IAI
Quality and Innovation

Position Controller for ROBO Cylinder®
Multi-axis Type

MSEP-C

Position Controller for ROBO Cylinder®
Multi-axis Type with PLC

MSEP-LC

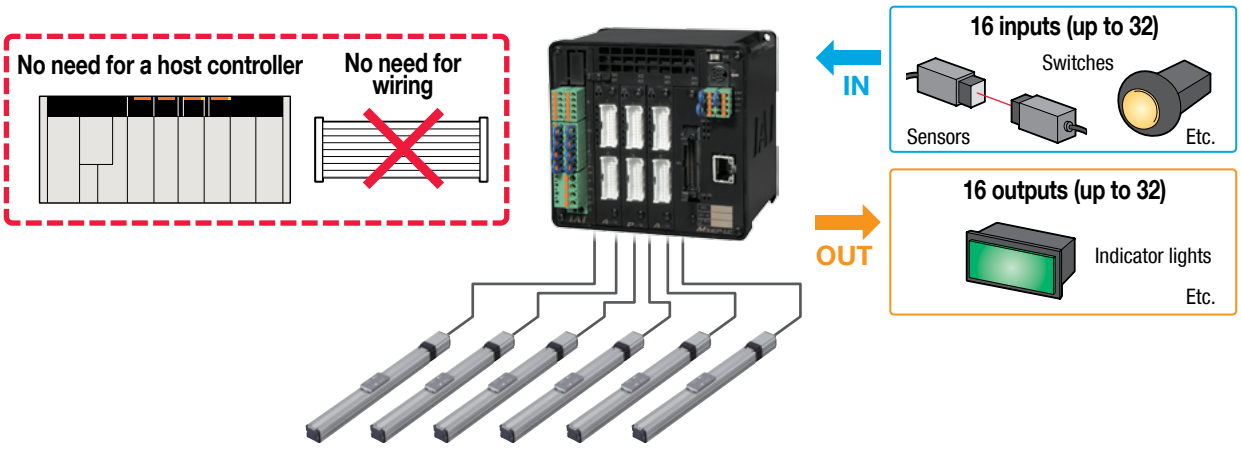
www.intelligentactuator.com

MSEP Features

1 Added PLC function

MSEP-LC

Operating the actuator and controlling the ON/OFF of I/O (input/output) signals using a ladder logic program is now possible. If your equipment is small enough, the MSEP-LC is all you need to control it. If your equipment is larger in size, you can still use the MSEP-LC to perform distributed control for each process to reduce the load of the main PLC. The MSEP-LC also makes your program simpler and troubleshooting easier.



2 Supporting actuators with the battery-less absolute encoder

MSEP-LC MSEP-C

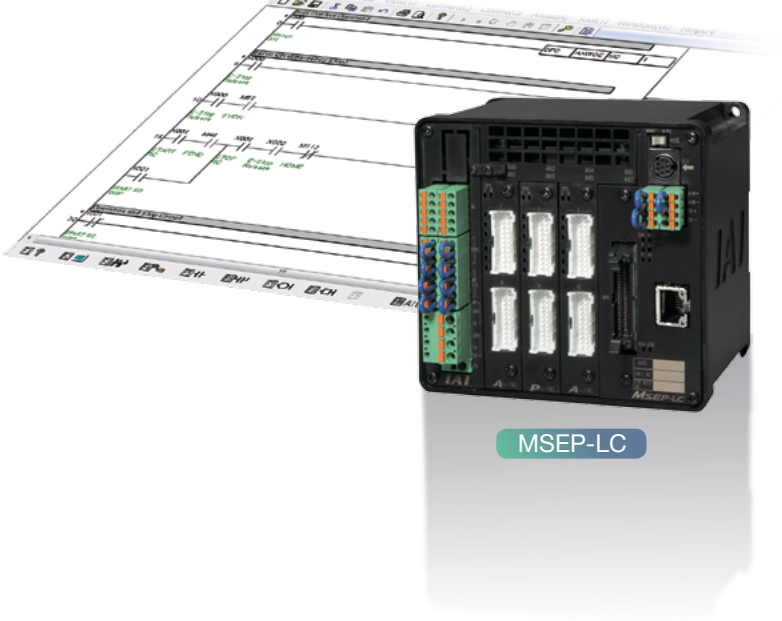
Features of actuators with the battery-less absolute encoder

1 Home return is no longer necessary, so these actuators start and restart quicker than incremental actuators to begin working right away. They are also free from problems relating to home return, such as position shift.

2 Compared to standard absolute actuators, no battery is required, which results in the following benefits:
- No need to purchase or replace batteries
- No need to control the stocks and replacement timing of batteries
- No need to make adjustment (absolute reset) normally required after battery replacement

ROBO Cylinder with the battery-less absolute encoder

RCP5



3 Supporting the Power CON (high-output driver) and Mini Cylinder

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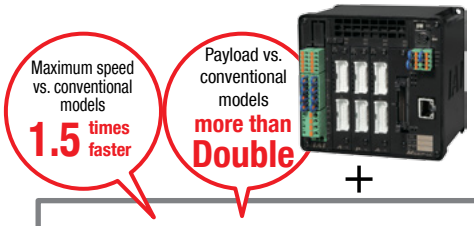
When the Power CON (newly developed high-output driver) is installed and combined with the RCP5 or RCP4, high performance is realized as indicated by the maximum speed of 1.5 times faster than that of conventional models and payload of more than double.
Since the super-compact Mini Cylinders are also supported, you have a greater range of actuator variations — from small to large — to choose from.



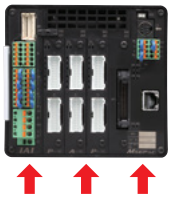
Power CON supported

RCP5-SA

RCP5-RA

Mini Cylinder

RCD-RA



Choice of 6 boards to install

1. Pulse motor board
NEW 2. Pulse motor board for battery-less absolute specification
NEW 3. Power CON (pulse high-output motor) board
NEW 4. Power CON board for battery-less absolute specification
5. AC servo motor board
NEW 6. Mini Cylinder (DC servo motor) board

* Boards 3 and 4 permit operation of only one axis per board.

4 Supporting field networks

MSEP-LC MSEP-C

DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, EtherCAT, EtherNet/IP, PROFINET IO and other major field networks are directly accessible.

Features of the network specification

- 256 positioning points per axis
- Numerically specify the target position or speed to move to
- Checking the current position in real time

DeviceNet
PROFIBUS
CompoNet
CC-Link
EtherNet/IP
EtherCAT
PROFINET

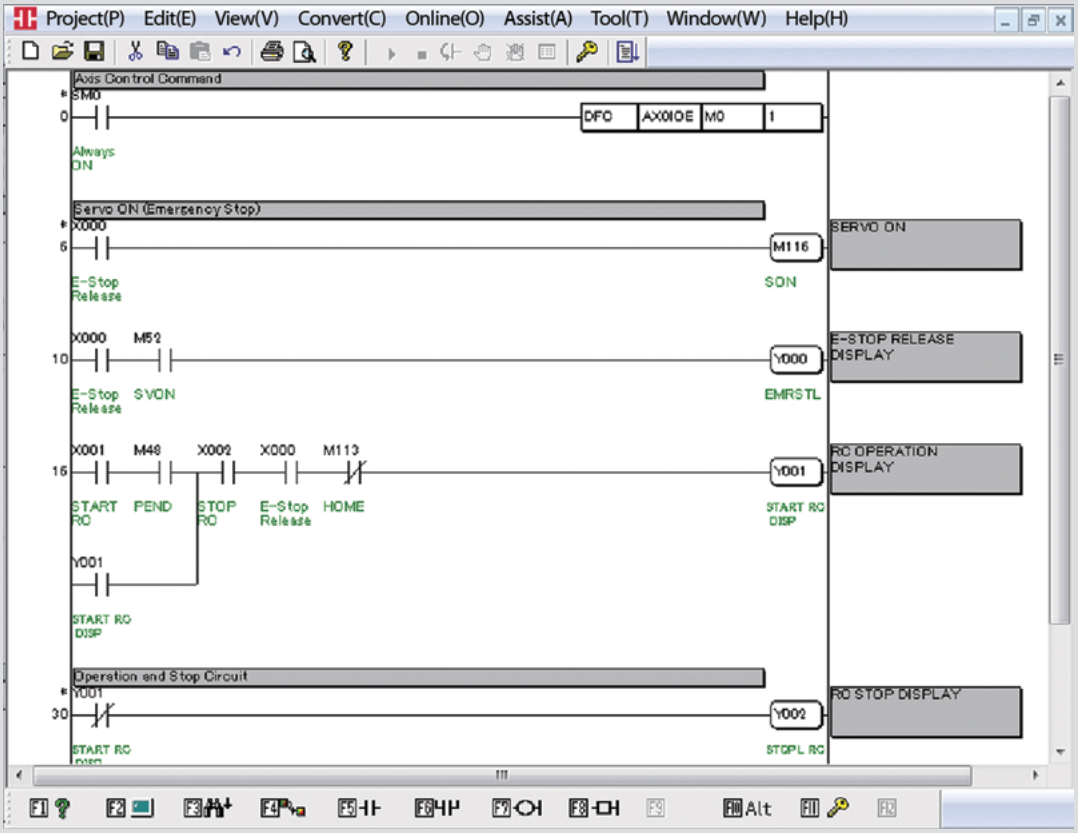
Ladder Software Features

LC-LADDER

LC-LADDER is a ladder supporting software application designed for creating, monitoring and debugging ladder programs via simple operations. You can create programs to turn on or off I/O signal or to operate the actuator connected to the controller, monitor programs, perform simulations and execute debugging.

1 Creating programs

Programs can be created using 27 basic commands (contact commands, output commands, etc.), and 53 advanced commands (data comparison, arithmetic computation, logic operation, etc.).

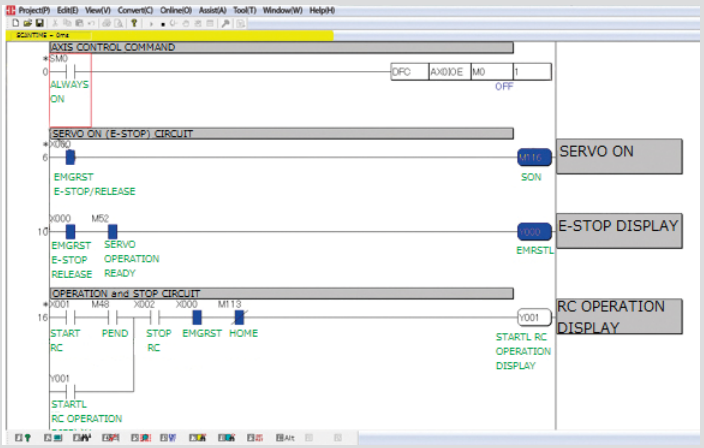


Functions

Comment display	▶	A comment can be displayed for a contact and coil. A label comment for a step or comment between lines can be displayed.
Move to display position	▶	You can jump to a registered label comment.
Search	▶	The block of a specified contact and coil memory is displayed. You can search for and display the specified command word in a program.

2 Monitoring

The status of a program being executed can be checked via various functions.

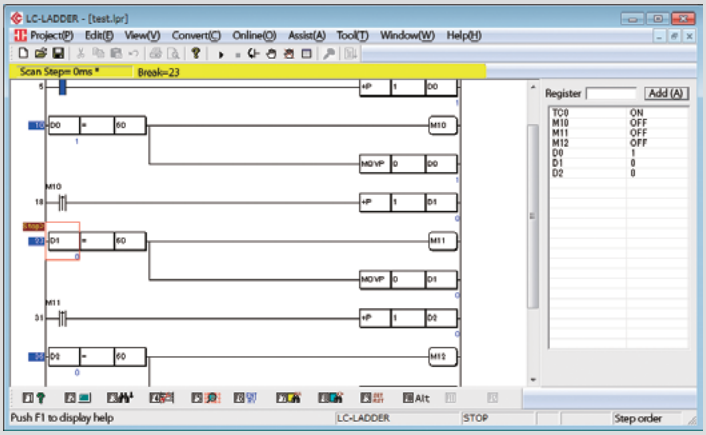


Functions

Monitoring registration list	You can check the status (current value) of a memory registered to the list at any time.
Memory batch display	You can display the entire bit memory and word memory.
Current memory value change	The current bit memory or word memory value can be reset or changed to a specified value.

3 Debugging function

You can run a program based on a specified condition and check the operation of the program.



Functions

Stop step specification	Programs can be stopped at the specified step.
Step execution	You can run a program for one step at a time.

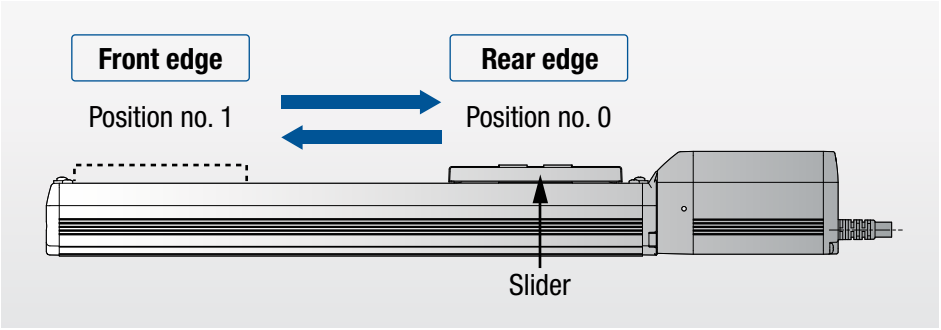
4 Simulations

You can check an execution of a program (perform a test run) on a computer without actually running the program on the controller.

Sample Program

Example Two-Point Round-Trip Ladder Program

This program moves the slider forward (position no.0) and back (position no. 1).



