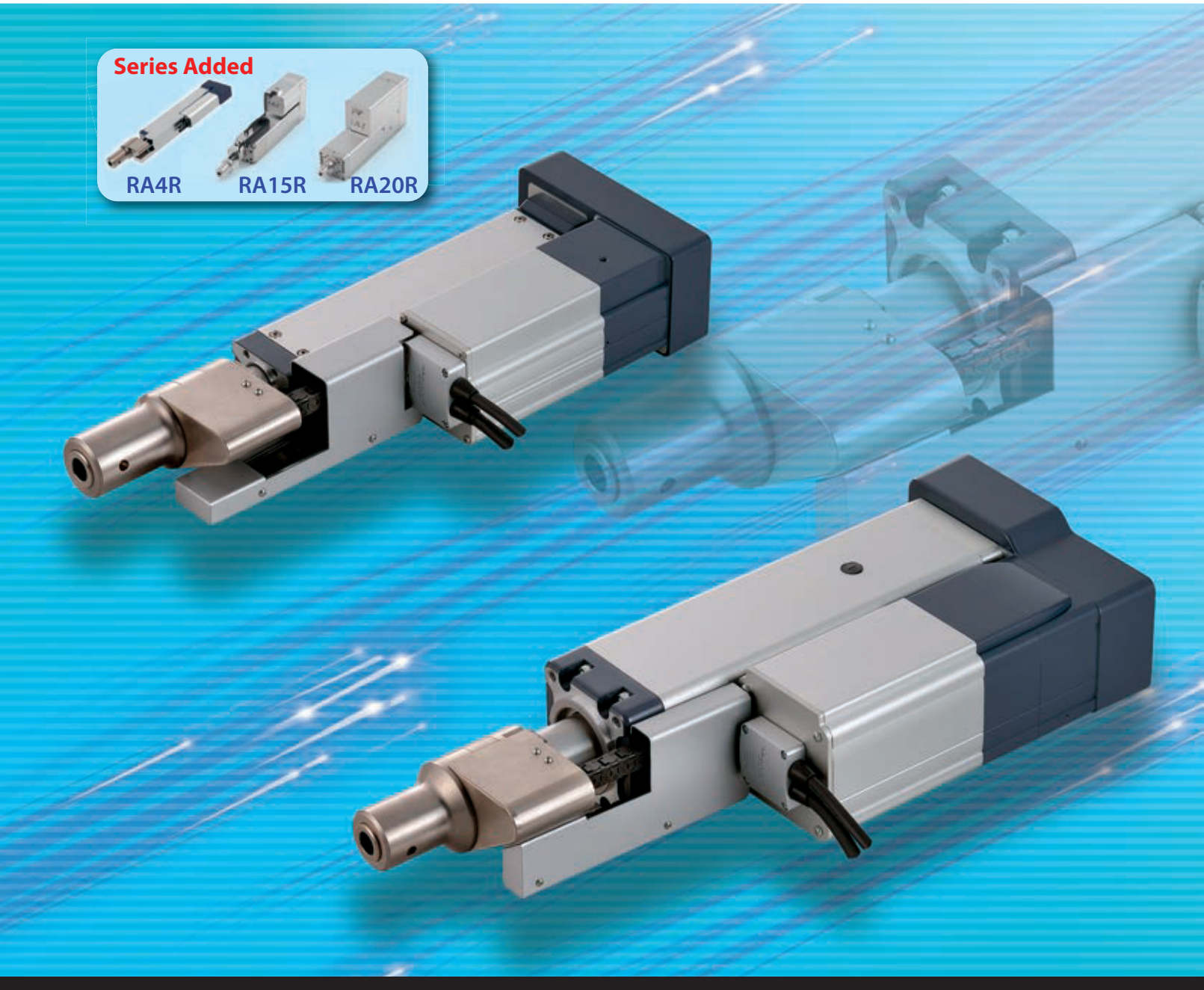
IAI
Quality and Innovation

Servo Press Compatible
ROBO Cylinder®with Load Cell

RCS3



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Compact and low-thrust rod type actuator that can even be used for simple pressing.
The high-precision position control enables easy adjustment of the push force and the position control, which is typically difficult for oil-hydraulic equipment.

1 The Servo Press Specifcation Available

The servo press specification has been expanded. With the load cell equipped as standard feature, force control is possible.

What Is the Push-motion Operation?

Similar to an air cylinder, push-motion operation is the function of keeping the rod and slider pushed to the work, etc.
Servo press provides superior stop stability during pressing, which makes them optimal for push-motion operation.
Also, servo press can be used in a wide variety of applications because they can be used in work operations that require strong push force, such as press fitting and riveting work.

What Is the Force Control?

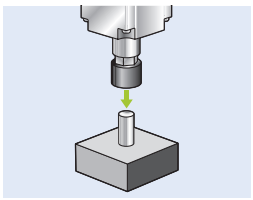
A function that can perform high-precision push control output using the feedback data from the dedicated load cell installed in the actuator.

What Is the Servo Press Specification?

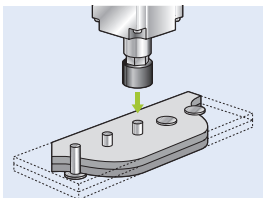
The specification which can perform various push-motion operations by using the press program.
For details, please refer to P. 3.

<Application Examples>

Press-fitting a pin



Riveting work



- Accurate push force can be managed
- Detailed push force setting can be set for each product

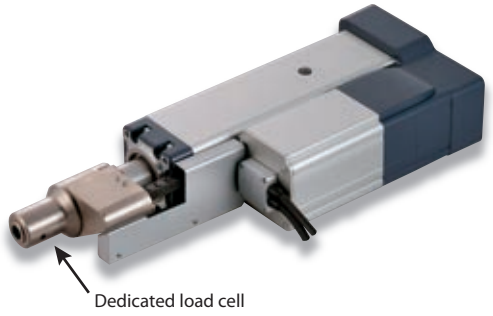
2 High-precision Load Control

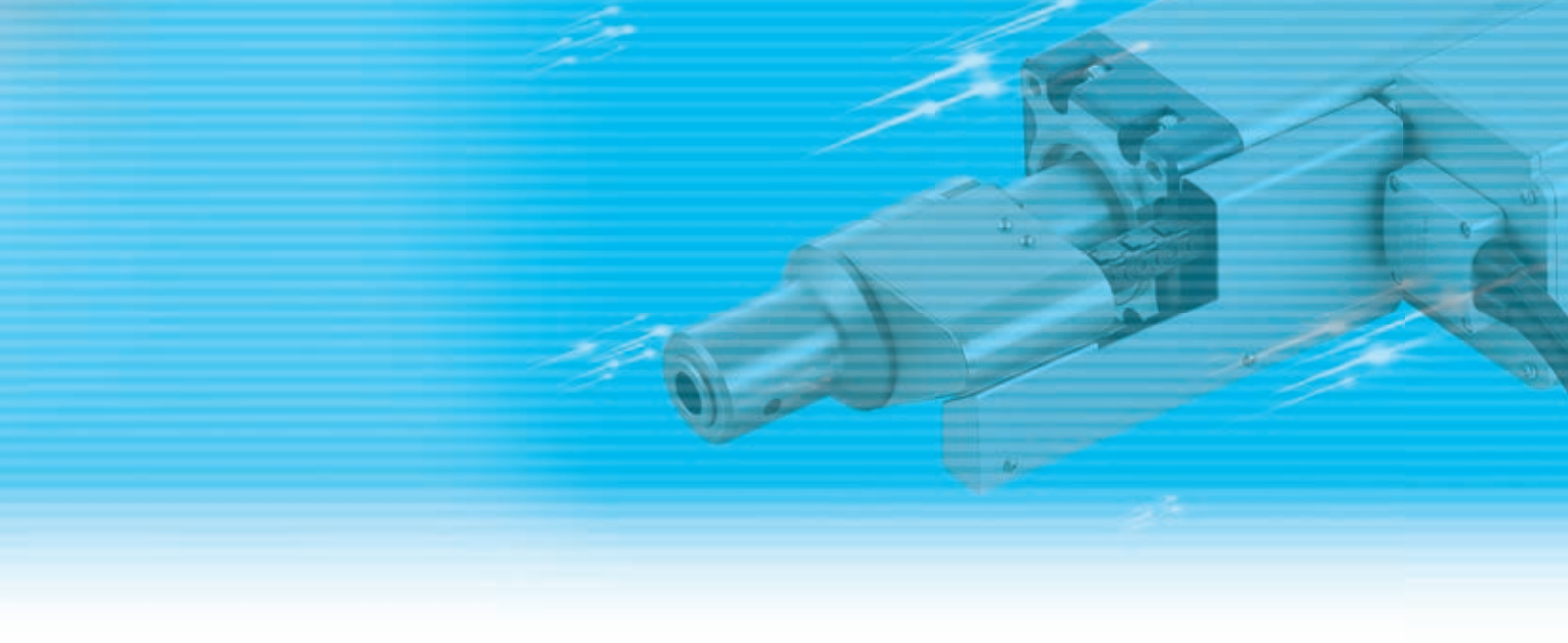
By attaching a dedicated load cell to the rod tip, the actual load applied to the press target can be detected. This allows for high-precision load control with a loading repeatability of ±0.5% F.S. (full scale).

Points

F.S. : Full Scale
Maximum measurable value

B.C. : Rated Capacity
Same as the rated load. The maximum load measured while the load cell maintains its specification.





3 Increased Product Offerings

RCS3 side-mounted motor rod types have been added, allowing you to select from a 200N to 50000N range. The development of a large variety of models allows you to pick models that suit your applications.

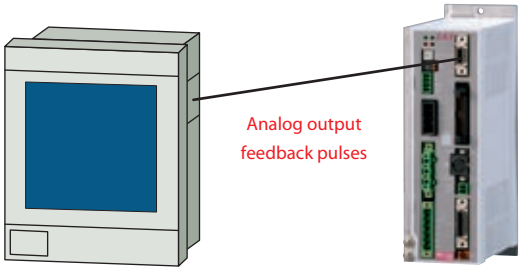
Product Lineup

		RCS3-RA4R	RCS3-RA6R	RCS3-RA7R	RCS3-RA8R
Stroke (mm)		110~410	115~415	120~520	100~500
Motor (W)		30	60	100	200
Lead (mm)		2.5	1.5	2	2.5
Max. Push Force (N)		200	600	1200	2000
Max. Payload (kg)	Horizontal	3	10	10	10
	Vertical	3	10	10	10
Max. Speed (mm/sec)		125	75	100	125

		RCS3-RA10R	RCS2-RA13R 1t Type	RCS2-RA13R 2t Type	RCS3-RA15R	RCS3-RA20R
Stroke (mm)		100~500	50~200		100~500	100~500
Motor (W)		400	750		3300	3000
Lead (mm)		2.5	2.5	1.25	3.6	4
Max. Push Force (N)		6000	9800	19600	30000	50000
Max. Payload (kg)	Horizontal	15	15	15	15	15
	Vertical	15	15	15	15	15
Max. Speed (mm/sec)		125	125	62	240	220

4 Connectivity with External Equipment

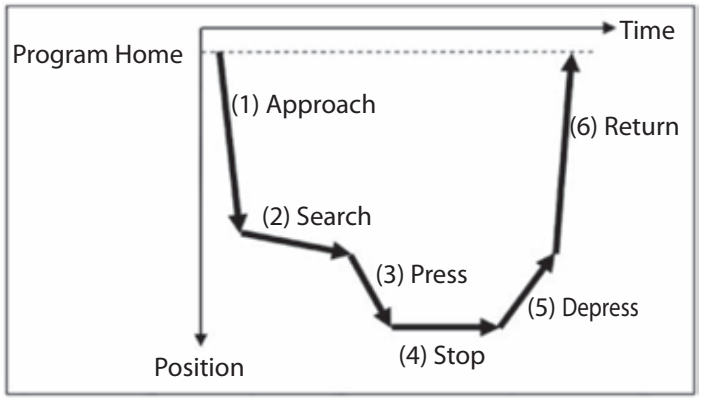
It's possible to perform analog output of load data (4-20mA).
By using a display panel manufactured by a third party, it is possible to display 2D graphs of the displacement vs. load cell output and judge them. Also, connecting a pulse counter allows you to check the feedback pulses.



Dedicated Software: Press Program

With this Press Program, one of two control methods, "Speed Control" or "Force Control", can be selected.
In addition, one of four stop conditions, "Position", "Distance", "Load", or "Incremental Load", can be selected as the method for stopping.
By utilizing a total of eight types of press methods, it is possible to handle a variety of press operations.

Explanation of Operation



(1) Approach (can be omitted)
Performs high-speed transfer until directly before contacting work

(2) Search (can be omitted)
Detects work contact

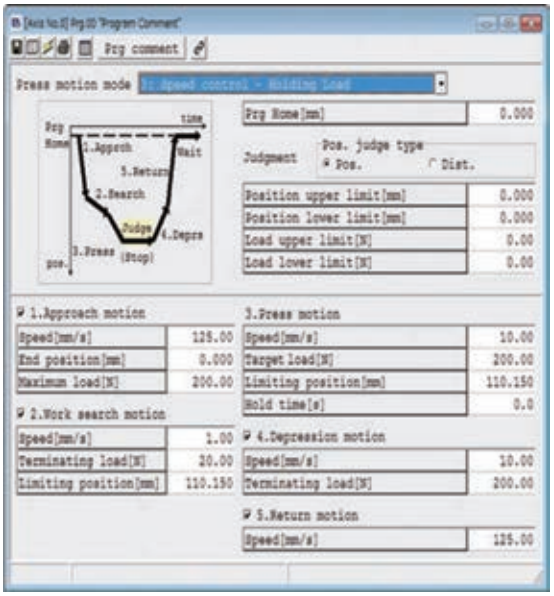
(3) Press (necessary)
Accelerates, then performs pressing work

(4) Stop (can be omitted when set to 0)
Stops at a fixed position or continues to push

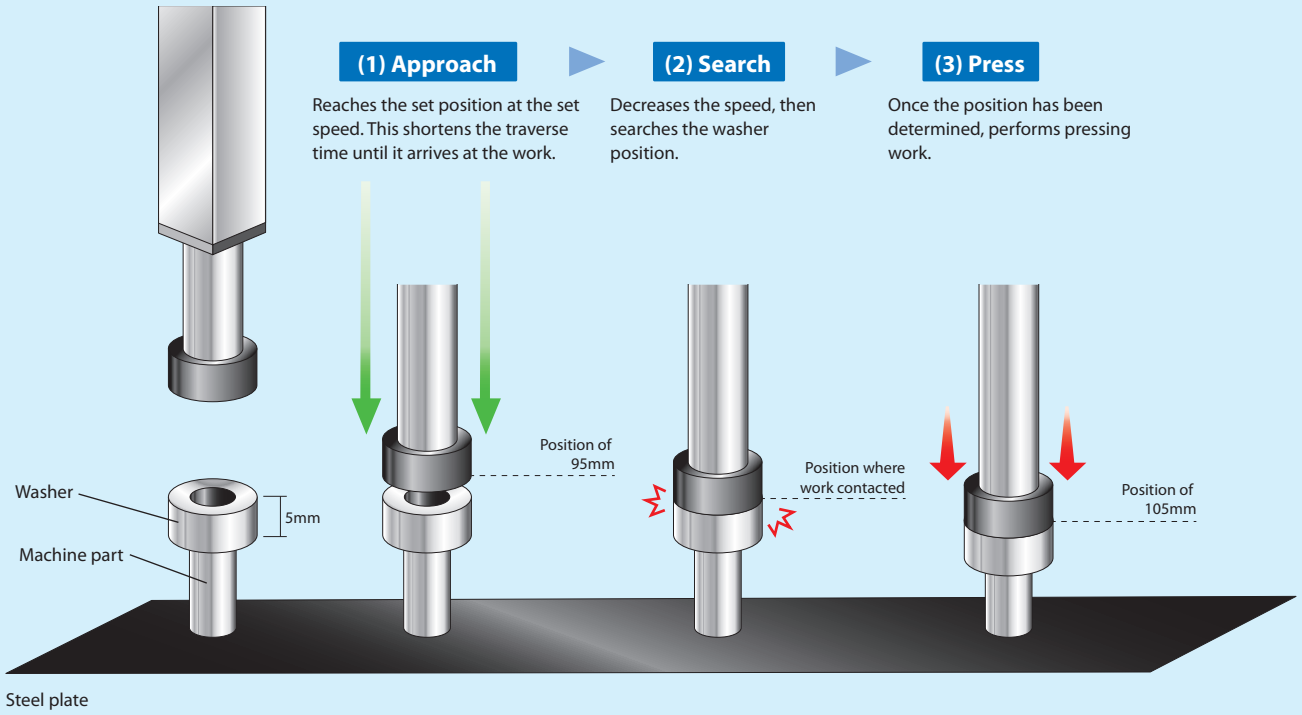
(5) Depress (can be omitted)
Slowly separates from the work

(6) Return (can be omitted)
Returns to the home position at high speed

Program Screen



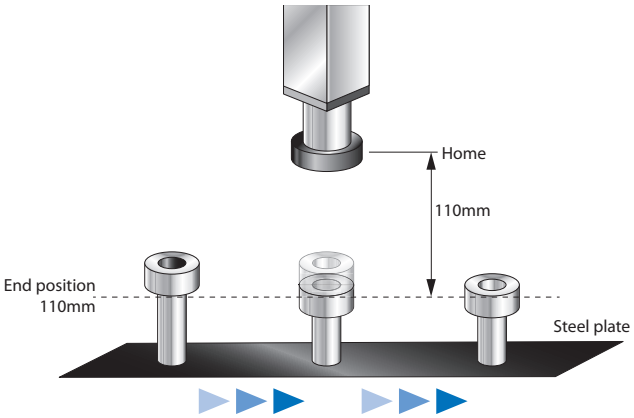
Example of press fitting a machine part into a washer



Mode		Internal control	Stop state	Applications
Speed control After arriving at the target position, stops while maintaining the position at the time of arrival.	Position stop Distance stop Load stop Incremental load stop	Positioning	Positioning stop	press fitting, riveting, squeezing, etc. (primarily metalworking)
Force control After arriving at the target position, stops while maintaining the force at the time of arrival.	Position stop Distance stop Load stop Incremental load stop	Pushing	Continuing push-motion operation	Compressive molding, etc. of powders

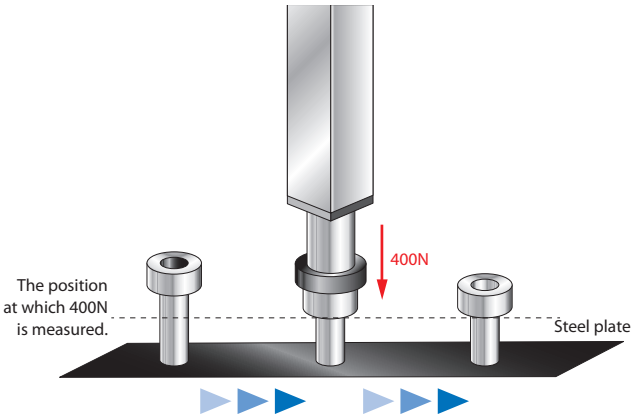
Position stop

Performs pressing work to the specified position.



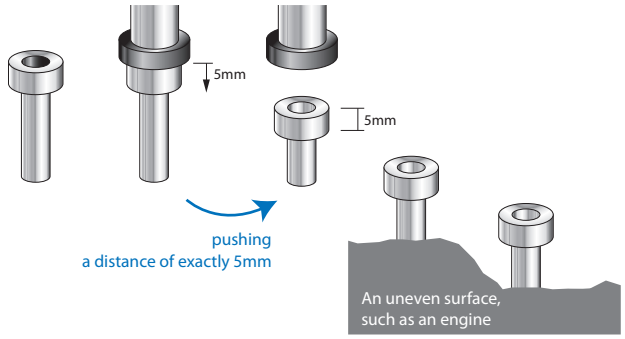
Load stop

Performs pressing work that stops at the position at which the specified load was detected.



Distance stop

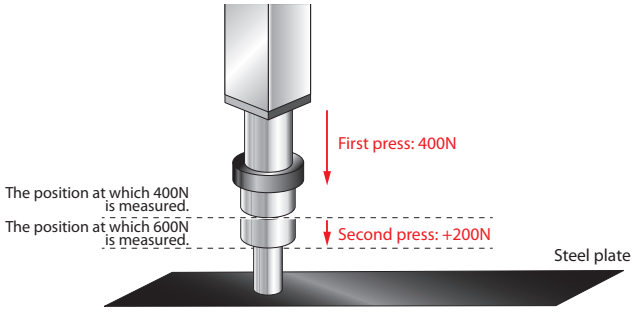
Performs pressing work by moving a specified distance and then stopping. This is optimal in situations in which the press start position changes.



