IAI
Quality and Innovation

RCS2/RCS3/Single-axis Robot/ Linear Motor Position Controller

S CON-CA

www.intelligentactuator.de

SCON Servo Controllers
Have Become Even More Advanced!

SCON controllers have been dramatically revamped with new functions.

Basic specifications

|	
Number of positioning points:	Up to 512 points
Power-supply voltage types:	Single-phase 115 VAC
	Single-phase 230 VAC
Encoder type:	Incremental
	Absolute

1 Increasing the actuator's load capacity with offboard tuning
<Standard function>

Offboard tuning is a function to increase the acceleration/deceleration when the load mass is small, or decrease the acceleration/deceleration when the load mass is large, so that the actuator is set to operate optimally for the given load mass.

For details ➜P3

Correlation diagram of acceleration/deceleration and payload
RCS2-SA5C 20W, lead 20 (horizontal installation)

Payload [kg]

- Standard specification
- Offboard tuning specification

Acceleration/deceleration [G]
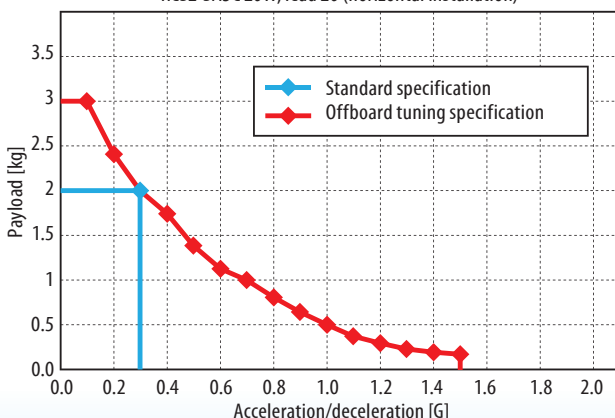
2 Supporting major field networks
<Optional function>

Direct connection is now possible not only to DeviceNet, CC-Link (*1) and PROFIBUS-DP, but also to MECHATROLINK, CompoNet, EtherCAT and EtherNet/IP. The actuator can also be operated by specifying coordinate values directly via a field network.

(*1) CC-Link was changed from remote I/O to remote device.

For details ➜P4

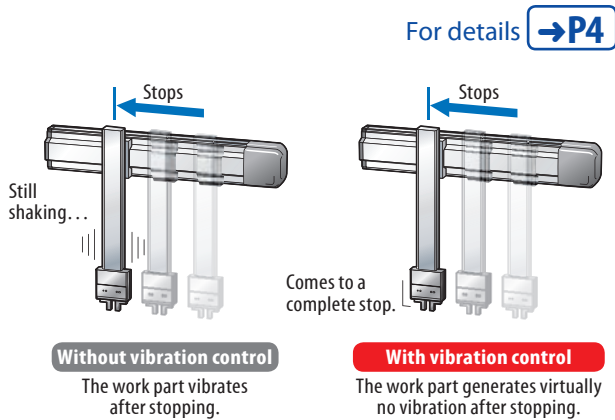CC-Link   CompoNet™

EtherCAT®   EtherNet/IP™

# 3 Vibration control function <Standard function>

A vibration control function has been added that suppresses vibration of the work part installed on the slider when the actuator's slider moves. This function shortens the time the actuator waits for vibration to settle, and consequently shortens the cycle time.

For details ➡P4

Stops

Stops

Still shaking...

Comes to a complete stop.

Without vibration control
The work part vibrates after stopping.

With vibration control
The work part generates virtually no vibration after stopping.

4 Force control function
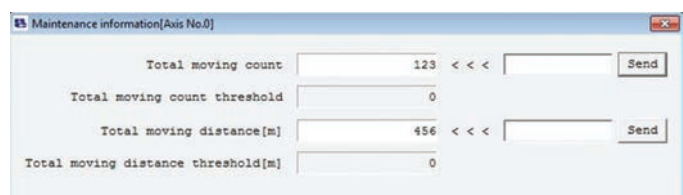Actuator: <Optional function>
Controller: <Standard function>

The RCS2-RA13R comes with a force control function that allows for accurate push-motion operation by feeding back the push force using the dedicated load cell fitted on the actuator.

For details ➡P5
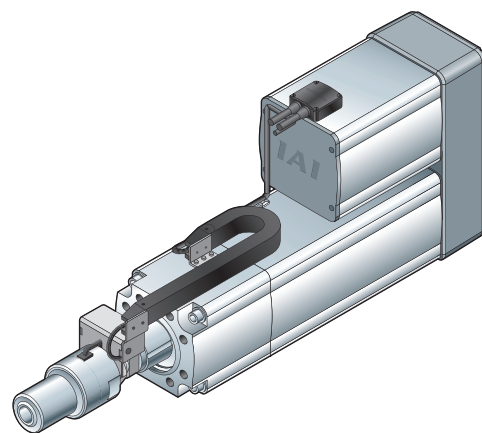
5 Checking when to maintain based on the total number of movements and total distance travelled
<Standard function>

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.

Maintenance information[Axis No.0]

Total moving count	123 <<<	Send
Total moving count threshold	0	
Total moving distance[m]	456 <<<	Send
Total moving distance threshold[m]	0	

6 Keeping the alarm generation times with the calendar function
<Standard function>

The clock function has been added to facilitate the analysis of the alarms because the time and date of each alarm that has occurred is now shown on the alarm history screen.
(The time and date data is retained for 10 days.)
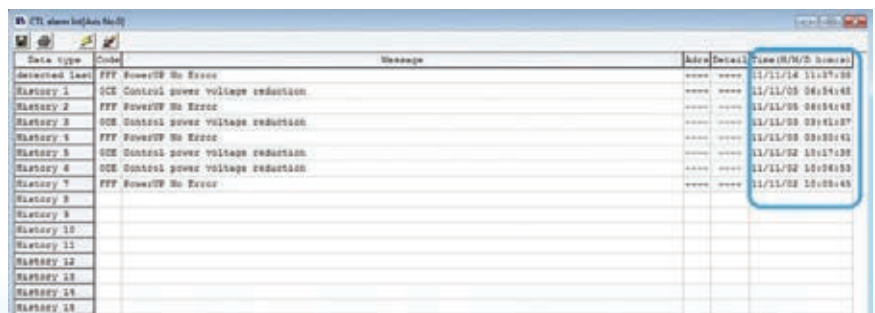
Offboard Tuning Function

Increasing the Actuator's Load Capacity

Offboard tuning is a function to automatically set an optimal gain according to the load, in order to improve the payload and acceleration/deceleration and thereby increase the payload capacity and shorten the takt time.

Supported by PC software Ver. 8.05.00.00 or later

Offboard tuning provides the following three benefits:
① By setting a lower acceleration/deceleration, a load exceeding the rated payload can be transported.
② If the load is smaller than the rated payload, the acceleration/deceleration can be increased.
③ The maximum speed can be increased.

Example) The graph on the right shows the benefits of offboard tuning with an RCS2-SA5C of lead 20.

① When the acceleration/deceleration is lowered to 0.1 G from the rated acceleration of 0.3 G, the maximum payload increases from 2 kg to 3 kg.

② If the load is small, the acceleration/deceleration can be increased to a maximum of 1.5 G.

③ The maximum speed can be increased from the standard specification of 1300 mm/s to 1660 mm/s.
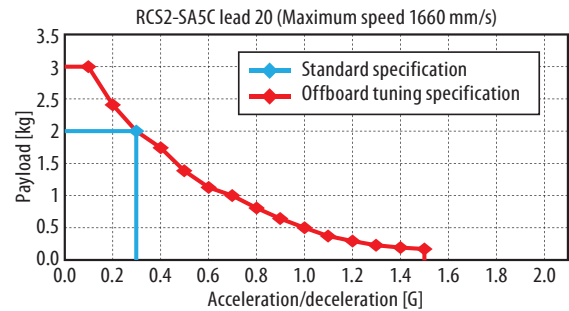
Offboard tuning is effective only when a SCON-CA controller is combined with one of the actuators listed below. Also note that the specific benefits vary depending on the actuator model. (See the table below.)

