RCP2/RCP3/RCP4/RCA/ RCA2/RCL Position Controller SEP Series 8-axis Type

MSEP

# 8 AXES in ONE

8 AXES in ONE

Achieving High-Performance in a Compact Design Network Connectable Controller

Features

1

Compact Design

A successfully designed 8-axis compact controller with a 123 mm width x 115 mm height unit.
A 60% reduction in width from the predecessor controller which contributes to space savings within the controller cabinet.

123mm

MSEP

Approximately 60 % smaller

ROBONET

306mm
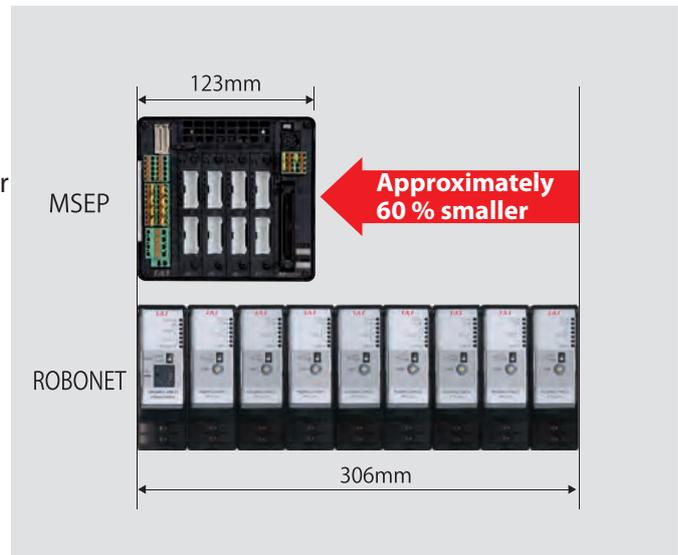
2

Supports major field networks

Allows direct connection with the major field networks including DeviceNet, CC-Link, PROFIBUS-DP, MECHATROLINK, CompoNet, EtherCAT, EtherNet/IP, and ProfiNet.

**Network Specification Features**

- 256 positioning points per each axis
- Allows designation of position and speed navigation numerically
- Ability to verify current position in real-time
- Significant communication time reduction within the controller (Approximately by 1/10 compared to the predecessor model)

DeviceNet

PROFI BUS®

CompoNet™

CC-Link

EtherNet/IP™

EtherCAT®

MECHATROLINK

PROFI NET®
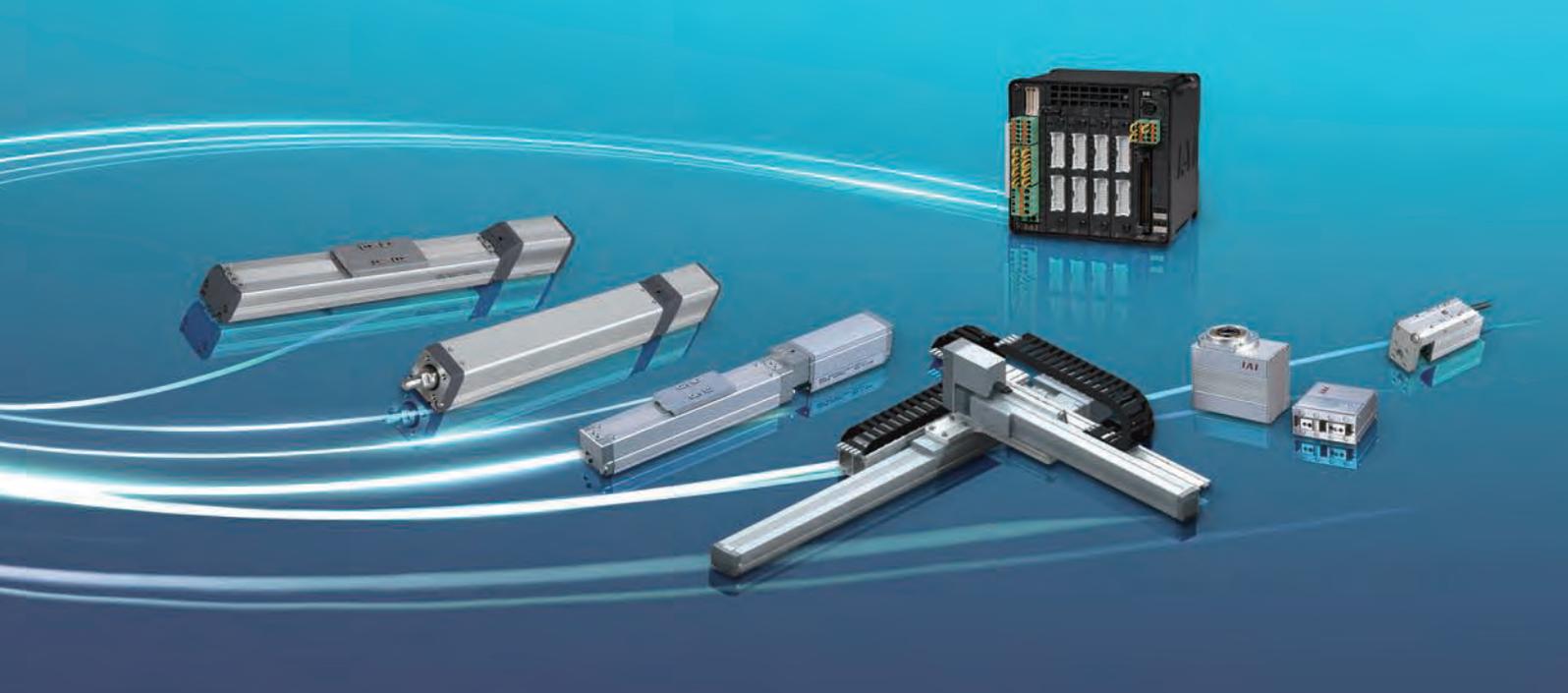
3 Supports both the pulse motor and the servo motor

A single MSEP controller can operate both the pulse motor and the servo motor type actuators, reducing set-up efforts significantly such as wiring even when different types of actuators have to be used at the same time.

Pulse Motor Type   Servo Motor Type
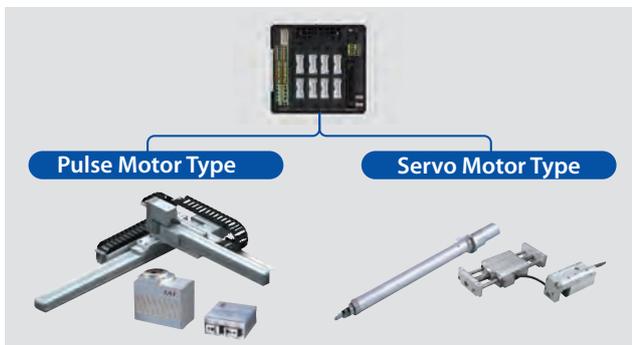
4 Simple absolute option

An absolute position encoder is available, which saves the position data by battery, providing prompt operation without returning to the home position after power off. Even in an emergency shut-off or momentary power-loss, it allows continuous operation from its last position.