Axis control command – always on

* SM0
0 — Always on
DFC | AX0IOE | M0 | 1

Keep DFC command running Operation mode = positioner 1

* DFC command is command that sets the operation of the axis.

Servo on

* M62
6 — CRDY controller ready
M116 SON

Command: Servo on

Return to origin

* M52 M49
10 — SV servo ON; HEND Return to origin complete
M113 HOME

Command: Return to origin

2-point movement between position no. 0/no. 1

* M51 M52 M49 M32
16 — ALM Alarm; SV servo ON; HEND Return to origin complete; PM1
M96 PC1

Command: Go between position no. 0/no. 1

M48 T0
PEND Position set; Timer 20ms
M112 CSTR

Command: Start signal

20ms
T0 Timer 20ms

Start after 20ms
After position no. command, delay 20ms and send start signal

* Operations will work without a timer, but depending on the ladder program, use of a timer may make operation more stable.

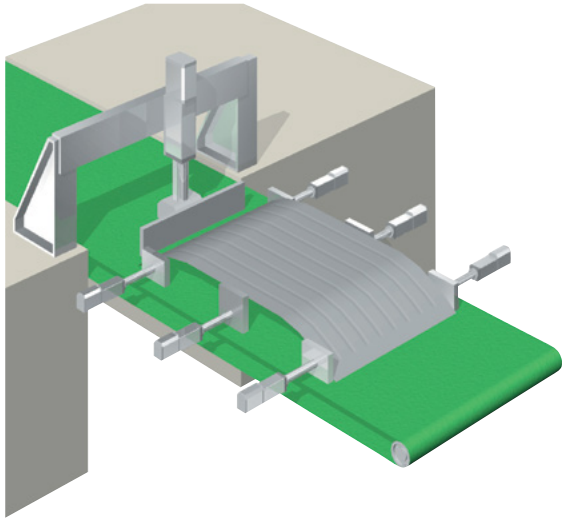
39 — END

Applications

Application Examples

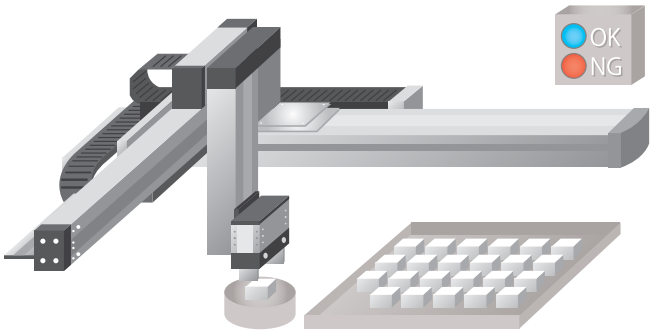
Rear panel positioning system

Shifted work parts are aligned by the “push motion” of the ROBO Cylinder as they enter the machining stage for automotive rear panels. One controller can handle multiple axes, so wiring is easy.



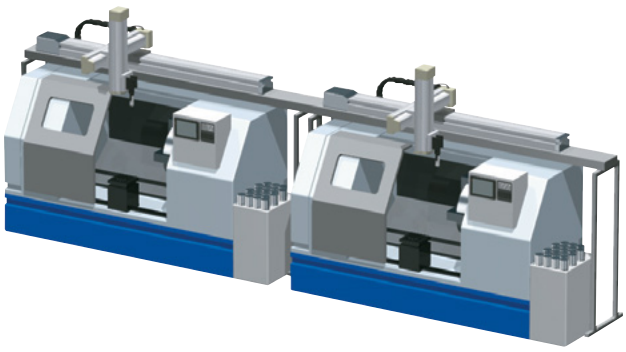
Palletizing system

Should the system halt due to an emergency stop, etc., it can resume operation right away thanks to the battery-less absolute encoder.



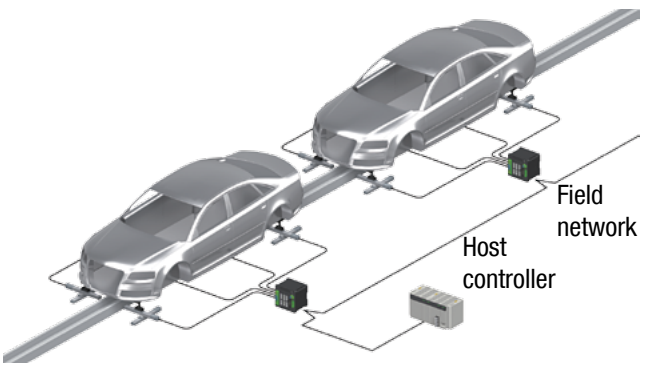
Transferring work parts between machining systems

Work parts can be transferred between systems without using a dedicated PLC.



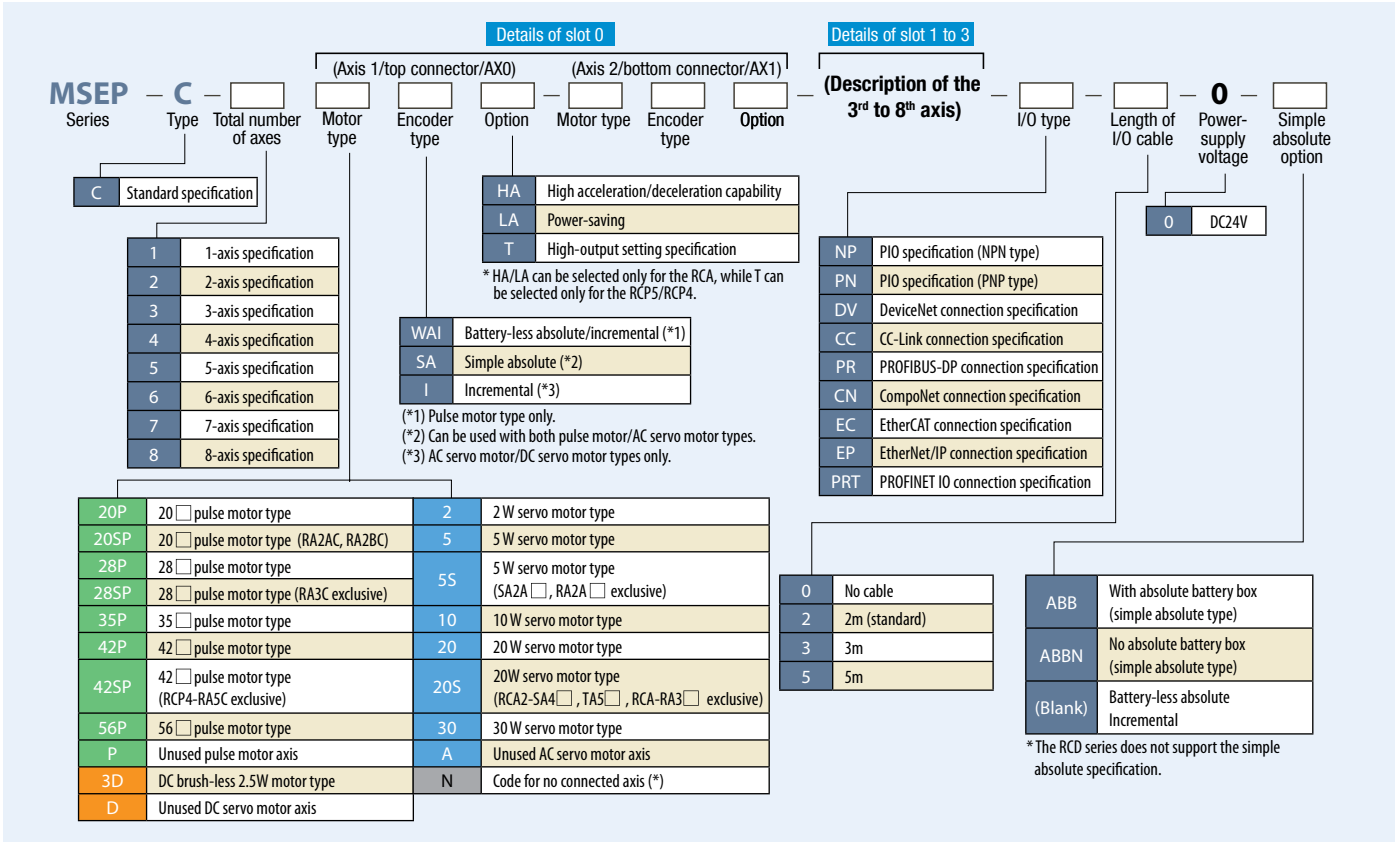
Positioning on an automotive manufacturing line

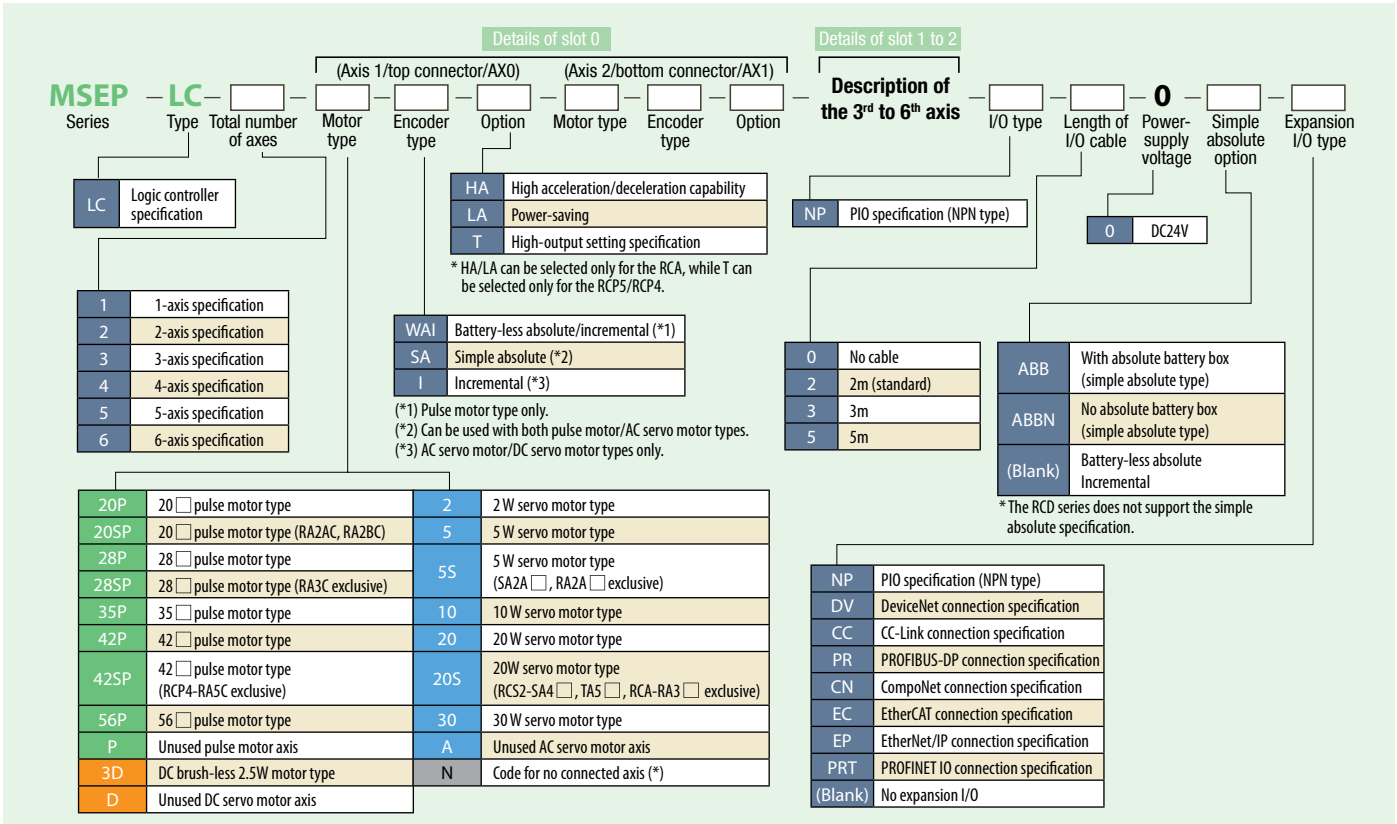
In the case of a large-scale line, implementing distributed control of each process and connecting to the host controller via a field network reduces the control load of the host controller.



Controller Models

MSEP Controller Models

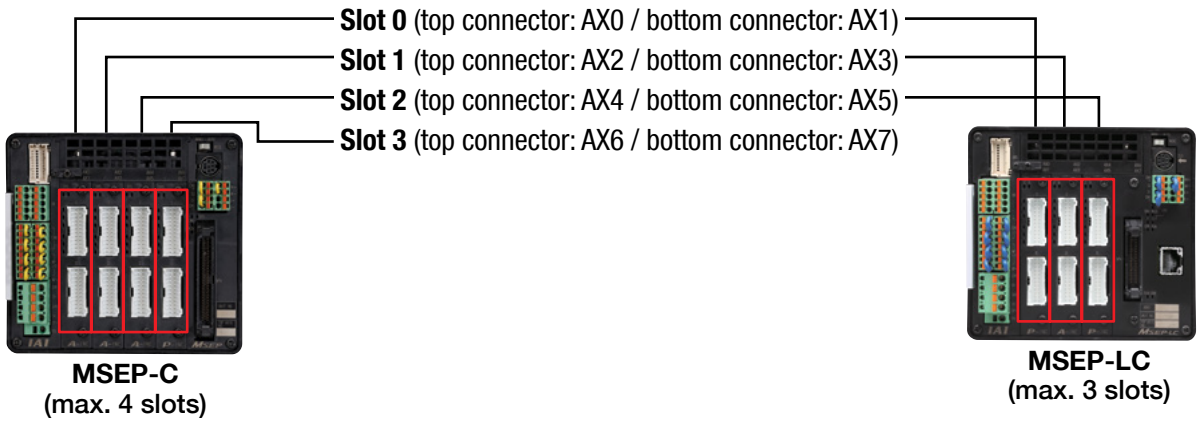




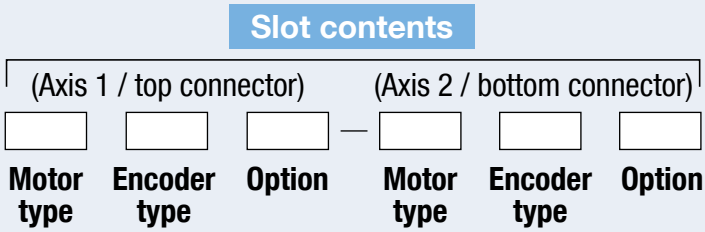
Slot Contents Entry Method

Slot Contents

(1) The MSEP-C contains 4 slots.
The MSEP-LC contains 3 slots.