Incremental load stop

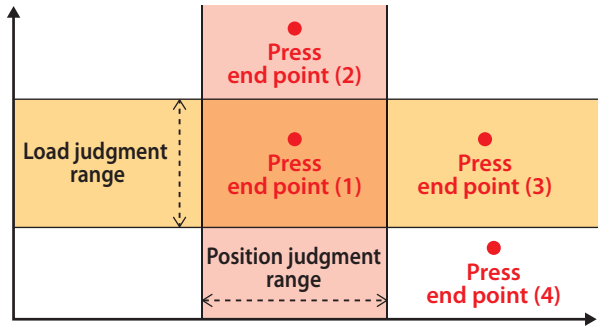
Performs pressing work that stops at the position at which the load (sum of the press start load and the specified incremental load) has been detected.

*It is possible to perform the operation by linking two programs together.
For details, please refer to the instruction manual.



Explanation of Operation

From the end of press to the end of the stop state, it is possible to perform position judgment and load judgment.



<Judgment Results>

No.	Position	Load
(1)	OK	OK
(2)	OK	NG
(3)	NG	OK
(4)	NG	NG

- When a result of NG has been detected for either the position or load, the program ends abnormally
- It is also possible to set position only, load only, or neither

RCS3-RA4R

RoboCylinder, Rod Type with Load Cell, Actuator Width 40mm
200V Servo Motor, Side-mounted Motor Specification

■ Model Specification Items

RCS3 — RA4R — ☐ — 30 — ☐ — ☐ — ☐ — T2 — ☐ — ☐

RCS3	RA4R	☐	30	☐	☐	T2	☐	☐
Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Options
		I: Incremental specification A: Absolute specification	30: Servo motor, 30 W	2.5: Lead 2.5mm	110: 110mm ~ 410: 410mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X☐☐: Specified length R☐☐: Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

*Controller is not included.

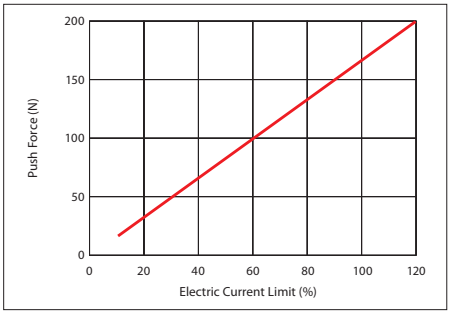
CE RoHS

* CE conformity has to be selected as option.

Horizontal Vertical Side Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.

■ Correlation Diagram of Push Force and Current Limit



Caution:

- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 12% or more because the push force would be unstable when the current limit value is lower than 12%.

POINT Note on selection

(1) There is no limit in time period of a continuous push-motion for RA4R. It is available to have continuous push-motion with a current limit value of 100%.

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) When using front flange and bracket, please install a support block for the horizontal installation of an actuator with 150mm-stroke or longer. However, adding the support block even for less than 150mm-stroke is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload		Rated thrust (N)	Max. push force (N)
					Horizontal (kg)	Vertical (kg)		
RCS3-RA4R-①-30-2.5-②-T2-③-④	30	2.5	125	0.5	3	3	126	200

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	110~410
2.5	125

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

(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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Outside)	**CJO**	
Motor side-mounted to the left	**ML**	
Motor side-mounted to the right	**MR**	
Equipped with load cell (Standard equipment) (*2)	**LCT**	-
Compliance with CE conformity (Standard option)	**CE**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø8mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.1mm or less
Load cell rated capacity	200N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

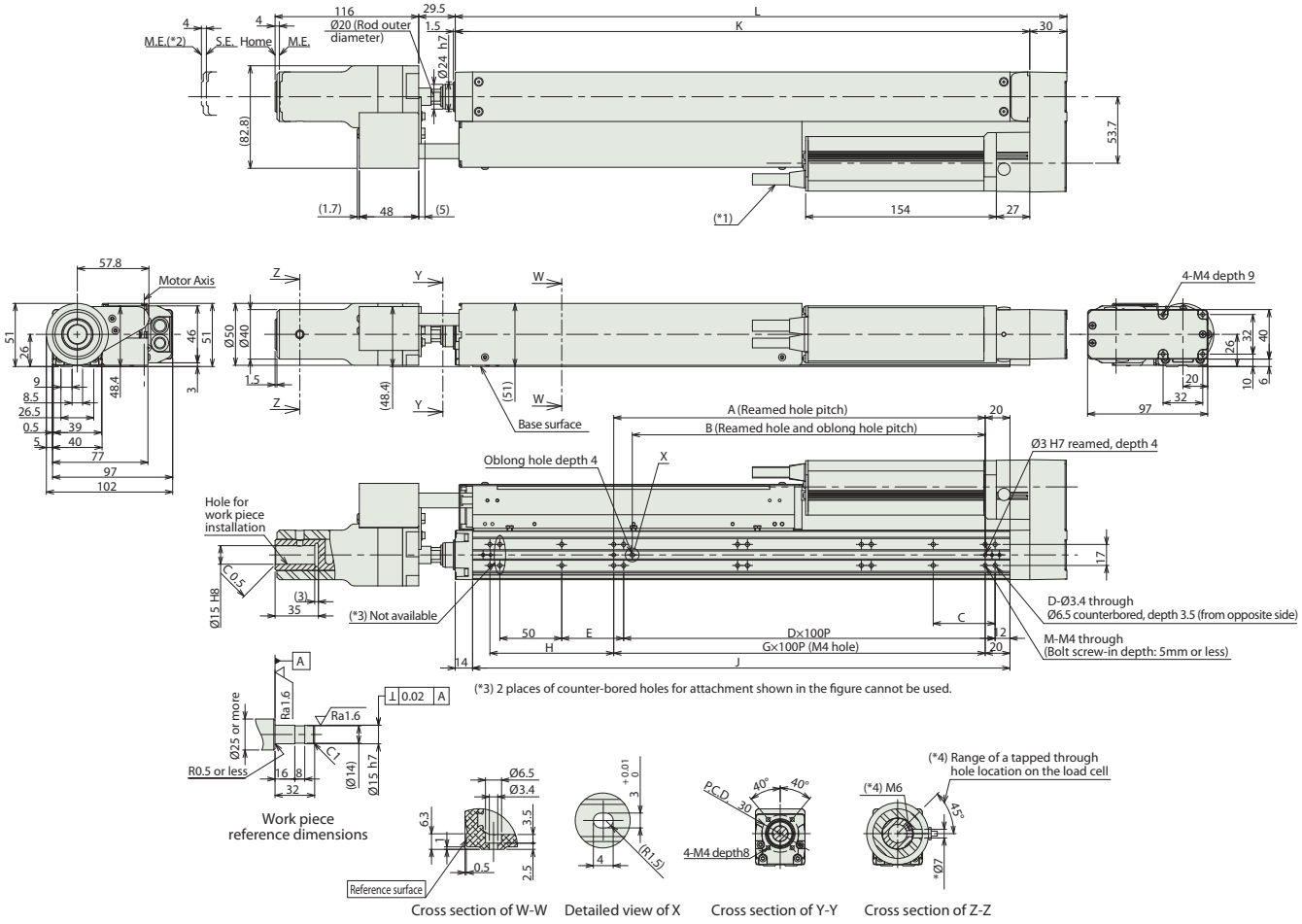
(*3) F.S: Full Scale

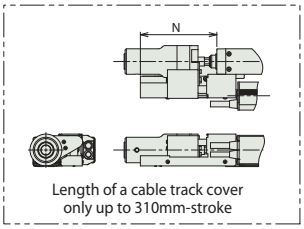
Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end





Dimensions and Mass by Stroke

Stroke		110	160	210	260	310	360	410
L		244	294	344	394	444	494	544
A		100	100	200	200	300	300	400
B		85	85	185	185	285	285	385
C		50	50	50	50	50	50	50
D		0	1	1	2	2	3	3
E		100	50	100	50	100	50	100
F		8	10	10	12	12	14	14
G		1	1	2	2	3	3	4
H		50	100	50	100	50	100	50
J		184	234	284	334	384	434	484
K		214	264	314	364	414	464	514
M		6	6	8	8	10	10	12
N		120	100	75	50	25	—	—
Mass (kg)	Without brake	3.1	3.2	3.4	3.6	3.8	3.9	4.1
	With brake	3.4	3.5	3.7	3.9	4.1	4.2	4.4

Compatible Controllers

RCS3-RA4R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-30DⒾF-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 100/200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-30DⒾF-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA6R

RoboCylinder, Rod Type with Load Cell, Actuator Width 58mm
200V Servo Motor, Side-mounted Motor Specification

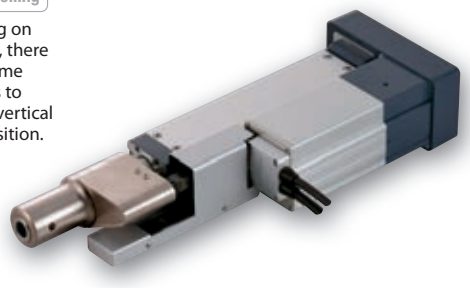
■ Model Specification Items

RCS3	RA6R	□	60	□	□	□	T2	□	□
Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Options
		I: Incremental specification A: Absolute specification	60: Servo motor, 60 W	1.5: Lead 1.5mm	115: 115mm ~ 415: 415mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X□□: Specified length R□□: Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

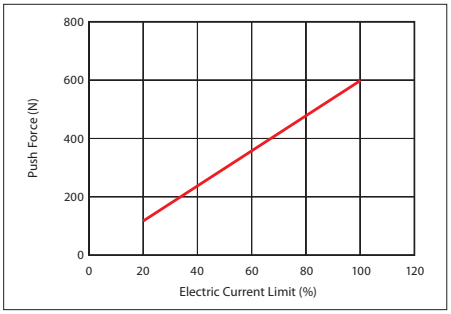
*Controller is not included.

Horizontal | Vertical | Side | Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 10% or more because the push force would be unstable when the current limit value is lower than 10%.

POINT Note on selection

(1) For push mode operation, please see P. 21 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) When using front flange and bracket, please install a support block for the horizontal installation of an actuator with 150mm-stroke or longer. However, adding the support block even for less than 150mm-stroke is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Max. push force (N)
RCS3-RA6R-①-60-1.5-②-T2-③-④	60	1.5	75	0.3	10	10	566	600

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	115~415
1.5	75

(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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Bottom) (*2)	**CJB**	
Cable exit direction (Outside)	**CJO**	
Motor side-mounted to the left	**ML**	
Motor side-mounted to the right	**MR**	
Equipped with load cell (Standard equipment) (*3)	**LCT**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) When you select „CJB" for an actuator whose stroke is 365mm or less, the foot bracket cannot be chosen.

(*3) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø10mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.1mm or less
Load cell rated capacity	600N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

(*3) F.S: Full Scale

Dimensions

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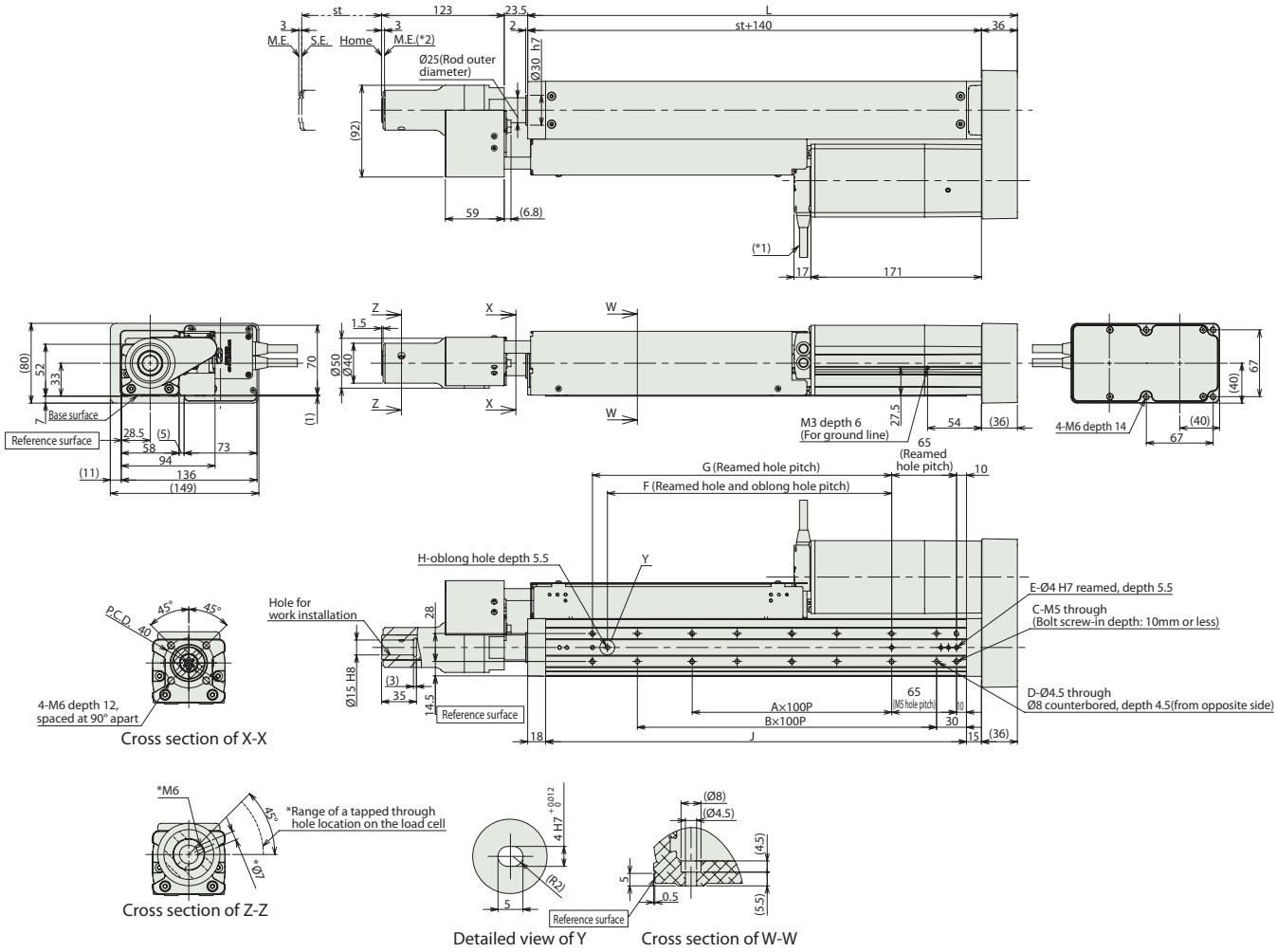
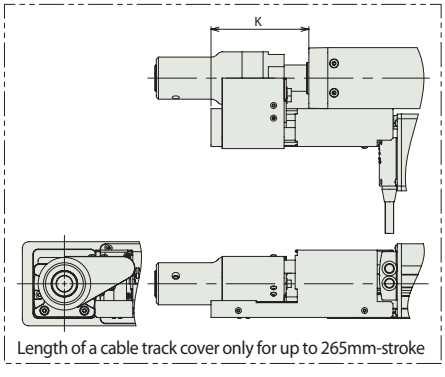
2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end





Dimensions and Mass by Stroke

Stroke		115	165	215	265	315	365	415
L		291	341	391	441	491	541	591
A		1	1	2	2	3	3	4
B		1	2	2	3	3	4	4
C		6	6	8	8	10	10	12
D		4	6	6	8	8	10	10
E		3	3	3	3	3	3	3
F		85	85	185	185	285	285	385
G		100	100	200	200	300	300	400
H		1	1	1	1	1	1	1
J		222	272	322	372	422	472	522
K		93	70	49	27	-	-	-
Mass (kg)	Without brake	4.7	4.9	5.2	5.5	5.8	6.1	6.4
	With brake	4.9	5.1	5.4	5.7	6.0	6.3	6.6

Compatible Controllers

RCS3-RA6R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-60Ⓘ F-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 100/200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-60Ⓘ F-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA7R

RoboCylinder, Rod Type with Load Cell, Actuator Width 73mm
200V Servo Motor, Side-mounted Motor Specification

■ Model Specification Items

RCS3 — RA7R — □ — 100 — □ — □ — T2 — □ — □

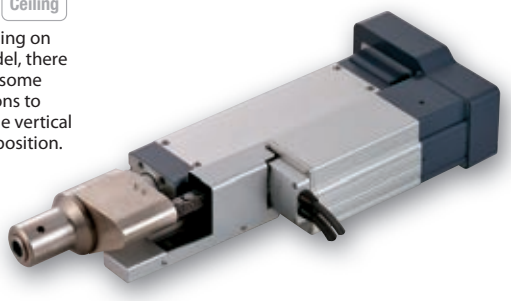
RCS3	RA7R	□	100	□	□	T2	□	□
Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Option
		I: Incremental specification A: Absolute specification	100: Servo motor, 100 W	2: Lead 2mm	120: 120mm ~ 520: 520mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X□□: Specified length R□□: Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

*__Controller__ is not included.

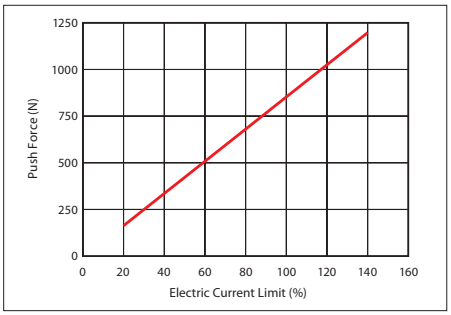
CE RoHS

Horizontal Vertical Side Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:

- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 24% or more because the push force would be unstable when the current limit value is lower than 24%.

POINT
Note on selection

(1) For push mode operation, please see P. 21 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) When using front flange and bracket, please install a support block for the horizontal installation of an actuator with 150mm-stroke or longer. However, adding the support block even for less than 150mm-stroke is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Max. push force (N)
RCS3-RA7R-①-100-2-②-T2-③-④	100	2	100	0.3	10	10	849	1200

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	120~520
2	100

(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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Bottom)	**CJB**	
Cable exit direction (Outside)	**CJO**	
Motor side-mounted to the left	**ML**	
Motor side-mounted to the right	**MR**	
Equipped with load cell (Standard equipment) (*2)	**LCT**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø12mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.1mm or less
Load cell rated capacity	2000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

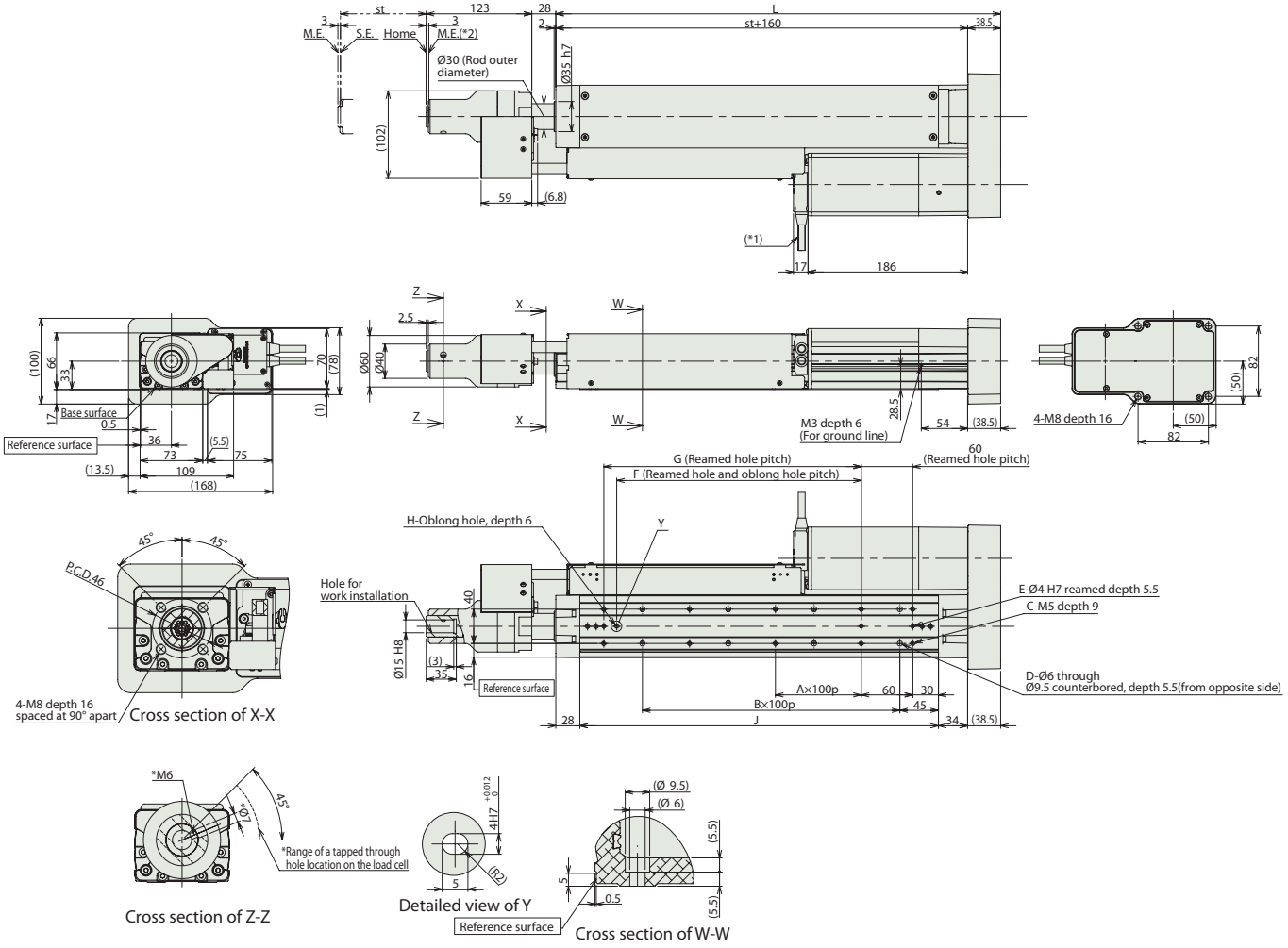
(*3) F.S: Full Scale

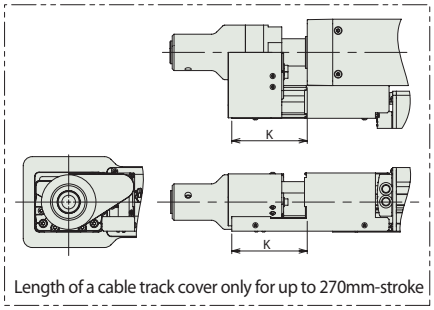
Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end