MSEP Controller

Absolute data backup battery
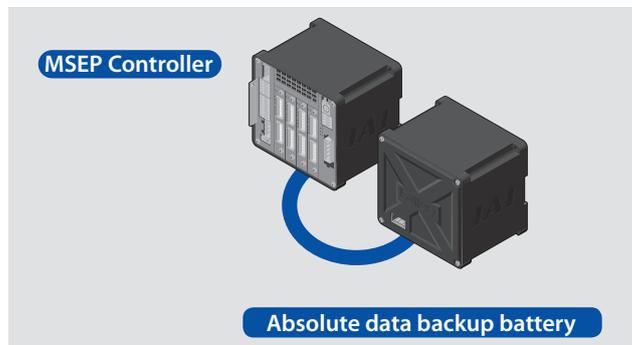
5 Checking when to maintain based on the total number of movements and total distance travelled

The total number of actuator movements and the total distance travelled are calculated and recorded in the controller, and when the predetermined count or distance is exceeded, a signal is output to an external device. You can use this function to check when the actuator needs re-greasing or periodic inspection.
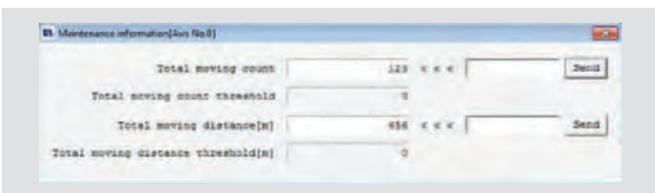
6 Recording the alarm occurrence time with the calendar function

An additional clock function facilitates the alarm analysis from the convenience of the display screen that shows the time of the alarm occurrence. (The retention period of the date and time data is 10 days)

Models

Type	C									
I/O category	NP	PN	DV	CC	PR	CN	ML	EC	EP	PT (*)
Item name	PIO specification (NPN type)	PIO specification (PNP type)	DeviceNet Specification	CC-Link Specification	PROFIBUS-DP Specification	CompoNet Specification	MECHATROLINK Specification	EtherCAT Specification	EtherNet/IP Specification	ProfiNet Specification
Exterior view						(*) Planned industrial ethernet interface. * The picture shown is of the PIO specification. Depending on the I/O category, the PIO connector and field network joint connector changes.				
Item description	Operates via digital signals from the PLC	Operates with any of the above field network connections. A choice of method either a serial communication with PIO specification control, or transmitting traveling position, velocity and acceleration by data is available.								
No. of positions	3 positions per axis	256 positions per axis (There is no limit if operated directly by transferring data)								

Configuration

* Representation of the 2nd to the 8th axis is depending on the total number of axes applied. (i.e. after the 2nd axis)

(Description of the 1st axis)

MSEP — C — ☐ — ☐ I ☐ — (☐ I ☐) — ☐ — ☐ — 0 — ☐

Series | Type | Total number of axes | Motor type | Encoder type | Option | Motor type | Encoder type | Option | I/O type | Type of I/O cable | Power-supply voltage | Absolute position encoder option

(Description of the 2nd to 8th axis)

1	1-axis specification
2	2-axis specification
3	3-axis specification
4	4-axis specification
5	5-axis specification
6	6-axis specification
7	7-axis specification
8	8-axis specification

HA	High acceleration/ deceleration capability
LA	Power-saving

* The above options are only available with the actuator.

I	Incremental specification

0	No cable
2	2m (standard)
3	3m
5	5m

0	DC24V

ABB	Absolute position encoder type (with absolute data backup battery)
ABBN	Absolute position encoder type (without absolute data backup battery)
(Blank)	Incremental Type

20P	20-frame pulse motor type
20SP	20-frame pulse motor type (RA2AC, RA2BC)
28P	28-frame pulse motor type
28SP	28-frame pulse motor type (RA3C exclusive)
35P	35-frame pulse motor type
42P	42-frame pulse motor type
56P	56-frame pulse motor type
P	Unused pulse motor axis (*)
N	Code for no connected axis (*)

2	2 W servo motor type
5	5 W servo motor type
5S	5 W servo motor type (SA2A☐, RA2A☐ exclusive)
10	10 W servo motor type
20	20 W servo motor type
20S	20 W servo motor type (RCS2-SA4☐/TA5☐, RCA-RA3☐ exclusive)
30	30 W servo motor type
A	Unused servo motor axis (*)

(*) Please refer to the instruction for completing a selected model description on the page at the right.

NP	PIO specification (NPN type)
PN	PIO specification (PNP type)
DV	DeviceNet connection specification
CC	CC-Link connection specification
PR	PROFIBUS-DP connection specification
CN	CompoNet connection specification
ML	MECHATROLINK connection specification
EC	EtherCAT connection specification
EP	EtherNet/IP connection specification
PT	ProfiNet connection specification (**)

(**) ProfiNet interface ("PT") is planned.

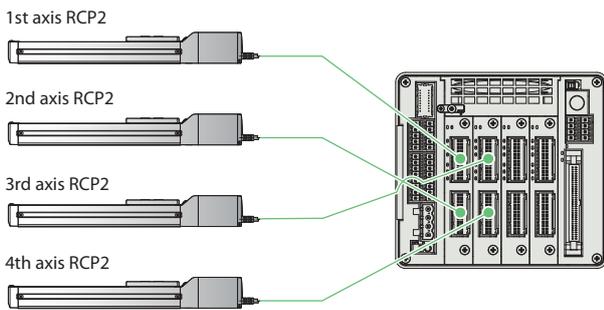# ■ Guide for the description of the selected configuration

The description of the MSEP controller configuration varies depending on the type of actuator connected to the controller, and the total number of axes installed. Please see the following conditions to configure a desired controller.

Connect the **SAME TYPE** of actuators (either pulse motor type or servo motor type)

Connect a **MIXTURE OF TYPES** of actuators (both pulse motor type and servo motor type)

Please indicate the motor type code of the actuator starting from the 1st axis respectively.

e.g.) MSEP — C — 4 — 42PI — 56PI — 42P — 56PI — NP — 2 — 0

Total number of axes
1st axis   2nd axis   3rd axis   4th axis
Pulse motor   Pulse motor

1st axis RCP2

2nd axis RCP2

3rd axis RCP2

4th axis RCP2

If the total number of axes is an odd count, please indicate an **[N]** following the last axis description (as shown after the 3rd axis below for example).

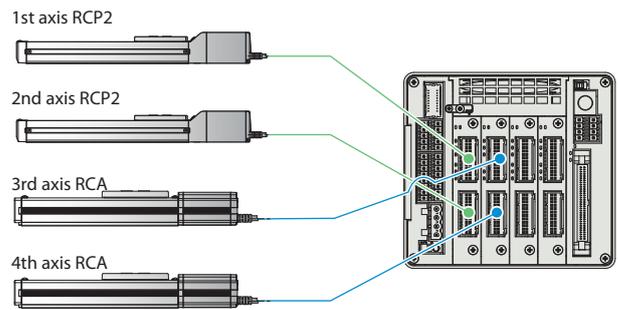e.g.) MSEP — C — 3 — 42PI — 56PI — 42P — N — NP — 2 — 0

Total number of axes
1st axis   2nd axis   3rd axis
Pulse motor   No connected axis

Each board is designed to connect to a pair of axes, and two different types of motors cannot be connected to the same board. Please indicate the same types of motors for each pair of axes.

e.g.) MSEP — C — 4 — 42PI — 56PI — 20I — 20I — NP — 2 — 0

Total number of axes
1st axis   2nd axis   3rd axis   4th axis
Pulse motor   Servo motor

1st axis RCP2

2nd axis RCP2

3rd axis RCA

4th axis RCA

If either motor type is an odd count, please indicate an **[N]** following the last axis description per the corresponding board.

e.g.) MSEP — C — 3 — 42PI — N — 20SI — 30I — NP — 2 — 0

Total number of axes
1st axis   2nd axis   3rd axis
Pulse motor   Servo motor
No connected axis

<If you choose to operate the controller with fewer axes connections now but may add more in the future>

- If there's a possibility to increase connections, for example, to 6 or 8 axes in the future but would like to start with only 4 axes to operate the controller now, it is possible to keep the base board installed as is and leave room for the potential axes by indicating an **[UNUSED AXIS]**.
- When configuring unused axis/axes for the pulse motor, please indicate a **[P]** in the box for the motor type.
- When configuring unused axis/axes for the servo motor, please indicate an **[A]** in the box for the motor type.
- When configuring unused axis/axes, please include number of unused axis/axes in the total number of axes.