RCS2-SA5C lead 20 (Maximum speed 1660 mm/s)

■ Models Supporting Offboard Tuning and Benefits

Series	Type	Lead	Motor	Horizontal installation					
				Standard specification			After offboard tuning		
				Rated acceleration	Payload	Maximum speed	Maximum acceleration	Payload	Maximum speed
		mm	W	G	kg	mm/s	G	kg	mm/s
RCS2	SA4C	10	20	0.3	4	665	1.5	0.5	665
	SA5C	20	20		2	1300	1.5	0.2	1660
	SA6C	20	30		3	1300	1.5	0.25	1660
	SA7C	16	60		12	800	2	1	1060
	SS7C	12	60		15	600	2	2	800
	SA4R	10	20		4	665	0.8	1	665
	SA5R	12	20		4	800	0.8	1	800
	SA6R	12	30		6	800	0.8	1	800
	SA7R	16	60		12	800	0.8	3.5	800
	SS7R	12	60		15	600	0.8	4	600
	RA4C	12	20		3	600	1	0.25	600
			30		4	600	1.5	0.25	600
	RA5C	16	60		12	800	1.5	2	800
			100		15	800	1.5	2.5	800
RCS3	SA8C/SS8C	30	100	1	1	1800	2	0.25	2000
			150		2	1800	2	0.5	2000
	SA8R/SS8R	30	100		1	1800	1.2	0.25	1800
			150		2	1800	1.2	1	1800
RCS2CR	SA4C	10	20	0.3	4	665	0.3	4	665
	SA5C	20	20		2	1300		2	1330
	SA6C	20	30		3	1300		3	1330
	SA7C	16	60		12	800		12	800
	SS7C	12	60		15	600		15	600
RCS3CR	SA8C/SS8C	30	100	1	1	1800	1	1	1800
			150		2	1800		2	1800
ISB ISPB	SXM/SXL	16	60	1.2	3.5	960	2	1.5	960
	MXM/MXL	30	100		3	1800		0.75	1800
			200		9	1800		4.5	1800
	LXM/LXL	40	200		6	2400		2	2400
			400		15	2400		6.5	2400
ISDB ISPDB	S	16	60	1	4.5	960	1.8	1.8	960
	M	30	100		4	1800		1.25	1800
			200		12	1800		5.5	1800
	L	40	200		7	1800		2.5	1800
			400		17	1800		7	1800
SSPA	SXM	30	200	1.2	10	1800	2	4.5	1800
	MXM	40	400		13.5	2400		5.5	2400
	LXM	50	750		20	2500		8	2500
ISDBCR ISPDBCR	S	16	60	1	4.5	960	1	4.5	960
	M	30	100		4	1800		4	1800
			200		12	1800		12	1800
	L	40	200		7	1800		7	1800
			400		17	1800		17	1800
SSPDACR	SXM	30	200	1.2	10	1600	1.2	10	1600
	MXM	40	400		13.5	1600		13.5	1600
	LXM	50	750		20	1600		20	1600

Network Function

Supporting Major Field Networks

Most of the major networks are supported, which means the controller can communicate with various equipment through simple, wire-saving connections.

■ Supported Networks

DeviceNet

CC-Link

PROFIBUS DP

CompoNet

MECHATROLINK

EtherCAT

EtherNet/IP
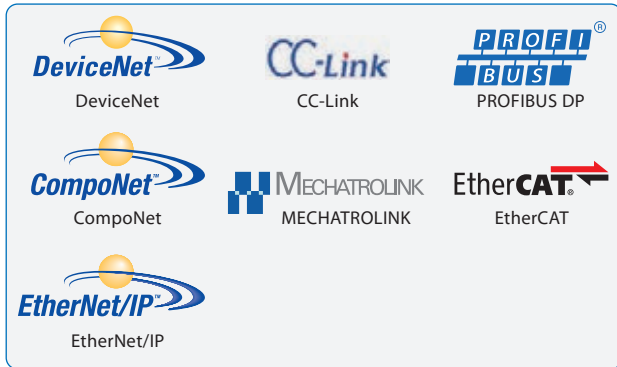
■ Operating Method

To operate the actuator via a network, you can do so by selecting one of the nine operation modes classified under the following two types of movement methods.

(1) Movement by position number specification
Enter the target position, speed, acceleration/deceleration, etc., under a position number in the position data table of the controller and specify the position number via a network to operate the actuator.

| Operation modes | Remote I/O mode (3 types)
Position/simple direct mode (2 types) |

(2) Movement by direct numerical specification
The target position, speed, acceleration/deceleration, etc., are directly sent as numerical values to operate the actuator.

| Operation modes | Half direct mode (3 types)
Full direct mode (1 type) |

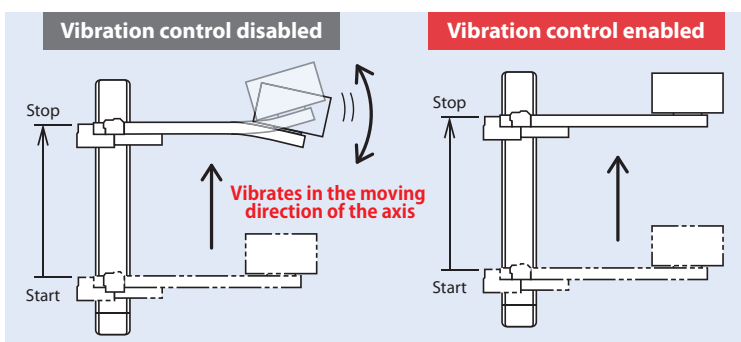### ■ List of Functions by Operation Mode

	Movement by position number specification					Movement by direct numerical specification			
	Remote I/O mode			Position/simple direct mode		Half direct mode			Full direct mode
	1	2	3	1	2	1	2	3	
Position data specified operation	—	—	—	○	○	○	○	○	○
Direct speed/acceleration specification	—	—	—	—	—	○	○	○	○
Push-motion operation	○	○	○	○	○	○	○	○	○
Current position read	—	○	○	○	○	○	○	○	○
Current speed read	—	○	○	○	○	○	○	○	○
Position number specified operation	○	○	○	○	○	—	—	—	—
Completed position number read	○	○	○	○	○	—	—	—	—
Maximum number of position tables	512	512	512	768	768	Not used	Not used	Not used	Not used
Force control	△	△	○	—	○	—	○	—	○
Vibration control	○	○	○	○	○	—	—	○	○

Note The contents of the above table and numbers of occupied bytes (numbers of occupied stations) vary depending on the network type. For details, refer to the operation manual.

Vibration Control

Shortening the Cycle Time

Vibration control is a function to suppress vibration of the work part overhanging from the slider surface of the actuator. Since the time the actuator remains on standby until the work part stops vibrating is shortened and the next operation can be started right away, this function can effectively shorten the cycle time, etc.

Vibration control disabled

Stop

Start

Vibrates in the moving direction of the axis

Vibration control enabled

Stop

Start

The following types of vibration can be suppressed:

① Vibration of the load induced by the IAI's actuator, where the load vibrates in the same direction as the moving direction of the actuator
② Vibration at frequencies of 0.5 Hz to 30Hz

Note Take note that the following types of vibration are not covered by vibration control:
 • Vibration not caused by an actuator operation (caused by an external force)
 • Vibration whose source is located not in the moving direction of the actuator
 • Vibration that has already started before the actuator moves
 • Vibration resulting from operation in the pulse-train input mode
 • Vibration resulting from home return operation or push-mode operation

4

Force Control Function

Usable As a Simple Servo Press

Force control is a function that allows for more accurate push control than the traditional push-motion operation, by feeding back the push force via the dedicated load cell (actuator option) fitted on the actuator. When this function is enabled on an actuator of the ultra-high thrust type where the dedicated load cell can be mounted, the actuator can be used as a simple servo press of up to 2 tons (19600 N) in capacity.
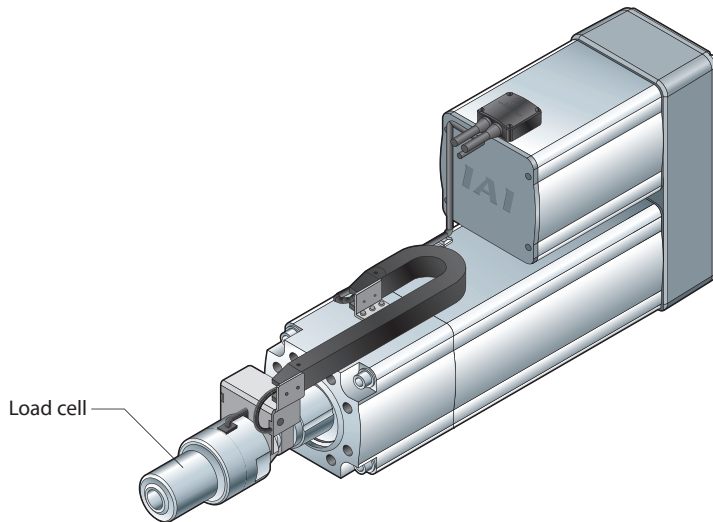
Load cell

■Load Cell Specifications

| Item	Specification
Load cell method	Strain gauge, hollow cylinder type
Rated capacity	20000N
Allowable overload	200%R.C*
Accuracy	±1%R.C*
Specified temperature range	0~40°C
Dielectric voltage	DC50V

*RC: Rated capacity

Note
- The optional load cell is used only for push-motion operation. Force control cannot be implemented in tensile direction.
- The load cell has a life of 2 million pushes.
- The load cell specifications apply to the load cell alone and not to the actuator as a whole.
- The force control function cannot be used if the actuator operates in the pulse-train mode.