Length of a cable track cover only for up to 270mm-stroke

■ Dimensions and Mass by Stroke

Stroke		120	170	220	270	320	370	420	470	520
L		318.5	368.5	418.5	468.5	518.5	568.5	618.5	668.5	718.5
A		1	1	2	2	3	3	4	4	5
B		1	2	2	3	3	4	4	5	5
C		6	6	8	8	10	10	12	12	14
D		4	6	6	8	8	10	10	12	12
E		3	3	3	3	3	3	3	3	3
F		85	85	185	185	285	285	385	385	485
G		100	100	200	200	300	300	400	400	500
H		1	1	1	1	1	1	1	1	1
J		218	268	318	368	418	468	518	568	618
K		83	59	38	17	-	-	-	-	-
Mass (kg)	Without brake	6.1	6.5	6.8	7.2	7.5	7.9	8.2	8.6	8.9
	With brake	6.3	6.7	7.0	7.4	7.7	8.1	8.4	8.8	9.1

Compatible Controllers

RCS3-RA7R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-100Ⓘ-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 100/200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-100Ⓘ-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA8R

RoboCylinder, Rod Type with Load Cell, Actuator Width 88mm
200V Servo Motor, Side-mounted Motor Specification

■ Model Specification Items

RCS3 — RA8R — ☐ — 200 — ☐ — ☐ — ☐ — T2 — ☐ — ☐

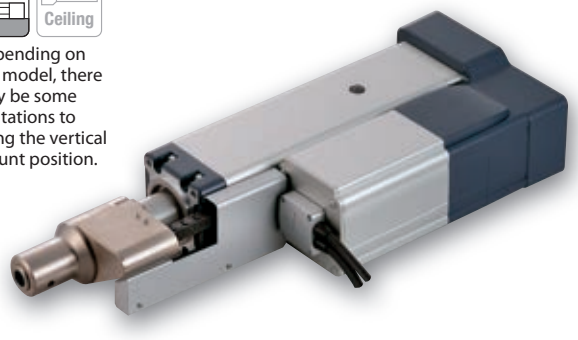
Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Option
RCS3	RA8R	I: Incremental specification A: Absolute specification	200: Servo motor, 200 W	2.5: Lead 2.5mm	100: 100mm ~ 500: 500mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N : No cable P : 1m S : 3m M : 5m X☐☐ : Specified length R☐☐ : Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

*Controller is not included.

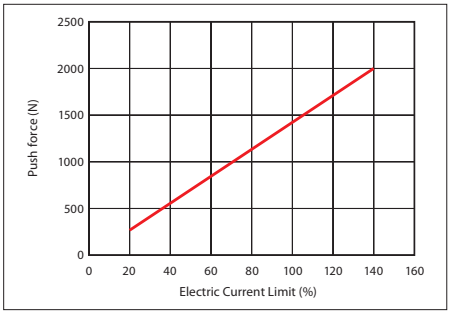
CE RoHS

Horizontal Vertical Side Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 14% or more because the push force would be unstable when the current limit value is lower than 14%.

POINT
Note on selection

(1) For push mode operation, please see P. 21 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) When using front flange and bracket, please install a support block for the horizontal installation of an actuator with 150mm-stroke or longer. However, adding the support block even for less than 150mm-stroke is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Max. push force (N)
RCS3-RA8R-①-200-2.5-②-T2-③-④	200	2.5	125	0.2	10	10	1367	2000

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	100~500
2.5	125

(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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Bottom) (*2)	**CJB**	
Cable exit direction (Outside)	**CJO**	
Motor side-mounted to the left	**ML**	
Motor side-mounted to the right	**MR**	
Equipped with load cell (Standard equipment) (*3)	**LCT**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) When you select „CJB" for an actuator whose stroke is 100mm, the foot bracket cannot be chosen.

(*3) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø16mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.1mm or less
Load cell rated capacity	2000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

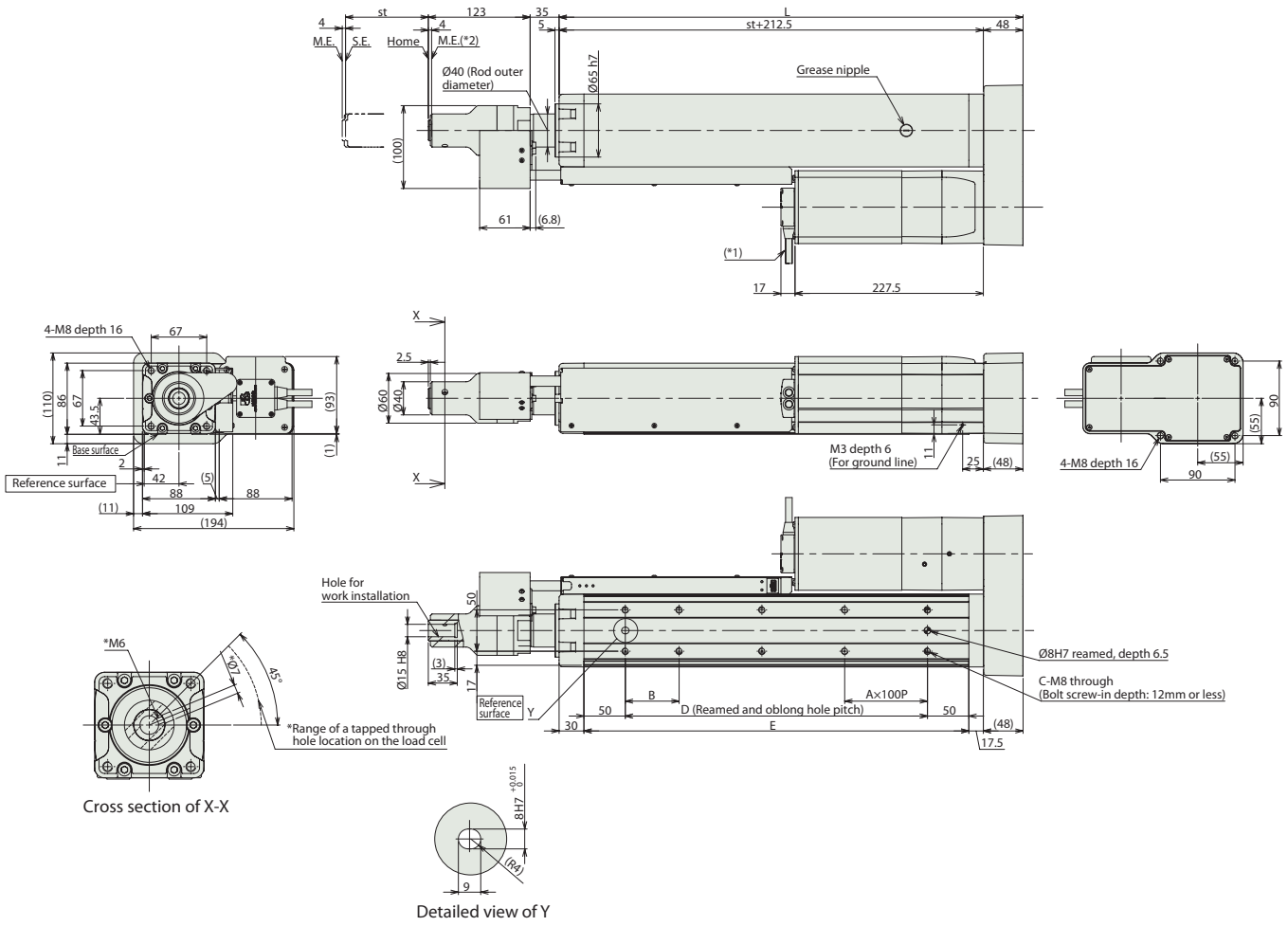
(*3) F.S: Full Scale

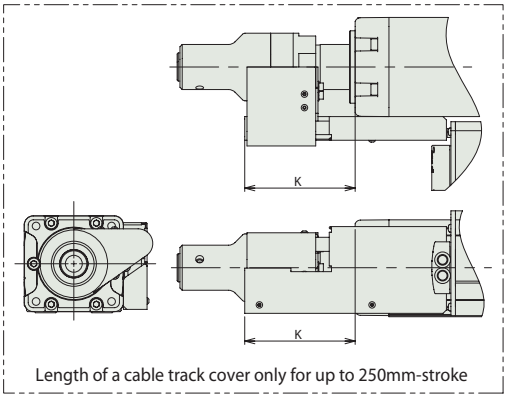
Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end





Length of a cable track cover only for up to 250mm-stroke

■ Dimensions and Mass by Stroke

Stroke		100	150	200	250	300	350	400	450	500
L		360.5	410.5	460.5	510.5	560.5	610.5	660.5	710.5	760.5
A		1	1	2	2	3	3	4	4	5
B		65	115	65	115	65	115	65	115	65
C		6	6	8	8	10	10	12	12	14
D		165	215	265	315	365	415	465	515	565
E		265	315	365	415	465	515	565	615	665
K		98	63	42	21	-	-	-	-	-
Mass (kg)	Without brake	10.2	10.8	11.3	11.9	12.5	13	13.6	14.1	14.7
	With brake	10.7	11.3	11.8	12.4	13.0	13.5	14.1	14.6	15.2

Compatible Controllers

RCS3-RA8R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-200Ⓘ-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 100/200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-200Ⓘ-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA10R

RoboCylinder, Rod Type with Load Cell, Actuator Width 108mm
200V Servo Motor, Side-mounted Motor Specification

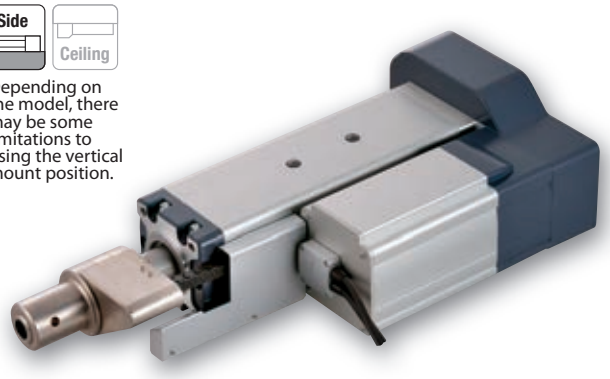
■ Models

Specification Items	RCS3	RA10R	☐	400	☐	☐	☐	T2	☐	☐
	Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Option
			I: Incremental specification A: Absolute specification	400: Servo motor, 400 W	2.5: Lead 2.5mm	100: 100mm ~ 500: 500mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X☐☐: Specified length R☐☐: Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

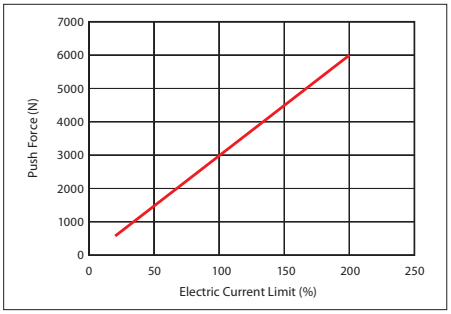
*Controller is not included.

Horizontal | Vertical | Side | Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 20% or more because the push force would be unstable when the current limit value is lower than 20%.

POINT Note on selection

(1) For push mode operation, please see P. 22 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) When using front flange and bracket, please install a support block for the horizontal installation of an actuator with 150mm-stroke or longer. However, adding the support block even for less than 150mm-stroke is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Max.push force (N)
RCS3-RA10R-①-400-2.5-②-T2-③-④	400	2.5	125	0.2	15	15	2713	6000

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	100~500
2.5	125

(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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Bottom) (*2)	**CJB**	
Cable exit direction (Outside)	**CJO**	
Motor side-mounted to the left	**ML**	
Motor side-mounted to the right	**MR**	
Equipped with load cell (Standard equipment) (*3)	**LCT**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) When you select „CJB" for an actuator whose stroke is 100mm, the foot bracket cannot be chosen.

(*3) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø20mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.1mm or less
Load cell rated capacity	6000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

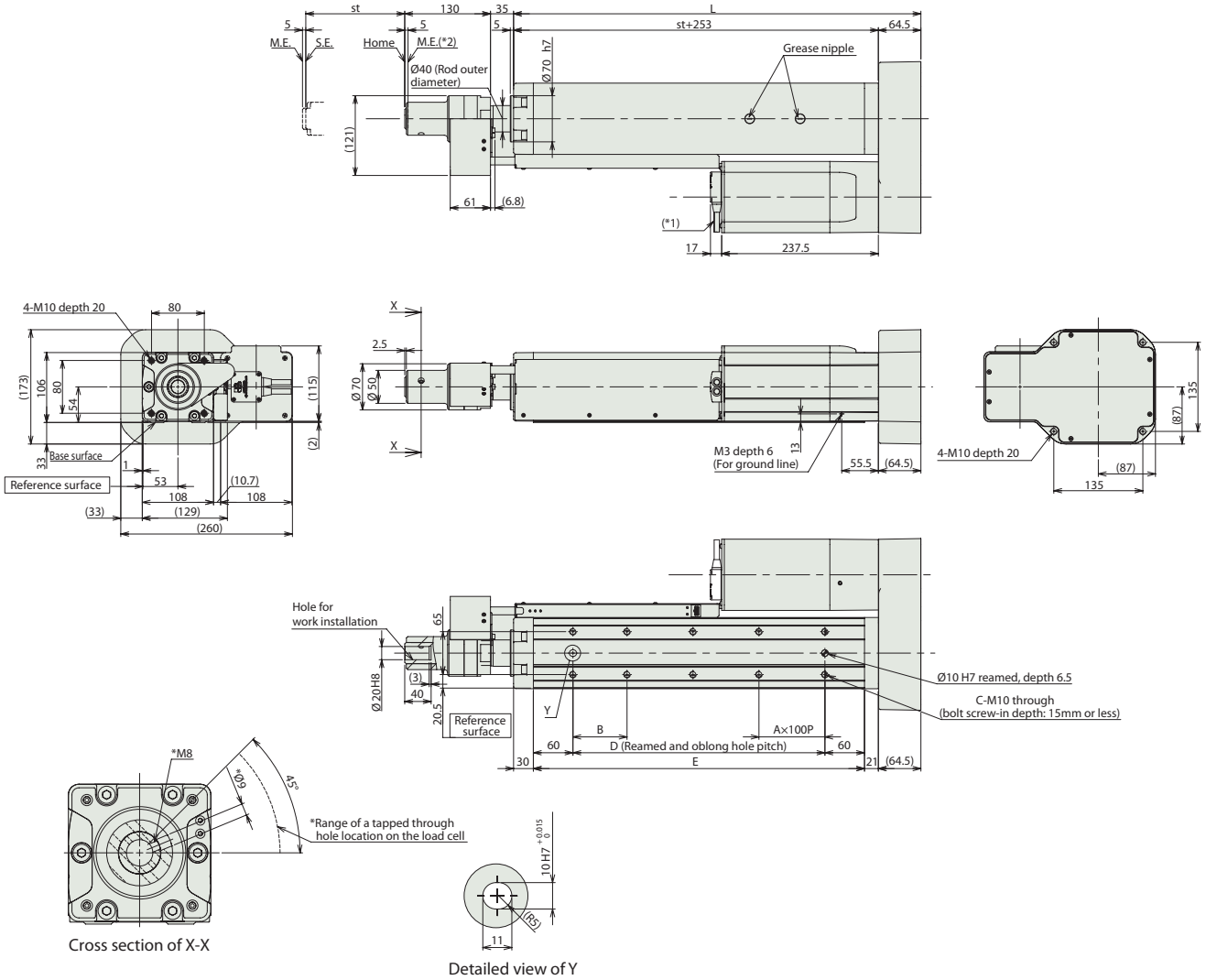
(*3) F.S: Full Scale

Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

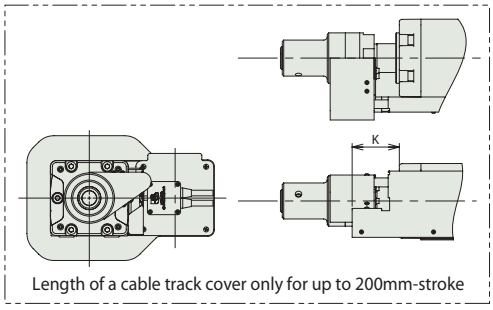
2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end



Cross section of X-X

Detailed view of Y



Length of a cable track cover only for up to 200mm-stroke

■ Dimensions and Mass by Stroke

Stroke		100	150	200	250	300	350	400	450	500
L		417.5	467.5	517.5	567.5	617.5	667.5	717.5	767.5	817.5
A		1	1	2	2	3	3	4	4	5
B		82	132	82	132	82	132	82	132	82
C		6	6	8	8	10	10	12	12	14
D		182	232	282	332	382	432	482	532	582
E		302	352	402	452	502	552	602	652	702
K		65.5	41.5	11.5	-	-	-	-	-	-
Mass (kg)	Without brake	17.1	17.9	18.7	19.5	20.4	21.2	22	22.9	23.7
	With brake	17.6	18.4	19.2	20	20.9	21.7	22.5	23.4	24.2

Compatible Controllers

RCS3-RA10R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-400Ⓘ F-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-400Ⓘ F-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS2-RA13R

RoboCylinder, Rod Type with Load Cell, Actuator Width 130mm
200V Servo Motor, Side-mounted Motor Specification

■ Models

Specification Items	RCS2	RA13R	☐	750	☐	☐	☐	T2	☐	☐
	Series	Type	Encoder type	Motor Type	Lead	Stroke	Applicable Controller	Cable length	Option
			I: Incremental specification A: Absolute specification	750: Servo motor, 750 W	2.5: Lead 2.5mm 1.25: Lead 1.25mm	50: 50mm ~ 200: 200mm (The increment of stroke is 50mm)	T2: SCON-CB/CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X☐☐: Specified length R☐☐: Robot cable	Please refer to the options table below. * Please make sure to select an option code for both the motor side-mounted direction and the cable exit direction.

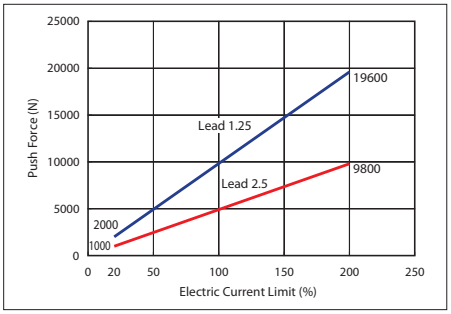
*Controller is not included.

CE RoHS

Horizontal Vertical Side Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.

■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 20% or more because the push force would be unstable when the current limit value is lower than 20%.

POINT Note on selection

(1) For push mode operation, please see P. 22 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(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 max. 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.

(5) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Contin. push force (N)	Max. push force (N)	Stroke (mm)
RCS2-RA13R-① -750-2.5- ②-T2-③-④	750	2.5	0.02	15	15	5106	3567	9800	50~200 (every 50mm)
RCS2-RA13R-① -750-1.25- ②-T2-③-④		1.25	0.01	15	15	10211	7141	19600	

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ 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)	

* Refer to P. 37 for maintenance cables.

Options

Name	Option code	Reference page
Front flange	**FL**	→P25
Foot bracket (*1)	**FT**	→P25
Brake (with brake box)	**B**	Refer to the RoboCylinder General Catalog.
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/ML2**	
Equipped with load cell (with cable track for the wiring) (*2)	**LCT**	-
Equipped with load cell (without cable track for the wiring) (*2)	**LCN**	-

(*1) Refer to P. 26 for the number of brackets included.