3rd axis   5th axis
1st axis   7th axis
2nd axis   8th axis
4th axis   6th axis
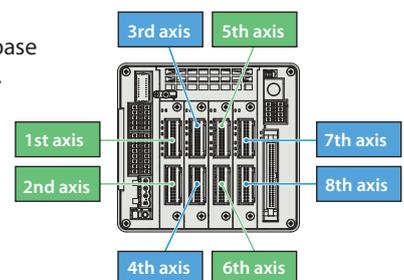
e.g.) MSEP — C — 8 — 42PI — 56PI — 20I — 10I — PI — PI — AI — AI — NP — 2 — 0

Total number of axes
1st axis   2nd axis   3rd axis 4th axis   5th axis 6th axis   7th axis 8th axis
Pulse motor   Servo motor   Unused axis (Pulse motor)   Unused axis (Servo motor)

Actuator combination patterns for the MSEP

There are 40 combination patterns of the pulse motor type or the servo motor type actuator that can be connected to the MSEP controller as shown in the table below.
(all * are an incremental specification)
(The boxes in the configuration lines are to indicate the type of motor code number)

<**Connectable actuators**>

Pulse
Pulse motor type actuator
• **RCP4 series (*)**
• **RCP3 series**
• **RCP2 series**

Servo
Servo motor type actuator
• **RCA2 series**
• **RCA series**
• **RCL series**

(*) High-output motion is not available

1-axis to 5-axis specification

Total number of axes	Driver slot 0		Driver slot 1		Driver slot 2		Driver slot 3		Configuration	Pattern No	
	AX0	AX1	AX2	AX3	AX4	AX5	AX6	AX7			
1-axis specification	Pulse	N							MSEP-C-1-□PI-N-(*)	1	
	Servo	N							MSEP-C-1-□I-N-(*)	2	
2-axis specification	Pulse	Pulse							MSEP-C-2-□PI-□PI-(*)	3	
	Pulse	N	Servo	N					MSEP-C-2-□PI-N-□I-N-(*)	4	
	Servo	Servo							MSEP-C-2-□I-□I-(*)	5	
3-axis specification	Pulse	Pulse	Pulse	N					MSEP-C-3-□PI-□PI-□PI-N-(*)	6	
	Pulse	Pulse	Servo	N					MSEP-C-3-□PI-□PI-□I-N-(*)	7	
	Pulse	N	Servo	Servo					MSEP-C-3-□PI-N-□I-□I-(*)	8	
	Servo	Servo	Servo	N					MSEP-C-3-□I-□I-□I-N-(*)	9	
4-axis specification	Pulse	Pulse	Pulse	Pulse					MSEP-C-4-□PI-□PI-□PI-□PI-(*)	10	
	Pulse	Pulse	Pulse	N	Servo	N			MSEP-C-4-□PI-□PI-□PI-N-□I-N-(*)	11	
	Pulse	Pulse	Servo	Servo					MSEP-C-4-□PI-□PI-□I-□I-(*)	12	
	Pulse	N	Servo	Servo	Servo	N			MSEP-C-4-□PI-N-□I-□I-□I-N-(*)	13	
	Servo	Servo	Servo	Servo					MSEP-C-4-□I-□I-□I-□I-(*)	14	
5-axis specification	Pulse	Pulse	Pulse	Pulse	Pulse	N			MSEP-C-5-□PI-□PI-□PI-□PI-□PI-N-(*)	15	
	Pulse	Pulse	Pulse	Pulse	Servo	N			MSEP-C-5-□PI-□PI-□PI-□PI-□I-N-(*)	16	
	Pulse	Pulse	Pulse	N	Servo	Servo			MSEP-C-5-□PI-□PI-□PI-N-□I-□I-(*)	17	
	Pulse	Pulse	Servo	Servo	Servo	N			MSEP-C-5-□PI-□PI-□I-□I-□I-N-(*)	18	
	Pulse	N	Servo	Servo	Servo	Servo			MSEP-C-5-□PI-N-□I-□I-□I-□I-(*)	19	
	Servo	Servo	Servo	Servo	Servo	N			MSEP-C-5-□I-□I-□I-□I-□I-N-(*)	20	

(*) include codes for (I/O type)-(I/O cable length)-(Power supply)-(Absolute position encoder option)

<Actuator connector and driver slot description>

Driver slot 0 | Driver slot 1 | Driver slot 2 | Driver slot 3

6-axis to 8-axis specification

Total number of axes		Driver slot 0		Driver slot 1		Driver slot 2		Driver slot 3		Configuration	Pattern No	
		AX0	AX1	AX2	AX3	AX4	AX5	AX6	AX7			
6-axis specification		Pulse	Pulse	Pulse	Pulse	Pulse	Pulse			MSEP-C-6-□PI-□PI-□PI-□PI-□PI-□PI-(*)	21	
		Pulse	Pulse	Pulse	Pulse	Pulse	N	Servo	N	MSEP-C-6-□PI-□PI-□PI-□PI-□PI-N-□I-N-(*)	22	
		Pulse	Pulse	Pulse	Pulse	Servo	Servo			MSEP-C-6-□PI-□PI-□PI-□PI-□I-□I-(*)	23	
		Pulse	Pulse	Pulse	N	Servo	Servo	Servo	N	MSEP-C-6-□PI-□PI-□PI-N-□I-□I-□I-N-(*)	24	
		Pulse	Pulse	Servo	Servo	Servo	Servo			MSEP-C-6-□PI-□PI-□I-□I-□I-□I-(*)	25	
		Pulse	N	Servo	Servo	Servo	Servo	Servo	N	MSEP-C-6-□PI-N-□I-□I-□I-□I-□I-N-(*)	26	
		Servo	Servo	Servo	Servo	Servo	Servo			MSEP-C-6-□I-□I-□I-□I-□I-□I-(*)	27	
7-axis specification		Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	N	MSEP-C-7-□PI-□PI-□PI-□PI-□PI-□PI-□PI-N-(*)	28	
		Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Servo	N	MSEP-C-7-□PI-□PI-□PI-□PI-□PI-□PI-□I-N-(*)	29	
		Pulse	Pulse	Pulse	Pulse	Pulse	N	Servo	Servo	MSEP-C-7-□PI-□PI-□PI-□PI-□PI-N-□I-□I-(*)	30	
		Pulse	Pulse	Pulse	Pulse	Servo	Servo	Servo	N	MSEP-C-7-□PI-□PI-□PI-□PI-□I-□I-□I-N-(*)	31	
		Pulse	Pulse	Pulse	N	Servo	Servo	Servo	Servo	MSEP-C-7-□PI-□PI-□PI-N-□I-□I-□I-□I-(*)	32	
		Pulse	Pulse	Servo	Servo	Servo	Servo	Servo	N	MSEP-C-7-□PI-□PI-□I-□I-□I-□I-□I-N-(*)	33	
		Pulse	N	Servo	Servo	Servo	Servo	Servo	Servo	MSEP-C-7-□PI-N-□I-□I-□I-□I-□I-□I-(*)	34	
		Servo	Servo	Servo	Servo	Servo	Servo	Servo	N	MSEP-C-7-□I-□I-□I-□I-□I-□I-□I-N-(*)	35	
8-axis specification		Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	MSEP-C-8-□PI-□PI-□PI-□PI-□PI-□PI-□PI-□PI-(*)	36	
		Pulse	Pulse	Pulse	Pulse	Pulse	Pulse	Servo	Servo	MSEP-C-8-□PI-□PI-□PI-□PI-□PI-□PI-□I-□I-(*)	37	
		Pulse	Pulse	Pulse	Pulse	Servo	Servo	Servo	Servo	MSEP-C-8-□PI-□PI-□PI-□PI-□I-□I-□I-□I-(*)	38	
		Pulse	Pulse	Servo	Servo	Servo	Servo	Servo	Servo	MSEP-C-8-□PI-□PI-□I-□I-□I-□I-□I-□I-(*)	39	
		Servo	Servo	Servo	Servo	Servo	Servo	Servo	Servo	MSEP-C-8-□I-□I-□I-□I-□I-□I-□I-□I-(*)	40	