(2) Code entry method for each slot



① Depending on actuator type, 1 slot may be connectable to either 1 or 2 axes.

Connectable axes per slot	Actuator type
1 axis	RCP5 (high-output mode enabled), RCP4 (high-output mode enabled)
2 axes	RCP5 (high-output mode disabled), RCP4 (high-output mode disabled) RCP3, RCP2, RCA2, RCA, RCD

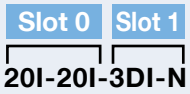
② If only one axis is connected per slot, the code for the second axis / bottom connector is set to "N".

③ Enter "T" into the option field if using the RCP5/RCP4 in high-output mode.

■ Slot entry examples

Example 1 Connecting 3 RCP5-SA4C-WA-35P axes (high output mode on)

Example 2 Connecting 2 RCA-SA5C-I-20 axes and 1 RCD-RA 1D-I-3 axis



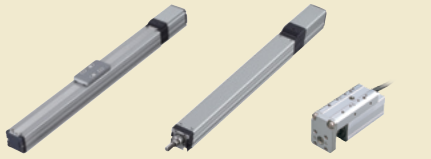
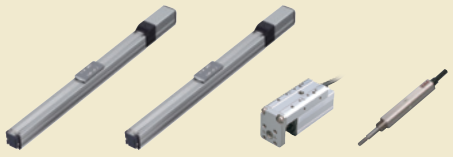
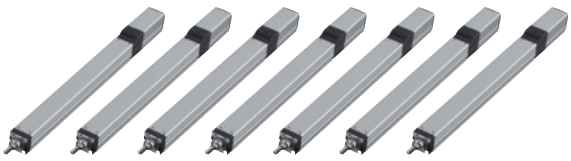
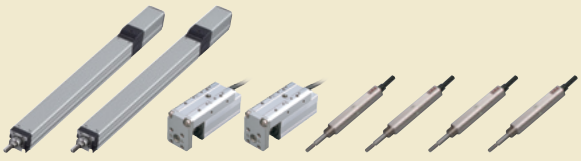
See the following page for example axis combinations.

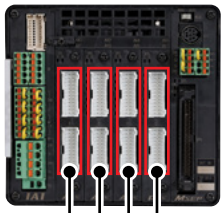
Combination Examples

Example Basic MSEP Combinations

The table below provides example combinations for MSEP-C/LC boards.

Note: The MSEP-LC can only use slots 0 through 2.

View of connected axes	Connected axis types	Number of axes
 RCP5-SA6C RCP5-RA4C	Axis 1: RCP5-SA6C-WA-42P PowerCon/battery-less abso. Axis 2: RCP5-RA4C-WA-35P PowerCon/battery-less abso.	2
 RCP5-SA6C RCP5-RA4C RCA2-TCA4NA	Axis 1: RCP5-SA6C-WA-42P pulse/battery-less abso. Axis 2: RCP5-RA4C-WA-35P pulse/battery-less abso. Axis 3: RCA2-TCA4NA-I-20I AC servo/absolute pos.	3
 RCP5-SA4C RCP5-RA4C	Axis 1: RCP5-SA4C-WA-35P PowerCon/battery-less abso. Axis 2: RCP5-SA4C-WA-35P PowerCon/battery-less abso. Axis 3: RCP5-RA4C-WA-35P PowerCon/battery-less abso. Axis 4: RCP5-RA4C-WA-35P PowerCon/battery-less abso.	4
 RCP5-SA4C RCA2-TCA4NA RCD-RA1D	Axis 1: RCP5-SA4C-WA-35P PowerCon/battery-less abso. Axis 2: RCP5-SA4C-WA-35P pulse/battery-less abso. Axis 3: RCA2-TCA4NA-I-20 AC servo/absolute pos. Axis 4: RCD-RA1D-I-3D DC servo/incremental	4
 RCP5-SA6C RCP5-RA4C RCA2-TCA4NA RCD-RA1D	Axis 1: RCP5-SA6C-WA-42P PowerCon/battery-less abso. Axis 2: RCP5-RA4C-WA-35P pulse/battery-less abso. Axis 3: RCP5-RA4C-WA-35P pulse/battery-less abso. Axis 4: RCA2-TCA4NA-I-20 AC servo/absolute pos. Axis 5: RCD-RA1D-I-3D DC servo/incremental	5
 RCP5-RA4C RCA2-TCA4NA RCD-RA1D	Axes 1-2: RCP5-RA4C-WA-35P pulse/battery-less abso. Axes 3-4: RCA2-TCA4NA-I-20 AC servo/incremental Axes 5-6: RCD-RA1D-I-3D DC servo/incremental	6
 RCP5-RA4C	Axes 1-7: RCP5-RA4C-WA-35P pulse/battery-less abso.	7
 RCP5-RA4C RCA2-TCA4NA RCD-RA1D	Axes 1-2: RCP5-RA4C-WA-35P pulse/battery-less abso. Axes 3-4: RCA2-TCA4NA-I-20 AC servo/absolute pos. Axes 5-6: RCD-RA1D-I-3D DC servo/incremental	8



Note: The RCD series does not support absolute positioning.

Slot 0	Slot 1	Slot 2	Slot 3	Model	Standard price
AX0	AX2	AX4	AX6	Bottom connector / Top connector / Top connector / Bottom connector MSEP-LC-2-42PWAIT-N-35PWAIT-N-NP-2-0 Slot 0 / Slot 1 Axis no.	—
PowerCon 42□ Battery-less abso.	PowerCon 35□ Battery-less abso.				
AX1	AX3	AX5	AX7		
N	N				
AX0	AX2	AX4	AX6	MSEP-LC-3-42PWAI-35PWAI-20SA-N-NP-2-0-ABB Slot 0 / Slot 1	—
Pulse 42□ Battery-less abso.	AC servo 20W Absolute pos.				
AX1	AX3	AX5	AX7		
Pulse 35□ Battery-less abso.	N				
AX0	AX2	AX4	AX6	MSEP-C-4-35PWAIT-N-35PWAIT-N- Slot 0 / Slot 1 35PWAIT-N-35PWAIT-N-NP-2-0 Slot 2 / Slot 3	—
PowerCon 35□ Battery-less abso.	PowerCon 35□ Battery-less abso.	PowerCon 35□ Battery-less abso.	PowerCon 35□ Battery-less abso.		
AX1	AX3	AX5	AX7		
N	N	N	N		
AX0	AX2	AX4	AX6	MSEP-C-4-42PWAIT-N-35PWAI-N- Slot 0 / Slot 1 20SA-N-3DI-N-NP-2-0-ABB Slot 2 / Slot 3	—
PowerCon 42□ Battery-less abso.	Pulse 35□ Battery-less abso.	AC servo 20W Absolute pos.	DC servo Incremental		
AX1	AX3	AX5	AX7		
N	N	N	N		
AX0	AX2	AX4	AX6	MSEP-C-5-42PWAIT-N- Slot 0 35PWAI-35PWAI-20SA-N-3DI-N-NP-2-0-ABB Slot 1 / Slot 2 / Slot 3	—
PowerCon 42□ Battery-less abso.	Pulse 35□ Battery-less abso.	AC servo 20W Absolute pos.	DC servo Incremental		
AX1	AX3	AX5	AX7		
N	Pulse 35□ Battery-less abso.	N			
AX0	AX2	AX4	AX6	MSEP-C-6-35PWAI-35PWAI- Slot 0 20I-20I-3DI-3DI—NP-2-0 Slot 1 / Slot 2	—
Pulse 35□ Battery-less abso.	AC servo 20W incremental	DC servo Incremental			
AX1	AX3	AX5	AX7		
Pulse 35□ Battery-less abso.	AC servo 20W incremental	DC servo Incremental			
AX0	AX2	AX4	AX6	MSEP-C-7-35PWAI-35PWAI-35PWAI-35PWAI- Slot 0 / Slot 1 35PWAI-35PWAI-35PWAI-N-NP-2-0 Slot 2 / Slot 3	—
Pulse 35□ Battery-less abso.	Pulse 35□ Battery-less abso.	Pulse 35□ Battery-less abso.	Pulse 35□ Battery-less abso.		
AX1	AX3	AX5	AX7		
Pulse 35□ Battery-less abso.	Pulse 35□ Battery-less abso.	Pulse 35□ Battery-less abso.	N		
AX0	AX2	AX4	AX6	MSEP-C-8-35PWAI-35PWAI-20SA-20SA- Slot 0 / Slot 1 3DI-3DI-3DI-3DI-NP-2-0-ABB Slot 2 / Slot 3	—
Pulse 35□ Battery-less abso.	AC servo 20W Absolute pos.	DC servo Incremental	DC servo Incremental		
AX1	AX3	AX5	AX7		
Pulse 35□ Battery-less abso.	AC servo 20W Absolute pos.	DC servo Incremental	DC servo Incremental		

Standard Price Chart

Standard Price Chart

The standard MSEP controller price is built from the base model price (table 1 below) with prices added depending on slot types (table 2), absolute positioning quantity (table 3), absolute backup box quantity (table 4), I/O type (table 5), and expanded I/O type (table 6).

1 Base price by model

Select between the standard controller (MSEP-C) or controller with PLC (MSEP-LC).

+

2 Prices by slot type

Add the price for the desired slot types designated in slots 0 through 3.

+

3 Prices by absolute position quantity

Add the price for the desired number of axes you wish to operate via absolute positioning.

+

1

Base price by model

Type	Model	Price
Standard	MSEP-C	—
With PLC	MSEP-LC	—

+

2

Prices by slot type
(Add all prices for slots used)

Slots			Model	Price
Pulse motor	1 axis	Absolute positioning (for PowerCon)	☐PSAT-N	—
		Battery-less abso. / Incremental (for PowerCon)	☐PWAIT-N	—
		Absolute positioning (for standard)	☐PSA-N	—
		Battery-less abso. / Incremental (for standard)	☐PWAI-N	—
	2 axes	Absolute positioning (for standard) + Absolute positioning (for standard)	☐PSA-☐PSA	—
		Battery-less abso. / Incremental (for standard) + Battery-less abso./ Incremental (for standard)	☐PWAI-☐PWAI	—
AC servo motor	1 axis	Incremental (for standard)	☐I-N	—
		Absolute positioning (for standard)	☐SA-N	—
	2 axes	Incremental (for standard) + Incremental (for standard)	☐I-☐I	—
		Absolute positioning (for standard) + Absolute positioning (for standard)	☐SA-☐SA	—
DC servo motor	1 axis	Incremental (for standard)	3DI-N	—
	2 axes	Incremental (for standard) + Incremental (for standard)	3DI-3DI	—

+

3

Absolute position quantity

Axes	Price
1	—
2	—
3	—
4	—
5	—
6	—
7	—
8	—

+

*Add the motor number to the empty squares (☐) above.

4 Absolute backup box quantity

Add the price for the desired number of axes to install a data backup battery (model ABB) on for absolute data.

5 I/O type

Select the controller I/O type. (Only NP can be selected for controllers with PLC.)

6 Expanded I/O type

Select the controller's expanded I/O type. (Not used for standard-model controllers.)

4 Absolute backup box quantity

Axes	Price
1	—
2	—
3	—
4	—
5	—
6	—
7	—
8	—

5 I/O type (Only NP can be selected for controllers with PLC)

Type	Model	Price
PIO (NPN) specification	NP	—
PIO (PNP) specification	PN	—
DeviceNet specification	DV	—
CC-Link specification	CC	—
PROFIBUS-DP specification	PR	—
CompoNet specification	CN	—
EtherCAT specification	EC	—
EtherNet/IP specification	EP	—
PROFINET IO specification	PRT	—

6 Expanded I/O type (Not used for standard-model controllers)

Type	Model	Price
PIO (NPN) specification	NP	—
DeviceNet specification	DV	—
CC-Link specification	CC	—
PROFIBUS-DP specification	PR	—
CompoNet specification	CN	—
EtherCAT specification	EC	—
EtherNet/IP specification	EP	—
PROFINET IO specification	PRT	—

Total

Specification specific standard price

*Do not add prices from tables 3 and 4 for battery-less absolute types.

System Configuration

System Configuration Map

PLC

Option
PC compatible software
(See P. 24)
RS232 connection version
Model RCM-101-MW
USB connection version
Model RCM-101-USB

* PowerCon (high-output drivers) and mini cylinders are supported by Ver.9.06.00.00 or later.

Option
Teaching Pendant
(See P. 24)
Model TB-01-C

Field Network
DeviceNet, CC-Link, PROFIBUS-DP,
CompoNet, EtherCAT, EtherNet/IP, PROFINET IO

PIO flat cable
(See P. 26)
Model CB-MSEP-PI0020
Standard length: 2m

Supplied with the PIO specification controller

* There are choices of either the PIO specification or the field network specification.