(*2) Please make sure to enter "LCT" or "LCN" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø32mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.2mm or less
Load cell rated capacity	20000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

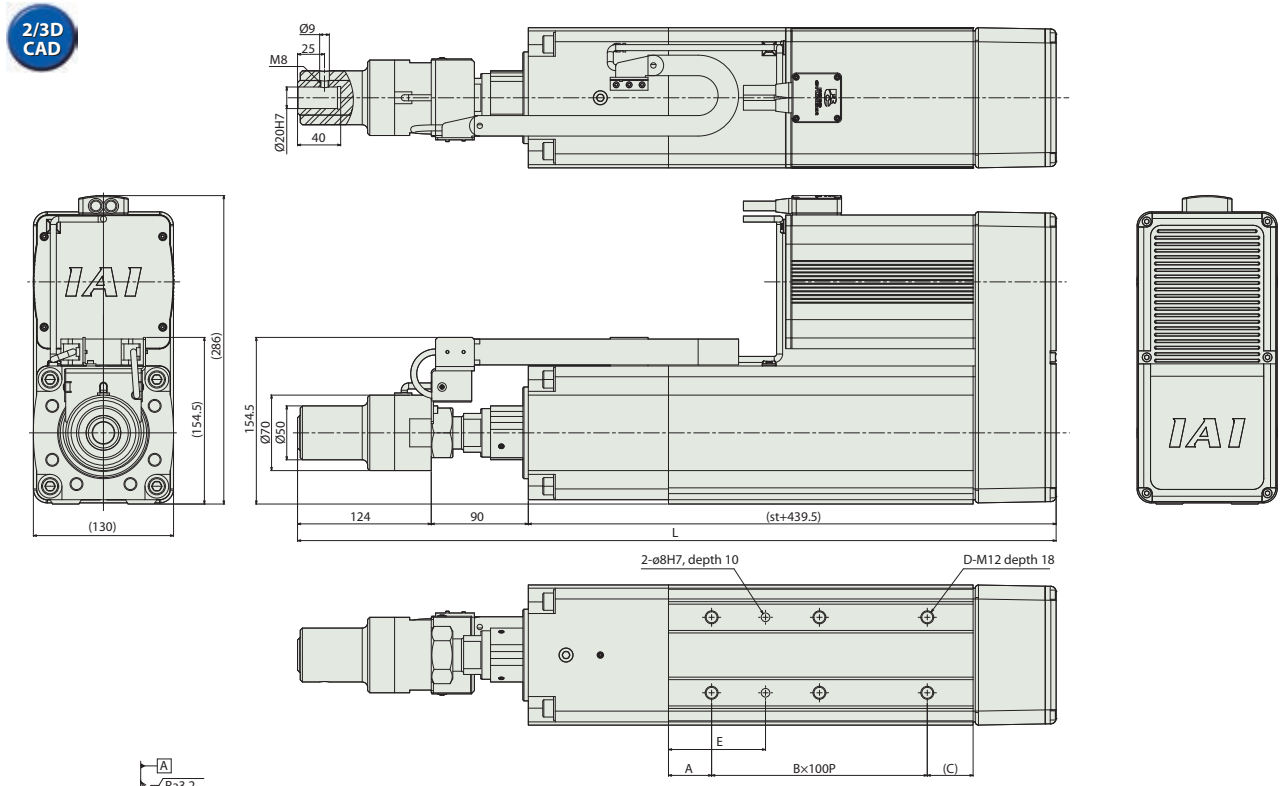
(*2) R.C: Rated Capacity

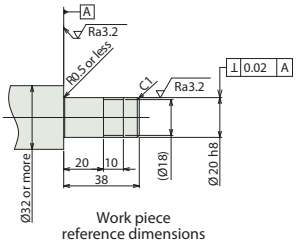
(*3) F.S: Full Scale

Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

2/3D CAD



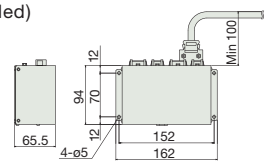


Work piece reference dimensions

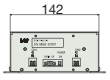
Brake box (included)

(Included in the brake-equipped model)

Standalone model: RCB-110-RA13-0



Note: The brake box requires a DC24V (max1A) power.



*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.

*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.

*3 The orientation of the bolt will vary depending on the product.

Note:
The brake-equipped model (option code: "-B") always comes with a brake box. If you want to order just the brake-equipped actuator, specify the option code "-BN".

Dimensions and Mass by Stroke

Stroke		50	100	150	200
L	Without brake	703.5	753.5	803.5	853.5
	With brake	760.5	810.5	860.5	910.5
A		40	65	40	65
B		2	2	3	3
C		42.5	67.5	42.5	67.5
D		6	6	8	8
E		90	115	90	115
Mass (kg)	Without brake	35.5	36.5	37.5	38.5
	With brake	37.5	38.5	39.5	40.5

Motor-mounting direction / Cable exit direction (Options)

Note:
Please be sure to specify one of the codes for the motor mounting direction and the cable exit direction.

Option Code	MT1	MT2	MT3	MR1	ML1	MR2	ML3
Motor-mounting direction	Top (standard)	Top	Top	Right	Left	Right	Left
Cable exit direction	Top (standard)	Right	Left	Top	Top	Right	Left

Compatible Controllers

RCS3-RA13R actuators can be operated with the following controllers. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Standard type)		SCON-CB-750SⒾF-NP-2-2	1 axis	Absolute Incremental	512 points	Single-phase 200 VAC	Position standard type controller
Single axis controller (Global type)		SCON-CGB-750SⒾF-NP-2-2					Position global type controller (Safety category compliant spec.)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA15R

RoboCylinder, Rod Type with Load Cell, Actuator Width 150mm
200V Servo Motor, Side-mounted Motor Specification

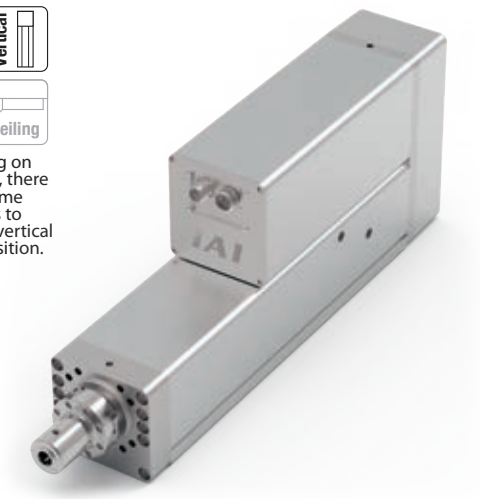
■ Models

Specification Items	RCS3	RA15R	Encoder type	3300	Lead	Stroke	T3	Cable length	Option
	Series	Type	I: Incremental specification A: Absolute specification	Motor Type 3300: Servo motor, 3300 W	3.6: Lead 3.6mm	100: 100mm ~ 500: 500mm (The increment of stroke is 100mm)	Applicable Controller T3: SCON-CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X□□: Specified length	Please refer to the options table below. * Please make sure to select an option code for the motor side-mounted direction (MT).

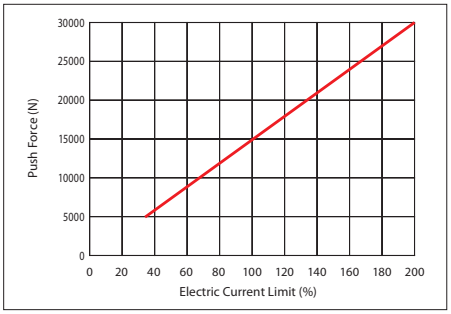
*Controller is not included.

Horizontal / Vertical / Side / Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 20% or more because the push force would be unstable when the current limit value is lower than 20%.

POINT Note on selection

(1) For push mode operation, please see P. 22 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) Please install a support block for the horizontal installation. It is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload Horizontal (kg)	Max. payload Vertical (kg)	Rated thrust (N)	Max.push force (N)
RCS3-RA15R-①-3300-3.6-②-T3-③-④	3300	3.6	240	0.1	15	15	15577	30000

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	100~500
3.6	240

(Unit: mm/s)

Cable Length

Type	Cable code	
Standard type (Robot cable)	**P** (1m)	
	S (3m)	
	M (5m)	
Special length	**X06** (6m) ~**X10** (10m)	
	X11 (11m)~**X15** (15m)	
	X16 (16m)~**X20** (20m)	

* Refer to P. 37 for maintenance cables.
* The standard cable is the robot cable.

Options

Name	Option code	Reference page
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Right side)	**CJR**	
Cable exit direction (Left side)	**CJL**	
Motor side-mounted to the top	**MT**	
Equipped with load cell (Standard equipment) (*1)	**LCT**	-

(*1) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø36mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.2mm or less
Load cell rated capacity	50000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

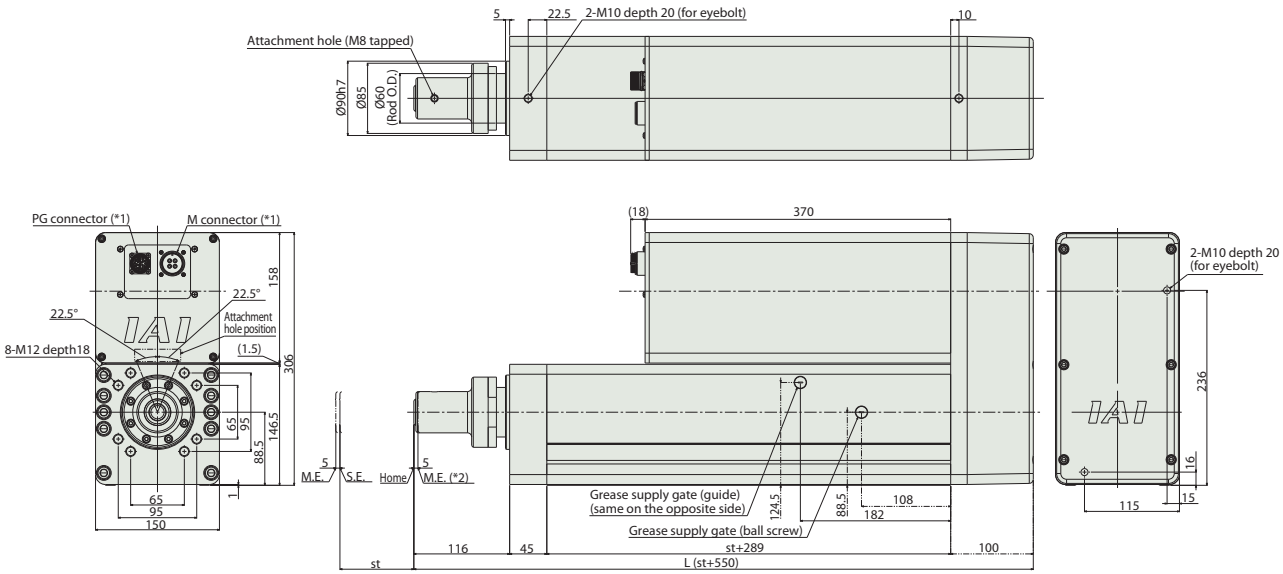
(*3) F.S: Full Scale

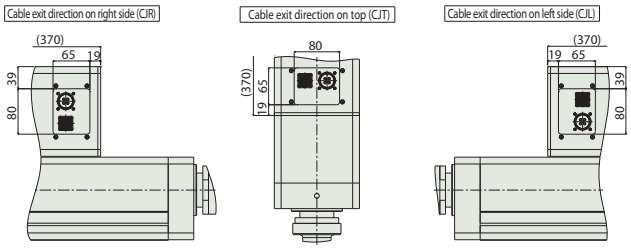
Dimensions

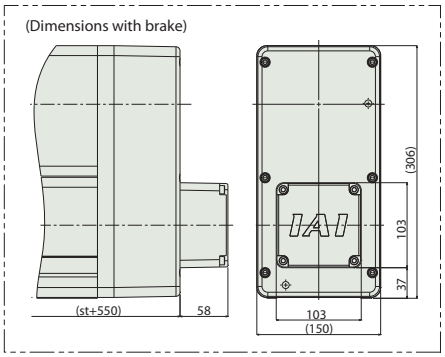
CAD drawings can be downloaded from our website. www.intelligentactuator.com

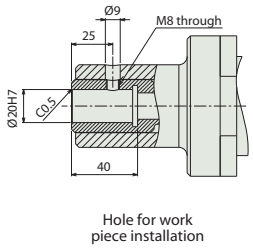
2/3D CAD

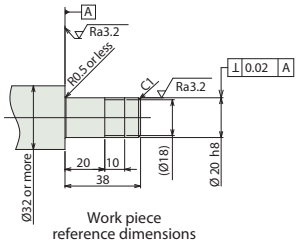
*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end











■ Dimensions and Mass by Stroke

Stroke		100	200	300	400	500
L		650	750	850	950	1050
Mass (kg)	Without brake	61	64.9	68.7	72.6	76.5
	With brake	63	66.9	70.7	74.6	78.5

Compatible Controllers

RCS3-RA15R actuators can be operated with the following controller. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Global type)		SCON-CGB-3300Ⓘ-NP-2-2	1 axis	Absolute Incremental	512 points	Three-phase 200 VAC	Position global type controller (Safety category compliant specification)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

RCS3-RA20R

RoboCylinder, Rod Type with Load Cell, Actuator Width 200mm
200V Servo Motor, Side-mounted Motor Specification

■ Models

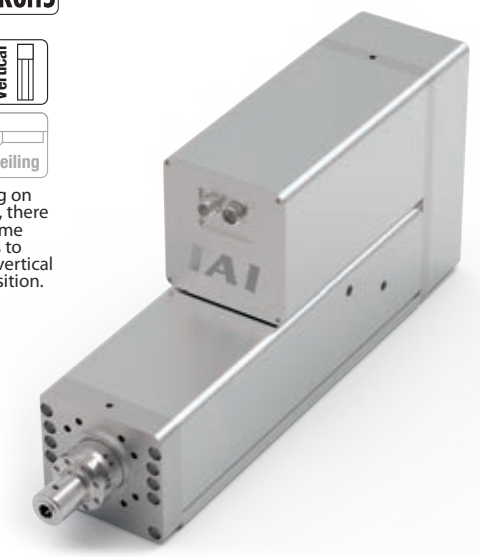
Specification Items	RCS3	RA20R	☐	3000	☐	☐	☐	T3	☐	☐
	Series	Type	Encoder type	Motor Type	Lead	Stroke		Applicable Controller	Cable length	Option
			I: Incremental specification A: Absolute specification	3000: Servo motor, 3000 W	4: Lead 4mm	100: 100mm ~ 500: 500mm (The increment of stroke is 100mm)		T3: SCON-CGB (Servo press specification)	N: No cable P: 1m S: 3m M: 5m X☐☐: Specified length	Please refer to the options table below. * Please make sure to select an option code for the motor side-mounted direction (MT) .

*__Controller__ is not included.

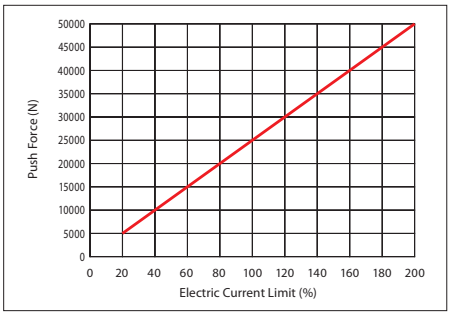
CE RoHS

Horizontal Vertical Side Ceiling

* Depending on the model, there may be some limitations to using the vertical mount position.



■ Correlation Diagram of Push Force and Current Limit



Caution:
- The correlation between push force and current limit value are strictly for reference purposes. Actual numbers may vary slightly.
- The current limit value should be 20% or more because the push force would be unstable when the current limit value is lower than 20%.

POINT Note on selection

(1) For push mode operation, please see P. 22 to check the allowable time period of a continuous push-motion with a different thrust force. Also, please check that the allowable continuous operational thrust force (please see P. 23) for the actual push cycle is less than the allowable continuous operational thrust force. (Even if there is no push motion)

(2) Customer's tooling is to be mounted on the load cell itself. In case any radial or moment load is applied to the load cell, please consider adding the external guides, etc. to offset those side loads.

(3) Please install a support block for the horizontal installation. It is recommended since vibration might occur depending on the operational and installation condition and damage the actuator.

(4) Force control is only for pushing motion, not valid for pulling motion.

Actuator Specifications

■ Lead and Payload

Model number	Motor (W)	Lead (mm)	Max. speed (mm/s)	Max. acceleration (G)	Max. payload		Rated thrust (N)	Max.push force (N)
					Horizontal (kg)	Vertical (kg)		
RCS3-RA20R-① -3000-4- ②-T3-③-④	3000	4	220	0.1	15	15	25902	50000

Legend: ① Encoder type ② Stroke ③ Cable length ④ Option

■ Stroke and Maximum Speed

Lead (mm) \ Stroke (mm)	100~500
4	220

(Unit: mm/s)

Cable Length

Type	Cable code	
Standard type (Robot cable)	**P** (1m)	
	S (3m)	
	M (5m)	
Special length	**X06** (6m) ~**X10** (10m)	
	X11 (11m)~**X15** (15m)	
	X16 (16m)~**X20** (20m)	

* Refer to P. 37 for maintenance cables.
* The standard cable is the robot cable.

Options

Name	Option code	Reference page
Brake	**B**	Refer to the RoboCylinder General Catalog.
Cable exit direction (Top)	**CJT**	
Cable exit direction (Right side)	**CJR**	
Cable exit direction (Left side)	**CJL**	
Motor side-mounted to the top	**MT**	
Equipped with load cell (Standard equipment) (*1)	**LCT**	-

(*1) Please make sure to enter "LCT" in the box of Model Specification Items to select the actuator with load cell.

Actuator Specifications

Item	Description
Drive system	Ball screw Ø40mm, rolled C10
Positioning repeatability	±0.01mm
Rod non-rotation precision	±0 deg.
Lost motion	0.2mm or less
Load cell rated capacity	50000N
Load cell system accuracy	±1% R.C (*2)
Loading repeatability (*1)	±0.5% F.S (*3)
Load cell service life	2 million times
Ambient operating temperature and humidity	0°C~40°C

(*1) Ratio (in percentage) of the load variations caused by the repeated operations to the load cell rated capacity. The ratio is calculated based on actual data at IAI.

(*2) R.C: Rated Capacity

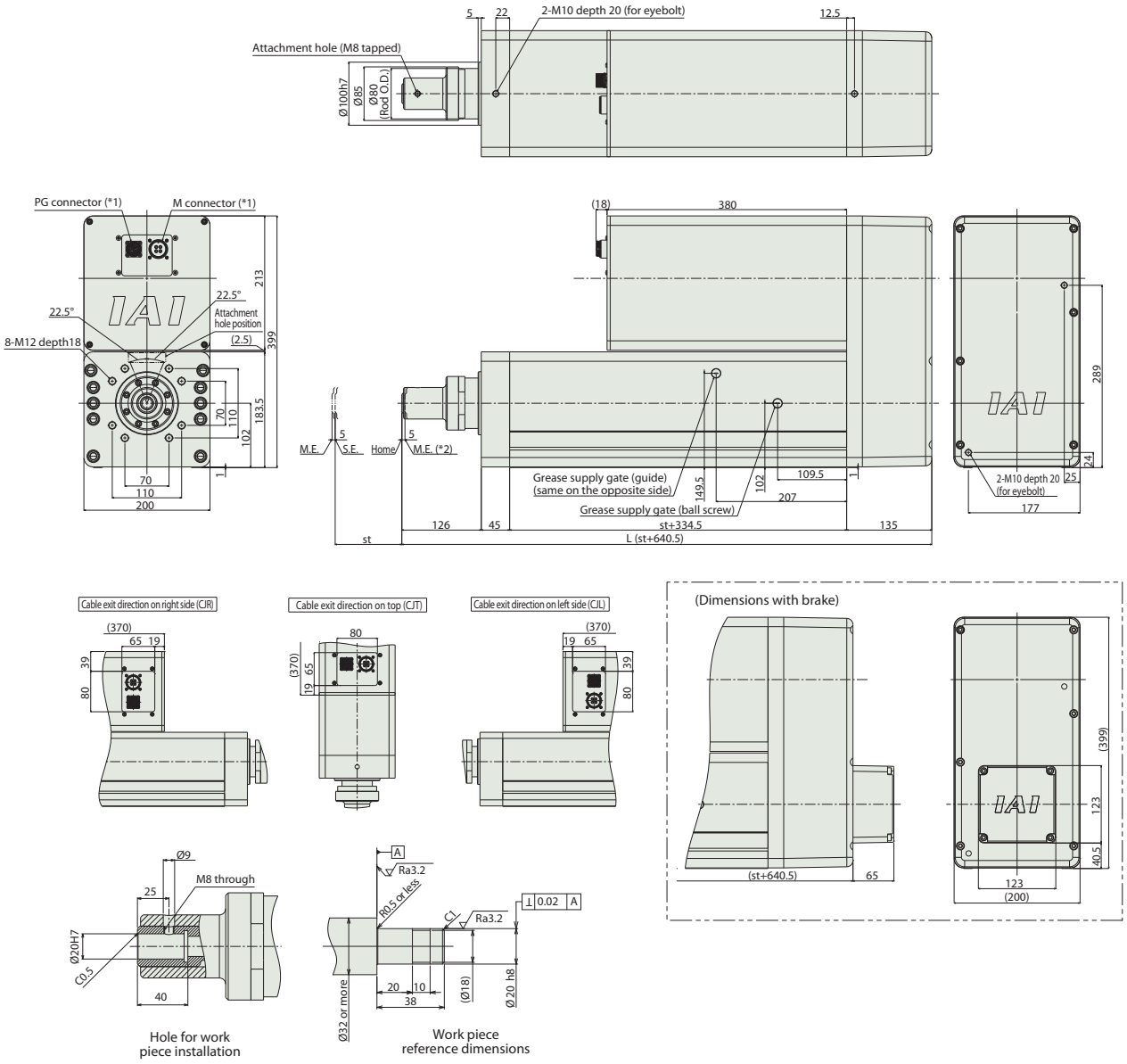
(*3) F.S: Full Scale

Dimensions

CAD drawings can be downloaded from our website. www.intelligentactuator.com

2/3D CAD

*1 Connects the motor-encoder cable. Refer to P. 37 for the details of the cable.
*2 While the rod is returning to its home position, please be careful of interference from surrounding objects, as it will travel until it reaches the ME.
ME : Mechanical end
SE : Stroke end



■ Dimensions and Mass by Stroke

Stroke		100	200	300	400	500
L		740.5	840.5	940.5	1040.5	1140.5
Mass (kg)	Without brake	93.3	99.6	105.8	112.1	118.4
	With brake	96.3	102.6	108.8	115.1	121.4

Compatible Controllers

RCS3-RA20R actuators can be operated with the following controller. Select an appropriate controller type according to your application.