(*) include codes for (I/O type)-(I/O cable length)-(Power supply)-(Absolute position encoder option)
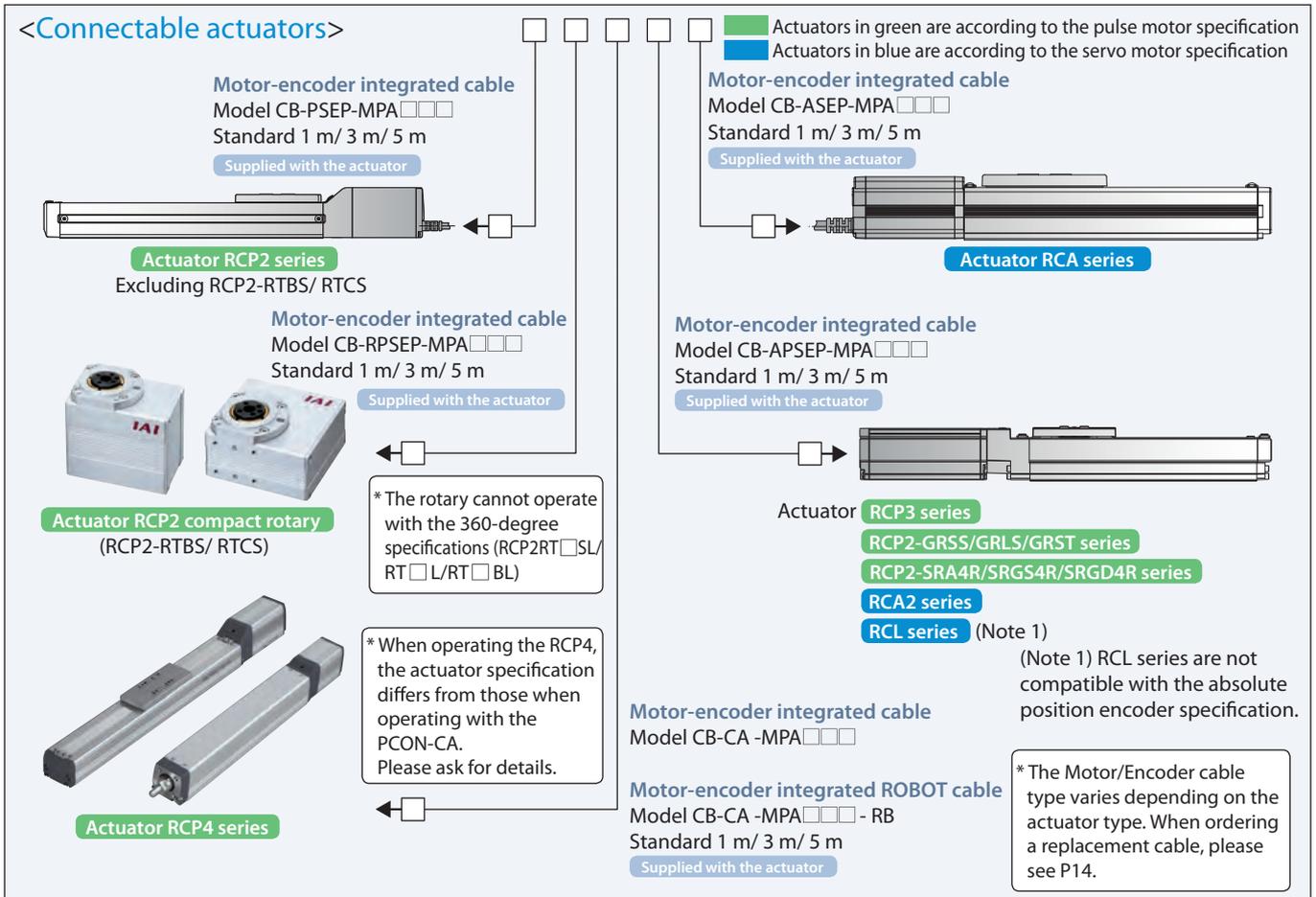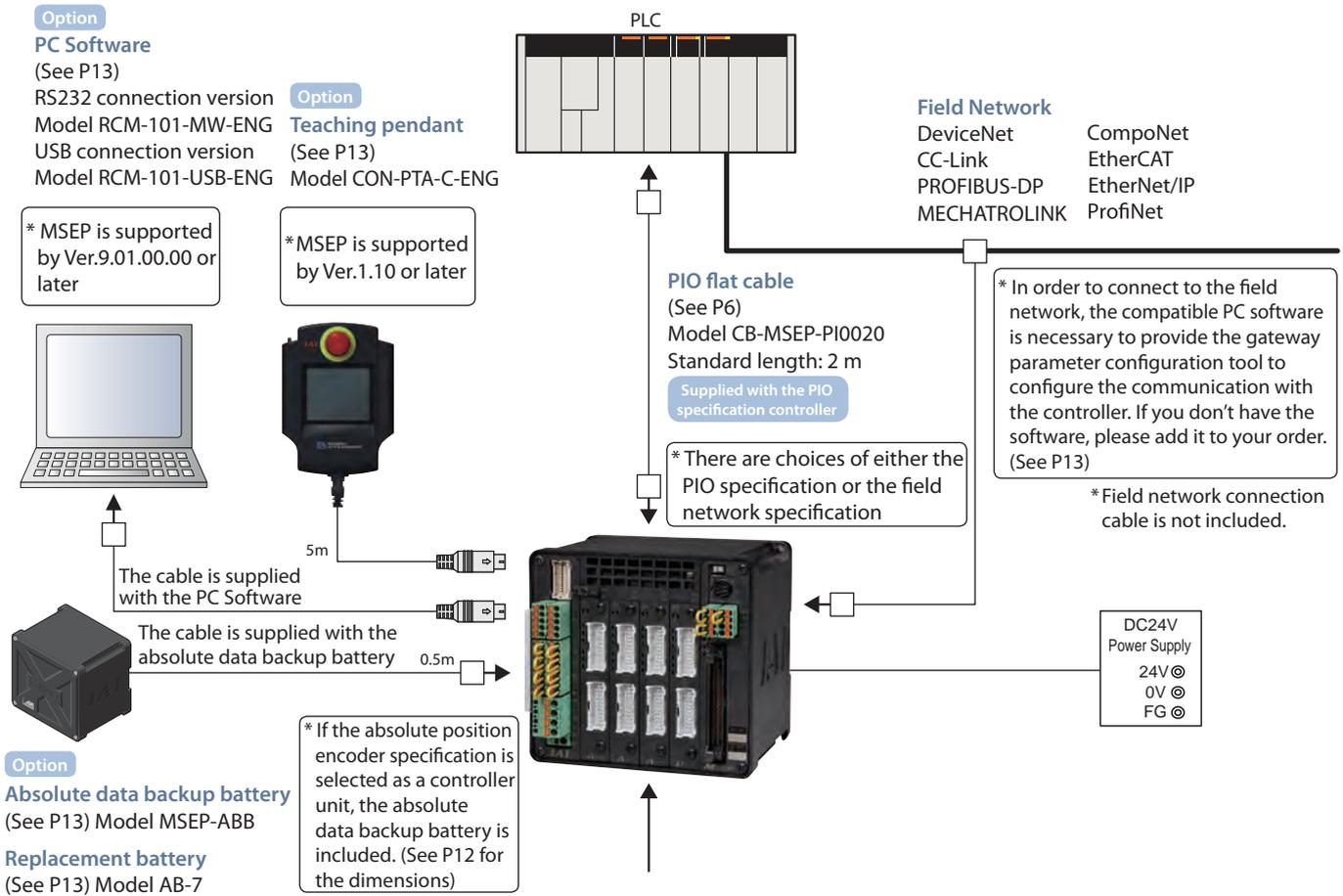
Standard price chart