* The gateway parameter configuration tool included with the PC compatible software is required for field network setup. Please purchase the PC compatible software if you do not have this tool. (See P. 24)

* Field network connection cable is not included.

5m
The cable is supplied with the PC compatible software

The cable is supplied with the absolute battery box
0.5m

Option
Absolute battery box
(See P. 24)
Model MSEP-ABB

Replacement battery
(See P. 24)
Model AB-7

* If the absolute position encoder specification is selected as a controller unit, the absolute data backup battery is included. (See P. 23 for dimensions)

MSEP-C

Option
DC24V power supply
Model PS-241 (100 V input)
Model PS-242 (200 V input)

Integrated motor-encoder cable
(See P. 25)
Model **CB-CAN-MPA□□□**

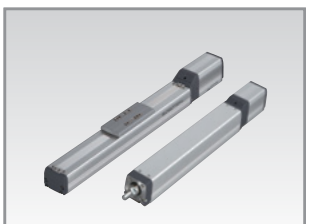
Integrated motor-encoder robot cable
(See P. 25)
Model **CB-CAN-MPA□□□-RB**

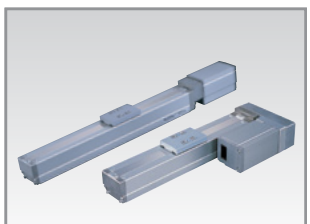
Integrated motor-encoder cable
(See P. 25)
Model **CB-CA-MPA□□□**

Integrated motor-encoder robot cable
(See P. 25)
Model **CB-CA-MPA□□□-RB**

Integrated motor-encoder robot cable
(See P. 25)
Model **CB-APSEP-MPA□□□**
* Only robot cable is available for this model.


RCP5 series


RCP4 series


RCP3 series

Option

PC compatible software

(See P. 24)

RS232 connection version
Model RCM-101-MW
USB connection version
Model RCM-101-USB

* PowerCon (high-output drivers) and mini cylinders are supported by Ver.9.06.00.00 or later.

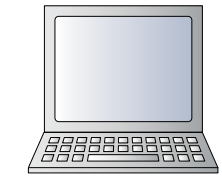
* The gateway parameter configuration tool included with the PC compatible software is required for MSEP-LC setup. Please purchase the PC compatible software if you do not have this tool.

Option

Teaching Pendant

(See P. 24)

Model TB-01-C

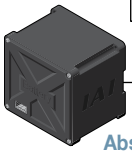


5m

The cable is supplied with the PC compatible software

The cable is supplied with the absolute battery box

0.5m



Option

Absolute battery box

(See P. 24)

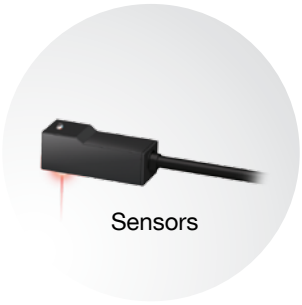
Model MSEP-ABB

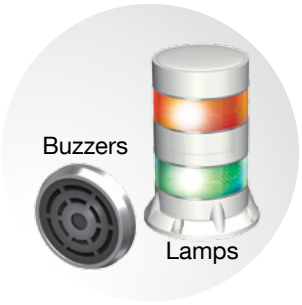
Replacement battery

(See P. 24)

Model AB-7

* If the absolute position specification is selected as a controller model, the absolute battery box is included. (See P. 23 for dimensions)





Signal input

Signal output

Field Network

DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, EtherCAT, EtherNet/IP, PROFINET IO

MSEP-LC

DC24V power supply Option

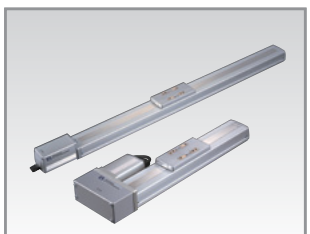
Model PS-241 (100 V input)
Model PS-242 (200 V input)

Integrated motor-encoder robot cable

(See P. 25)

Model **CB-PSEP-MPA□□□**

* Only robot cable is available for this model.



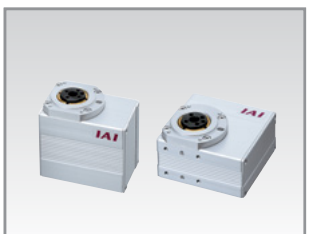
RCP2 series

Integrated motor-encoder robot cable

(See P. 26)

Model **CB-RPSEP-MPA□□□**

* Only robot cable is available for this model.



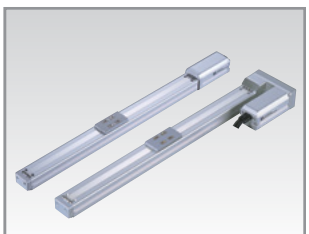
RCA2-RT□S/RT□SL

Integrated motor-encoder robot cable

(See P. 26)

Model **CB-ASEP-MPA□□□**

* Only robot cable is available for this model.



RCA series

Integrated motor-encoder cable

(See P. 25)

Model **CB-CAN-MPA□□□**

Integrated motor-encoder robot cable

(See P. 25)

Model **CB-CAN-MPA□□□-RB**

RCD series

Control Methods PIO

Control Method by Controller Type

Type	External view	1 Controle methods	No. of control axes		2 PIO controlled motion mode	3 Field network control motion mode
			Using high-output driver	Using standard driver		
MSEP-C		Positioner function	4	8	○	○
MSEP-LC		PLC function + Positioner function	3	6	—	(*)

* If using the MSEP-LC in a field network, ladder program-based data transfer and axis operation is required.

1 Control Methods

The MSEP-C controller itself has no sequencing functionality, so the positioner accepts movement positioning and other commands from a higher-level PLC to conduct operations.
The MSEP-LC executes a ladder program inside the controller, allowing it to communicate with external devices via I/O to operate axes (positional operation).

2 PIO Controlled Motion Mode

This mode allows external devices to move actuators based on an ON/OFF signal assigned to the PIO.
Six different types of PIO-assigned signal patterns can be selected and used (see table below).
* Not available with the MSEP-LC.

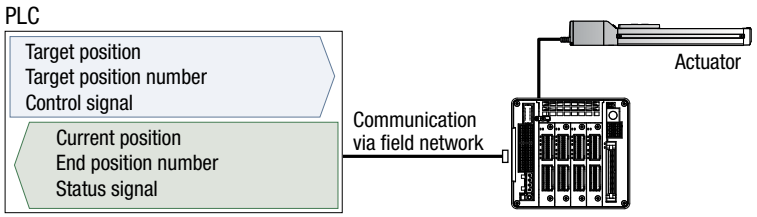
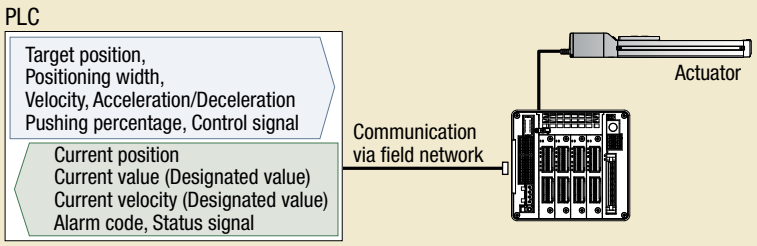
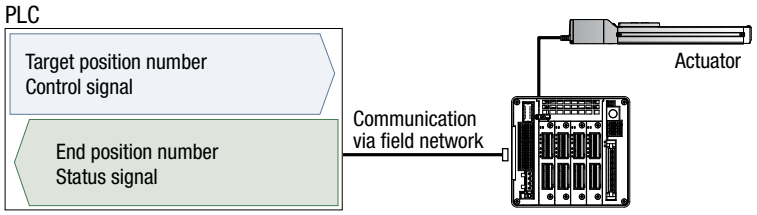
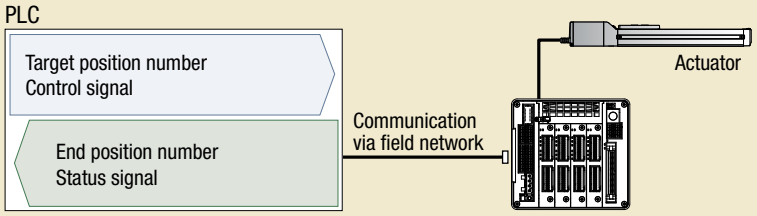
Motion Mode No.		0		1		2		3	4	5
Motion Mode Type		Standard 2-position motion		Speed change during movement		Position data change		2-input/ 3-position motion	3-input/ 3-position motion	Continuous cycle operation
Feature		2-position motion		2-position motion		2-position motion		3-position motion	3-position motion	2-position continuous motion
		Push		Push		Push		Push	Push	Push
		–		Speed change during movement		Travel position data change		–	–	–
Solenoid configurations		Single	Double	Single	Double	Single	Double	–	–	–
Input	0	Motion signal	Motion signal 1	Motion signal	Motion signal 1	Motion signal	Motion signal 1	Motion signal 1	Retract motion signal	Continuous motion signal
	1	Pause signal	Motion signal 2	Pause signal	Motion signal 2	Pause signal	Motion signal 2	Motion signal 2	Extend motion signal	Pause signal
	2	Reset signal		Speed change signal (Reset signal)		Target position change signal (Reset signal)		Reset signal	Intermediate point motion command signal (Reset signal)	Reset signal
	3	– /Servo-ON signal		– /Servo-ON signal		– /Servo-ON signal		– /Servo-ON signal	– /Servo-ON signal	– /Servo-ON signal
Output	0	Retract motion output signal		Retract motion output signal		Retract motion output signal		Retract motion output signal	Retract motion output signal	Retract motion output signal
	1	Extend motion output signal		Extend motion output signal		Extend motion output signal		Extend motion output signal	Extend motion output signal	Extend motion output signal
	2	Homing complete signal/ Servo-ON output signal		Homing complete signal/ Servo-ON output signal		Homing complete signal/ Servo-ON output signal		Intermediate point position output signal	Intermediate point position output signal	Homing complete signal/ Servo-ON output signal
	3	Alarm output signal/ Servo-ON output signal		Alarm output signal/ Servo-ON output signal		Alarm output signal/ Servo-ON output signal		Alarm output signal/ Servo-ON output signal	Alarm output signal/ Servo-ON output signal	Alarm output signal/ Servo-ON output signal

* Please refer to the controller operation instruction for the above signal information. (Download is available from our website)

3 Field Network Control Motion Mode

There are five operation modes to choose from when using the MSEP-C over a field network.
Data required for operation (target position, velocity, acceleration, push current, etc.) is written by a PLC or such connected to a higher-level device into a defined address. If operating the MSEP-LC via a field network, data required for axis operation is transferred via ladder program, and axis operation is conducted based on this ladder program motion command.

* Ladder programming is required for MSEP-LC axis operations.

Motion pattern (*1)	Description	Outline
Positioner 1/ Simple numerical mode	Positioner 1 mode is programmable up to 256 positions of data to designate the stop position. The simple numerical control allows designating the target position numerically. They both have the capability of monitoring the current position.	
Direct numerical control mode	This mode allows designating the target position, velocity, acceleration, and current parameters for pushing. Also, it is capable of monitoring the current position, real-time velocity, and the electric current command value.	
Positioner 2 mode	Positioner 2 mode is programmable up to 256 positions of data to designate stop positions, and this mode does not allow monitoring of the current position. This mode has less in/out data transfer volume than the positioner 1 mode.	
Positioner 3 mode	Positioner 3 mode is programmable up to 256 positions of data to designate stop positions, and this mode does not allow monitoring of the current position. This mode has less in/out data transfer volume from the positioner 2 mode, and operates under minimum number of signals..	
SEP I/O	This mode allows the same functions with the field network as the PIO controlled motion mode 0 to 5 as described in the previous page.	Please refer to the PIO controlled motion mode.

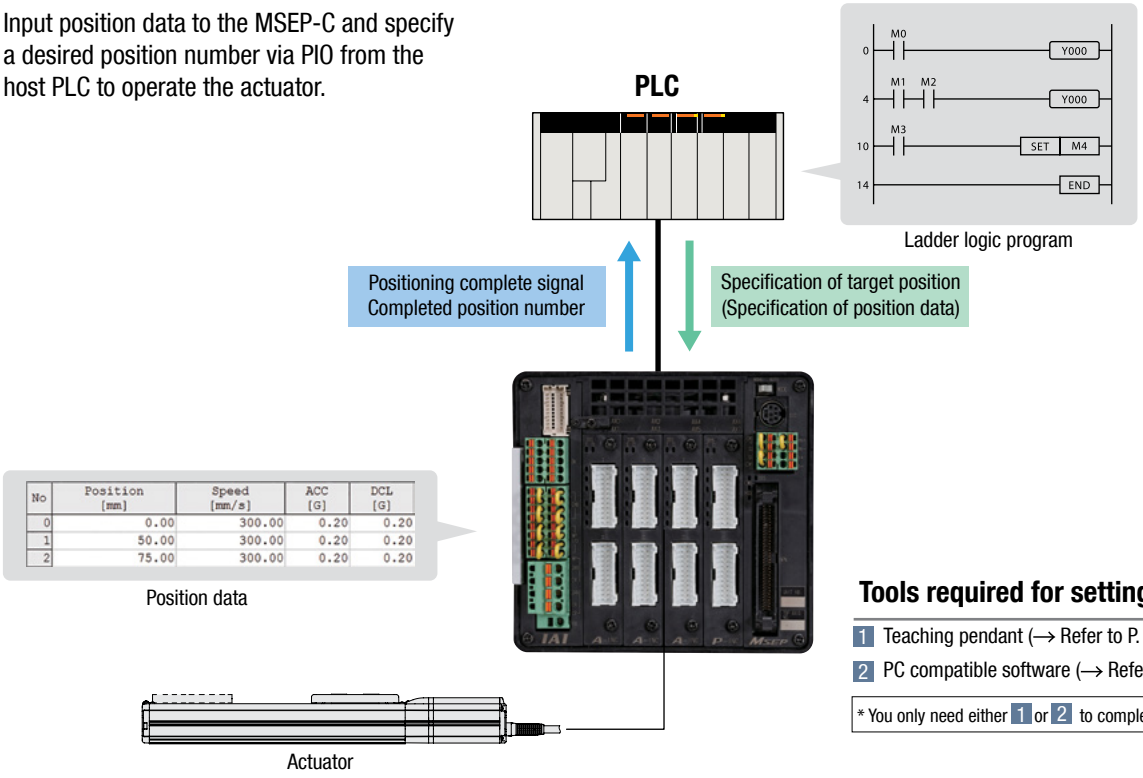
(*1) For MSEP-C, only the positioner 3 mode and the SEP I/O mode are available with CompoNet.

