

Vacuum Pump **ROBO PUMP**



Environmentally friendly: Non-pneumatic electric vacuum pump

ROBO PUMP

Two types are available to suit the application

Standard type

(Open to atmosphere)



Opens the valve to return the vacuum line to atmospheric pressure.

Compact, lightweight, and inexpensive

Air blow type

(Vacuum release)



Applies (positive pressure) discharge to the vacuum line.

Lightweight workpieces* can be released quickly and thoroughly

*Approx. 0.5g or less

■ Contributes to energy savings

Factory air not required, with electric bills of 0.87 USD/(year) in Japan.

<Conditions>

- ROBO Pump®: 1 unit with air blow
- Power consumption: 3.98W*
- Operating hours per day: 8 hours
- Operating days per year: 240 days
- Price of electricity: 0.11 USD/kWh

Electric bill/year

0.87 USD

(0.00398kWh/hour x 0.11 USD x 8 hours x 240 days)



* Power consumption measured with suction 0.7s → air blow 0.3s → standby 0.2s

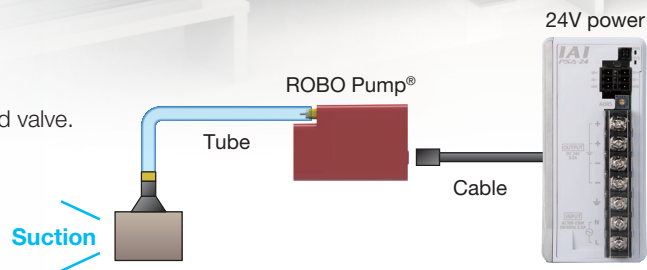
* Researched by IAI Japan. Exchange Rate: 1 (USD)= 150 (Japanese yen)

Simple installation

Ideal for suction transport of workpieces hard to grasp with a gripper.
Compact, it can be installed near the robot tip for use.

No piping needed

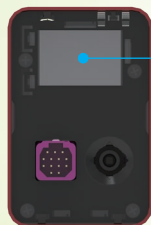
No need for air piping, a compressor, or a solenoid valve.
Just connect the power to operate.



Simple status confirmation and setting

ROBO Pump® (body)

Current pressure display and threshold value setting are possible with the body display panel.
Operation can be done with the body operation switch.



Current pressure display

Pressure
- 54 kPa

Threshold value setting

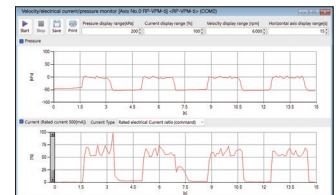
Threshold
Suction -45kPa
Release -4kPa

Teaching tools

Teaching tools enable confirmation of pressure waveforms, maintenance information, and so on.
Operation over a wireless connection is possible.



Pressure waveforms



Maintenance information

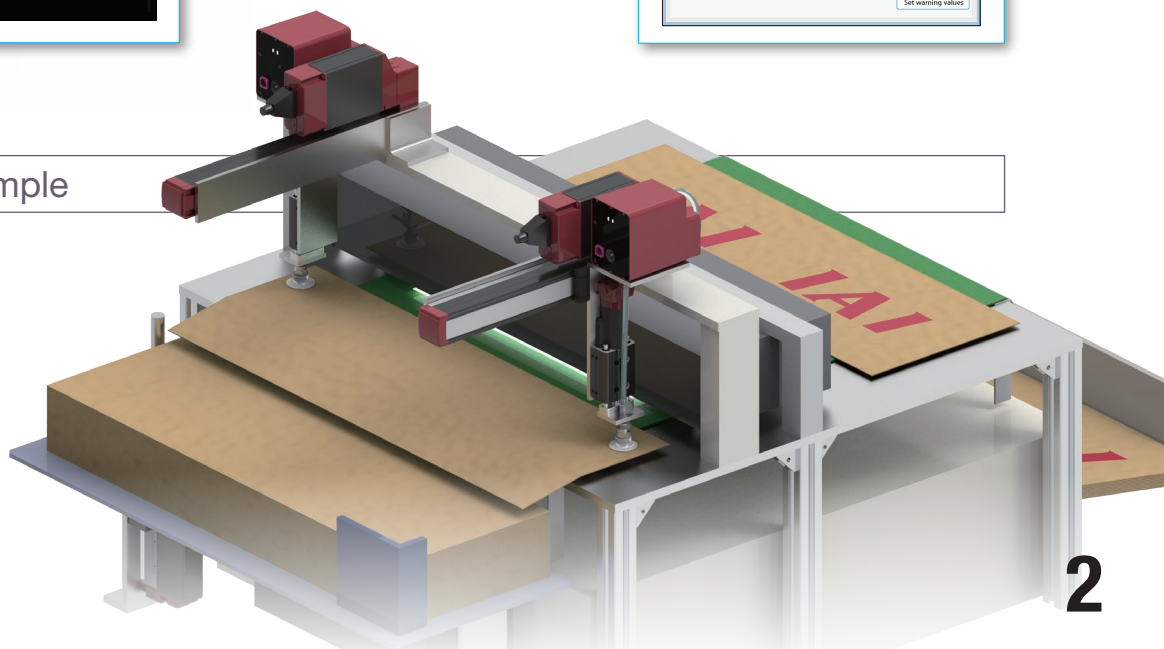
Maintenance information [Axis No.0]			Set
Operation status			
Item name	Current value	Warning output threshold	
Suction count [cycles]	27,195	0	
Total motor run time	0 04:58	0 00:00	
Overload warning level [%]	-	100	
Set warning values			

Application Example

Cardboard printer

Video here

intelligentactuator.com/pump2



Model Specification Items

ROBO Pump®

NPN specification is standard. PNP option is available.