The standard price of the MSEP controller can be calculated by adding the **2** I/O type price, plus additional prices for the **3** absolute position encoder specification, and the **4** absolute data backup battery (Absolute-battery) option to the basic unit prices as listed in **1** below.

1 Basic unit price (Incremental specification + PIO specification)
+
2 Additional price by I/O type
+
3 Additional price for the absolute position encoder specification
+
4 Additional battery price for the absolute position encoder specification

The prices of combination patterns from page 9 (all incremental axes)

For field network specification, please add the price.

For the absolute position encoder specification, please add the price for the total number of axes in the controller.

Please add the battery price for the absolute position encoder specification. If the battery is not necessary such as it is an extra module to the controller, (if configuration code ABBN for absolute position encoder specification is selected), please omit the price for **4** .

Pattern No	1 Unit price (Incremental specification/ PIO specification)	2 Additional I/O type price	3 Additional absolute position encoder specification price	4 Additional battery price for the absolute position encoder specification	Standard price
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12		DeviceNet specification -	1st axis -	1st axis -	
13					
14		CC-Link specification -	2nd axis -	2nd axis -	
15					
16		PROFIBUS-DP -	3rd axis -	3rd axis -	
17					
18		CompoNet specification -	4th axis -	4th axis -	
19					
20			5th axis -	5th axis -	Specification specific standard price
21		MECHATROLINK specification -			
22			6th axis -	6th axis -	
23		EtherCAT specification -			
24			7th axis -	7th axis -	
25		EtherNet/IP specification -	8th axis -	8th axis -	
26					
27		ProfiNet specification -			
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

System configuration

Option
PC Software
(See P13)
RS232 connection version
Model RCM-101-MW-ENG
USB connection version
Model RCM-101-USB-ENG

Option
Teaching pendant
(See P13)
Model CON-PTA-C-ENG

PLC

Field Network
DeviceNet   CompoNet
CC-Link   EtherCAT
PROFIBUS-DP   EtherNet/IP
MECHATROLINK   ProfiNet

* MSEP is supported by Ver.9.01.00.00 or later

* MSEP is supported by Ver.1.10 or later

PIO flat cable
(See P6)
Model CB-MSEP-PI0020
Standard length: 2 m
Supplied with the PIO specification controller

* In order to connect to the field network, the compatible PC software is necessary to provide the gateway parameter configuration tool to configure the communication with the controller. If you don't have the software, please add it to your order. (See P13)

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

* Field network connection cable is not included.

5m

The cable is supplied with the PC Software

The cable is supplied with the absolute data backup battery

0.5m

DC24V
Power Supply
24V ◎
0V ◎
FG ◎

Option
Absolute data backup battery
(See P13) Model MSEP-ABB

Replacement battery
(See P13) Model AB-7

* If the absolute position encoder specification is selected as a controller unit, the absolute data backup battery is included. (See P12 for the dimensions)

<Connectable actuators>

Actuators in green are according to the pulse motor specification
Actuators in blue are according to the servo motor specification

Motor-encoder integrated cable
Model CB-PSEP-MPA□□□
Standard 1 m/ 3 m/ 5 m
Supplied with the actuator

Actuator RCP2 series
Excluding RCP2-RTBS/ RTCS

Motor-encoder integrated cable
Model CB-ASEP-MPA□□□
Standard 1 m/ 3 m/ 5 m
Supplied with the actuator

Actuator RCA series

Motor-encoder integrated cable
Model CB-RPSEP-MPA□□□
Standard 1 m/ 3 m/ 5 m
Supplied with the actuator

Actuator RCP2 compact rotary
(RCP2-RTBS/ RTCS)

* The rotary cannot operate with the 360-degree specifications (RCP2RT□SL/ RT□L/RT□BL)

Motor-encoder integrated cable
Model CB-APSEP-MPA□□□
Standard 1 m/ 3 m/ 5 m
Supplied with the actuator

Actuator RCP3 series
RCP2-GRSS/GRLS/GRST series
RCP2-SRA4R/SRGS4R/SRGD4R series
RCA2 series
RCL series (Note 1)

(Note 1) RCL series are not compatible with the absolute position encoder specification.

* When operating the RCP4, the actuator specification differs from those when operating with the PCON-CA. Please ask for details.

Motor-encoder integrated cable
Model CB-CA -MPA□□□

Motor-encoder integrated ROBOT cable
Model CB-CA -MPA□□□ - RB
Standard 1 m/ 3 m/ 5 m
Supplied with the actuator

* The Motor/Encoder cable type varies depending on the actuator type. When ordering a replacement cable, please see P14.

Actuator RCP4 series

PIO Controlled Motion Mode

The MSEP controller with the PIO control specification offers the following six-motion modes. In addition, Mode No. 0 through 2 support both the single and double solenoid valves for signal configuration.

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)

PIO Plug Chart
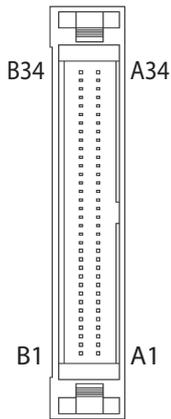
B34 A34

B1 A1

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	Input (Axis No. 0)	IN0	A19	Output (Axis No. 0)	OUT1
A3		IN1	A20		OUT2
A4		IN2	A21		OUT3
A5		IN3	A22	Output (Axis No. 1)	OUT4
A6	Input (Axis No. 1)	IN4	A23		OUT5
A7		IN5	A24		OUT6
A8		IN6	A25		OUT7
A9		IN7	A26	Output (Axis No. 2)	OUT8
A10	Input (Axis No. 2)	IN8	A27		OUT9
A11		IN9	A28		OUT10
A12		IN10	A29		OUT11
A13		IN11	A30	Output (Axis No. 3)	OUT12
A14	Input (Axis No. 3)	IN12	A31		OUT13
A15		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	Input (Axis No. 4)	IN16	B19	Output (Axis No. 4)	OUT17
B3		IN17	B20		OUT18
B4		IN18	B21		OUT19
B5		IN19	B22	Output (Axis No. 5)	OUT20
B6	Input (Axis No. 5)	IN20	B23		OUT21
B7		IN21	B24		OUT22
B8		IN22	B25		OUT23
B9		IN23	B26	Output (Axis No. 6)	OUT24
B10	Input (Axis No. 6)	IN24	B27		OUT25
B11		IN25	B28		OUT26
B12		IN26	B29		OUT27
B13		IN27	B30	Output (Axis No. 7)	OUT28
B14	Input (Axis No. 7)	IN28	B31		OUT29
B15		IN29	B32		OUT30
B16		IN30	B33		OUT31
B17		IN31	B34	0V	For I/O