■Purpose of Use
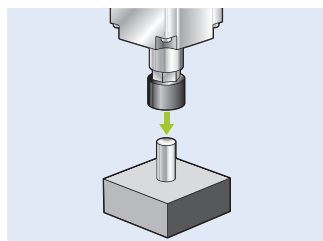
Press-fitting pins
The push force can be controlled accurately.
Also, defects can be recognized by setting an appropriate threshold even when the pins to be press-fitted are thin and loose.
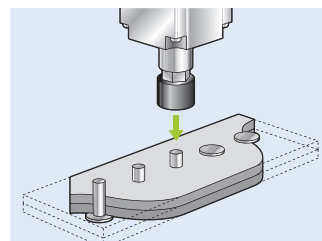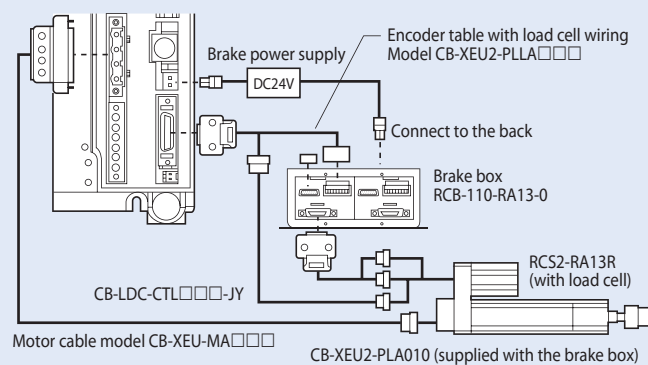
Clinching
A different push force can be set precisely for each product, and whether the clinching completion position has been reached can be checked, as well.

■How to Use

An ultra-high thrust actuator with load cell (RCS2-RA13R) is required to implement force control. Push-motion operation is performed in the same manner as before, so all you need is to set a desired push force in the position data table in percent (%).

With brake

Brake power supply
DC24V
Encoder table with load cell wiring
Model CB-XEU2-PLLA□□□
Connect to the back
Brake box
RCB-110-RA13-0
CB-LDC-CTL□□□-JY
RCS2-RA13R
(with load cell)
Motor cable model CB-XEU-MA□□□
CB-XEU2-PLA010 (supplied with the brake box)

Without brake

Encoder table with load cell wiring
Model CB-XEU2-PLLA□□□
RCS2-RA13R
(with load cell)
Motor cable model CB-XEU-MA□□□
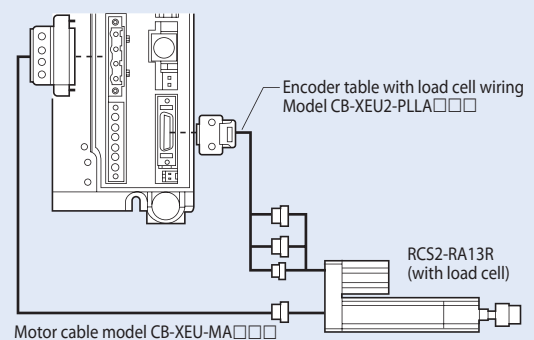
Ultra-high Thrust Actuator with Load Cell <RCS2-RA13R-LCT/LCN>

■ Model Specification Items

RCS2	—	RA13R	—	☐	—	750	—	☐	—	☐	—	T2	—	☐	—	☐	—	LCT/LCN
Series		Type		Encoder type		Motor type		Lead		Stroke		Applicable controller		Cable length		Options		Load cell model

Encoder type	Motor type	Lead	Stroke	Applicable controller	Cable length	Options	Load cell model
I: Incremental specification A: Absolute specification	750: Servo motor 750W	2.5: 2.5mm 1.25: 1.25mm	50: 50mm ∼ 200: 200mm (every 50mm)	T2: SCON SSEL XSEL-P/Q	N: None P: 1 m S: 3 m M: 5 m X☐☐: Specified length R☐☐: Robot cable	Refer to the options table below. * Be sure to enter codes indicating the motor side-mounted direction and cable exit position, respectively.	LCT: With cable track for load cell wiring LCN: Without cable track for load cell wiring

■ External Dimensions

Cable track for load cell wiring

(286)
(154.5)
154.5
ø70
ø50
(130)
124　90　(st+439.5)
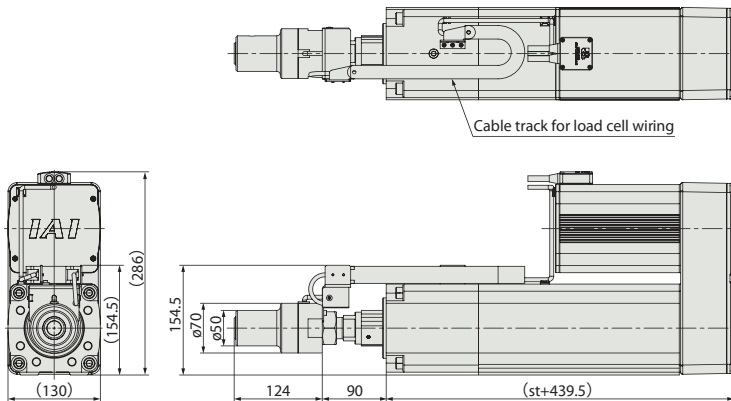
■ Correlation Diagram of Push Force and Current Limit
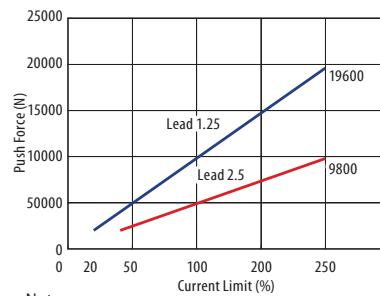
Note:
• The accuracy of push force corresponds to the accuracy range of the load cell (±1% of rated capacity).
• The push force can be adjusted in a range of 2000 N to 9800 N when the lead is 2.5, or in a range of 2000 N to 19600 N when the lead is 1.25.

POINT
Notes on selection

(1) When push-motion operation is performed, the continuous operating time is determined by the push force you have set. Also note that the continuous operation thrust that factors in the load and duty must be smaller than the rated thrust even during normal operation.
(2) The value of the payload assumes an acceleration of 0.02 G when the lead is 2.5, or acceleration of 0.01 G when the lead is 1.25. The above value is at the maximum acceleration.
(3) The value of the horizontal payload assumes that no external force is applied to the rod from any direction other than the moving direction.
(4) If the actuator comes with a brake (optional), the brake box (supplied with the brake) is required in addition to the actuator and controller.