Name	External view	Model number (Note 1)	Max. number of controlled axes	Encoder type	Max. number of positioning points	Power-supply capacity	Description
Single axis controller (Global type)		SCON-CGB-3000Ⓘ-NP-2-2	1 axis	Absolute Incremental	512 points	Three-phase 200 VAC	Position global type controller (Safety category compliant specification)

(Note 1) The model numbers are based on a 1-axis specification without network support. Ⓘ represents the encoder type (absolute/incremental). For details, refer to page 28.

Push Force / Continuous Operation Thrust

RCS3 • RCS2 Series High-thrust Rod Type

When using the actuator, the following three conditions must be satisfied.

Condition 1. The push time must be no greater than the determined time

Condition 2. The continuous operational thrust force of a single cycle must be no greater than the allowable continuous operational thrust force.

Condition 3. In a single cycle, push motion operation must occur only once

■ Selection method

Condition 1. Push time

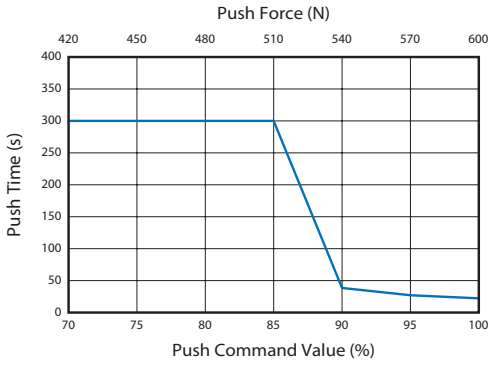
The maximum push time of each push command value is determined in the tables below. When using the actuator, please make sure that the push time is no greater than the time indicated in the tables below. Please be aware that using the actuator beyond the times indicated in the tables below may cause the actuator to malfunction.

RCS3

RA4R There is no limit in pressing time for RA4R. It is available to have continuous pushing.

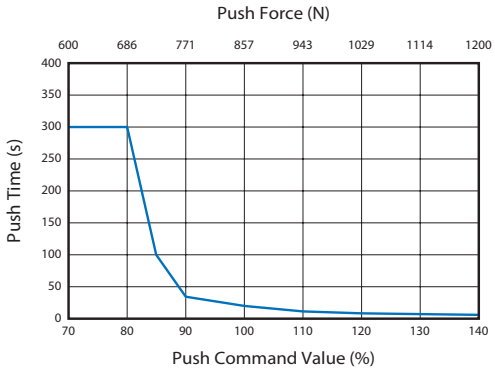
RA6R

Push Command Value (%)	Maximum Push Time (s)
70 or less	Continuous pushing is available
85	300
90	38
95	27
100	21



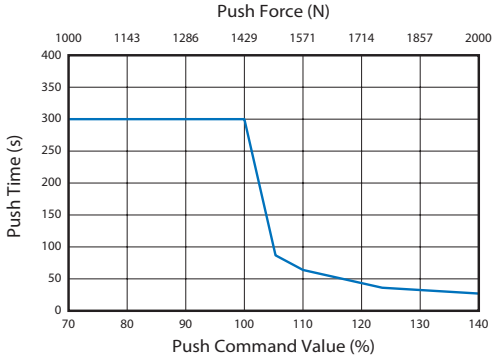
RA7R

Push Command Value (%)	Maximum Push Time (s)
70 or less	Continuous pushing is available
80	300
85	94
90	33
95	24
100	18
105	15
110	12
115	11
120	9
125	8
130	7
135	6
140	5



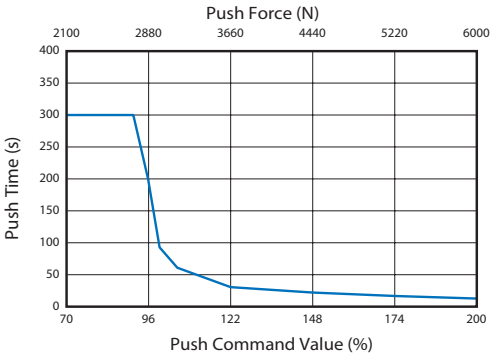
RA8R

Push Command Value (%)	Maximum Push Time (s)
70 or less	Continuous pushing is available
100	300
105	92
110	67
115	54
120	44
125	38
130	33
135	29
140	25



RA10R

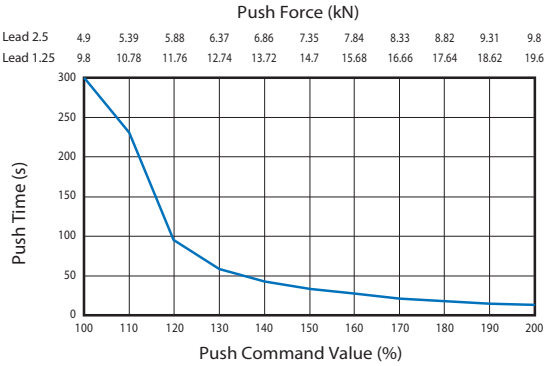
Push Command Value (%)	Maximum Push Time (s)
70 or less	Continuous pushing is available
90	300
95	210
100	95
105	70
110	56
115	46
120	39
125	34
130	30
135	26
140	24
145	21
150	19
155	17
160	16
165	14
170	13
175	12
180	11
185	10
190	9
195	9
200	8



RCS2

RA13R

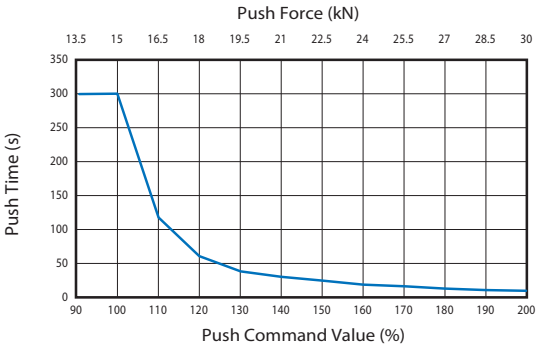
Push Command Value (%)	Maximum Push Time (s)
70 or less	Continuous pushing is available
71~100	300
110	230
120	95
130	58
140	43
150	33
160	27
170	21
180	18
190	15
200	13



RCS3

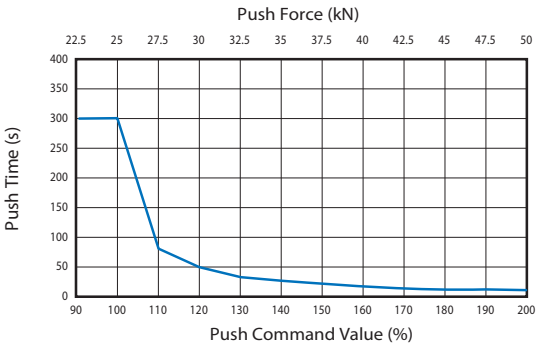
RA15R

Push Command Value (%)	Maximum Push Time (s)
90 or less	Continuous pushing is available
91~100	300
110	118
120	58
130	40
140	30
150	25
160	20
170	16
180	13
190	10
200	9



RA20R

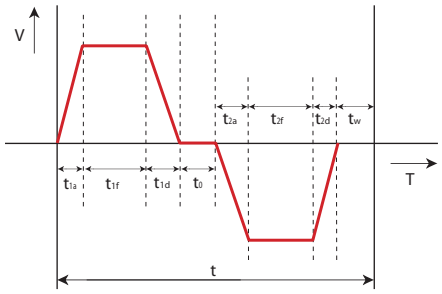
Push Command Value (%)	Maximum Push Time (s)
90 or less	Continuous pushing is available
91~100	300
110	80
120	50
130	36
140	28
150	22
160	18
170	15
180	13
190	11
200	10



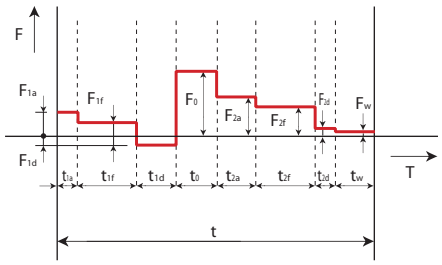
Push Force / Continuous Operation Thrust

Condition 2. Continuous operational thrust force

Please consider that the load and duty cycle of a single continuous operational thrust force must be smaller than the allowable continuous operational thrust force of the actuator.
Also, push motion operation is performed only once during a single cycle.



If the operation patterns on the left are rewritten so that thrust becomes the vertical axis



t : Operation time per cycle (s)	t_{2a} : Acceleration time 2
t_{1a} : Acceleration time 1	t_{2f} : Constant rate of traverse time 2
t_{1f} : Constant rate of traverse time 1	t_{2d} : Deceleration time 2
t_{1d} : Deceleration time 1	t_w : Wait time
t_0 : Push motion operation time	

F_{1a} : Thrust necessary for acceleration 1	F_{2a} : Thrust necessary for acceleration 2
F_{1f} : Thrust necessary for constant traverse 1	F_{2f} : Thrust necessary for constant traverse 2
F_{1d} : Thrust necessary for deceleration 1	F_{2d} : Thrust necessary for deceleration 2
F_0 : Thrust necessary for push motion operation	F_w : Thrust necessary for waiting

The continuous operational thrust force (Ft) of a single cycle is calculated with the following formula.

$$Ft = \sqrt{\frac{F_{1a}^2 \times t_{1a} + F_{1f}^2 \times t_{1f} + F_{1d}^2 \times t_{1d} + F_0^2 \times t_0 + F_{2a}^2 \times t_{2a} + F_{2f}^2 \times t_{2f} + F_{2d}^2 \times t_{2d} + F_w^2 \times t_w}{t}}$$

*In the case of horizontal use, it is not necessary to calculate the thrust necessary for constant traverse or waiting.

- $F_{1a}/F_{2a}/F_{1d}/F_{2d}$ vary according to the direction of operation, so please calculate them with the formulas shown below.

For horizontal use: thrust at acceleration/deceleration	$F_{1a} = F_{1d} = F_{2a} = F_{2d} = (M+m) \times d + F_S$
For horizontal use: thrust at constant velocity	$F_{1f} = F_{2f} = f + F_S$
For horizontal use: retaining force at the wait state	$F_W = 0$
For vertical use: thrust at acceleration during descent	$F_{1a} = (M+m) \times 9.8 - (M+m) \times d + F_S$
For vertical use: thrust at constant traverse during descent	$F_{1f} = (M+m) \times 9.8 + \alpha + F_S$ (*1)
For vertical use: thrust at deceleration during descent	$F_{1d} = (M+m) \times 9.8 + (M+m) \times d + F_S$
For vertical use: thrust at acceleration during ascent	$F_{2a} = (M+m) \times 9.8 + (M+m) \times d + F$
For vertical use: thrust at constant traverse during ascent	$F_{2f} = (M+m) \times 9.8 + \alpha + F_S$ (*1)
For vertical use: thrust at deceleration during ascent	$F_{2d} = (M+m) \times 9.8 - (M+m) \times d + F_S$
For vertical use: retaining force at the wait state	$F_W = (M+m) \times 9.8$

M : Weight of moving part (kg)
m : Weight of load (kg)
d : Directive acceleration/deceleration setting (m/s^2)
α : Thrust taking into account the driving resistance of the external guide
f : Driving resistance when attaching external guide (N)
F_S : Find the thrust of RA15R and RA20R types for each speed from the table below and put it in the formula.

Actuator
Mass of moving part :
RA6R : 2.5kg
RA7R : 3.5kg
RA8R : 4kg
RA10R : 5kg
RA13R : 9kg
RA15R : 10kg
RA20R : 18kg

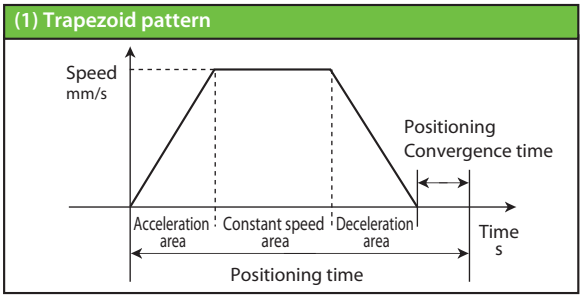
*1 When an external guide or similar component is installed, it is necessary to take into account the driving resistance.

RCS3-RA15R		RCS3-RA20R	
Speed [mm/s]	Fs [N]	Speed [mm/s]	Fs [N]
0~180	0	0~40	0
181~190	625	41~50	1875
191~200	1250	51~60	3750
201~210	1875	61~70	5625
211~220	2500	71~80	7500
221~230	3125	81~90	9375
231~240	3750	91~100	11250
		101~110	13125
		111~120	15000
		121~130	16875
		131~140	18750
		141~150	20625
		151~160	22500
		161~170	24375
		171~180	26250
		181~220	27500

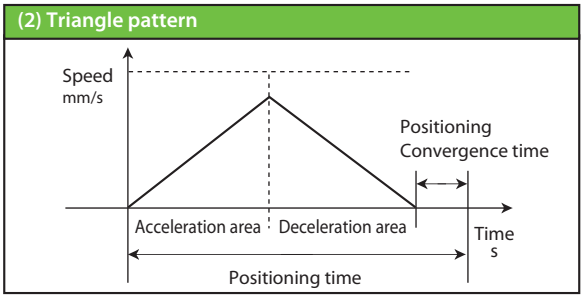
- t□a is the acceleration time, but the calculation methods of a trapezoid pattern and a triangle pattern are different.
  The difference between a trapezoid pattern and a triangle pattern can be determined by whether the arrival speed of operation of the traverse distance at the set speed is larger or smaller than the set speed.
  Arrival speed (Vmax) $=\sqrt{\text{traverse distance (m)} \times \text{set acceleration (m/s}^2\text{)}}$

  Set speed < arrival speed → (1) trapezoid pattern
  Set speed > arrival speed → (2) triangle pattern

(1) In the case of a trapezoid pattern
t□a=Vs/a Vs : Set speed (m/s) a : Directive acceleration (m/s²)



(2) In the case of a triangle pattern
t□a=Vt/a Vt : Arrival speed (m/s) a : Directive acceleration(m/s²)



- t□f is the constant traverse speed. Please calculate this to calculate the constant traverse distance.
  t□f= Lc/V Lc : Constant traverse distance (m) V : Directive speed (m/s)
  *Constant traverse distance = traverse distance – acceleration distance – deceleration distance Acceleration distance (deceleration distance) = $V^2/2a$
- t□d is the deceleration time, but if acceleration and deceleration are the same, then it is the same as the acceleration time.
  t□d=V/a V : The set speed (trapezoid pattern) or arrival speed (triangle pattern) (m/s) a: Directive deceleration (m/s²)

[RCS3-RA15R/RA20R types]

- Next, calculate the average velocity. The average velocity can be figured out with following formula.

$$v_t = \frac{0.5 \cdot v_1 \cdot t_{1a} + v_1 \cdot t_{1f} + 0.5 \cdot v_1 \cdot t_{1d} + 0.5 \cdot v_2 \cdot t_{2a} + v_2 \cdot t_{2f} + 0.5 \cdot v_2 \cdot t_{2d}}{t}$$

v_1 : Velocity at constant speed in approaching motion
v_2 : Velocity at constant speed in returning motion

Next, calculate the final continuous operation thrust F from the continuous operation thrust F_t and the average velocity v_t that have been figured out.

$$F = F_t + v_t \cdot K$$

The coefficient K should be selected from the table below.

Model name	Coefficient K
RA15R	150
RA20R	412.5

Please confirm that the calculated continuous operational thrust force Ft (RA15R、20Rの場合は上記計算式で算出したF)
is smaller than the allowable continuous operational thrust force.
The allowable continuous operational thrust force Ft of this product is as follows.

Model name	Allowable continuous operational thrust force (N)
RA6R-LC	481
RA7R-LC	679
RA8R-LC	1367
RA10R-LC	2577
RA13R-LC	1t: 5100
	2t: 10200
RA15R-LC	13500
RA20R-LC	22500

If the conditions cannot be satisfied, please adopt measures such as shortening the push time or extending the wait time.

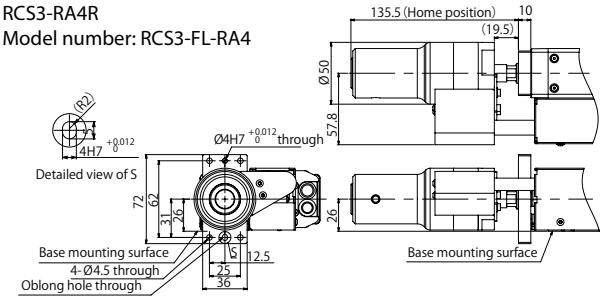
Actuator Options

Front flange

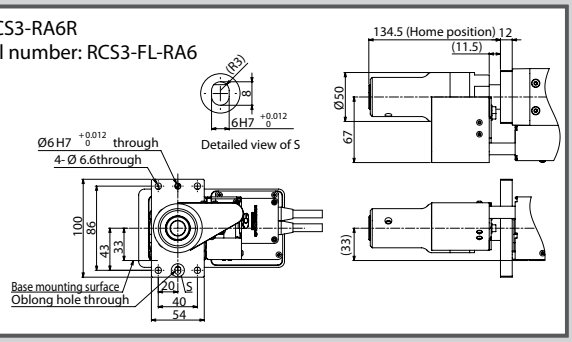
Model **FL**

Description This is a bracket for fixing the actuator body with the bolts.