PIO Flat Cable

Mode **CB-MSEP-PIO**☐☐☐

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

Flat Cable Ⓐ Cut edge

Flat Cable Ⓑ Cut edge
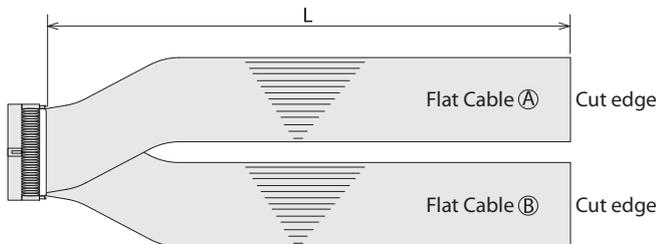
Connector: HIF6-068D-1.27R

Connection Chart

Connector: HIF6-068D-1.27R

Pin No.	Signal name			Pin No.	Signal name
A1	For I/O +24V			B1	For I/O +24V
A2	IN0			B2	IN16
A3	IN1			B3	IN17
A4	IN2			B4	IN18
A5	IN3			B5	IN19
A6	IN4			B6	IN20
A7	IN5			B7	IN21
A8	IN6			B8	IN22
A9	IN7			B9	IN23
A10	IN8			B10	IN24
A11	IN9			B11	IN25
A12	IN10			B12	IN26
A13	IN11			B13	IN27
A14	IN12			B14	IN28
A15	IN13	Flat cable Ⓐ		B15	IN29
A16	IN14			B16	IN30
A17	IN15			B17	IN31
A18	OUT0			B18	OUT16
A19	OUT1			B19	OUT17
A20	OUT2			B20	OUT18
A21	OUT3			B21	OUT19
A22	OUT4			B22	OUT20
A23	OUT5			B23	OUT21
A24	OUT6			B24	OUT22
A25	OUT7			B25	OUT23
A26	OUT8			B26	OUT24
A27	OUT9			B27	OUT25
A28	OUT10			B28	OUT26
A29	OUT11			B29	OUT27
A30	OUT12			B30	OUT28
A31	OUT13			B31	OUT29
A32	OUT14			B32	OUT30
A33	OUT15			B33	OUT31
A34	GND for I/O			B34	GND for I/O

Flat cable Ⓑ

9

PIO Input/Output Interface

■ Input External Input Specification

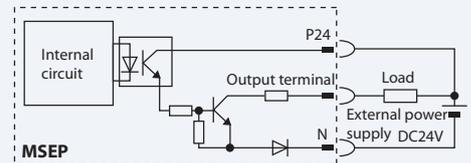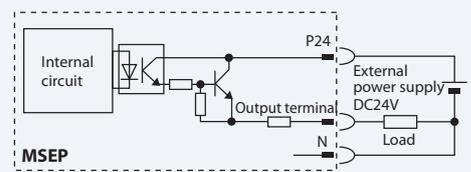| Item	Specification
Input voltage	DC24V ±10%
Input current	5mA, 1 circuit
ON/OFF voltage	ON voltage min. DC18V OFF voltage max. DC6V

NPN specification

External power supply DC24V — P24 — Input terminal — Internal circuit — **MSEP**

PNP specification

Input terminal — N — External power supply DC24V — Internal circuit — **MSEP**
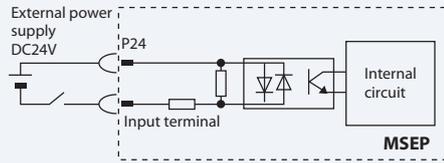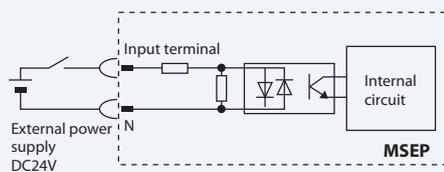
■ Output External Output Specification

Item	Specification
Load voltage	DC24V ±10%
Maximum load current	50mA, 1 circuit
Leakage current	max. 2mA/one point

NPN specification

Internal circuit — **MSEP** — P24 — Output terminal — Load — N — External power supply DC24V

PNP specification

Internal circuit — **MSEP** — P24 — Output terminal — External power supply DC24V — N — Load

Field network control motion mode

There are five motion modes to choose from in the field network control mode with the MSEP controller as follows.

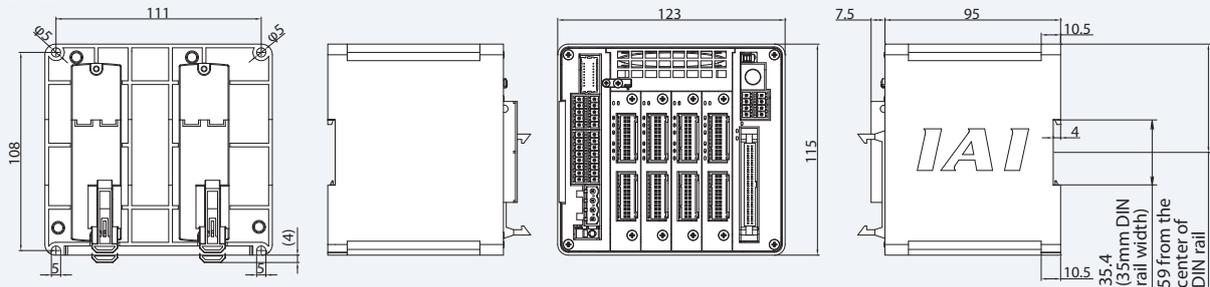| Motion pattern (*1)	Description	Outline
Positioner 1/ Simple numerical mode	Positioner 1 mode is programmable up to 256 positions of data to designate the stop position. The simple numerical control allows designating the target position numerically. They both have the capability of monitoring the current position.	PLC — Target position / Target position number / Control signal — Current position / End position number / Status signal — Communication via field network — Actuator
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.	PLC — Target position, Positioning width, Velocity, Acceleration, Pushing percentage, Control signal — Current position / Current value (Designated value) / Current velocity (Designated value) / Alarm code, Status signal — Communication via field network — Actuator
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.	PLC — Target position number / Control signal — End position number / Status signal — Communication via field network — Actuator
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..	PLC — Target position number / Control signal — End position number / Status signal — Communication via field network — Actuator
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) Only the positioner 3 mode and the SEP I/O mode are available with CompoNet and MECHATROLINK.