Operation Methods

How to Operate MSEP-C

PIO Specification

Input position data to the MSEP-C and specify a desired position number via PIO from the host PLC to operate the actuator.



Tools required for setting

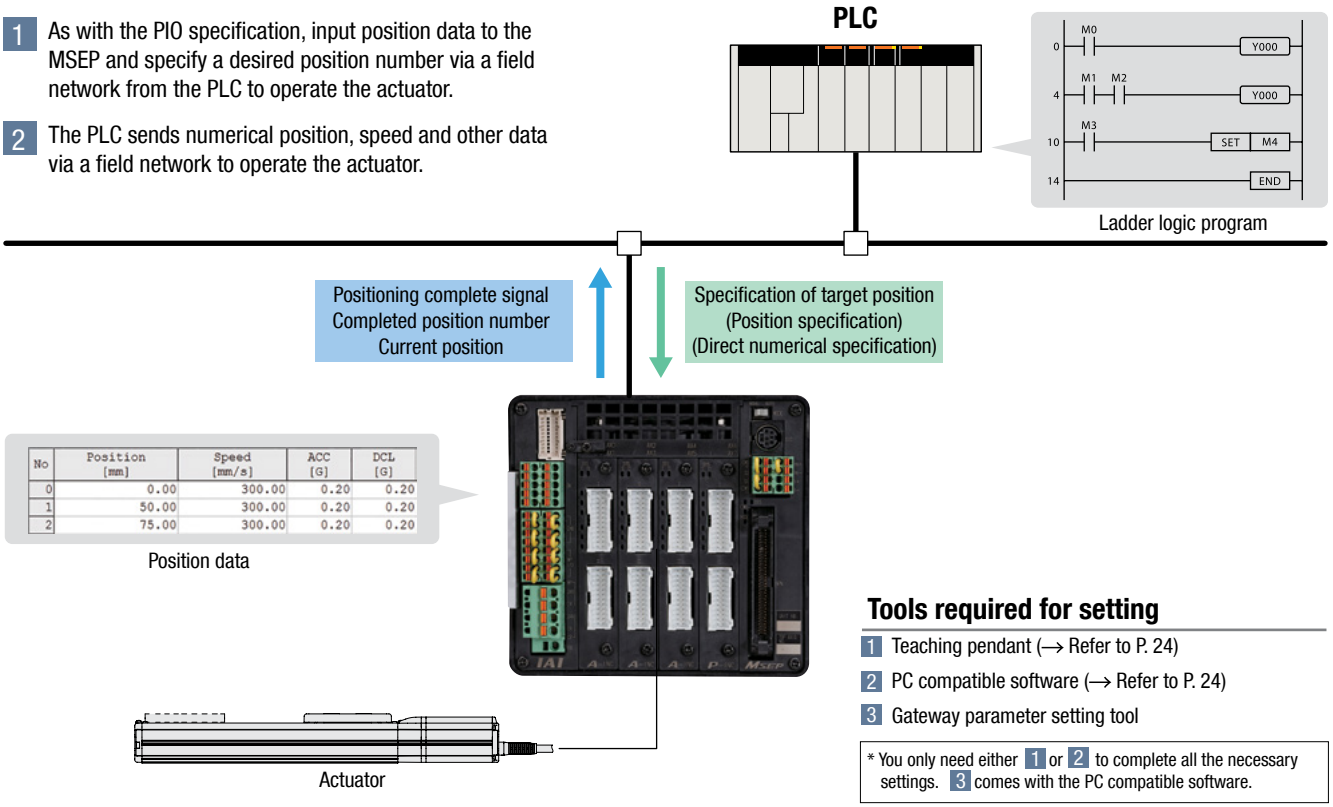
1 Teaching pendant (→ Refer to P. 24)
2 PC compatible software (→ Refer to P. 24)

* You only need either 1 or 2 to complete all necessary settings.

Field Network Specification

1 As with the PIO specification, input position data to the MSEP and specify a desired position number via a field network from the PLC to operate the actuator.

2 The PLC sends numerical position, speed and other data via a field network to operate the actuator.



Tools required for setting

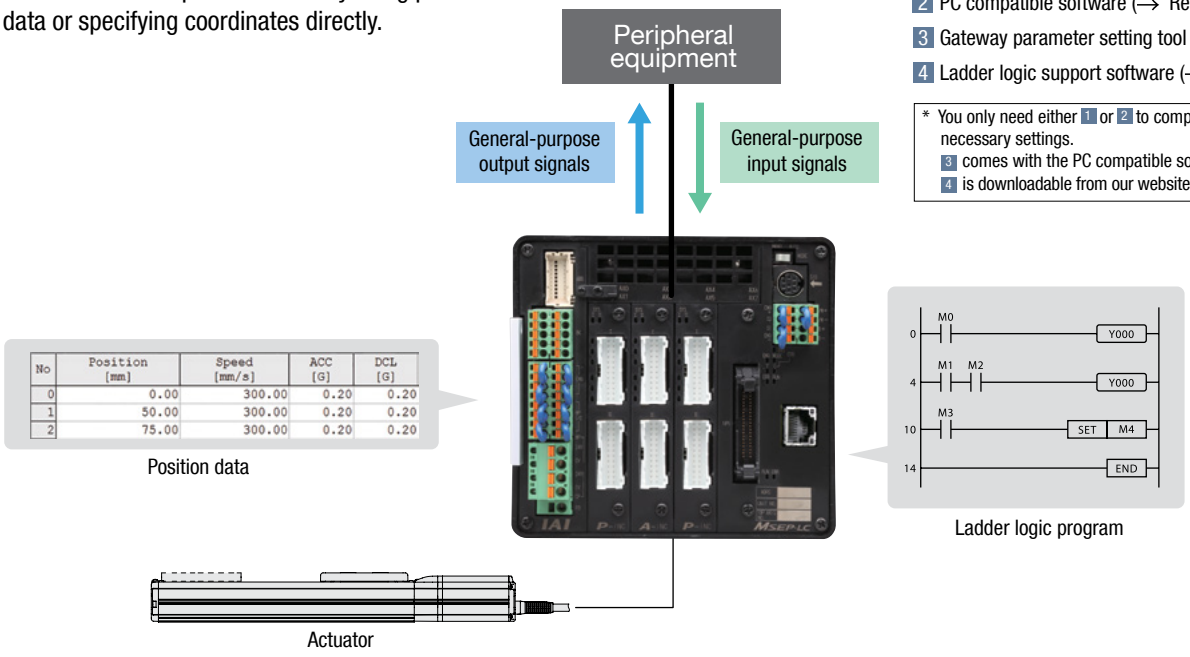
1 Teaching pendant (→ Refer to P. 24)
2 PC compatible software (→ Refer to P. 24)
3 Gateway parameter setting tool

* You only need either 1 or 2 to complete all the necessary settings. 3 comes with the PC compatible software.

How to Operate MSEP-LC

PIO Specification

The MSEP-LC runs a ladder logic program internally to operate the axes and control the PIO I/O signals.
The axes can be operated either by using position data or specifying coordinates directly.



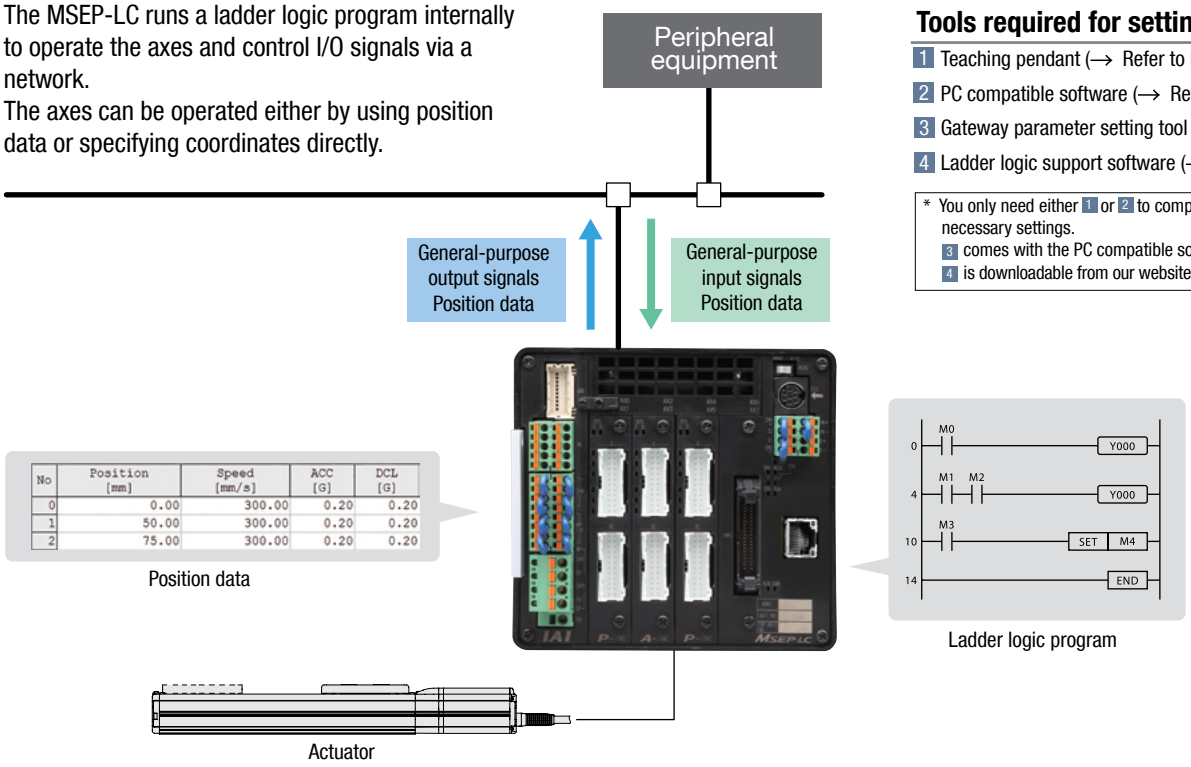
Tools required for setting

1 Teaching pendant (→ Refer to P. 24)
2 PC compatible software (→ Refer to P. 24)
3 Gateway parameter setting tool
4 Ladder logic support software (→ Refer to P. 3)

* You only need either 1 or 2 to complete all the necessary settings.
3 comes with the PC compatible software.
4 is downloadable from our website.

Field Network Specification

The MSEP-LC runs a ladder logic program internally to operate the axes and control I/O signals via a network.
The axes can be operated either by using position data or specifying coordinates directly.



Tools required for setting

1 Teaching pendant (→ Refer to P. 24)
2 PC compatible software (→ Refer to P. 24)
3 Gateway parameter setting tool
4 Ladder logic support software (→ Refer to P. 3)

* You only need either 1 or 2 to complete all the necessary settings.
3 comes with the PC compatible software.
4 is downloadable from our website.

Ladder Program

MSEP-LC Ladder Program Specifications

The MSEP-LC's I/O control functionality allows you to run ladder programs to control input/output signals and operate axes connected to the controller. Ladder programming specifications are outlined below.

1 Memory types and sizes

The sizes defined in the table below can be used in programming.

Program contents	4K steps	
Number of memories	Input (X)	16 points / 32 points
	Output (Y)	16 points / 32 points
	Internal relays (M)	3,072 points
	Special relays (SM)	128 points
	Data registers (D)	64 points
	Special registers (SD)	32 points
	Timer (T), counter (C)	32 points each
	Index register (IX)	2 points
	Labels (L)	33 points

2 Basic commands

There are a total of 27 basic commands, covering contact points, output, and other commands.

Type	Command		Symbol	Process	Steps
Contact point commands	LD	S	—| |—	a contact	2
	LDN	S	—| / |—	b contact	2
	OR	S	⌙| |⌐	a contact	2
	ORN	S	⌙| / |⌐	b contact	2
	AND	S	—| |—	a contact	2
	ANDN	S	—| / |—	b contact	2
	LDP	S	—| ↑ |—	Trigger on rise	2
	LDNP	S	—| ↓ |—	Trigger on fall	2
	ORP	S	⌙| ↑ |⌐	Trigger on rise	2
	ORNP	S	⌙| ↓ |⌐	Trigger on fall	2
	ANDP	S	—| ↑ |—	Trigger on rise	2
	ANDNP	S	—| ↓ |—	Trigger on fall	2
Combination commands	OR-BLK		–	OR block processing	1
	AND-BLK		–	AND block processing	1
	M-PUSH		–	Write to memory	1
	M-READ		–	Load from memory	1
	M-POP		–	Load from memory	1
Output commands	OUT	D	—( )—	Coil output	2
	OUT	T parameter	—( )—	Timer output	3
	OUT	C parameter	—( )—	Counter output	3
	SET	D	—[ ]—	Set OM	2
	RST	D	—[ ]—	Reset OM	2
	PLS	D	—[ ]—	Output pulse	2
	PLSN	D	—[ ]—	Output pulse OFF	2
	SFT	D	—[ ]—	Bit shift	2
End commands	END		—[ ]—	End program	1
	ENDS		—[ ]—	End main routine	1

3 Applied commands

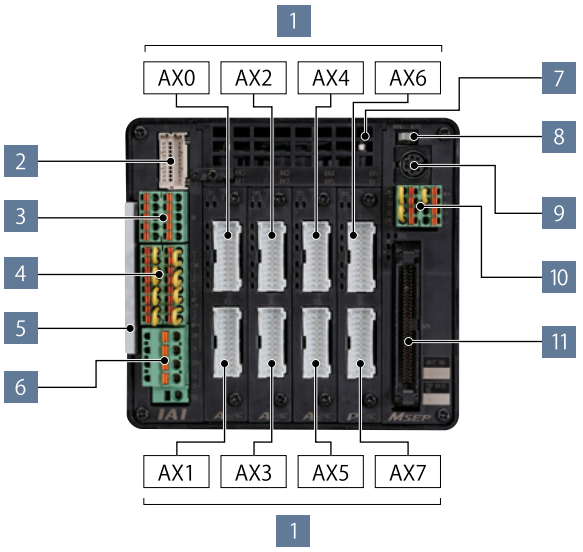
There are a total of 53 applied commands, covering data comparison, numerical functions, and more.