Actuator Specifications

■ Leads and Payloads

Model number	Motor output (W)	Lead (mm)	Maximum acceleration (G)	Maximum payload Horizontal (kg)	Maximum payload Vertical (kg)	Rated thrust (N)	Continuous push force (N)	Maximum push force (N)	Stroke (mm)
RCS2-RA13R-①-750-2.5-②-T2-③-④	750	2.5	0.02	400	200	5106	3567	9800	50~200 (every 50mm)
RCS2-RA13R-①-750-1.25-②-T2-③-④		1.25	0.01	500	300	10211	7141	19600	

Code explanation　① Encoder type　② Stroke　③ Cable length　④ Options

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	50	100	150	200
2.5	85	120	125	
1.25	62			

(unit: mm/s)

Cable Length

Type	Cable code	
Standard type	P (1m)	
	S (3m)	
	M (5m)	
Special length	X06 (6m) ~X10 (10m)	
	X11 (11m) ~X15 (15m)	
	X16 (16m) ~X20 (20m)	
Robot cable	R01 (1m) ~R03 (3m)	
	R04 (4m) ~R05 (5m)	
	R06 (6m) ~R10 (10m)	
	R11 (11m) ~R15 (15m)	
	R16 (16m) ~R20 (20m)	

Options

Name	Option code	
Brake (with brake box)	B	
Brake (without brake box)	BN	
Motor side-mounted to the top	MT1/MT2/MT3	
Motor side-mounted to the right	MR1/MR2	
Motor side-mounted to the left	ML1/ML3	
Flange	FL	
Foot bracket	FT	
With load cell (with cable track for the wiring)	LCT	
With load cell (without cable track for the wiring)	LCN	

Actuator Specifications

Item	Description
Drive system	Ball screw Ø32mm, rolled C10
Positioning repeatability	±0.01mm
Backlash	0.2mm or less
Rod diameter	Ø50mm (ball spline)
Allowable rod load moment	120 N-m
Ambient operating temperature, humidity	0 to 40℃, 85% RH or less (Non-condensing)
Push-motion operation life of load cell	2 million operations (*1)

(*1) The actuator life is 10 million operations. The load cell can be replaced.

Details of the SCON-CA Controllers

List of Models

Model	SCON-CA							
External view								
I/O type	Standard specification	Network connection specification (optional)						
I/O type specification	PIO connection specification (*1)	DeviceNet	CC-Link	PROFIBUS-DP	CompoNet	MECHATROLINK	EtherCAT	EtherNet/IP
I/O type code	NP/PN	DV	CC	PR	CN	ML	EC	EP
Applicable encoder type	Incremental / Absolute	Incremental/Absolute						

(*1) If the controller is operated in the pulse-train mode, only an incremental encoder can be used.

Model

SCON – CA – ☐ ☐ ☐ – ☐ – ☐ – ☐

Series — Type — Motor type — Encoder type — Option — I/O type — I/O cable length — Power supply voltage

CA	High-function type

HA	High-acceleration/deceleration specification

Please refer to each actuator catalog for the detail.

1	Single phase 115VAC
2	Single phase 230VAC

20	20W motor
30D	30W motor (for RCS2)
30R	30W motor (for RS)
60	60W motor
100	100W motor
100S	For LSA-N10
150	150W motor
200	200W motor
200S	For LSA-S10H/N15
300S	For LSA-N19
400	400W motor
600	600W motor
750	750W motor
750S	For 750W actuator with load cell

I	Incremental
A	Absolute

NP	PIO NPN specification (standard)
PN	PIO PNP specification
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

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

*If "DV","CC","PR","CN","ML","EC" or "EP" is selected for the I/O type, select "0" for the I/O cable length.

System Configuration

PLC

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

*If the host unit is of the open-collector type, use the optional AK-04/JM-08. (See below.)

I/O flat cable
<Model CB-PAC-PI0020>
Cable length
Standard 2m (comes with the controller)

Pulse-train control plug + shell (comes with the controller)

Pulse-train control cable
<Model CB-SC-PIOS□□□>
(Options)

Main power supply Single phase 115VAC
Single phase 230VAC

* Be sure to use a noise filter when connecting the power supply.

Recommended model: NF2010A-UP (Manufacturer: Soshin Electric)
(You can also purchase this noise filter through IAI. Contact us for details.)

Absolute data backup battery (See P14.)
<Model AB-5>
(comes with the controller with the absolute specification)

Regenerative resistance unit (See P14.)
<Model REU-2>
(Options)

PC software (See P14)
RC 232 connection version
<Model RCM-101-MW-EU>
USB connection version
<Model RCM-101-USB-EU>
* The cable is supplied with the PC software.

Teaching pendant (See P14.)
<Model CON-PTA-C-ENG>
<Model CON-T-ENG>

Motor cable
<Model CB-XEU-MA□□□>
Standard 1m/3m/5m

**Actuator
RCS2 Series/RCS3 Series/Single-Axis Robot/
Linear Motor**

Encoder cable
Standard: CB-XEU3-PA□□□
With load cell: CB-XEU2-PLLA□□□
Standard 1m/3m/5m

●Pulse Converter: AK-04

Open-collector command pulses are converted to differential command pulses. Use this converter if the host controller outputs open-collector pulses.

▌Specification

Item	Specification
Input power	24 VDC±10% (Max. 50mA)
Input pulse	Open-collector (Collector current: 12mA max.)
Input frequency	200kHz or less
Output pulse	Differential output (10mA max.) (26C31 or equivalent)
Mass	10g or less (excluding cable connectors)
Accessories	37104-3122-000L (e-CON connector) x 2 Applicable wire: AWG Nos. 24 to 26

Opencollector Input
1 24V
2 GND
3 PP
4 NP

AK—04

Differential Output
PP 1
/PP 2
NP 3
/NP 4

IAI

20
10
50
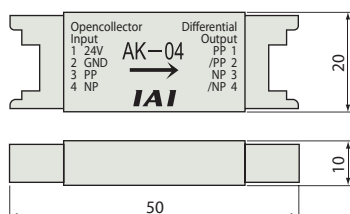
## ●Pulse Converter: JM-08

Difference feedback pulses are converted to open-collector feedback pulses. Use this converter if the host controller inputs open-collector pulses.

▌Specification

Item	Specification
Input power	24 VDC±10% (Max. 50mA)
Input pulse	Differential input (10 mA max.) (conforming to RS422)
Input frequency	500kHz or less
Output pulse	24-VDC open-collector (Collector current: 25mA max.)
Mass	10g or less (excluding cable connectors)
Accessories	37104-3122-000FL (e-CON connector) x 2 Applicable wire: AWG Nos. 24 to 26

Opencollector Input
1 24V
2 GND
3 PP
4 NP

JM—08

Differential Output
PP 1
/PP 2
NP 3
/NP 4

IAI

20
10
10
50

8
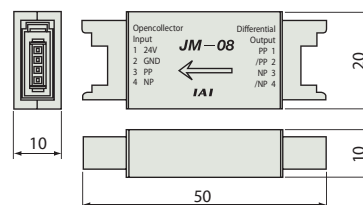
Operation Modes

With this controller, you can select a desired control method from the two modes of positioner mode and pulse-train control mode.
In the positioner mode, you can enter position data (target position, speed, acceleration, etc.) in the controller under the desired numbers and then specify each number externally via a I/O (input/output signal) to operate the actuator.
Also, in the positioner mode, you can select the desired operation mode from the eight modes using the parameter.
In the pulse-train control mode, you can control the travel, speed, acceleration, etc., by sending pulses from an external pulse generator.

Mode		Number of positioning points	Features
Positioner mode	Positioning mode	64 points	Standard factory-set mode. Specify externally a number corresponding to the position you want to move to, to operate the actuator.
	Teaching mode	64 points	In this mode, you can move the slider (rod) via an external signal and register the stopped position in the position data table.
	256-point mode	256 points	In this mode, the number of positioning points available in the positioning mode has been increased to 256 points.
	512-point mode	512 points	In this mode, the number of positioning points available in the positioning mode has been increased to 512 points.
	Solenoid value mode 1	7 points	In this mode, the actuator can be moved only by turning signals ON/OFF, just like you do with an air cylinder of solenoid valve type.
	Solenoid value mode 2	3 points	In this mode, the output signal is set to the same as the air cylinder auto switch in the solenoid valve mode.
	Force mode 1	32 points	In this mode, you can move to positions under force control in the positioning mode. (Up to 32 positioning points are available.)
	Force mode 2	5 points	In this mode, you can move to positions under force control in the solenoid valve mode. (Up to five positioning points are available.)
Pulse-train control mode		—	There is no need to enter position data in the controller, and the customer can operate the actuator freely based on custom control.

I/O Signal Table * You can select one of nine types of I/O signal assignments.