10

Table of General Specification

Specification item	Description						
Number of axes in the controller	Max. 8 axes						
Controller/ Motor input power	DC24V ±10%						
Controller power supply	2A						
Controller inrush current	Max. 5A, under 30 ms						
Motor consumption current	Servo motor type	Rated current	Maximum		Pulse motor type	Rated current	Maximum
			Energy saver	Standard/Hi-accel./decel.			
	2W	0.8A		4.6A	20P	1.0A	2.0A
	5W	1.0A		6.4A	28P	1.0A	2.0A
	10W(RCL)	1.3A		6.4A	35P	2.0A	2.0A
	10W(RCA/RCA2)		2.5A	4.4A			
	20W	1.3A	2.5A	4.4A	42P	2.0A	2.0A
	20W(20S type)	1.7A	3.4A	5.1A			
	30W	1.3A	2.2A	4.4A	56P	2.0A	2.0A
Motor inrush current	Slot numbers x max. 10A, under 5ms						
Motor-encoder cable length	Maximum length 20m (max. length 10m for absolute position encoder type)						
Serial communication (SIO port: dedicated teaching)	RS485 1ch (Modbus protocol compatible) Velocity 9.6~230.4kbps						
External interface — PIO specification	PIO specification : DC24 V dedicated signal in/output; maximum input of 4 points/axis; maximum output of 4 points/axis; maximum cable length 10 m						
External interface — Field network specification	DeviceNet, CC-Link, PROFIBUS-DP, MECHATROLINK, CompoNet, EtherCAT, EtherNet/IP, ProfiNet						
Data configuration and input method	PC software application, touch panel teaching pendant, gateway parameter configuration tool						
Data retention memory	Restore the position data and parameter in non-volatile memory (no limited 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 (DC24 V input).						
Surge protection	Overcurrent protection (An interception semiconductor circuit is furnished on each slot)						
Electric shock protection	Class I basic insulation						
Insulation resistance	DC500V 10MΩ						
Weight	620g, 690g with the absolute position encoder specification plus 1950 g absolute data backup battery (8-axis specification)						
Cooling method	Forced-air cooling						
Required ambient temperature/humidity for operation	0~40°C, under 85% RH (non-condensing)						
Vibration resistance	Frequency 10~57Hz/Amplitude 0.075mm Frequency 57~150Hz/Acceleration 9.8m/s^2 Each XYZ direction, sweep time 10 minutes, sweep count 10 times						
Shock resistance	150mm/s^2, 11 ms half sine wave pulse, each XYZ direction 3 times						
International protection code	IP20						

Exterior Dimensions

Controller

Absolute data backup battery box
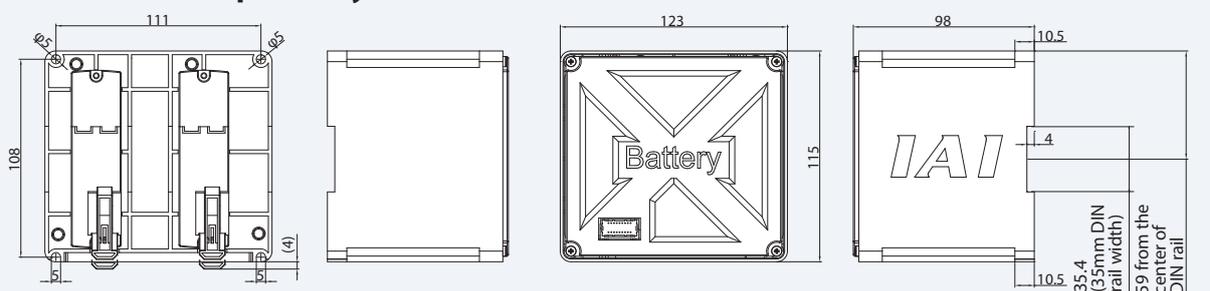
Names of the MSEP Controller components

1 | Motor-encoder connectors for the actuator connection

AX0   AX2   AX4   AX6

7 Fan unit

2 Connector for the absolute data backup battery

8 AUTO/MANUAL switch

3 Connector for the external brake input

9 SIO connector

4 Connector for the emergency stop input for power source shut-off

10 System I/O connector

5 Information card for the connecting axes configuration

11 PIO connector/ field network connection connector

6 +24 V power source input connector

AX1   AX3   AX5   AX7

(Note) All the connectors are represented as AX0 through AX7. Please be aware that the motor-encoder cable for the first axis is to be connected to AX0 and the second axis to AX1 respectively.

■ 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 (*1).

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 box and the connecting cable for PC 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**
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.

(*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.
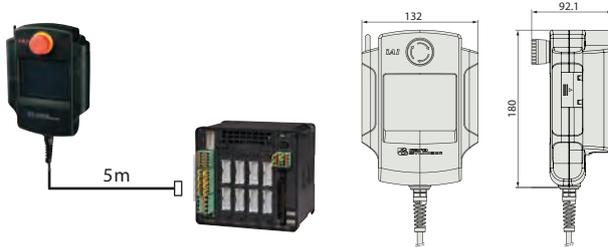
Options

Teaching pendant

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

Model **CON-PTA-C-ENG** (Touch panel teaching pendant)

Setting

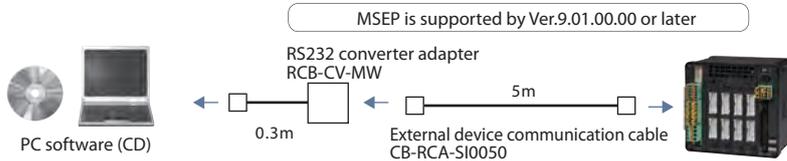132   92.1   180   5m

Specification

Item	CON-PTA-C-ENG
Data input	○
Actuator motion	○
Operating ambient temperature/humidity	Temperature 0 to 40°C, humidity 85%RH or less
Operating environment	Free from corrosive gas and especially, considerably dusty condition
Protection degree	IP40
Weight	Approximately 570g
Cable length	5m
Display	65536 color White LED back light

PC software (Windows only) * For the field network specification, the PC 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.
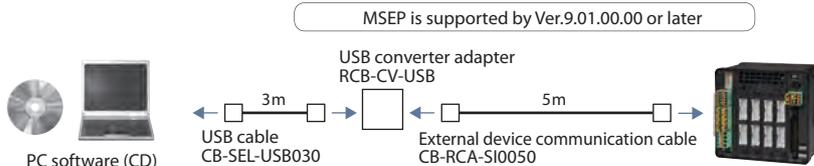
Model **RCM-101-MW-ENG** (External device communication cable + RS232 conversion unit)

MSEP is supported by Ver.9.01.00.00 or later

Setting

PC software (CD)

RS232 converter adapter RCB-CV-MW

0.3m

5m

External device communication cable CB-RCA-SI0050

Model **RCM-101-USB-ENG** (External device communication cable + USB converter adapter + USB cable)

MSEP is supported by Ver.9.01.00.00 or later

Setting

PC software (CD)

3m

USB cable CB-SEL-USB030

USB converter adapter RCB-CV-USB

5m

External device communication cable CB-RCA-SI0050

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.

Note: When 3 or more servo actuators with the HA option are used then a regeneration resistor is recommended to convert the excess motor current into heat.