Type	Command				Symbol	Process	Steps
Data compare	S1 = S2				—[ ]—	Compare and pass if S1=S2	3
	S1 > S2				—[ ]—	Compare and pass if S1>S2	3
	S1 >= S2				—[ ]—	Compare and pass if S1>=S2	3
	S1 < S2				—[ ]—	Compare and pass if S1<S2	3
	S1 <= S2				—[ ]—	Compare and pass if S1<=S2	3
	S1 <> S2				—[ ]—	Compare and pass if S1≠S2	3
Numerical operations	+	S	D		—[ ]—	Store S+D (BIN) in D	3
	+	S1	S2	D	—[ ]—	Store S1+S2 (BIN) in D	4
	-	S	D		—[ ]—	Store D-S (BIN) in D	3
	-	S1	S2	D	—[ ]—	Store S1-S2 (BIN) in D	4
	*	S1	S2	D	—[ ]—	Store S1×S2 (BIN) in D	4
	/	S1	S2	D	—[ ]—	Store S1÷S2 (BIN) in D	4
	B+	S	D		—[ ]—	Store S+D (BCD) in D	3
	B+	S1	S2	D	—[ ]—	Store S1+S2 (BCD) in D	4
	B-	S	D		—[ ]—	Store D-S (BCD) in D	3
	B-	S1	S2	D	—[ ]—	Store S1-S2 (BCD) in D	4
	B*	S1	S2	D	—[ ]—	Store S1×S2 (BCD) in D	4
	B/	S1	S2	D	—[ ]—	Store S1÷S2 (BCD) in D	4
	INC	D			—[ ]—	Increment	2
	DEC	D			—[ ]—	Decrement	2
BCD/BIN conversion	BCD	S	D		—[ ]—	Convert to BCD	3
	BIN	S	D		—[ ]—	Convert to BIN	3
Transfer	MOV	S	D		—[ ]—	Move S to D	3
	MOVN	S	D		—[ ]—	Move S to D, inverting all bits	3
	MCPY	S	D	n	—[ ]—	Move the value n locations after S to n locations after D	4
	MSET	S	D	n	—[ ]—	Move S to n locations after D	4
	XCHG	D1	D2		—[ ]—	Exchange bit data between D1 and D2	3
Branching	JE	S			—[ ]—	Jump to L if conditions pass	2
	JMP	L			—[ ]—	Jump to L with no conditions	2
	CALL	L			—[ ]—	Execute subroutine designated in L	2
	RET				—[ ]—	Return from subroutine	1
Logical operations	LAND	S	D		—[ ]—	Store result of S/D AND operation in D	3
	LAND	S1	S2	D	—[ ]—	Store result of S1/S2 AND operation in D	4
	LOR	S	D		—[ ]—	Store result of S/D OR operation in D	3
	LOR	S1	S2	D	—[ ]—	Store result of S1/S2 OR operation in D	4
	LXOR	S	D		—[ ]—	Store result of S/D XOR operation in D	3
	LXOR	S1	S2	D	—[ ]—	Store result of S1/S2 XOR operation in D	4
	LXNR	S	D		—[ ]—	Store result of S/D NOR operation in D	3
	LXNR	S1	S2	D	—[ ]—	Store result of S1/S2 NOR operation in D	4
	NEG	D			—[ ]—	Invert sign	2
Rotation	ROR	D	n		—[ ]—	Rotate D n bits right, ignoring carry flag	3
	RCR	D	n		—[ ]—	Rotate D n bits right, including carry flag	3
	ROL	D	n		—[ ]—	Rotate D n bits left, ignoring carry flag	3
	RCL	D	n		—[ ]—	Rotate D n bits left, including carry flag	3
Shift	SHR	D	n		—[ ]—	Shift D n bits right	3
	SHL	D	n		—[ ]—	Shift D n bits left	3
	BSHR	D	n		—[ ]—	Shift location n bits after D 1 bit right	3
	BSHL	D	n		—[ ]—	Shift location n bits after D 1 bit left	3
	WSHR	D	n		—[ ]—	Shift value n locations after D 1 location right	3
	WSHL	D	n		—[ ]—	Shift value n locations after D 1 location left	3
Data processing	SUM	S	D		—[ ]—	Store no. of ON bits in S (16-bit data) in D	3
	DECO	S	D	n	—[ ]—	Decode lowest n bits of S and store 2^n bits from D	4
	ENCO	S	D	n	—[ ]—	Encode value 2^n bits from S and store in D	4
	BSET	D	n		—[ ]—	Set bit n of D	3
	BRST	D	n		—[ ]—	Reset bit n of D	3
	DDV	S	D	n	—[ ]—	Store lower n places of S to lower 4 bits n locations from D	4
	DCV	S	D	n	—[ ]—	Store lower 4 bits n locations from S in D	4
FIFO	FIFW	S	D		—[ ]—	Write to FIFO table	3
	FIFR	D1	D2		—[ ]—	Read from FIFO table	3
Loops	FOR	S			—[ ]—	Execute FOR-NEXT loop n times	2
	NEXT				—[ ]—		1
	BREAK				—[ ]—	Execute step following NEXT	1
Carry flag	STC				—[ ]—	Set carry flag contact point	1
	CLC				—[ ]—	Reset carry flag contact point	1
DFC command	DFC	fcn	S1	S2	—[ ]—	Call DFC command	4

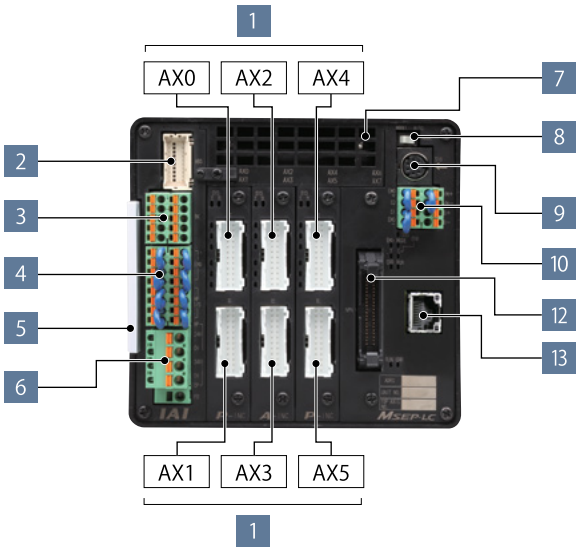
Components Names

Names of the MSEP Controller Components

MSEP-C



MSEP-LC



Caution: With the high-output setting specification (Power CON), only one axis can be connected per slot.

Descriptions of the components

1 **Motor-encoder connectors for the actuator connection**
Connect motor-encoder cable to the actuator

2 **Connector for the absolute data backup battery**
Connect the absolute data backup battery if the controller has the absolute position encoder specification

3 **Connector for the external brake input**
The connector to input a signal to release the brake for the actuator externally.

4 **Connector for the emergency stop input for power source shut-off**
The emergency stop input connector to connect in/output terminal of the external relay of the motor drive shut-off and each driver slot (*).

5 **Information card for configuration of the connecting axes**
The information card contains information regarding the configuration of the controller axes which is removable to examine the contents.

6 **+24 V power source input connector**
The main power source connector for the controller: Motor drive source shut-down is possible while restoring the power source for the controller unit in case of an emergency shut-down; This is because the terminals for the power source of the motor and the controller are separate.

7 **Fan unit**
Easily replaceable fan unit. (Replacement fan unit: Model MSEP-FU)

8 **AUTO/MANUAL switch**
To switch automatic operation to/from manual operation

9 **SIO connector**
To connect teaching pendant and the connecting cable for PC compatible software

10 **System I/O connector**
The connector for remote AUTO/MANU switch input and emergency stop input for the entire controller with functions including an external regeneration-resistance expansion terminal.

11 **PIO connector/ field network connection connector (MSEP-C only)**
The PIO specification - connects to a 68-pin ribbon I/O cable.
The field network specification - connects to a field network type specified on the MSEP controller.

12 **Standard I/Os (MSEP-LC only)**
The MSEP-LC comes installed with a 40-pin PIO connector as standard equipment.

13 **Expansion I/Os (MSEP-LC only)**
Expansion I/Os can be installed as an option.
Available I/O types include PIO, DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, Ethernet/IP, EtherCAT and PROFINET IO.

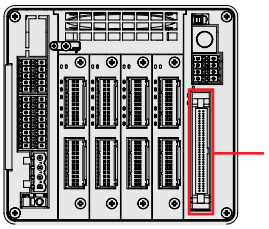
(*1) The shut-off feature is available on a single slot basis which is for two axes per slot. Please note that a single axis basis cannot be accommodated.

Input/Output (PIO) Signals

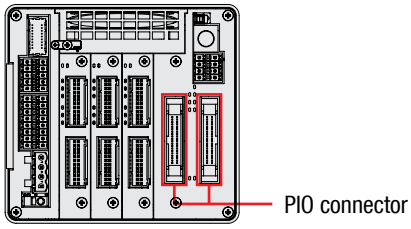
The MSEP-C has dedicated inputs and outputs set to PIO signals at 34 input points/34 output points. The axis operates when each signal is turned ON/OFF from the host PLC.

With the MSEP-LC, general-purpose input/output signals at 32 input points/32 output points can be used in a ladder program by using the standard 16 input points/16 output points plus expansion I/Os.

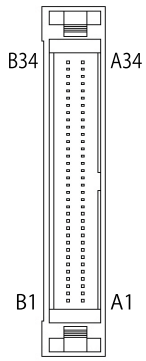
MSEP-C (PIO specification)



MSEP-LC (Expansion I/O specification)



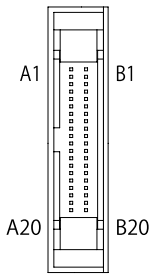
PIO Wiring Diagram for MSEP-C



Connector name: HIF6-68PA-1.27DS (Hirose Electric)					
Pin No.	Category	Signal ID	Pin No.	Category	Signal ID
A1	24V	For I/O	A18		OUT0
A2		IN0	A19	Output (Axis No. 0)	OUT1
A3	Input (Axis No. 0)	IN1	A20		OUT2
A4		IN2	A21		OUT3
A5		IN3	A22		OUT4
A6		IN4	A23	Output (Axis No. 1)	OUT5
A7	Input (Axis No. 1)	IN5	A24		OUT6
A8		IN6	A25		OUT7
A9		IN7	A26		OUT8
A10		IN8	A27	Output (Axis No. 2)	OUT9
A11	Input (Axis No. 2)	IN9	A28		OUT10
A12		IN10	A29		OUT11
A13		IN11	A30		OUT12
A14		IN12	A31	Output (Axis No. 3)	OUT13
A15	Input (Axis No. 3)	IN13	A32		OUT14
A16		IN14	A33		OUT15
A17		IN15	A34	0V	For I/O

Connector name: HIF6-68PA-1.27DS (Hirose Electric)					
Pin No.	Category	Signal ID	Pin No.	Category	Signal ID
B1	24V	For I/O	B18		OUT16
B2		IN16	B19	Output (Axis No. 4)	OUT17
B3	Input (Axis No. 4)	IN17	B20		OUT18
B4		IN18	B21		OUT19
B5		IN19	B22		OUT20
B6		IN20	B23	Output (Axis No. 5)	OUT21
B7	Input (Axis No. 5)	IN21	B24		OUT22
B8		IN22	B25		OUT23
B9		IN23	B26		OUT24
B10		IN24	B27	Output (Axis No. 6)	OUT25
B11	Input (Axis No. 6)	IN25	B28		OUT26
B12		IN26	B29		OUT27
B13		IN27	B30		OUT28
B14		IN28	B31	Output (Axis No. 7)	OUT29
B15	Input (Axis No. 7)	IN29	B32		OUT30
B16		IN30	B33		OUT31
B17		IN31	B34	0V	For I/O

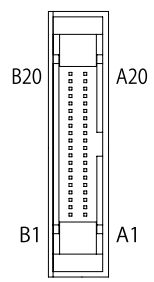
PIO Wiring Diagram for MSEP-LC



Standard I/Os

Pin No.	Category	Assigned memory	Pin No.	Category	Assigned memory
A1	—	24V	A11	Input	X006
A2		external input	A12		X007
A3		Not used	A13		X008
A4		Not used	A14		X009
A5	Input	X000	A15		X00A
A6		X001	A16		X00B
A7		X002	A17		X00C
A8		X003	A18		X00D
A9		X004	A19		X00E
A10		X005	A20		X00F