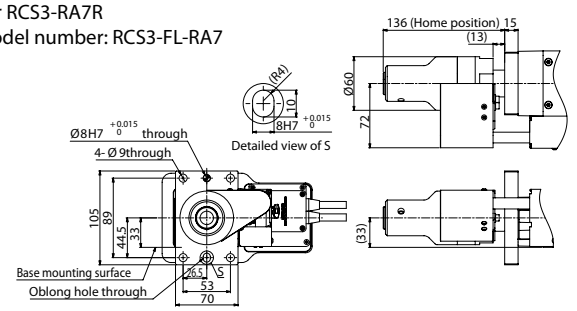
RCS3-RA4R
Model number: RCS3-FL-RA4



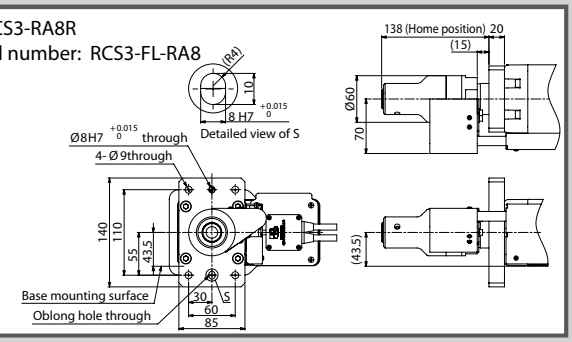
For RCS3-RA6R
Model number: RCS3-FL-RA6



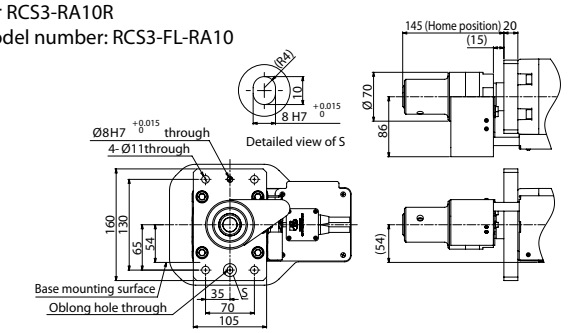
For RCS3-RA7R
Model number: RCS3-FL-RA7



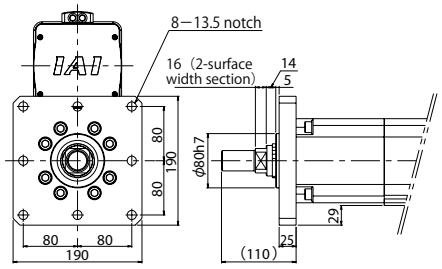
For RCS3-RA8R
Model number: RCS3-FL-RA8



For RCS3-RA10R
Model number: RCS3-FL-RA10



RCS2-RA13R
Model number: RCS2-FL-RA13

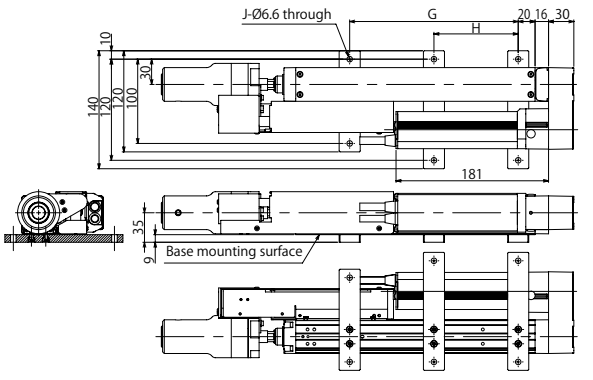


Foot Bracket

Model **FT**

Description This is a bracket to fix the actuator with bolts from the top side. (Bolts are tightened from the top, not from the bottom.)
The actuator body may be twisted or deformed if insufficient number of mounting foot brackets are used. Actuator life could also be shortened.
* Refer to the installation dimensions in the actuator drawing for the installation pitch between the foot brackets.
(Note 1) 2 hexagonal socket head bolts enclosed

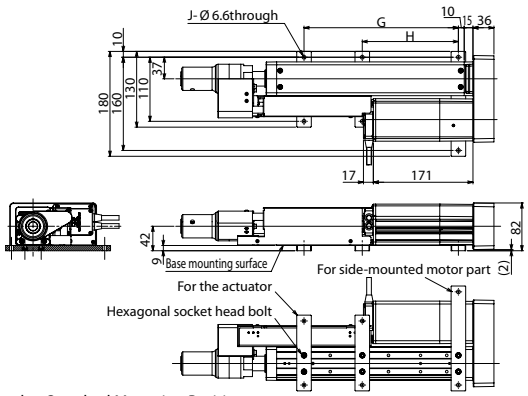
For RCS3-RA4R Model number - Short type: RCS3-FT-RA4-1 (Note1)
- Long type: RCS3-FT-RA4-2 (Note1)



Foot Bracket Standard Mounting Position

Stroke	110	160	210	260	310	360	410
G	150	200	250	300	350	400	450
H	0	0	200	200	200	200	200
J	4	4	6	6	6	6	6

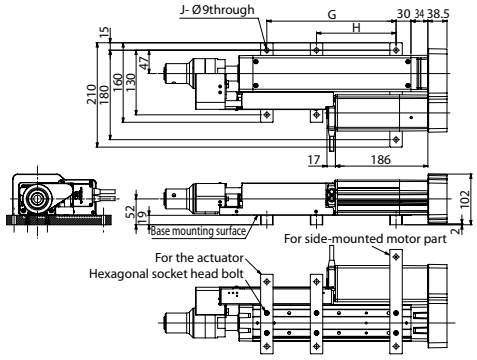
For RCS3-RA6R Model number - Short type: RCS3-FT-RA6-1 (Note 1)
- Long type: RCS3-FT-RA6-2 (Note 1)



Foot Bracket Standard Mounting Position

Stroke	115	165	215	265	315	365	415
G	165	165	265	265	365	365	465
H	0	0	165	165	165	165	265
J	4	4	6	6	6	6	6

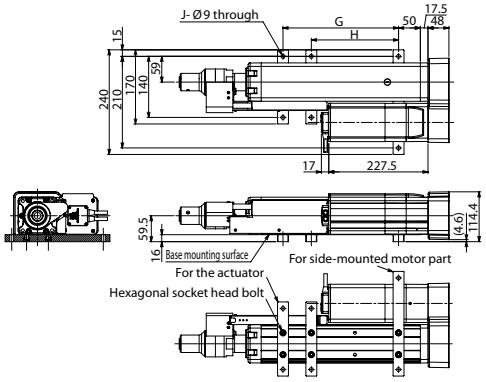
For RCS3-RA7R Model number - Short type: RCS3-FT-RA7-1 (Note 1)
- Long type: RCS3-FT-RA7-2 (Note 1)



Foot Bracket Standard Mounting Position

Stroke	120	170	220	270	320	370	420	470	520
G	160	160	260	260	360	360	460	460	560
H	0	0	160	160	160	160	260	260	260
J	4	4	6	6	6	6	6	6	6

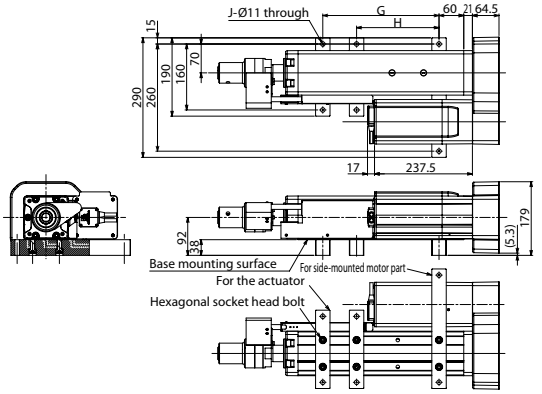
For RCS3-RA8R Model number - Short type: RCS3-FT-RA8-1 (Note 1)
- Long type: RCS3-FT-RA8-2 (Note 1)



Foot Bracket Standard Mounting Position

Stroke	100	150	200	250	300	350	400	450	500
G	165	215	265	315	365	415	465	515	565
H	0	0	200	200	200	200	200	300	300
J	4	4	6	6	6	6	6	6	6

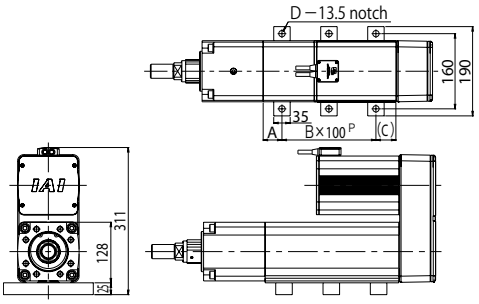
For RCS3-RA10R Model number - Short type: RCS3-FT-RA10-1 (Note 1)
- Long type: RCS3-FT-RA10-2 (Note 1)



Foot Bracket Standard Mounting Position

Stroke	100	150	200	250	300	350	400	450	500
G	182	232	282	332	382	432	482	532	582
H	0	0	200	200	200	200	200	300	300
J	4	4	6	6	6	6	6	6	6

For RCS2-RA13R Model number: RCS2-FT-RA13



Foot Bracket Standard Mounting Position

Stroke	50	100	150	200
A	40	65	40	65
B	2	2	3	3
C	42.5	67.5	42.5	67.5
D	6	6	8	8

● Quantities Enclosed

The following number of foot brackets and bolts is enclosed when the foot bracket option (Option code: FT) is selected at the time of the actuator purchase.

Model Name	Stroke (mm)	Foot Brackets	Enclosed QTY	Number of Bolts Enclosed
RCS3-RA4R	110	Long type	2	4
	160	Short type	1	4
		Long type	1	
	210～410	Short type	2	6
		Long type	1	
RCS3-RA6R	415	Short type	2	6
		Long type	1	
RCS3-RA7R	120～170	Short type	1	4
		Long type	1	
	220～520	Short type	2	6
		Long type	1	
RCS3-RA8R	150	Short type	1	4
		Long type	1	
	200～500	Short type	2	6
		Long type	1	
RCS3-RA10R	150	Short type	1	4
		Long type	1	
	200～500	Short type	2	6
		Long type	1	
RCS2-RA13R	50～100	—	3	6
	100～200		4	8

SCON-CB

Servo Press Dedicated Controller

Feature

1 Dedicated Press Program Included

There are 8 types of press-operation modes to choose from

By combining 2 types of control methods and 4 types of stoppage methods, there are a total of 8 types of press operation modes to choose from.

Speed control After arriving at the target position, stops while maintaining the position at the time of arrival.	Position stop
	Distance stop
	Load stop
	Incremental load stop
Force control After arriving at the target position, stops while maintaining the force at the time of arrival.	Position stop
	Distance stop
	Load stop
	Incremental load stop

Simple program input

Simply operate the program by inputting the values into the screen for each press operation mode that you are using.
Also, because the input increment for position is 0.001mm, it is now possible to input more precise settings.
This allows the user to make more microscopic adjustments in the positioning process.

A judgment function has also been added

Setting the judgment range with the press program judges whether or not the position and load fall within the specified range.

2 Assignment of I/O Signals Specialized for the Servo Press Functions

The assignment of servo press dedicated I/O signals is completely different than the former PIO pattern.

3 Predictive Maintenance Functions

- A function that issues a warning when a motor overload is detected has been included.
  Monitoring changes in the temperature of the motor makes it possible to detect abnormalities before the occurrence of a breakdown or a malfunction.
- Improvement of monitoring functions:
  Similar to the trigger function of an oscilloscope, it is now possible to acquire the waveforms of the current position, current speed, etc. from the instant the state of the selected signal changes. Also, it is possible to acquire the signal states of positioning completion, alarms, etc.
- A function that integrates the number of cycles with the distance covered makes it possible to check maintenance timing.
- The calendar function makes it possible to keep a timetable of the alarms that have been generated.

List of Models

Model number	SCON-CB/CGB								
External view									
I/O type	Standard specification	Network connection specification (*2)							
	PIO connection specification (*1)	DeviceNet	CC-Link	PROFIBUS	CompoNet	MECHATROLINK	EtherCAT	EtherNet/IP	PROFINET
		DeviceNet connection specification	CC Link connection specification	PROFIBUS DP connection specification	CompoNet connection specification	MECHATRO LINK I,II connection specification	EtherCAT connection specification	EtherNet/IP connection specification	PROFINET IO connection specification
I/O type model number	NP/PN	DV	CC	PR	CN	ML	EC	EP	PRT
Supported encoder type	Incremental/Absolute								

(*1) Pulse train control is not available.
(*2) Communication with PIO or pulse train is not available.

Model Number

SCON – CB – [ ] [ ] F – [ ] – [ ] – [ ]

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

CB	Standard type
CGB	Safety category type

*There is only safety category applicable type for the RCS3-RA15R/20R.

F	Servo press type

1	Single-Phase AC100V
2	Single-Phase AC200V
3	Three-Phase AC200V

30D	30W motor
60	60W motor
100	100W motor
200	200W motor
400	400W motor
750S	750W motor
3000	3000W motor
3300	3300W motor

*The 750S is designated for the RCS2-RA13R only.

WAI	Battery-less absolute/ incremental
A	Absolute

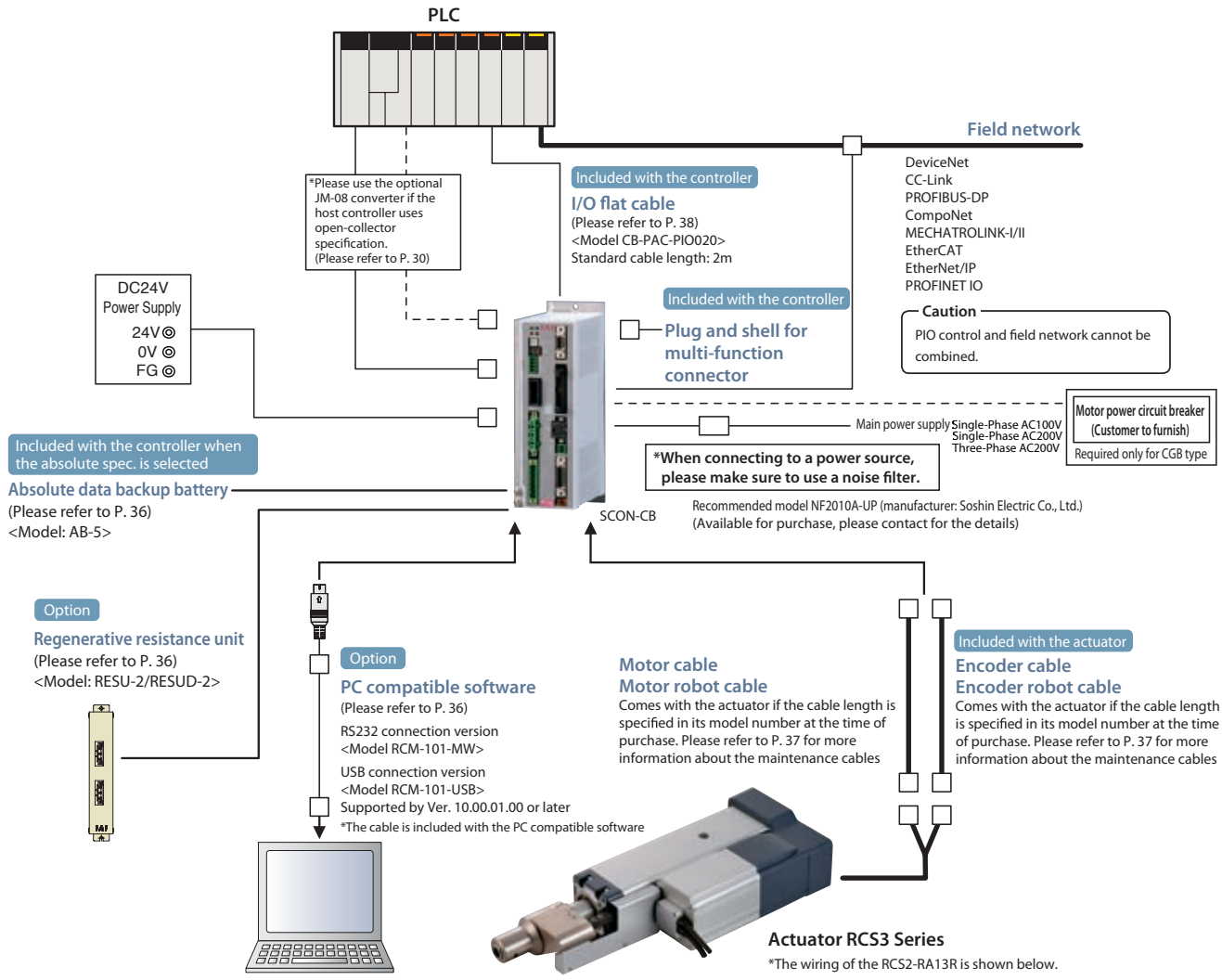
*The actuator equipped with a battery-less absolute encoder will be available soon.

NP	PIO NPN specification
PN	PIO PNP specification
DV	DeviceNet connection spec.
CN	CompoNet connection spec.
CC	CC Link connection spec.
ML	MECHATROLINK I,II connection spec.
PR	PROFIBUS DP connection spec.
EC	EtherCAT connection spec.
EP	EtherNet/IP connection spec.
PRT	PROFINET IO connection spec.

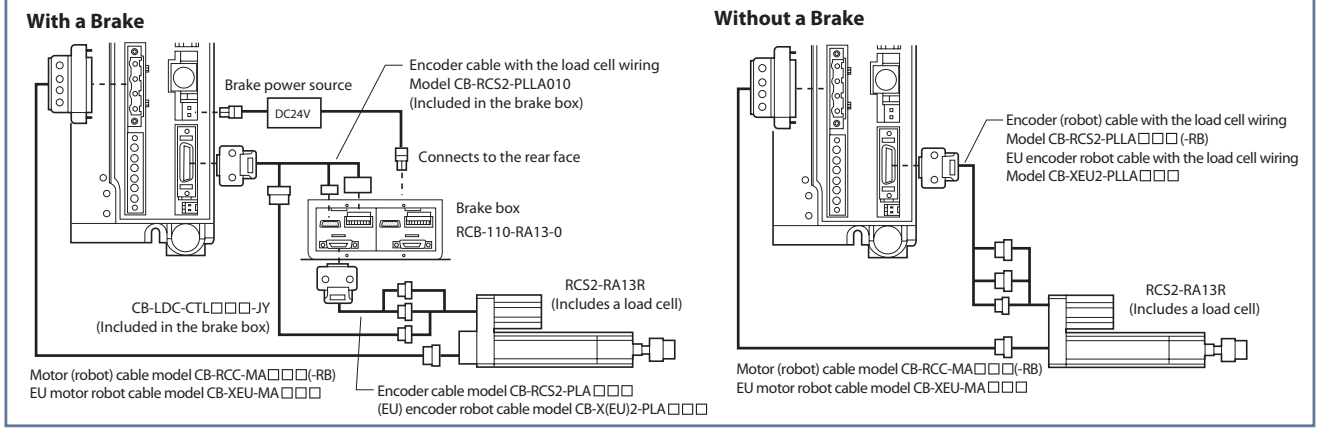
0	No cable
2	2m (standard)
3	3m
5	5m

* When DV, CN, CC, ML, PR, EC, EP, or PRT has been selected as the I/O type, please select 0 as the I/O cable length.

System Configuration



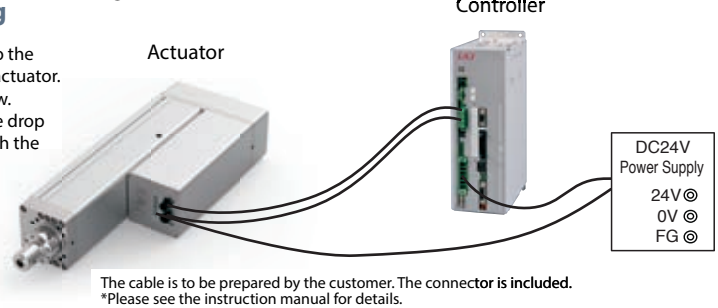
RCS2-RA13R Wiring



RCS3-RA15R/20R (with brake) wiring

The brake circuits for the RCS3-RA15R/20R are built into the actuator. Please input a voltage of DC24V±10% to the actuator. (The brake cannot be released if the input voltage is low. Please supply power by taking into account the voltage drop of the wiring.) The supply of DC24V is necessary for both the **actuator and the controller.**

Diagram of connection



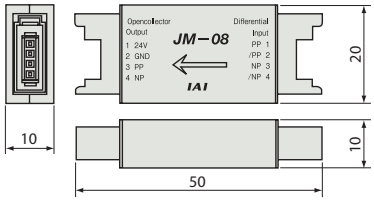
The cable is to be prepared by the customer. The connector is included.
*Please see the instruction manual for details.

■ Pulse Converter: JM-08

Converts differential pulses to the open-collector specification (NPN only).
Please use this converter if the host controller uses open-collector input.