Model **RER-1**

Exterior dimensions

500   ø4.2   8   12   3   6   48   9.5   9.5   2.8   14   0.6

Square shape helix resistor: BGR10THA12RJ (KOA)
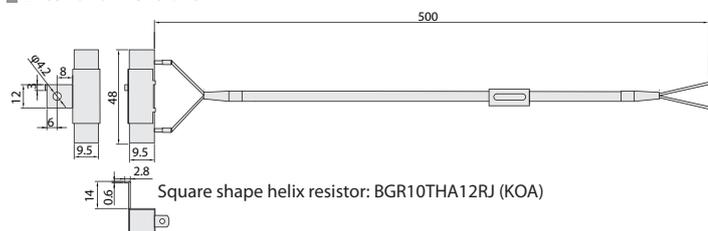
Driver board

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

Type			Model	
For the pulse motor	Incremental	1-axis	MSEP-PD1-I	
		2-axis	MSEP-PD2-I	
	Absolute position encoder	1-axis	MSEP-PD1-A	
		2-axis	MSEP-PD2-A	
For the servo motor	Incremental	1-axis	MSEP-AD1-I	
		2-axis	MSEP-AD2-I	
	Absolute position encoder	1-axis	MSEP-AD1-A	
		2-axis	MSEP-AD2-A	

Box for the absolute data backup battery

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** (Battery not included)

Exterior dimensions **See P12**

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

Replacement battery

Summary The replacement battery for the absolute data backup battery box.
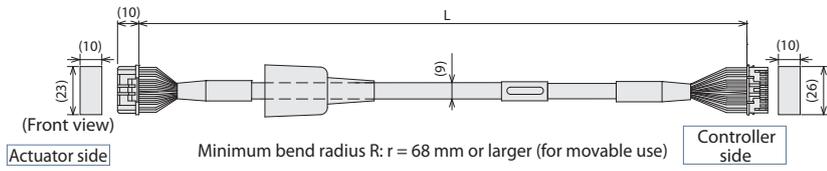
Model **AB-7**

Replacement fan unit

Model **MSEP-FU**

Service parts

Integrated Motor-Encoder Cable/ Motor-Encoder Robot Cable for RCP4

Model **CB-CA-MPA**☐☐☐ **/ CB-CA-MPA**☐☐☐**-RB**

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

(Front view)
Actuator side

Minimum bend radius R: r = 68 mm or larger (for movable use)

Controller side

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

* Color in ( ) indicates color of robot cable

Integrated Motor-Encoder Cable for RCP3/RCA2 and others

Model **CB-APSEP-MPA**☐☐☐

* Robot cable is the standard specification.
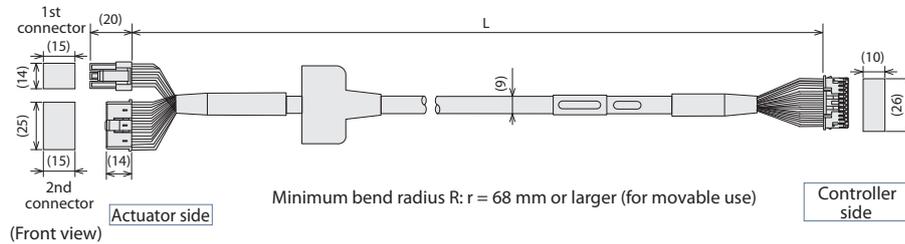Please indicate cable length (L) in ☐☐☐, maximum 20 m. e.g.) 080=8 m

(Front view)
Actuator side

Minimum bend radius R: r = 68 mm or larger (for movable use)
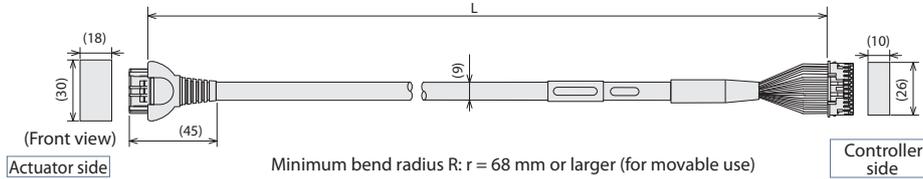
Controller side

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

Integrated Motor-Encoder Cable for RCP2

Model **CB-PSEP-MPA**☐☐☐

* Robot cable is the standard specification.
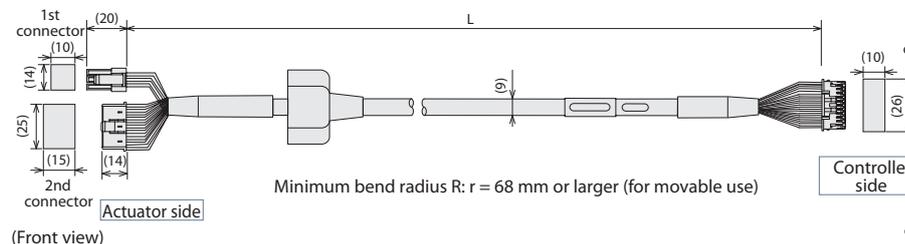Please indicates cable length (L) in ☐☐☐, maximum 20 m. e.g.) 080=8 m

1st connector
2nd connector
(Front view)
Actuator side

Minimum bend radius R: r = 68 mm or larger (for movable use)

Controller side

Actuator side Pin number		Controller side Pin number
1	Black [ØA]	1
2	White [VMM]	2
4	Red [ØB]	3
5	Green [VMM]	4
3	Brown [Ø/A]	5
6	Yellow [Ø/B]	6
16	Orange [BK+]	9
17	Gray [BK-]	10
5	NC	11
6	NC	12
13	Black [LS+]	7
14	Brown [LS-]	8
1	White [A+]	13
2	Yellow [A-]	14
3	Red [B+]	15
4	Green [B-]	16
10	White (label)[VCC]	17
11	Yellow (label)[VPS]	18
9	Red (label)[GND]	19
12	Green (label)[(Spare)]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield [FG]	24

Integrated Motor-Encoder Cable for RCA

Model **CB-ASEP-MPA**☐☐☐

* Robot cable is the standard specification.
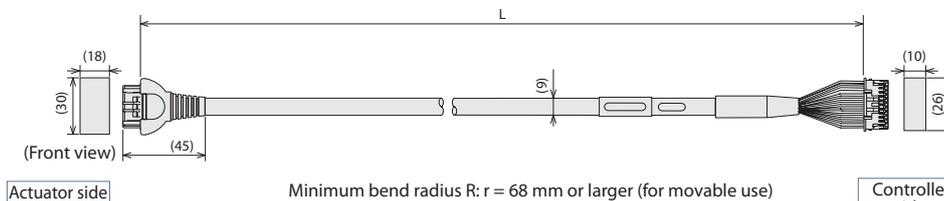Please indicates cable length (L) in ☐☐☐, maximum 20 m. e.g.) 080=8 m

1st connector
2nd connector
(Front view)
Actuator side

Minimum bend radius R: r = 68 mm or larger (for movable use)

Controller side

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

Integrated Motor-Encoder Cable for RCP2 Compact Rotary

Model **CB-RPSEP-MPA**☐☐☐

* Robot cable is the standard specification.
Please indicate cable length (L) in ☐☐☐, maximum 20 m. e.g.) 080=8 m

(Front view)
Actuator side

Minimum bend radius R: r = 68 mm or larger (for movable use)

Controller side

Actuator side Pin number		Controller side Pin number
A1	Black [ØA]	1
B1	White [VMM]	2
A2	Brown [Ø/A]	5
B2	Green [ØB]	3
A3	Yellow [VMM]	4
B3	Red [Ø/B]	6
A6	Orange [LS+]	7
B6	Gray [LS-]	8
A7	Red [A+]	13
B7	Green [A-]	14
A8	Black [B+]	15
B8	Brown [B-]	16
A4	NC	
B4	NC	-
A5	Black (label)[BK+]	9
B5	Brown (label)[BK-]	10
A9	Green (label)[GNDLS]	20
B9	Red (label)[VPS]	18
A10	White (label)[VCC]	17
B10	Yellow (label)[GND]	19
A11	Shield [FG](FG)	24
B11	NC	22
	NC	23

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