Pin No.	Category	Positioning point	Parameter (PIO pattern) selection								Pulse-train mode
			0	1	2	3	4	5	6	7	0
			Positioning mode	Teaching mode	256-point mode	512-point mode	Solenoid value mode 1	Solenoid value mode 2	Force mode 1	Force mode 2	Standard mode
			64 points	64 points	256 points	512 points	7 points	3 points	32 points	5 points	—
1A	24V		P24								P24
2A	24V		P24								P24
3A	—		NC								NC
4A	—		NC								NC
5A	Input	IN0	PC1	PC1	PC1	PC1	ST0	ST0	PC1	ST0	SON
6A		IN1	PC2	PC2	PC2	PC2	ST1	ST1(JOG+)	PC2	ST1	RES
7A		IN2	PC4	PC4	PC4	PC4	ST2	ST2(−)	PC4	ST2	HOME
8A		IN3	PC8	PC8	PC8	PC8	ST3	—	PC8	ST3	TL
9A		IN4	PC16	PC16	PC16	PC16	ST4	—	PC16	ST4	CSTP
10A		IN5	PC32	PC32	PC32	PC32	ST5	—	—	—	DCLR
11A		IN6	—	MODE	PC64	PC64	ST6	—	—	—	BKRL
12A		IN7	—	JISL	PC128	PC128	—	—	—	—	RMOD
13A		IN8	—	JOG+	—	PC256	—	—	CLBR	CLBR	—
14A		IN9	BKRL	JOG−	BKRL	BKRL	BKRL	BKRL	BKRL	BKRL	—
15A		IN10	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	—
16A		IN11	HOME	HOME	HOME	HOME	HOME	—	HOME	HOME	—
17A		IN12	*STP	*STP	*STP	*STP	*STP	—	*STP	*STP	—
18A		IN13	CSTR	CSTR/PWRT	CSTR	CSTR	—	—	CSTR	—	—
19A		IN14	RES	RES	RES	RES	RES	RES	RES	RES	—
20A		IN15	SON	SON	SON	SON	SON	SON	SON	SON	—
1B	Output	OUT0	PM1	PM1	PM1	PM1	PE0	LS0	PM1	PE0	PWR
2B		OUT1	PM2	PM2	PM2	PM2	PE1	LS1(TRQS)	PM2	PE1	SV
3B		OUT2	PM4	PM4	PM4	PM4	PE2	LS2(−)	PM4	PE2	INP
4B		OUT3	PM8	PM8	PM8	PM8	PE3	—	PM8	PE3	HEND
5B		OUT4	PM16	PM16	PM16	PM16	PE4	—	PM16	PE4	TLR
6B		OUT5	PM32	PM32	PM32	PM32	PE5	—	TRQS	TRQS	*ALM
7B		OUT6	MOVE	MOVE	PM64	PM64	PE6	—	LOAD	LOAD	*EMGS
8B		OUT7	ZONE1	MODES	PM128	PM128	ZONE1	ZONE1	CEND	CEND	RMDS
9B		OUT8	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1	PM256	PZONE/ZONE2	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1	ALM1
10B		OUT9	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	ALM2
11B		OUT10	HEND	HEND	HEND	HEND	HEND	HEND	HEND	HEND	ALM4
12B		OUT11	PEND	PEND/WEND	PEND	PEND	PEND	—	PEND	PEND	ALM8
13B		OUT12	SV	SV	SV	SV	SV	SV	SV	SV	*OVLW/*ALML
14B		OUT13	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	—
15B		OUT14	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	ZONE1
16B		OUT15	*BALM	*BALM	*BALM	*BALM	*BALM	*BALM	*BALM	*BALM	ZONE2
17B	—		—								—
18B	—		—								—
19B	0V		N								N
20B	0V		N								N

* In the above table, signals in ( ) represent functions available before the home return.
* In the above table, signals preceded by * are turned OFF while the actuator is operating.

Explanation of the I/O Signal Functions

The table below explains the functions assigned to the controller's I/O signals.
The available signals vary depending on the controller type and settings, so use the signal table of each controller to check the functions available with that controller.
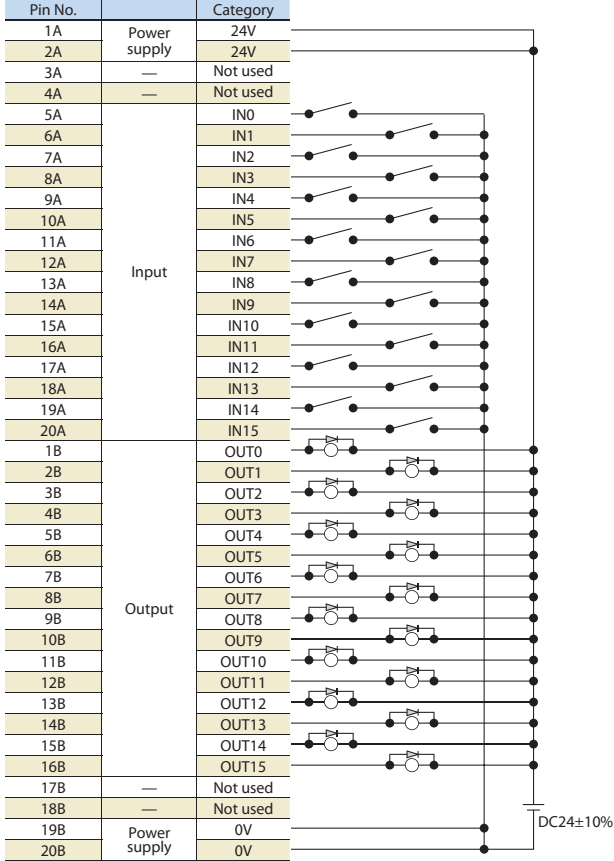
Category	Signal abbreviation	Signal name	Description of function
Input	CSTR	PTP strobe (start signal)	The actuator starts moving to the position set by the command position.
	PC1~PC256	Command position number	The position number of the target position is input (binary input).
	BKRL	Forced brake release	The brake is forcibly released.
	RMOD	Operation mode switching	The operation mode can be switched when the MODE switch on the controller is in the AUTO position. (The switch position is AUTO when this signal is OFF, or MANU when the signal is ON.)
	*STP	Pause	The actuator will decelerate to a stop when this signal turns OFF while the actuator is moving. The remaining movement will be suspended while the actuator is stopped and the movement will resume once the signal turns ON.
	RES	Reset	The alarm will be reset when the signal turns ON. The remaining travel can be cancelled by turning this signal ON while the actuator is paused (*STP is OFF).
	SON	Servo ON	The servo is ON while this signal is ON, and remains OFF while this signal is OFF.
	HOME	Home return	When this signal turns ON, the actuator performs home return operation.
	MODE	Teaching mode	When this signal turns ON, the actuator switches to the teaching mode. (Switching will not occur if CSTR, JOG+ and JOG- are all OFF and the actuator is still moving.)
	JISL	Jog/inch switching	When this signal turns OFF, the actuator can be jogged with JOG+ and JOG-. When the signal is ON, the actuator can be inched with JOG+ and JOG-.
	JOG+, JOG-	Jog	When the JISL signal is OFF, the actuator starts jogging in + or – direction upon detection of the ON edge of this signal. If the OFF edge of this signal is detected during jogging, the actuator decelerates to a stop.
	PWRT	Current position write	In the teaching mode, specify a position and then turn this signal ON for at least 20ms, and the current position will be written to the specified position.
	ST0~ST6	Start signal	In the solenoid valve mode, the actuator moves to the specified position when this signal turns ON. (The start signal is not required.)
	CLBR	Load cell calibration command	Load cell calibration starts when this signal has remained ON for at least 20ms.
Output	PEND/INP	Positioning complete	This signal turns ON when the actuator enters the in-position band after movement. If the actuator exceeds the in-position band, the PEND signal does not turn OFF, but the INP signal turns OFF. PEND and INP can be switched using a parameter.
	PM1~PM256	Complete position number	The position number of the position reached at the end of positioning is output (binary output).
	HEND	Home return completion	This signal turns ON upon completion of home return.
	ZONE1/ZONE2	Zone	This signal turns ON if the current actuator position is within the range set by the parameter.
	PZONE	Position zone	This signal turns ON when the current actuator position enters the range set in the position data table after position movement. This signal can be used with ZONE1, but PZONE becomes effective only when moving to a specified position.
	RMDS	Operation mode status output	The operation mode status is output. This signal turns ON when the controller is in the manual mode.
	*OVLW	Overload warning	This signal is ON in a normal condition, and turns OFF when the overload warning level is exceeded. (Operation will continue.)
	*ALML	Minor failure alarm	This signal is ON in a normal condition, and turns OFF when a message-level alarm occurs. (Operation will continue.)
	*ALM	Alarm	This signal is ON when the controller is in a normal condition, and turns OFF when an alarm occurs.
	MOVE	Moving	This signal is ON while the actuator is moving (also during home return and push-motion operation).
	SV	Servo ON	This signal is ON while the servo is ON.
	*EMGS	Emergency stop output	This signal is ON when no emergency stop is actuated on the controller, and turns OFF when an emergency stop is actuated.
	*BALM	Absolute battery voltage low warning	If the controller is of the absolute specification, this signal turns OFF when the voltage of the absolute battery drops. (Operation will continue.)
	MODES	Teaching mode output	This signal turns ON when the actuator enters the teaching mode via MODE signal input. It turns OFF once the actuator returns to the normal mode.
	WEND	Write complete	This signal is OFF immediately after switching to the teaching mode, and turns ON once writing is completed according to the PWRT signal. When the PWRT signal turns OFF, this signal also turns OFF.
	PE0~PE6	Current position number	This signal turns ON when the actuator has completed moving to the target position in the solenoid valve mode.
	CEND	Load cell calibration complete	This signal turns ON upon completion of load cell calibration. When the CLBR signal turns OFF, this signal also turns OFF.
	LOAD	Load output judgment signal	During push-motion operation, this signal is output when the current value set for the "threshold" is exceeded within the range of "Zone+" and "Zone–" set in the position data table. The signal is used to determine if press-fitting action has been performed correctly.
	TRQS	Torque level output	This signal is output when the motor current reaches the current value set for the "threshold" in the position data table after the slider (rod) has collided with an obstacle, etc., during movement in push-motion operation.
	LS0~LS2	Limit switch output	This signal turns ON when the current actuator position enters the in-position band set before and after the target position. If the home return has already completed, this signal is output even before a movement command is issued or while the servo is OFF.