Specifications

Item	Specifications
Input power	DC24V±10% (Max.50mA)
Input pulses	Differential input (Max. 10mA) (RS422 compliant)
Input frequency	500kHz or less
Output pulses	DC24V open collector (collector current Max. 25mA)
Mass	10g or less (not including the cable connectors)
Accessory	37104-3122-000FL (e-CON connector) x 2 by 3M Suitable power line AWG No.24~26



I/O Signals

Pin number	Category	Signal	Symbol	Name
1A	24V		P24	Power supply (+24V) for I/O
2A	24V		P24	Power supply (+24V) for I/O
3A	-		NC	-
4A	-		NC	-
5A	Input	IN0	PC1	Command program No. 1
6A		IN1	PC2	Command program No. 2
7A		IN2	PC4	Command program No. 4
8A		IN3	PC8	Command program No. 8
9A		IN4	PC16	Command program No. 16
10A		IN5	PC32	Command program No. 32
11A		IN6	PSTR	Program start
12A		IN7	PHOM	Move to program home position
13A		IN8	ENMV	Enable axis to move
14A		IN9	FPST	Forcibly stop program from running
15A		IN10	CLBR	Load cell calibration command
16A		IN11	BKRL	Forcibly release brake
17A		IN12	RMOD	Operation mode switching
18A		IN13	HOME	Home return
19A		IN14	RES	Alarm reset
20A		IN15	SON	Servo ON command
1B	Output	OUT0	PCMP	Program normally completed
2B		OUT1	PRUN	Program running
3B		OUT2	PORG	Program home position
4B		OUT3	APRC	Approaching
5B		OUT4	SERC	Searching
6B		OUT5	PRSS	Pressing
7B		OUT6	PSTP	Stop pressing
8B		OUT7	MPHM	Moving to program home position
9B		OUT8	JDOK	Overall judgment OK
10B		OUT9	JDNG	Overall judgment NG
11B		OUT10	CEND	Load cell calibration completed
12B		OUT11	RMDS	Operation mode status
13B		OUT12	HEND	Home return completed
14B		OUT13	SV	Servo ON status
15B		OUT14	*ALM	Alarm (Negative logic)
16B		OUT15	*ALML	Minor failure alarm (Negative logic)
17B	-		-	-
18B	-		-	-
19B	0V		N	Power supply (0V) for I/O
20B	0V		N	Power supply (0V) for I/O

Descriptions of I/O Signal Functions

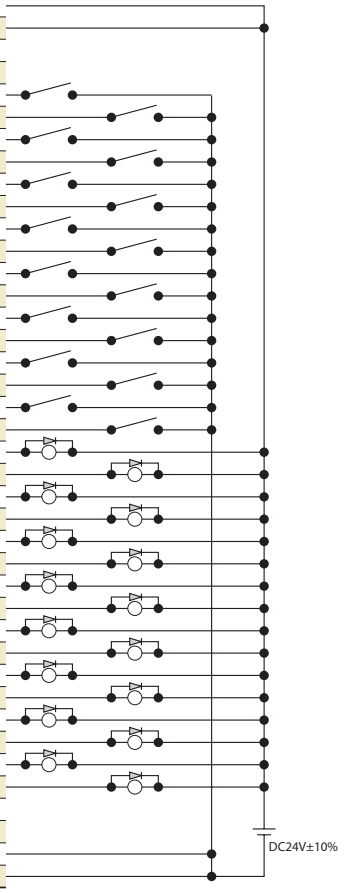
Category	Signal abbreviation	Signal name	Description
Input	PC1	Command program No. 1	Specifies the program No. for Program start command or Move to program home position command. Also moves to the program home position of the specified program when PHOM signal is set to ON after specifying the program No.
	PC2	Command program No. 2	
	PC4	Command program No. 4	
	PC8	Command program No. 8	
	PC16	Command program No. 16	
	PC32	Command program No. 32	
	PSTR	Program start	Starts the specified program after specifying the program No. in PC1 through PC32 and set this signal to ON.
	PHOM	Move to program home position	Moves to the program home position after specifying the program No. in PC1 through PC32 and set this signal to ON.
	ENMV	Enable axis to move	An axis can move only when this signal is set to ON because the axis and program are interlocked. When this signal is set to OFF, the axis cannot move and the program is stopped.
	FPST	Forcibly stop program from running	When this bit is set to ON while the program is running, the program stops running. It is possible to select whether to take refuge to the program home position when the program is forcibly made to stop by changing the parameter.
	CLBR	Load cell calibration command	The load cell calibration is initiated when this signal is set to ON for 20ms or more.
	BKRL	Forcibly release brake	Used to forcibly release the brake.
	RMOD	Operation mode switching	This signal can change the operation mode when MODE switch on the controller is set to AUTO. (AUTO mode when this signal is set to OFF and MANU mode when this signal is set to ON)
	HOME	Home return	Performs home return when this signal is set to ON.
	RES	Reset	Resets alarm when this signal is set to ON.
	SON	Servo ON	Servo is turned ON while this signal is set to ON, and OFF while it is set to OFF.
Output	PCMP	Program normally completed	Indicates that the program has been successfully completed. This signal is set to ON when the system has transferred to the standby stage. This signal is not set to ON when the movement to program home position is successfully completed.
	PRUN	Program running	Indicates that the program is running. This signal is kept ON from the start of the program to the end of the standby stage. This signal is not set to ON while moving to program home position.
	PORG	Program home position	This signal is set to ON when the program is running or when the actuator is on the program home position coordinate of the program that is commanded during the move to the program home position.
	APRC	Approaching	This signal is set to ON when the program is in the approach stage.
	SERC	Searching	This signal is set to ON during the program search stage.
	PRSS	Pressing	This signal is set to ON when the program is in the pressing stage.
	PSTP	Stop pressing	This signal is set to ON when the program is in the stop stage.
	MPHM	Moving to program home position	This signal is set to ON when the program is in the depressing stage.
	JDOK	Overall judgment OK	Indicates that program position (distance) and load judgments have been successfully passed (Overall judgment OK status).
	JDNG	Overall judgment NG	Indicates that program position (distance) and load judgments have been failed (Overall judgment NG status).
	CEND	Load cell calibration completed	This signal is set to ON when the load cell calibration has been completed.
	RMDS	Operation mode output	Outputs the operation mode status. This signal is set to ON when the controller is in the manual mode.
	HEND	Home return completed	This signal is set to ON when the actuator has successfully returned to the home position.
	SV	Servo ON	This signal is set to ON when the servo is in the ON status.
	*ALM	Alarm	This signal is set to ON when the controller is in the normal condition, and OFF when an alarm is generated.
	*ALML	Minor failure alarm	This signal is set to ON when the controller is in the normal condition, and OFF when the message level alarm is issued. (Note that an alarm is generated keeps operating.)

Note: The above "Signal abbreviation" with superscript * is set normally to ON, and OFF when an actuator is in its operation.

I/O Wiring Diagram

PIO connector (NPN specification)

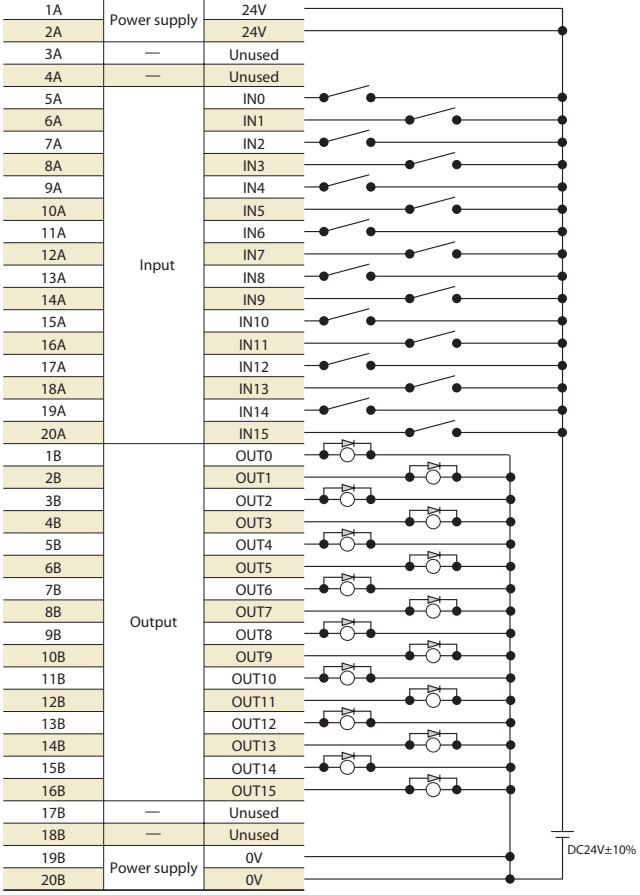
Pin number	Classification	Signal name
1A	Power supply	24V
2A		24V
3A	—	Unused
4A	—	Unused
5A	Input	IN0
6A		IN1
7A		IN2
8A		IN3
9A		IN4
10A		IN5
11A		IN6
12A		IN7
13A		IN8
14A		IN9
15A		IN10
16A		IN11
17A		IN12
18A		IN13
19A		IN14
20A		IN15
1B	Output	OUT0
2B		OUT1
3B		OUT2
4B		OUT3
5B		OUT4
6B		OUT5
7B		OUT6
8B		OUT7
9B		OUT8
10B		OUT9
11B		OUT10
12B		OUT11
13B		OUT12
14B		OUT13
15B		OUT14
16B		OUT15
17B	—	Unused
18B	—	Unused
19B	Power supply	0V
20B		0V



*Connect pin numbers 1A and 2A to 24V, and connect pin numbers 19B and 20B to 0V.

PIO connector (PNP specification)

Pin number	Classification	Signal name
1A	Power supply	24V
2A		24V
3A	—	Unused
4A	—	Unused
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	—	Unused
18B	—	Unused
19B	Power supply	0V
20B		0V



*Connect pin numbers 1A and 2A to 24V, and connect pin numbers 19B and 20B to 0V.

PIO Input/Output Interface

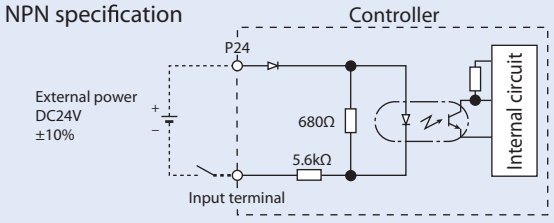
■ Input section External input specification

Item	Specification
Input voltage	DC24V ±10%
Input current	4mA/circuit
ON/OFF voltage	ON voltage…Min. DC18.0V OFF voltage…Max. DC6.0V
Isolation method	Photo-coupler

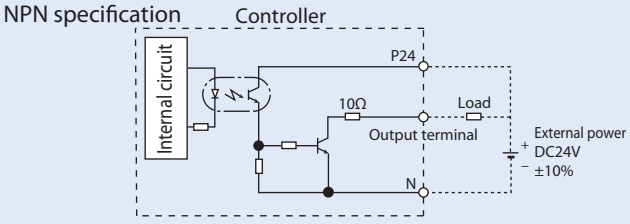
■ Output section External output specification

Item	Specification
Load voltage	DC24V
Maximum load current	50mA/point
Leakage current	Max. 0.1mA/point
Isolation method	Photo-coupler

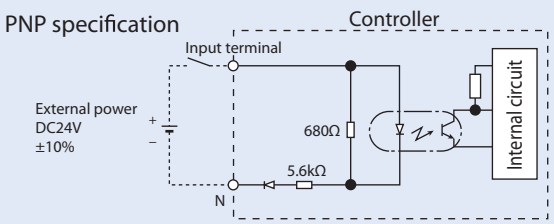
NPN specification



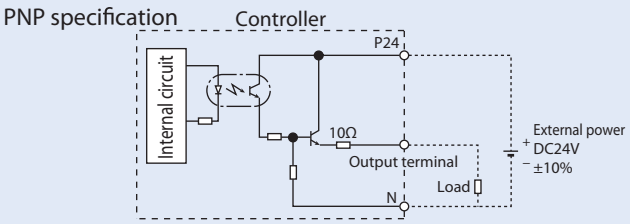
NPN specification



PNP specification

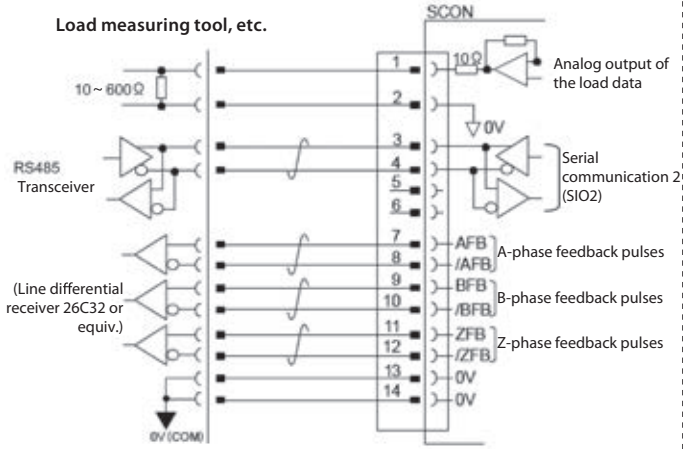


PNP specification

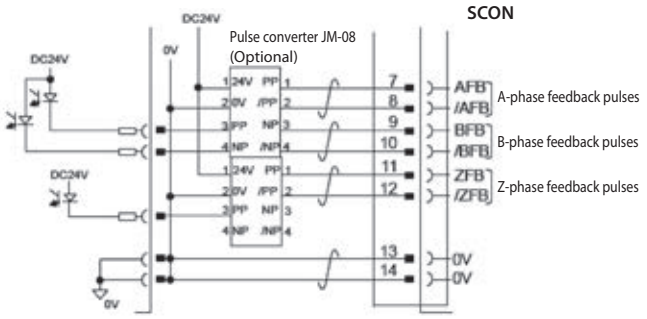


Multi-function Connector (Interface)

(1) When the host controller inputs feedback pulses with a line differential receiver.



(2) When the host controller inputs feedback pulses with an open collector
Requires a pulse converter (JM-08: optional).

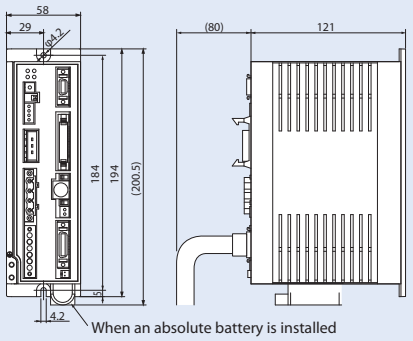


Specifications

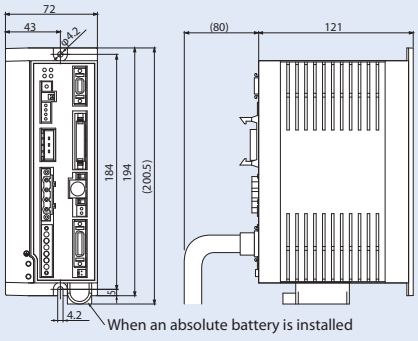
Item			Specification		
Supported motor capacity			Less than 400W	400W~750W	3000W~3300W
Connected actuator			RCS2/RCS3 Series actuator (with load cell)		
Number of controlled axes			1 axis		
Operation method			Press-program type		
Backup memory			Non-volatile memory (FRAM)		
I/O connector			40-pin connector		
Number of I/O points			Input: 16 points/Output: 16 points		
I/O power			External supply DC24V ±10%		
Power Supply for Electromagnetic Brake			External supply DC24V ±10% (max. 1A)		External supply DC24V ±10% (max. 0.1A) *Supply of 1.5A is necessary separately also for the actuator.
Serial communication			RS485 1ch		
Position detection methods			Incremental encoder/absolute encoder/battery-less absolute encoder		
Driving power shut-off function			CB: available (relay-internal) CGB: not available		
Electromagnetic brake force release			Brake release switch ON/OFF		
Input power			Single phase AC100~115V ±10% Single phase AC200~230V ±10%	Single phase AC200~230V ±10%	Three phase AC200~230V ±10%
Power supply capacity			30W/94VA 60W/186VA 100W/282VA 200W/469VA	400W/968VA 750W/1569VA	3000W/5705VA 3300W/6062VA
SCON-CB/CGB	External interface	PIO specification	Dedicated DC24V signal inputs/outputs (NPN/PNP selectable) --- Max. of 16 input/16 output points		
		Field bus specification	DeviceNet, CC-Link, PROFIBUS-DP, CompoNet, MECHATROLINK-I/II, EtherCAT, EtherNet/IP, PROFINET IO		
	Data retention memory		Position data and parameters are saved in non-volatile memory (No limit to rewrite).		
Vibration control			X,Y,and Z directions, 10~57Hz single-side width 0.035mm (continuous), 0.075mm (intermittent) 58~150Hz 0.5G (continuous), 1G (intermittent)		
Calendar/clock function		Retention time	Approximately 10 days		
		Charging time	Approximately 100 hours		
Protection functions			Excess current, temperature abnormalities, monitoring of fan speed drops, encoder disconnection, etc.		
Internal regenerative resistance			2000Ω 10W		34Ω 160W
Ambient operating temperature			0~40°C		
Ambient operating humidity			85% or less (non-condensing)		
Ambient operating atmosphere			Free from corrosive gases		
Protection class			IP20		
Mass			ca. 900g (an absolute spec. is 25g heavier)	ca. 1.2kg (an absolute spec. is 25g heavier)	ca. 2.8kg (an absolute spec. is 25g heavier)
External dimensions			58mm (W) x 194mm (H) x 121mm (D)	72mm (W) x 194mm (H) x 121mm (D)	92.7mm (W) x 300mm (H) x 172mm (D)

External Dimensions

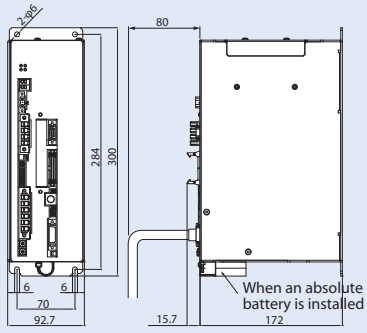
Less than 400W



400W~750W

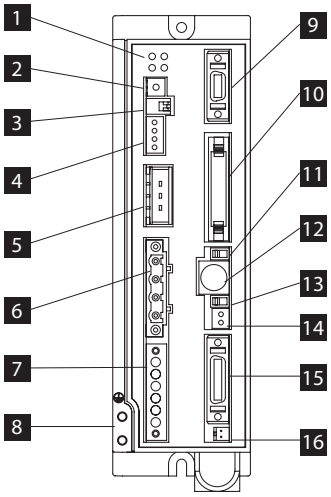


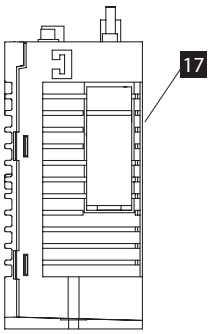
3000W, 3300W



Names of the Parts

[30W~750W type]





1 LED display

Indicates the status of the controller.

Name	Color	
PWR	Green	Turned ON when the system is ready (after power input and while CPU is normally functioning).
SV	Green	Turned ON when the servo is ON.
ALM	Orange	Turned ON when alarm is being issued.
EMG	Red	Turned ON when the system is in the emergency stop status.

2 Rotary switch

Used to set up the controller address after connecting the controller in order to identify every controller connected.

3 Piano switch

Switch for the controller system.

Name	
1	Press-operation mode selection switch Always keep this switch OFF to use the servo press.
2	Used by the manufacturer for adjustment. Always keep this switch OFF.

4 System I/O connector

Connector used to connect switches such as emergency stop switch.

5 Regenerative unit connector

Connector used to connect the resistance unit that absorbs the regenerative current generated when the actuator decelerates to stop.

6 Motor connector

Connector used to connect the actuator cable.

7 Power supply connector

Connector used to connect the AC power supply. Pins of this connector are divided into two groups, one for power to controller and the other for power to motor.

8 Grounding terminal

Screw used to connect the protection grounding. Make sure to secure the grounding.

9 Multi-function connector

This connector is to output the feedback pulses, analog load data of the load cell, and to use the SIO communication function (SIO2).

10 PIO connector

Used to connect communication cable between peripheral equipment such as PLC in parallel communication.

11 Operation mode selection switch

Name	Description
MANU	Does not accept commands from PIO.
AUTO	Ready to accept commands from PIO.

* The emergency stop switch on the teaching pendant is enabled when the connection is made, regardless of the states, AUTO or MANU. Turn the power OFF before removing the teaching pendant and SIO communication cable.

12 SIO connector

Used to connect the teaching pendant or the communication cable with PC.

13 Brake release switch

Used to forcibly release the electromagnetic brake installed in the actuator.

* To release the brake, the power supply (DC24V) for driving brake must be connected.

14 Brake power supply connector

Connector used to connect lines to brake power supply (DC24V) (Use only when the actuator with a brake is connected).

15 Encoder and sensor connector

Connector used to connect encoder and sensor cables.

16 Absolute battery connector

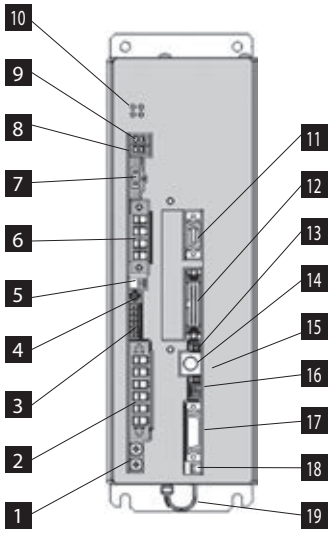
Connector used to connect the absolute data backup battery (only when the actuator with an absolute encoder is selected).

17 Absolute battery holder

Battery holder used to hold the absolute data backup battery.

Names of the Parts

[3000W/3300W type]



1 Grounding terminal

Screw used to connect the protection grounding.
Make sure to secure the grounding.

2 Power supply connector

Connector used to connect the AC power supply. Pins of this connector are divided into two groups, one for power to controller and the other for power to motor.

3 System I/O connector

Connector used to connect switches such as emergency stop switch.

4 Rotary switch

Used to set up the controller address after connecting the controller in order to identify every controller connected.

5 Piano switch

Switch for the controller system.

6 Motor connector

Connector used to connect the actuator cable.

7 Regenerative unit connector

Connector used to connect the resistance unit that absorbs the regenerative current generated when the actuator decelerates to stop.

8 Internal Regenerative Resistor Valid Connector

Short-circuit cable is connected at delivery.
Caution : Make sure to use the unit in the condition that the short-circuit cable is connected. Use the unit without this connected may damage the device.

9 Charge Status Display LED

It shows the status of electric charge in the controller.
Caution : While this LED lamp is on, do not attempt to touch controller or regenerative resistor units to prevent electric shock.

10 LED display

Indicates the status of the controller.