Pin No.	Category	Assigned memory	Pin No.	Category	Assigned memory
B1	Output	Y000	B11	Output	Y00A
B2		Y001	B12		Y00B
B3		Y002	B13		Y00C
B4		Y003	B14		Y00D
B5		Y004	B15		Y00E
B6		Y005	B16		Y00F
B7		Y006	B17	—	Not used
B8		Y007	B18		Not used
B9		Y008	B19		0V external input
B10		Y009	B20		



Expansion I/Os

Pin No.	Category	Assigned memory	Pin No.	Category	Assigned memory
A1	—	24V	A11	Input	X016
A2		external input	A12		X017
A3		Not used	A13		X018
A4		Not used	A14		X019
A5	Input	X010	A15		X01A
A6		X011	A16		X01B
A7		X012	A17		X01C
A8		X013	A18		X01D
A9		X014	A19		X01E
A10		X015	A20		X01F

Pin No.	Category	Assigned memory	Pin No.	Category	Assigned memory
B1	Output	Y010	B11	Output	Y01A
B2		Y011	B12		Y01B
B3		Y012	B13		Y01C
B4		Y013	B14		Y01D
B5		Y014	B15		Y01E
B6		Y015	B16		Y01F
B7		Y016	B17	—	Not used
B8		Y017	B18		Not used
B9		Y018	B19		0V external input
B10		Y019	B20		

Specifications

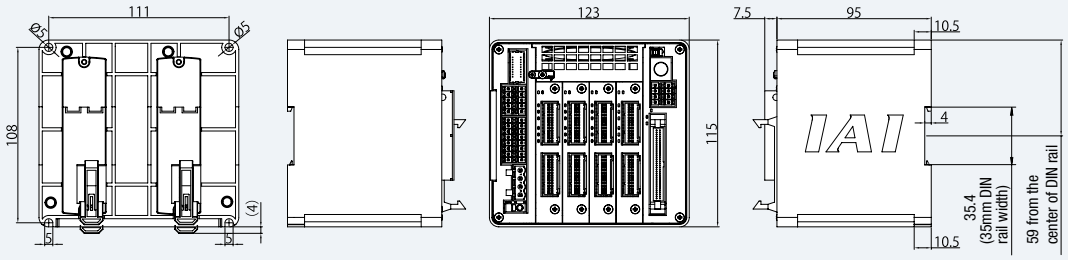
Table of General Specifications

Specification item		Description						
Number of axes in the controller		8 axes MAX (MSEP-C), 6 axes MAX (MSEP-LC)						
Controller/ Motor input power		DC24V ±10%						
Brake power		0.15 A x Number of axes						
Current consumption by control power		0.8A						
Controller inrush current		5A MAX, under 30 ms						
Motor consumption current		Servo motor type	Rated ampere	Maximum		Pulse motor type	Rated ampere	Maximum
				Energy saver	Standard/ Hi-accel./decel.			
		2W	0.8A		4.6A	20P	1.0A	2.0A
		3W(RCD)	0.7A		1.5A	28P	1.0A	2.0A
		5W	1.0A		6.4A	35P	2.2 A (high output disabled) 3.5 A (high output spec.)	2.2 A (high output disabled) 4.2 A (high output spec.)
		10W(RCL)	1.3A		6.4A			
		10W(RCA/RCA2)		2.5A	4.4A	42P		
		20W	1.3A	2.5A	4.4A			
		20 W (20S type)	1.7A	3.4A	5.1A	56P		
		30W	1.3A	2.2A	4.4A			
Motor inrush current		Slot numbers x 10A MAX, under 5ms						
Motor-encoder cable length		Maximum length 20m (*10m for absolute positioning)						
Serial communication (SIO port: dedicated teaching)		RS485 1ch (Modbus protocol compatible) Speed 9.6 to 230.4kbps						
External interface	PIO specification	PIO specification : DC24V dedicated signal in/output; Maximum input of 4 points/axis; Maximum output of 4 points/axis; Maximum cable length 10 m						
	Field network specification	DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, EtherNet/IP, EtherCAT, PROFINET IO						
Data configuration and input method		PC compatible software application, touch panel teaching pendant, gateway parameter configuration tool						
Data retention memory		Restore the position data and parameter in non-volatile memory (unlimited input)						
Positioning points		PIO specification: 2 or 3 points Field network specification: 256 points (no limited input for the simple numerical control and the direct numerical control) (Note) The number of designated positions vary depending on the parameter configuration with motion mode selection.						
LED display (On the front panel)		LED for driver status, 8 LEDs (for each driver board) Status LED, 4 LEDs (PIO specification), 7 LEDs (Fieldbus specification)						
Electromagnetic brake force release		Enable to force-release by transmitting a deactivation signal to each axis (DC24V input).						
Surge protection		Overcurrent protection (A cut-off semiconductor circuit is built-in on each slot)						
Electric shock protection		Class I basic insulation						
Insulation resistance		DC500V 10MΩ						
Weight		620g with the absolute position encoder specification plus 1950g absolute data backup battery (8-axis specification)						
Cooling method		Forced-air cooling						
Ambient operating temperature/humidity		0 to 40°C, under 85% RH (non-condensing)						
International Protection code		IP20						
PLC function (MSEP-LC)		Dedicated ladder program (4,000 steps total)						

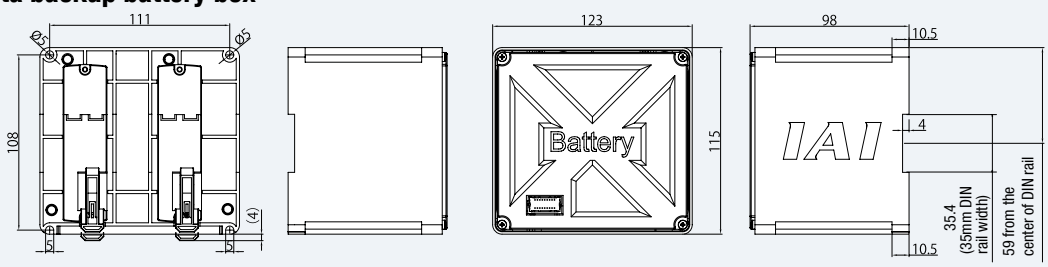
Dimensions

Exterior Dimensions

Controller (The same dimensions apply to the MSEP-C/LC)



Absolute data backup battery box



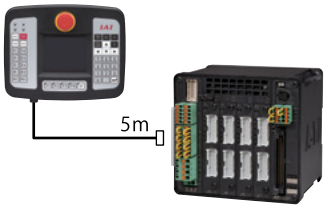
Options

Teaching pendant

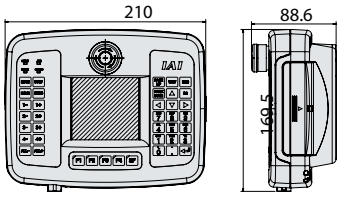
Summary Teaching device for positioning input, test operation, and monitoring.

Model **TB-01-C**

Setting



Exterior dimensions



Specification

Rated voltage	24V DC
Power consumption	3.6 W or less (150 mA or less)
Ambient operating temperature	0~50°C
Ambient operating humidity	20~85%RH (non-condensing)
Environmental resistance	IP40 (initial state)
Weight	507g (TB-01 unit only)

PC compatible software (Windows only)

* For the MSEP field network specification, the PC compatible software is required.

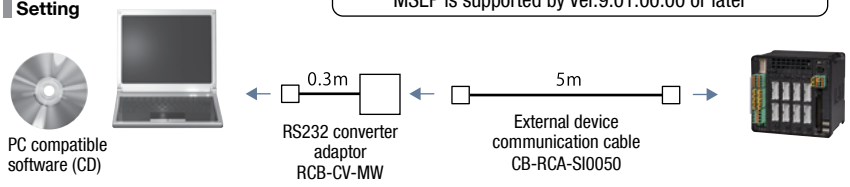
Summary A startup support software for inputting positions, performing test runs, and monitoring.
With enhancements for adjustment functions, the startup time is shortened.

Supported Windows: 2000 SP4 or later / XP SP2 or later / Vista / 7

Model **RCM-101-MW** (External device communication cable and RS232 conversion adoptor included)

Setting

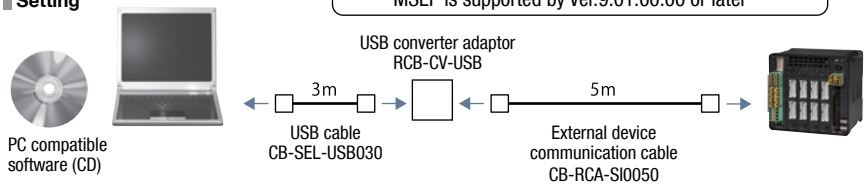
MSEP is supported by Ver.9.01.00.00 or later



Model **RCM-101-USB** (External device communication cable, USB converter adaptor and USB cable included)

Setting

MSEP is supported by Ver.9.01.00.00 or later

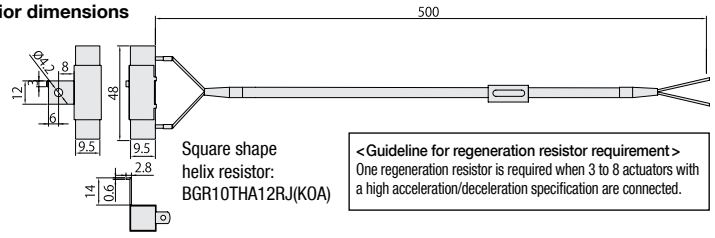


External regeneration resistor

Summary The regeneration resistor converts regenerated current dissipated during deceleration of the motor load into heat. The MSEP controller has an internal regeneration resistor for ordinary operations, however, depending on the operational condition, please install an external regeneration resistor if the internal regeneration resistor capacity is insufficient.

Model **RER-1**

Exterior dimensions



<Guideline for regeneration resistor requirement>
One regeneration resistor is required when 3 to 8 actuators with a high acceleration/deceleration specification are connected.

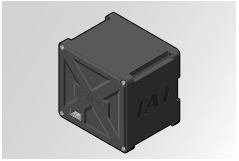
Absolute data backup battery box

Summary If the absolute position encoder specification is selected with code ABB, the absolute data backup battery box is included with the controller. However, if the battery box is ordered as a separate unit, it does not include the battery but just the box itself. If the battery is needed, please purchase it separately. (Model: AB-7).

Model **MSEP-ABB** (Batteries not included)

Exterior dimensions **See P.23**

* A cable (Model CB-MSEP-AB005) that connects the absolute data backup battery box to the MSEP is included with the box.



Driver board

Summary A supplement or modification to the driver board is feasible with the MSEP controller. When the actuator that control motions needs to be modified, just replacing the driver board would serve the purpose without changing the entire controller. (The parameters need to be adjusted when changing the driver board)

Model / Standard price

Motor type	High output type	Encoder type	Number of axes	Model	Standard price
Pulse motor	High output setting enabled	Battery-less absolute/ incremental	1-axis	MSEP-PPD1-W	—
		Simple absolute	1-axis	MSEP-PPD1-A	—
	High output setting disabled	Battery-less absolute/ incremental	1-axis	MSEP-PD1-W	—
			2-axis	MSEP-PD2-W	—
		Simple absolute	1-axis	MSEP-PD1-A	—
			2-axis	MSEP-PD2-A	—
AC servo motor	—	Incremental	1-axis	MSEP-AD1-I	—
			2-axis	MSEP-AD2-I	—
		Simple absolute	1-axis	MSEP-AD1-A	—
			2-axis	MSEP-AD2-A	—
DC servo motor	—	Incremental	1-axis	MSEP-DD1-I	—
			2-axis	MSEP-DD2-I	—

Replacement battery

Summary The replacement battery for the absolute data backup battery box.

Model **AB-7**

Replacement fan unit

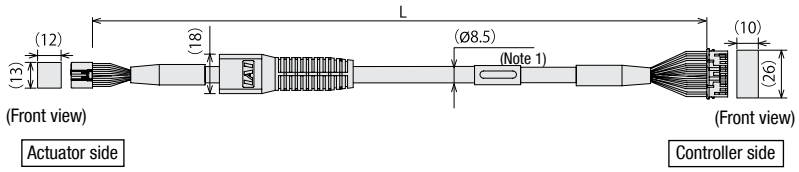
Model **MSEP-FU**

Service Parts

Service Parts

Model number			
CB-CAN-MPA □□□	Integrated Motor-Encoder Cable	for RCP5/RCD
CB-CAN-MPA □□□-RB	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m



Minimum bending radius 5m or less length R = 68mm or more (Dynamic bending condition)
Longer than 5m R = 73mm or more (Dynamic bending condition)

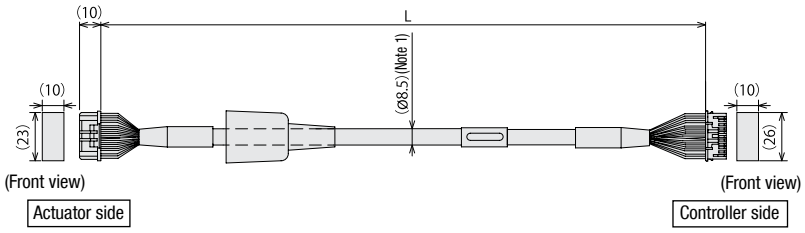
* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through the cable track.

(Note 1) If the cable is 5m or longer, Ø9.1 cable diameter applies for a non-robot cable and Ø10 for a robot cable.