* In the above table, signals preceded by * are normally ON and turn OFF while the actuator is operating.

I/O Wiring Diagram
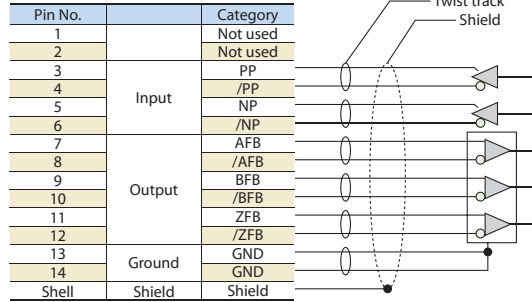
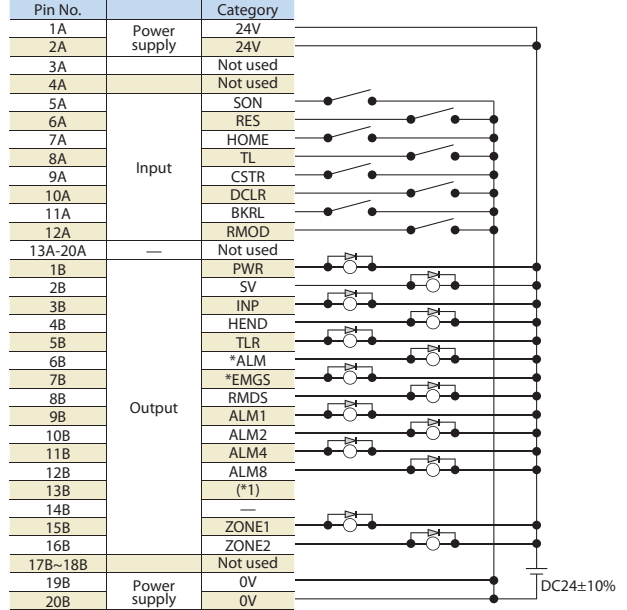### ● Positioning mode/Teaching mode/ Solenoid valve mode

PIO connector (NPN specification)

Pin No.		Category
1A	Power supply	24V
2A		24V
3A	—	Not used
4A	—	Not used
5A	Input	IN0
6A		IN1
7A		IN2
8A		IN3
9A		IN4
10A		IN5
11A		IN6
12A		IN7
13A		IN8
14A		IN9
15A		IN10
16A		IN11
17A		IN12
18A		IN13
19A		IN14
20A		IN15
1B	Output	OUT0
2B		OUT1
3B		OUT2
4B		OUT3
5B		OUT4
6B		OUT5
7B		OUT6
8B		OUT7
9B		OUT8
10B		OUT9
11B		OUT10
12B		OUT11
13B		OUT12
14B		OUT13
15B		OUT14
16B		OUT15
17B	—	Not used
18B	—	Not used
19B	Power supply	0V
20B		0V

DC24±10%

*Connect Pins 1A and 2A to 24 V, and Pins 19B and 20B to 0 V.

● Pulse Train Mode (Differential Output)

Pulse connector

Pin No.		Category
1		Not used
2		Not used
3	Input	PP
4		/PP
5		NP
6		/NP
7	Output	AFB
8		/AFB
9		BFB
10		/BFB
11		ZFB
12		/ZFB
13	Ground	GND
14		GND
Shell	Shield	Shield

Twist track
Shield

PIO connector (NPN specification)

Pin No.		Category
1A	Power supply	24V
2A		24V
3A		Not used
4A		Not used
5A	Input	SON
6A		RES
7A		HOME
8A		TL
9A		CSTR
10A		DCLR
11A		BKRL
12A		RMOD
13A-20A	—	Not used
1B	Output	PWR
2B		SV
3B		INP
4B		HEND
5B		TLR
6B		*ALM
7B		*EMGS
8B		RMDS
9B		ALM1
10B		ALM2
11B		ALM4
12B		ALM8
13B		(*1)
14B		—
15B		ZONE1
16B		ZONE2
17B~18B		Not used
19B	Power supply	0V
20B		0V

DC24±10%

* Be sure to connect to the shell the shied of the twist track cable connected to the PULSE connector. Also **keep the cable length to 10m or less**.
* Connect Pins 1A and 2A to 24 V, and Pins 19B and 20B to 0 V
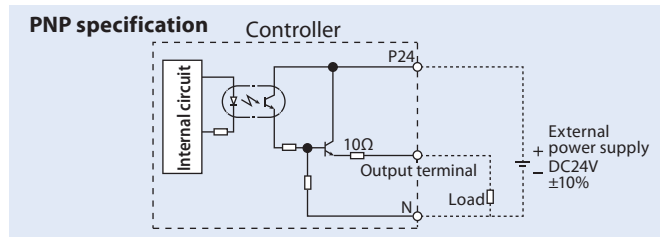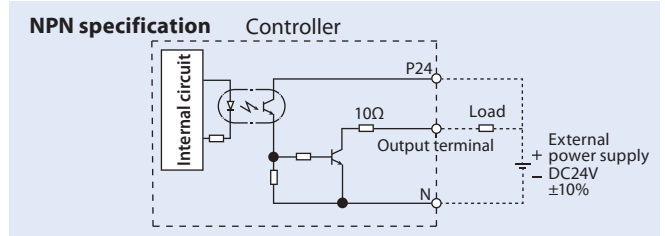(*1)-/*ALML/*OVLW/*BALM (switchable with parameters)

I/O Specification

● Input Part External Input Specifications

Item	Specification
Input voltage	24VDC±10%
Input current	4mA/1 circuit
ON/OFF voltage	ON voltage: 18VDC min. OFF voltage: 6VDC max.
Isolation method	Photocoupler

NPN specification

Controller
P24
External power supply + DC24V ±10%
680Ω
5.6kΩ
Internal circuit
Input terminal