Name	Color	
PWR	Green	Turned ON when the system is ready (after power input and while CPU is normally functioning).
SV	Green	Turned ON when the servo is ON.
ALM	Orange	Turned ON when alarm is being issued.
EMG	Red	Turned ON when the system is in the emergency stop status.

11 Multi-function connector

This connector is to output the feedback pulses, analog load data of the load cell, and to use the SIO communication function (SIO2).

12 PIO connector

Used to connect communication cable between peripheral equipment such as PLC in parallel communication.

13 Operation mode selection switch

It is an interlocking switch to prevent duplication of movement commands from PIO (PLC) and commands from the teaching tools such as PC.

14 SIO connector

Used to connect the teaching pendant or the communication cable with PC.

15 Brake power supply connector

For the actuator equipped with a brake, the switch is used to release the brake control.
Warning : Always set the switch to NOM in normal operation. The brake would not work even with the servo OFF condition if the switch is on the RLS side. In the vertical oriented mount, the work may drop and cause an injury or the work to be damaged.

16 Brake power supply connector

Connector used to connect lines to brake power supply (DC24V).
(Use only when the actuator with a brake is connected).

17 Encoder and sensor connector

Connector used to connect encoder and sensor cables.

18 Absolute battery connector

Connector used to connect the absolute data backup battery.
(only when the actuator with an absolute encoder is selected).

19 Absolute battery holder

Battery holder used to hold the absolute data backup battery.

Options

PC Compatible Software (Windows Only)

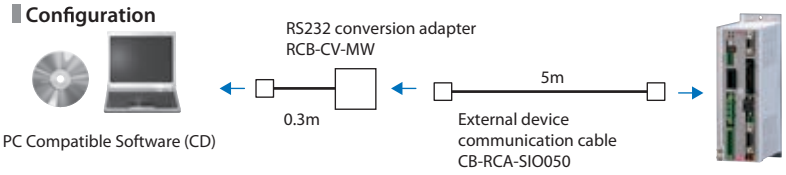
Features Start-up support software that allows you to input positions, perform test operations, monitor functions, etc. This software allows you to shorten the time until start-up by providing functions necessary for making adjustments.

Supported Windows versions:
XP SP2 or later / Vista / 7 / 8

Model **RCM-101-MW** (Includes an external device communication cable and an RS232 conversion unit)

Compatible with Ver. 10.00.01.00 or later

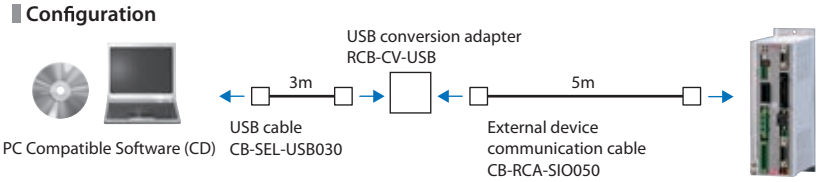
Configuration



Model **RCM-101-USB** (Includes an external device communication cable, USB conversion adapter, and USB cable)

Compatible with Ver. 10.00.01.00 or later

Configuration



Regenerative Resistance Unit

Features This unit converts the regenerative current, which is generated when the motor decelerates, into heat.
Please refer to the tables below to confirm the total wattage of the actuators, and use the regenerative unit as necessary.

*When two regenerative units are required, please use one RESU-2 and one RESU-1 (Please contact IAI for the details).

[30W~750W type]

Model **RESU-2** (Standard specification) **/ RESUD-2** (DIN-installed specification)

Specifications

Model number	RESU-2	RESUD-2
Mass	Approximately 0.4kg	
Internal regen. resistance value	235Ω 80W	
Mounting method	Screw mounting	DIN rail mounting
Included cable	CB-SC-REU010	

Necessary Amount Guideline

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

*Depending on the operating conditions, a regeneration resistance higher than that mentioned above may be necessary.

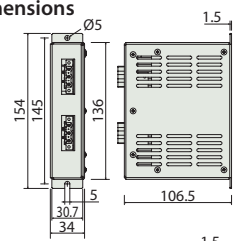
Necessary Amount Guideline (for RCS2-RA13R)

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

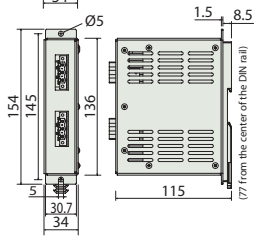
*Depending on the operating conditions, a regeneration resistance higher than that mentioned above may be necessary.

External dimensions

〈RESU-2〉



〈RESUD-2〉



[3000W/3300W type]

Model **RESU-35T**

Specifications

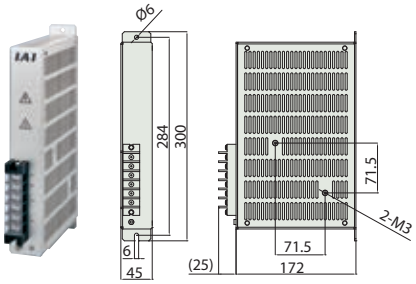
Mass	Approx. 1.8kg
Internal regen. resistance value	30Ω 450W
Mounting method	Screw mounting

Note 1: Not necessary for RCS3-RA15R, since it is processed with internal resistance.
Note 2: The cable is to be prepared by the customer.

Necessary Amount Guideline

Cycle time	Quantity of external regenerative resistance to connect
12sec or more	External attachment not necessary (0 unit)
6~12sec	1 unit
3.5~6sec	2 unit
3.5sec or less	(Note)

*The necessary quantity varies depending on the operating conditions.
(Note) Please contact us if a cycle time of 3.5sec or less is expected.



Absolute Data Backup Battery

Features This is an absolute data backup battery for an actuator with absolute specification.

Model **AB-5 (Battery only)**
AB-5-CS (With a case)

Maintenance Parts

When placing an order for the replacement cable, please use the model name shown below.

Actuator-Controller Connection Cable Models

Connection Type		Motor Cable	Motor Robot Cable	Encoder Cable	Encoder Robot Cable
RCS3	RA4R	CB-RCC-MA□□□	CB-RCC-MA□□□-RB CB-XEU-MA□□□ (EU version)	CB-RCS2-PLDA□□□	CB-RCS2-PLDA□□□-RB CB-XEU2-PLDA□□□ (EU version)
	RA6R				
	RA7R				
	RA8R				
	RA10R				
	RA15R	—	CB-RCS3-MA□□□-RB	—	CB-RCS3-PLA□□□-RB
	RA20R				
RCS2	RA13R (with cable track for the wiring)	CB-RCC-MA□□□	CB-RCC-MA□□□-RB CB-XEU-MA□□□ (EU version)	CB-RCS2-PLA□□□ (w/o load cell) CB-RCS2-PLLA□□□	CB-X2-PLA□□□ (w/o load cell) CB-XEU2-PLA□□□ (EU version) CB-RCS2-PLLA□□□-RB CB-XEU2-PLLA□□□ (EU version)
	RA13R (without cable track for the wiring)			CB-RCS2-PLLA□□□	CB-RCS2-PLLA□□□-RB CB-XEU2-PLLA□□□ (EU version)

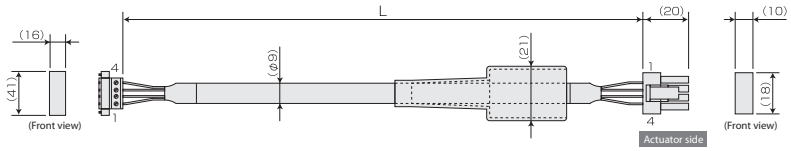
Connection Type	I/O Flat Cable
SCON-CB	CB-PAC-PIO□□□

Motor Cable / Motor Robot Cable for RCS2-RA13R & RCS3-RA4/6/7/8/10R

Model CB-RCC-MA□□□ / CB-RCC-MA□□□-RB

* EU robot cable version with metal connector: CB-XEU-MA□□□ (not shown here)

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Wiring	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

No.	Signal	Color	Wiring
1	U	Red	0.75sq (Pressure-welded)
2	V	White	
3	W	Black	
4	PE	Green	

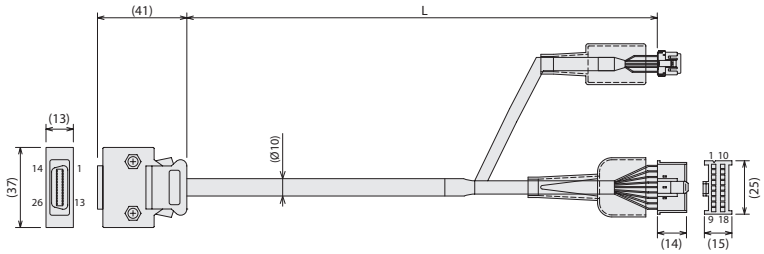
Minimum bending radius R = 51mm or more (Dynamic bending condition)
***Please use the robot cable if the cable needs to be installed through the cable track.**

Encoder Cable / Encoder Robot Cable for RCS3-RA4/6/7/8/10R

Model CB-RCS2-PLDA□□□ / CB-RCS2-PLDA□□□-RB

* EU robot cable version with metal connector: CB-XEU2-PLDA□□□ (not shown here)

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Wiring	Signal	No.
AWG26 (Soldered)	-	
	E24V	12
	0V	13
	LS	26
	CREEP	25
	OT	24
	RSV	23
	LC SRD+	9
	LC SRD−	10
	LC VCC	18
	LC GND	19
	A+	1
	A−	2
	B+	3
	B−	4
	Z+	5
	Z−	6
	SRD+	7
	SRD−	8
	BAT+	14
	BAT−	15
	VCC	16
	GND	17
	BKR−	20
	BKR+	21
	-	22

Shield clamps to the hood

No.	Signal	Wiring
1	SGA	AWG26 (Pressure-welded)
2	SGB	
3	VIN	
4	GND	
5	FG	

No.	Signal	Wiring
1	A	AWG26 (Pressure-welded)
2	Ā	
3	B	
4	B̄	
5	Z	
6	Z̄	
7	-	
8	-	
9	FG	
10	SD	
11	SD	
12	BAT+	
13	BAT−	
14	VCC	
15	GND	
16	-	
17	BK−	
18	BK+	

Drain wire and shielded braid

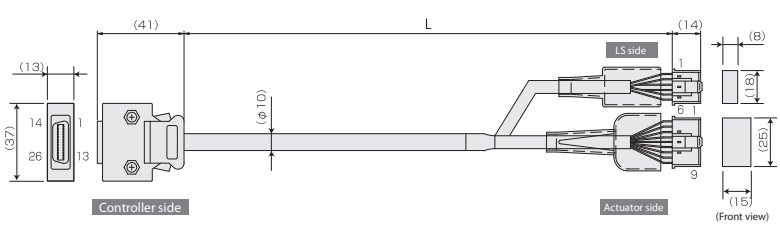
Minimum bending radius R = 52mm or more (Dynamic bending condition)
***Please use the robot cable if the cable needs to be installed through the cable track.**

Limit Switch Encoder Cable / Limit Switch Encoder Robot Cable for RCS2-RA13R without Load Cell Specification

Model CB-RCS2-PLA□□□ / CB-X2-PLA□□□

* EU robot cable version with metal connector: CB-XEU2-PLA□□□ (not shown here)

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Wiring	Color	Signal	No.
AWG26 (soldered)	-	—	10
	-	—	11
	Brown/white	E24V	12
	Gray/white	0V	13
	Red/white	LS	26
	Black/white	CREEP	25
	Yellow/black	OT	24
	Pink/black	RSV	23
	-	—	9
	-	—	18
	-	—	19
	Pink	A+	1
	Purple	A−	2
	White	B+	3
	Blue/red	B−	4
	Orange/white	Z+	5
	Green/white	Z−	6
	Blue	SRD+	7
	Orange	SRD−	8
	Black	BAT+	14
	Yellow	BAT−	15
	Green	VCC	16
	Brown	GND	17
	Gray	BKR−	20
	Red	BKR+	21
	-	—	22

The shield is connected to the hood by a clamp.

No.	Signal	Color	Wiring
1	E24V	Brown/white	AWG26 (crimped)
2	0V	Gray/white	
3	LS	Red/white	
4	CREEP	Black/white	
5	OT	Yellow/black	
6	RSV	Pink/black	

No.	Signal	Color	Wiring
1	A	Pink	AWG26 (crimped)
2	Ā	Purple	
3	B	White	
4	B̄	Blue/red	
5	Z	Orange/white	
6	Z̄	Green/white	
7	—	-	
8	—	-	
9	FG	Floating ground	
10	SD	Blue	
11	SD	Orange	
12	BAT+	Black	
13	BAT−	Yellow	
14	VCC	Green	
15	GND	Brown	
16	—	-	
17	BK−	Gray	
18	BK+	Red	

Ground wire and braided shield

("Brown/white" in cable color indicates the colors of line/insulator.)

Minimum bending radius R = 58mm or more (Dynamic bending condition)
***Please use the robot cable if the cable needs to be installed through the cable track.**

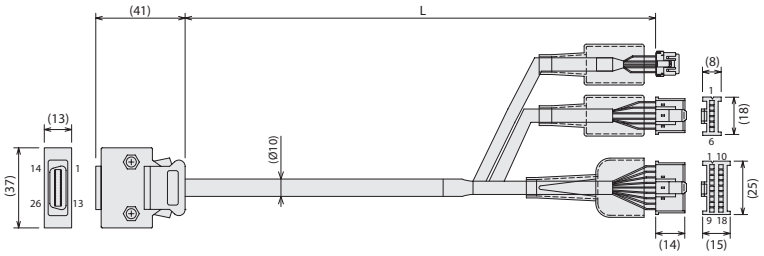
* The wiring diagram shows the cable colors of the standard cable. For the cable colors of the robot cable please refer to brochures of the SCON controller series.

Limit Switch Encoder Cable / Limit Switch Encoder Robot Cable for RCS2-RA13R with Load Cell Specification

Model CB-RCS2-PLLA□□□ / CB-RCS2-PLLA□□□-RB

* EU robot cable version with metal connector: CB-XEU2-PLLA□□□ (not shown here)

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Minimum bending radius R = 52mm or more (Dynamic bending condition)
*Please use the robot cable if the cable needs to be installed through the cable track.

Wiring	Signal	No.
AWG26 (Soldered)	-	
	E24V	12
	0V	13
	LS	26
	CREEP	25
	OT	24
	RSV	23
	LC SRD+	9
	LC SRD-	10
	LC VCC	18
	LC GND	19
	A+	1
	A-	2
	B+	3
	B-	4
	Z+	5
	Z-	6
	SRD+	7
	SRD-	8
	BAT+	14
	BAT-	15
	VCC	16
	GND	17
	BKR-	20
	BKR+	21
	-	22

Shield clamps to the hood

No.	Signal	Wiring
1	SGA	AWG26 (Pressure-welded)
2	SGB	
3	VIN	
4	GND	
5	FG	

No.	Signal	Wiring
1	E24V	AWG26 (Pressure-welded)
2	0V	
3	LS	
4	CREEP	
5	OT	
6	RSV	

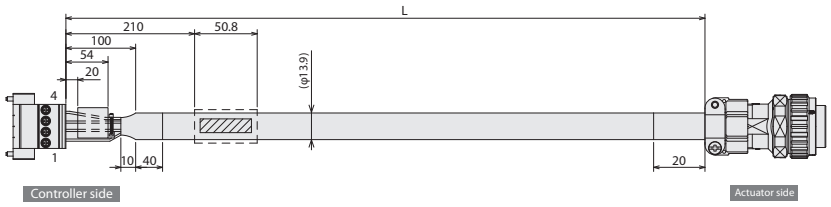
No.	Signal	Wiring
1	A	AWG26 (Pressure-welded)
2	A	
3	B	
4	B	
5	Z	
6	Z	
7	-	
8	-	
9	FG	
10	SD	
11	SD	
12	BAT+	
13	BAT-	
14	VCC	
15	GND	
16	-	
17	BK-	
18	BK+	

Drain wire and shielded braid

Motor Robot Cable for RCS3-RA15/20R

Model CB-RCS3-MA□□□-RB

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Minimum bending radius R = 83.4mm or more (Dynamic bending condition)

IPC5/4-STF-7.62

Wiring	Color	Signal	No.
AWG12	Green/yellow	PE	1
	Black 1	U	2
	Black 2	V	3
	Black 3	W	4

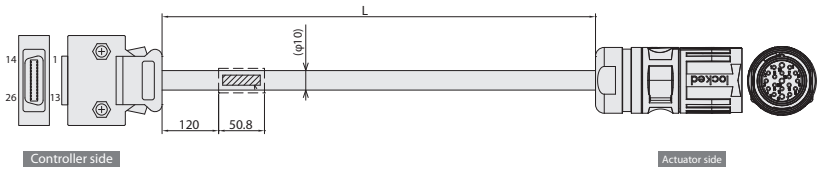
JL10-6A18-10SE-EB

No.	Signal	Color	Wiring
A	U	Black 1	AWG26 (soldered)
B	V	Black 2	
C	W	Black 3	
D	PE	Green/yellow	

Limit Switch Encoder Robot Cable for RCS3-RA15/20R

Model CB-RCS3-PLA□□□-RB

* Please indicate the cable length (L) in □□□, maximum 30m e.g.) 080 = 8m



Minimum bending radius R = 50mm or more (Dynamic bending condition)

10126-3000PE

Wiring	Color	Signal	No.
AWG26 (soldered)	—	—	11
	White/orange	E24V	12
	White/Green	E24G	13
	Brown/Blue	LS	26
	Brown/Yellow	CREEP	25
	Brown/Red	OT	24
	Brown/Black	RSV	23
	White/Blue	LC_SRD+	9
	White/Yellow	LC_SRD-	10
	White/Red	LC_VCC	18
	White/Black	LC_GND	19
	—	—	1
	—	—	2
	—	—	3
	—	—	4
	—	—	5
	—	—	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Gray	BAT-	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
	—	—	22

Shield clamps to the hood

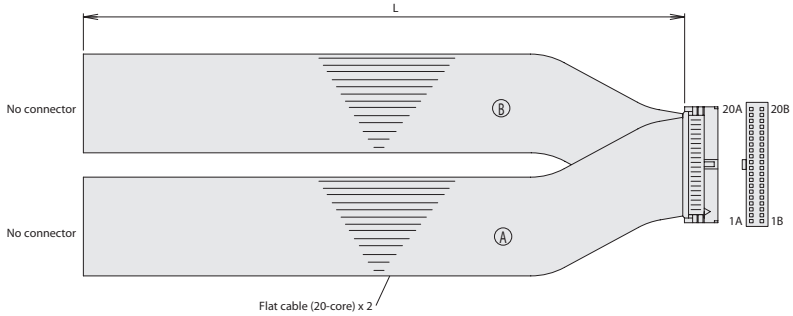
CA-19S1N1280DNS

No.	Signal	Color	Wiring
1	LS	Brown/Blue	AWG26 (crimped)
2	CREEP	Brown/Yellow	
3	OT	Brown/Red	
4	RSV	Brown/Black	
5	BAT+	Purple	
6	VCC	Red	
7	LC_SRD+	White/Blue	
8	LC_SRD-	White/Yellow	
9	LC_VCC	White/Red	
10	BKR+	Yellow	
11	BKR-	Blue	
12	FG	Drain	
13	E24V	White/orange	
14	BAT-	Gray	
15	SRD+	Orange	
16	SRD-	Green	
17	LC_GND	White/Black	
18	E24G	White/Green	
19	GND	Black	

I/O Flat Cable

Model CB-PAC-PIO

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



HIF6–40D–1.27R

No.	Signal name	Cable color	Wiring
1A	24V	Brown-1	Flat cable A (pressure-welded)
2A	24V	Red-1	
3A	-	Orange-1	
4A	-	Yellow-1	
5A	IN0	Green-1	
6A	IN1	Blue-1	
7A	IN2	Purple-1	
8A	IN3	Gray-1	
9A	IN4	White-1	
10A	IN5	Black-1	
11A	IN6	Brown-2	
12A	IN7	Red-2	
13A	IN8	Orange-2	
14A	IN9	Yellow-2	
15A	IN10	Green-2	
16A	IN11	Blue-2	
17A	IN12	Purple-2	
18A	IN13	Gray-2	
19A	IN14	White-2	
20A	IN15	Black-2	

No.	Signal name	Cable color	Wiring
1B	OUT0	Brown-3	Flat cable B (pressure-welded) AWG28
2B	OUT1	Red-3	
3B	OUT2	Orange-3	
4B	OUT3	Yellow-3	
5B	OUT4	Green-3	
6B	OUT5	Blue-3	
7B	OUT6	Purple-3	
8B	OUT7	Gray-3	
9B	OUT8	White-3	
10B	OUT9	Black-3	
11B	OUT10	Brown-4	
12B	OUT11	Red-4	
13B	OUT12	Orange-4	
14B	OUT13	Yellow-4	
15B	OUT14	Green-4	
16B	OUT15	Blue-4	
17B	-	Purple-4	
18B	-	Gray-4	
19B	0V	White-4	
20B	0V	Black-4	

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