Pin No	Signal name	Pin No	Signal name
3	ØA	1	ØA
5	VMM	2	VMM
10	ØB	3	ØB
9	VMM	4	VMM
4	Ø A	5	Ø A
15	Ø B	6	Ø B
8	LS+	7	LS+
14	LS-	8	LS-
12	SA[mABS]	11	SA[mABS]
17	SB[mABS]	12	SB[mABS]
1	A+	13	A+
6	A-	14	A-
11	B+	15	B+
16	B-	16	B-
20	BK+	9	BK+
2	BK-	10	BK-
21	VCC	17	VCC
7	GND	19	GND
18	VPS	18	VPS
13	LS_GND	20	LS_GND
19	—	22	—
22	—(CFvcc)	21	—(CFvcc)
23	—	23	—
24	FG	24	FG

Model number			
CB-CA-MPA □□□	Integrated Motor-Encoder Cable	for RCP4
CB-CA-MPA □□□-RB	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m



Minimum bending radius 5m or less length R = 68mm or more (Dynamic bending condition)
Longer than 5m R = 73mm or more (Dynamic bending condition)

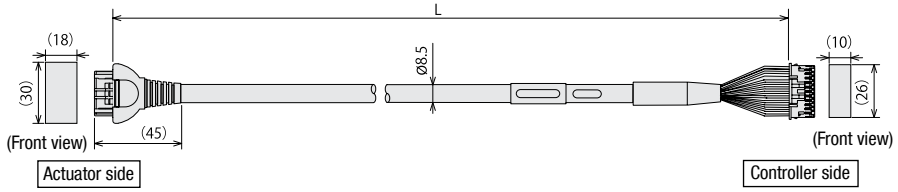
* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through the cable track.

(Note 1) If the cable is 5m or longer, Ø9.1 cable diameter applies for a non-robot cable and Ø10 for a robot cable.

Actuator side 1-1827863-1 (AMP) Pin No	Signal name	Controller side PADP-24V-1-S (JST) Pin No	Signal name
A1	ØA/U	1	Ø A/U
B1	VMM/V	2	VMM/V
A2	Ø A/W	5	Ø A/W
B2	ØB/-	3	ØB/-
A3	VMM/-	4	VMM/-
B3	Ø B/-	6	Ø B/-
A4	LS+/BK+	7	LS+/BK+
B4	LS-/BK-	8	LS-/BK-
A6	-/A+	11	-/A+
B6	-/A-	12	-/A-
A7	A+/B+	13	A+/B+
B7	A-/B-	14	A-/B-
A8	B+/Z+	15	B+/Z+
B8	B-/Z-	16	B-/Z-
A5	BK+/LS+	9	BK+/LS+
B5	BK-/LS-	10	BK-/LS-
A9	LS_GND	20	LS_GND
B9	VPS	18	VPS
A10	VCC	17	VCC
B10	GND	19	GND
A11	—	21	—
B11	FG	22	—
		23	—
		24	FG

Model number			
CB-APSEP-MPA □□□-LC	Integrated Motor-Encoder Cable	for RCP3/RCA2 and others
CB-APSEP-MPA □□□	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m



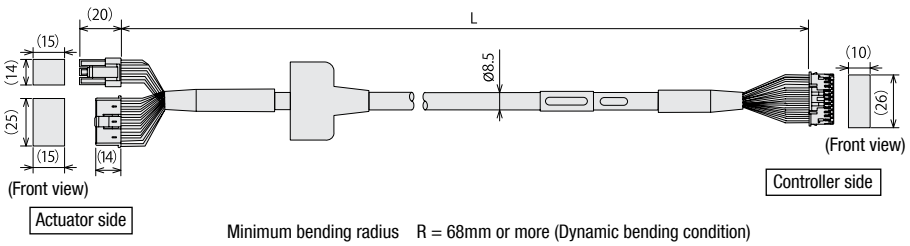
Minimum bending radius R = 68mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through the cable track.

Actuator side Pin number		Controller side Pin number
A1	[PCON](ACON) [ØA] (U)	1
B1	[VMM] (V)	2
A2	[Ø/A] (W)	5
B2	[ØB] (-)	3
A3	[VMM] (-)	4
B3	[Ø/B] (-)	6
A4	[LS+] (BK+)	7
B4	[LS-] (BK-)	8
A6	[-] (A+)	11
B6	[-] (A-)	12
A7	[A+] (B+)	13
B7	[A-] (B-)	14
A8	[B+] (Z+)	15
B8	[B-] (Z-)	16
A5	[BK+] (LS+)	9
B5	[BK-] (LS-)	10
A9	[GNDLS] (GNDLS)	20
B9	[VPS] (VPS)	18
A10	[VCC] (VCC)	17
B10	[GND] (GND)	19
A11	NC	21
B11	Shield [FG] (FG)	24
	NC	22
	NC	23

Model number CB-PSEP-MPA□□□ — Integrated Motor-Encoder Robot Cable — for RCP2

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m
* Only robot cable is available for this model.

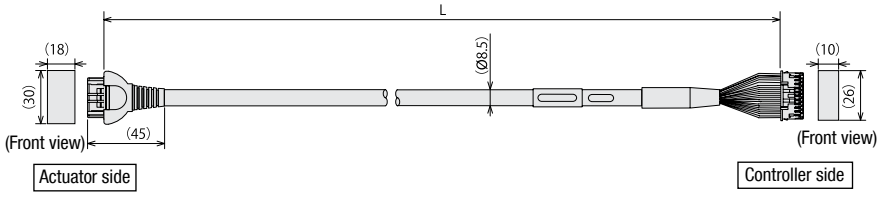


Minimum bending radius R = 68mm or more (Dynamic bending condition)

Actuator side Pin number		Controller side Pin number
1	[ΦA]	1
2	[VMM]	2
4	[ΦB]	3
5	[VMM]	4
3	[Φ/A]	5
6	[Φ/B]	6
16	[BK+]	9
17	[BK-]	10
5	NC	11
6	NC	12
13	[LS+]	7
14	[LS-]	8
1	[A+]	13
2	[A-]	14
3	[B+]	15
4	[B-]	16
10	[VCC]	17
11	[VPS]	18
9	[GND]	19
12	[Spare]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield [FG]	24

Model number CB-RPSEP-MPA□□□ — Integrated Motor-Encoder Robot Cable — for RCP2-RTBS/RTBSL/RTCS/RTCSL

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m
* Only robot cable is available for this model.

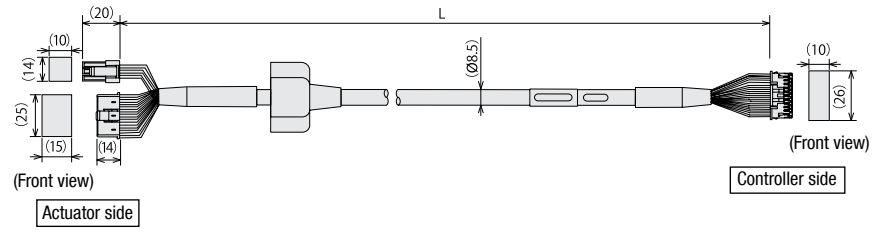


Minimum bending radius R = 68mm or more (Dynamic bending condition)

Actuator side Pin number		Controller side Pin number
A1	[ΦA]	1
B1	[VMM]	2
A2	[Φ/A]	5
B2	[ΦB]	3
A3	[VMM]	4
B3	[Φ/B]	6
A6	[LS+]	7
B6	[LS-]	8
A7	[A+]	13
B7	[A-]	14
A8	[B+]	15
B8	[B-]	16
A4	NC	—
B4	NC	—
A5	[BK+]	9
B5	[BK-]	10
A9	[GNDLS]	20
B9	[VPS]	18
A10	[VCC]	17
B10	[GND]	19
A11	NC	21
B11	Shield [FG] (FG)	24
	NC	22
	NC	23

Model number CB-ASEP-MPA□□□ — Integrated Motor-Encoder Robot Cable — for RCA

* Please indicate cable length (L) in , □□□ maximum 20m. e.g.) 080=8m
* Only robot cable is available for this model.

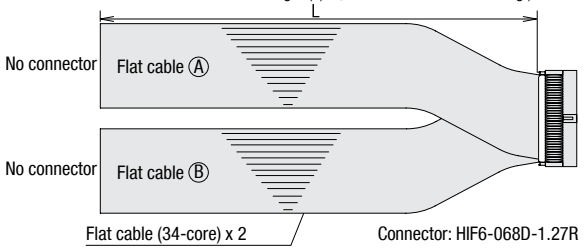


Minimum bending radius R = 68mm or more (Dynamic bending condition)

Actuator side Pin number		Controller side Pin number
1	[U]	1
2	[V]	2
	NC	3
	NC	4
3	[W]	5
	NC	6
18	[BK+]	7
17	[BK-]	8
7	[LS+]	9
16	[LS-]	10
1	[A+]	11
2	[A-]	12
3	[B+]	13
4	[B-]	14
10	[Z+]	15
11	[Z-]	16
14	[VCC]	17
13	[VPS]	18
15	[GND]	19
6	[Spare]	20
5	NC	21
8	NC	22
12	NC	23
9	Shield [FG]	24

Model number CB-MSEP-PIO□□□ — PIO Flat Cable — for MSEP-C

* Please indicate cable length (L) in, □□□ maximum 10m. e.g.) 020=2m



HIF6-068D-1.27R

No.	Cable color	Wiring
A1	Brown-1	Flat cable Ⓐ (pressure-welded)
A2	Red-1	
A3	Orange-1	
A4	Yellow-1	
A5	Green-1	
A6	Blue-1	
A7	Purple-1	
A8	Gray-1	
A9	White-1	
A10	Black-1	
A11	Brown-2	
A12	Red-2	
A13	Orange-2	
A14	Yellow-2	
A15	Green-2	
A16	Blue-2	
A17	Purple-2	

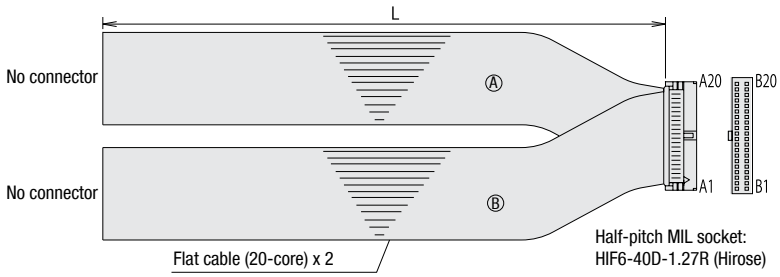
No.	Cable color	Wiring
A18	Gray-2	Flat cable Ⓐ (pressure-welded)
A19	White-2	
A20	Black-2	
A21	Brown-3	
A22	Red-3	
A23	Orange-3	
A24	Yellow-3	
A25	Green-3	
A26	Blue-3	
A27	Purple-3	
A28	Gray-3	
A29	White-3	
A30	Black-3	
A31	Brown-4	
A32	Red-4	
A33	Orange-4	
A34	Yellow-4	

No.	Cable color	Wiring
B1	Brown-5	Flat cable Ⓑ (pressure-welded)
B2	Red-5	
B3	Orange-5	
B4	Yellow-5	
B5	Green-5	
B6	Blue-5	
B7	Purple-5	
B8	Gray-5	
B9	White-5	
B10	Black-5	
B11	Brown-6	
B12	Red-6	
B13	Orange-6	
B14	Yellow-6	
B15	Green-6	
B16	Blue-6	
B17	Purple-6	

No.	Cable color	Wiring
B18	Gray-6	Flat cable Ⓑ (pressure-welded)
B19	White-6	
B20	Black-6	
B21	Brown-7	
B22	Red-7	
B23	Orange-7	
B24	Yellow-7	
B25	Green-7	
B26	Blue-7	
B27	Purple-7	
B28	Gray-7	
B29	White-7	
B30	Black-7	
B31	Brown-8	
B32	Red-8	
B33	Orange-8	
B34	Yellow-8	

Model number CB-PAC-PIO□□□ — PIO Flat Cable — for PCON-CA/MSEP-LC

* Please indicate cable length (L) in , □□□ maximum 10m. e.g.) 080=8m



HIF6-40D-1.27R

No.	Signal name	Cable color	Wiring
A1	24V	Brown-1	Flat cable Ⓐ (pressure-welded)
A2	24V	Red-1	
A3	—	Orange-1	
A4		Yellow-1	
A5	IN0	Green-1	
A6	IN1	Blue-1	
A7	IN2	Purple-1	
A8	IN3	Gray-1	
A9	IN4	White-1	
A10	IN5	Black-1	
A11	IN6	Brown-2	
A12	IN7	Red-2	
A13	IN8	Orange-2	
A14	IN9	Yellow-2	
A15	IN10	Green-2	
A16	IN11	Blue-2	
A17	IN12	Purple-2	
A18	IN13	Gray-2	
A19	IN14	White-2	
A20	IN15	Black-2	

No.	Signal name	Cable color	Wiring
B1	OUT0	Brown-3	Flat cable Ⓑ (pressure-welded)
B2	OUT1	Red-3	
B3	OUT2	Orange-3	
B4	OUT3	Yellow-3	
B5	OUT4	Green-3	
B6	OUT5	Blue-3	
B7	OUT6	Purple-3	
B8	OUT7	Gray-3	
B9	OUT8	White-3	
B10	OUT9	Black-3	
B11	OUT10	Brown-4	
B12	OUT11	Red-4	
B13	OUT12	Orange-4	
B14	OUT13	Yellow-4	
B15	OUT14	Green-4	
B16	OUT15	Blue-4	
B17	—	Purple-4	
B18		Gray-4	
B19	0V	White-4	
B20	0V	Black-4	

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IAI America, Inc.

Headquarters: 2690 W. 237th Street, Torrance, CA 90505 (800) 736-1712
Chicago Office: 110 E. State Pkwy, Schaumburg, IL 60173 (800) 944-0333
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066 (888) 354-9470

www.intelligentactuator.com

IAI Industrieroboter GmbH
Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany

IAI Robot (Thailand), CO., Ltd.
825 PhairojKijja Tower 12th Floor, Bangna-Trad RD.,
Bangna, Bangna, Bangkok 10260, Thailand