PNP specification

Controller
Input terminal
External power supply + DC24V ±10%
680Ω
5.6kΩ
Internal circuit
N
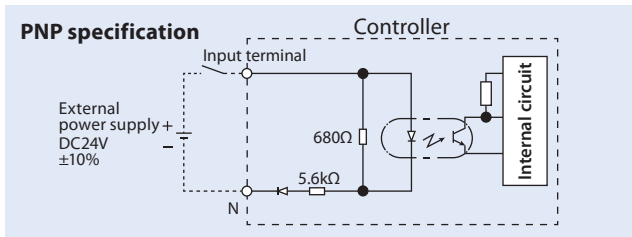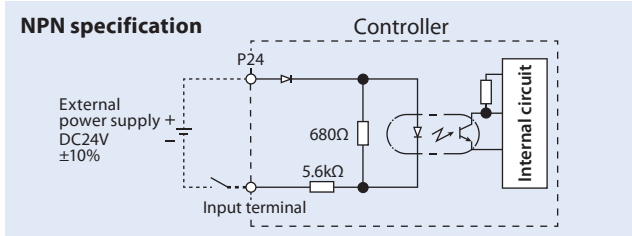
● Output Part External Output Specifications
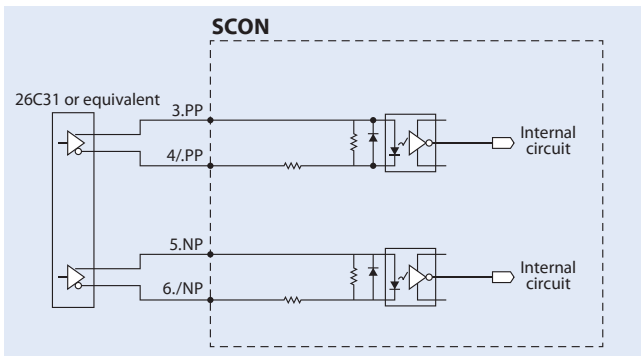
Item	Specification
Load voltage	24VDC
Maximum load current	100mA/1 point, 400mA/8 points
Leak current	0.1mA max./1 point
Isolation method	Photocoupler

NPN specification

Controller
Internal circuit
P24
10Ω
Load
Output terminal
External + power supply DC24V ±10%
N

PNP specification

Controller
Internal circuit
P24
10Ω
Output terminal
External + power supply DC24V ±10%
Load
N

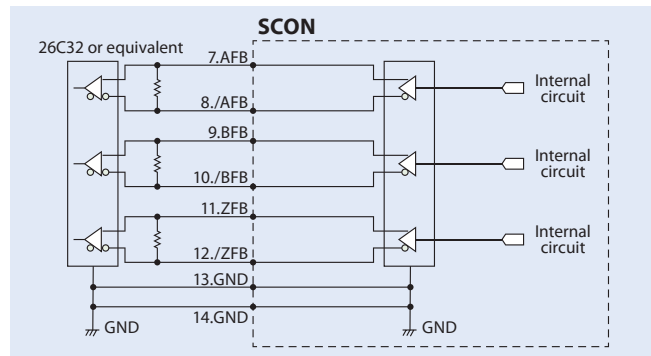## Pulse-Train Type I/O Specification (Differential Line Driver Specification)

● Input Part

Maximum number of input pulses : Line driver interface 2.5Mpps
Isolation method　　　　　　 : Photocoupler isolation

● Output Part

Maximum number of output pulses : Line driver interface 2.5Mpps
Isolation/non-isolation　　　　 : Non-isolation

## Pulse-Train Type I/O Specification (Open-collector Specification)

The AK-04 (Options) is needed to input pulses. The JM-08 (Options) is needed to output pulses.

Maximum number of input pulses:
　　　200kpps (The AK-04 is needed.)
Maximum number of output pulses:
　　　200kpps (The JM-08 is needed.)

* The 24-VDC power supply connected to the AK-4 must be shared with the PIO interface.

* Keep the length of the cable connecting the pulse output unit (PLC) and AK-04/JM-08 as short as possible.
Also keep the cable between the AK-04/JM-08 and **PULSE connector to 2m or less**.

Note

Use the same power supply for open collector input/output to/from the host and for the AK-04, JM-08.
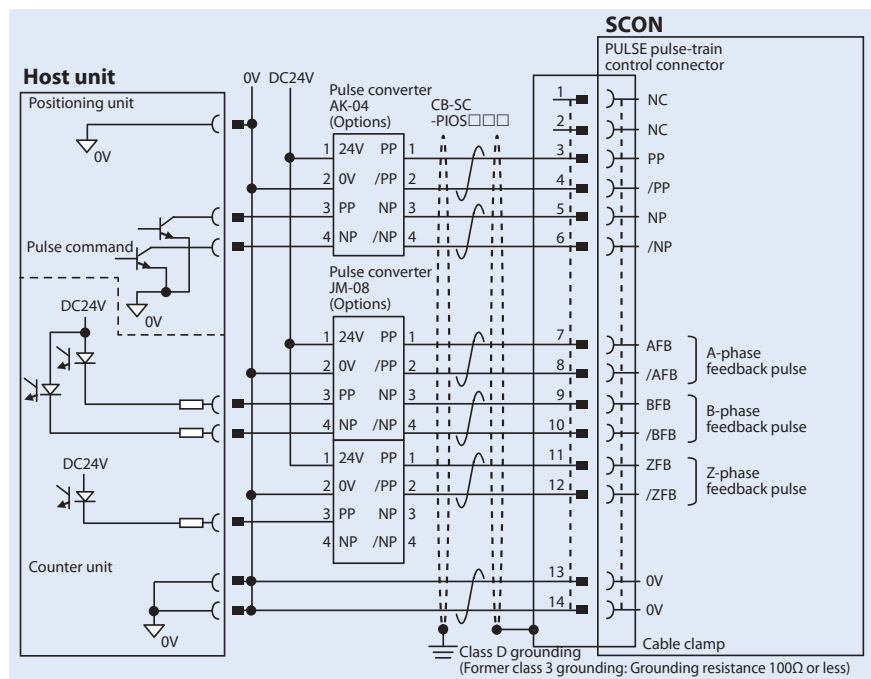
Command Pulse Input Patterns

Command pulse train pattern		Input terminal	Forward	Reverse
Negative logic	Forward pulse-train	PP·/PP		
	Reverse pulse-train	NP·/NP		
	A forward pulse-train indicates the amount of motor rotation in the forward direction, while a reverse pulse-train indicates the amount of motor rotation in the reverse direction.			
	Pulse-train	PP·/PP		
	Sign	NP·/NP	Low	High
	The command pulse is used for the amount of motor rotation, while the sign indicates the rotating direction.			
	Phase A/B pulse-train	PP·/PP		
		NP·/NP		
	Command phases A and B having a 90° phase difference (multiplier is 4) indicate the amount of rotation and the rotating direction.			
Positive logic	Forward pulse train	PP·/PP		
	Reverse pulse-train	NP·/NP		
	Pulse-train	PP·/PP		
	Sign	NP·/NP	High	Low
	Phase A/B pulse-train	PP·/PP		
		NP·/NP		

Specification Table

Item	Specification	
Applicable motor capacity	Less than 400W	400W or more
Connected actuator	RCS2/RCS3 series actuator/single-axis robot/linear motor	
Number of controlled axes	1 axis	
Operation method	Positioner type/pulse-train type	
Number of positioning points	512 points (PIO specification), 768 points (fieldbus specification)	
Backup memory	Nonvolatile memory (FRAM)	
I/O connector	40-pin connector	
Number of I/O points	16 input points/16 output points	
I/O power supply	Externally supplied 24VDC±10%	
Serial communication	RS485 1ch	
Peripherals communication cable	CB-PAC-PIO□□□	
Command pulse-train input method (Note 1)	Differential line driver output supported	
Maximum input pulse frequency	Differential line driver method: 2.5Mpps max./Open-collector method (pulse converter used): 200kpps max.	
Position detection method	Incremental encoder/absolute encoder	
Emergency stop function	Available (built-in relay)	
Forced electromagnetic brake release	Brake release switch ON/OFF	
Motor cable	CB-XEU-MA□□□ (20m max.)	
Encoder cable	CB-XEU3-PA□□□ (20m max.)	
Input power supply	Single-phase AC90V to AC126.5V Single-phase AC180V to AC253V	Single-phase AC180V to AC253V
Power-supply capacity (Note 2)	20W/74VA 30W (other than RS)/94VA 30W (RS)/186VA 60W/186VA 100W/282VA 150W/376VA 200W/469VA	100W (LSA-N10)(*)/331VA 200W (LSA-S10H, N15S)(*)/534VA 200W (LSA-N15H)(*)/821VA 300W (LSA-N19)(*)/710VA 400W/968VA 600W/1212VA 750W/1569VA
Vibration resistance	XYZ directions – 10 to 57Hz: Single amplitude 0.035mm (continuous), 0.075mm (intermittent) 58 to 150Hz: 4.9 m/s^2 (continuous), 9.8 m/s^2 (intermittent)	
Ambient operating temperature	0 ~ 40°C	
Ambient operating humidity	85%RH or less (non-condensing)	
Operating ambience	Not exposed to corrosive gases	
Protection degree	IP20	
Mass	Approx. 900g (+ 25g for the absolute specification)	Approx. 1.2kg (+ 25g for the absolute specification)
External dimensions	58mm (W) x 194mm (H) x 121mm (D)	72mm (W) x 194mm (H) x 121mm (D)

(Note 1) For the command pulse input method, use the differential line driver method resistant to noise. If the open-collector method must be used, use the optional pulse converter (AK-04/JM-08) to convert open-collector pulses to differential pulses.
(Note 2) Controllers operating any of the actuator models denoted by (*) shall conform to the external dimensions of controllers for 400 W or more, even when the output is less than 400W.
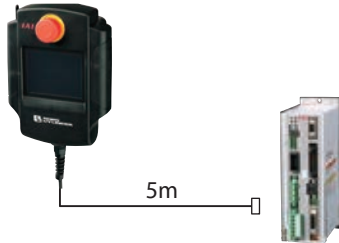
External dimensions

Less than 400W

When the absolute battery is installed

400W or more

When the absolute battery is installed
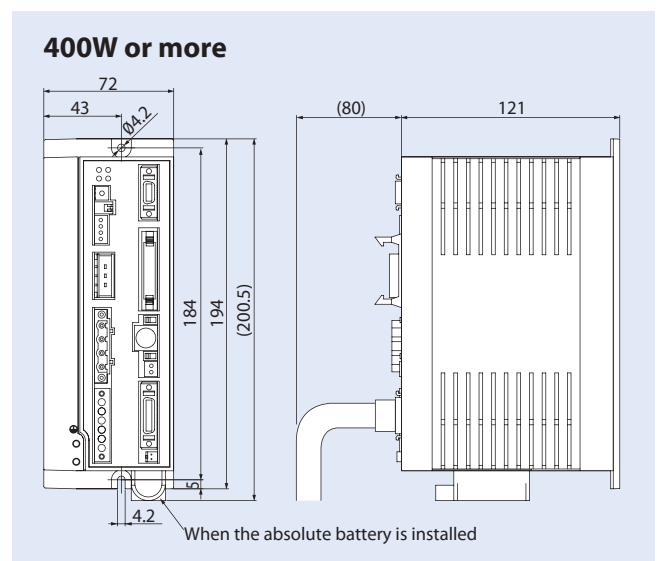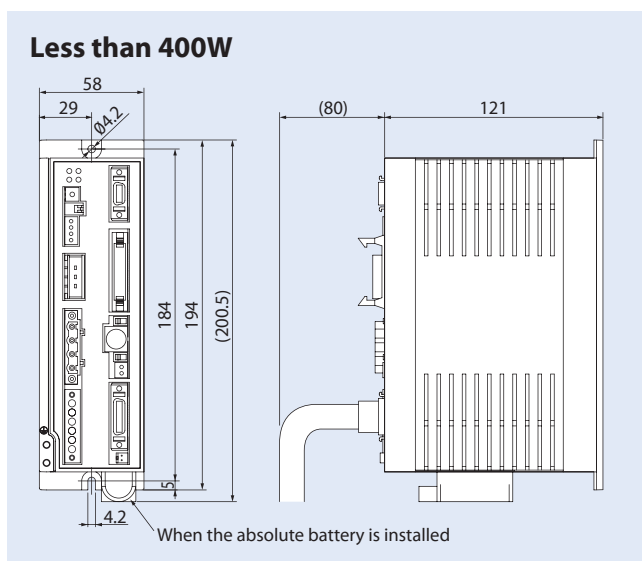
Options

Teaching Pendant

▌ Features — Teaching device offering position input, test operation, monitoring and other functions.

▌ Model — **CON-PTA-C-ENG** (Touch panel teaching pendant)
CON-T-ENG (Standard Type teaching pendant)
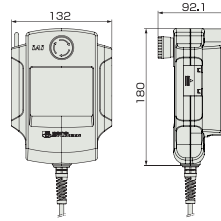
▌ Configuration

5m

▌ CON-T-ENG options
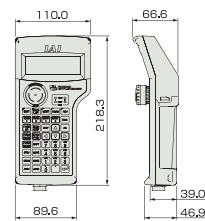 • Wall-mounting hook
    Model: **HK-1**
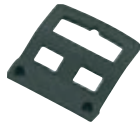
  • Strap
    Model: **STR-1**

### CON-PTA-C-ENG

CON-T-ENG

▌ Specification

| Item	CON-PTA-C-ENG	CON-T-ENG
Data input	○	○
Actuator operation	○	○
Ambient operating temperature/humidity	Temperature 0 to 40ºC, humidity 85%RH or less	
Operating ambience	Free from corrosive gases or significant powder dust.	
Protection degree	IP40	IP54
Mass	Approx. 570g	Approx. 400g
Cable length	5m	
Display	65536 colors White LED backlight	20 characters x 4 lines LCD display

PC Software (Windows Only)

▌ Features — This startup support software provides functions to input positions, perform test operations and monitor data, among others.
Incorporating all functions needed to make adjustments, this software helps shorten the initial startup time.

▌ Model number **RCM-101-MW-EU** (With external device communication cable + RS232 conversion unit)
▌ Configuration

Offboard tuning is supported only in Ver. 8.05.00.00 or later.

RS232 conversion adapter
RCB-CV-MW

5m

PC software (CD)

0.3m

External device communication cable
CB-RCA-SIO050
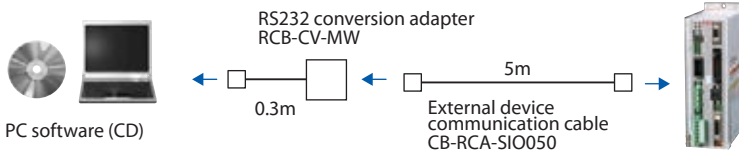
▌ Model number **RCM-101-USB-EU** (With external device communication cable + USB adapter + USB cable)
▌ Configuration

Offboard tuning is supported only in Ver. 8.05.00.00 or later.

USB conversion adapter
RCB-CV-USB

3m

5m

PC software (CD)

USB cable
CB-SEL-USB030

External device communication cable
CB-RCA-SIO050
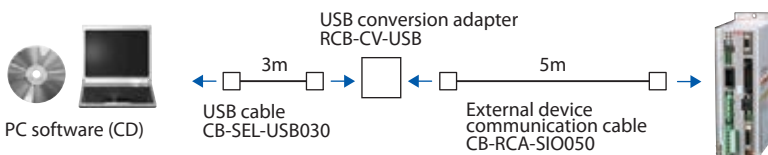
Regenerative Resistance Unit

▌ Features — This unit converts regenerative current that generates when the motor decelerates, to heat. Check the total wattage of the actuators to be operated and provide a regenerative resistance unit or units if required.

* If two regenerative units are required, arrange one REU-2 and one REU-1.

▌ Model — **REU-2** (for SCON/SSEL)
▌ Specification

Unit mass	0.9Kg
Built-in regenerative resistor	220Ω 80W
Unit-controller connection cable (supplied)	CB-SC-REU010 (for SSEL)

▌ Guide for Required Quantity

	Horizontal	Vertical
0 unit	~ 100W	~ 100W
1 unit	~ 400W	~ 400W
2 unit	~ 750W	~ 750W

* The required regenerative resistance may be more than as specified above depending on the operating conditions.

▌ Guide for Required Quantity
(RCS2-RA13R only)

	Lead 2.5	Lead 1.25
Horizontal	1 unit	0 unit
Vertical	1 unit	1 unit

* The required regenerative resistance may be more than as specified above depending on the operating conditions.

▌ External Dimensions

Ø5 34
195 186 175
5 16.6 126
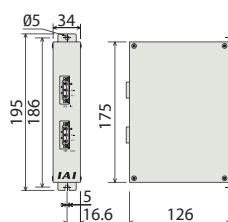
Absolute Data Backup Battery

▌ Features — Absolute data backup battery used when an actuator of absolute specification is operated.

▌ Model number **AB-5**

ISO 9001
BUREAU VERITAS
Certification

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