RP - VPM() - - -

Workpiece
Release Type

Power/Communication
Cable Length

Power · I/O
Cable Length

Options

Left blank	Standard (open to atmosphere)
V	Air blow type (Vacuum release)

1	1m
ι	ι
10	10m

(every 1m)

0	No cable With power · I/O connector*
(S)1	1m
ι	ι
(S)9	9m

(every 1m)

(S): Cable with 4-way connector

*When selecting RCON-EC connection specification (ACR), select "0".

Power-I/O connector is not included with ACR option.

(Note) Make sure that the total length along with the actuator cable is 10m or less.

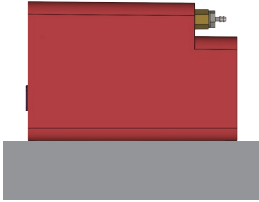
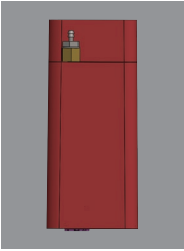
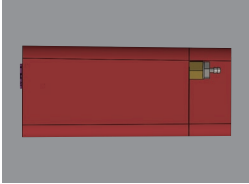
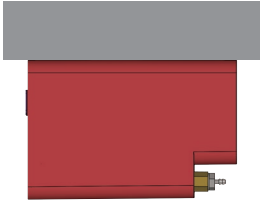
*Please choose "ENG" option for the English language version.

Left blank	NPN specification, no options
ACR	RCON-EC connection specification*1
ENG	English language version
PN	PNP specification (connection via interface box)*1
TMD2	Split motor and controller power supply specification (connection via interface box)*1
WL	Wireless communication specification (connection via interface box)*2

*1 If "ACR" is selected, "PN" and "TMD2" options cannot be selected (I/O for the "ACR" option is NPN only; compatible with split motor and controller power supply as standard)

*2 Selectable when RCON-EC connection specification "ACR" has not been selected (for wireless communication, purchase interface box 2 and cable separately)

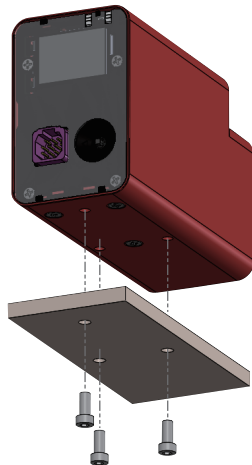
Mounting Orientation

	Mounting orientation			
				
Type	Horizontal table mounting	Vertical mounting	Horizontal side mounting	Horizontal ceiling mounting
VPM	○	×	×	×
VPMV	○	×	×	×

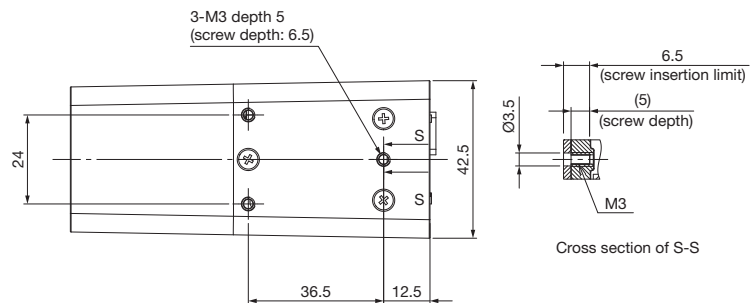
○: Can be mounted
x: Cannot be mounted

Mounting method

• Mount using screw holes on bottom

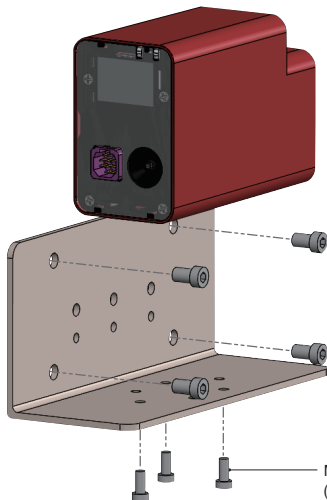


(VPM specification only)

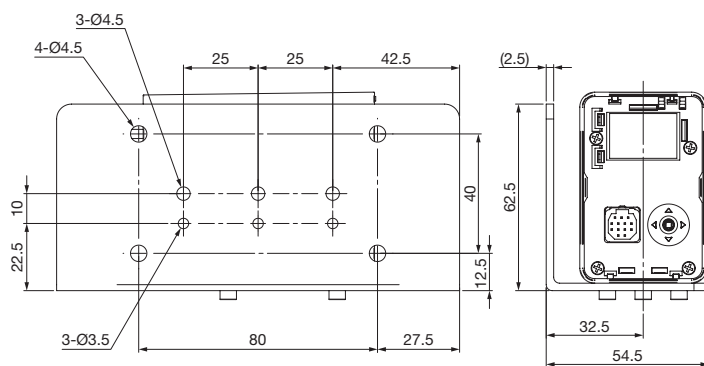


• Mount using side mounting bracket (option)

*Side mounting holes are an example. Refer to P. 10 for the details of the bracket.



(VPM specification only)



M3×8
(to be supplied by customer)

RP-VPM

Pump 24v Stepper Motor

Model Specification Items

RP		VPM							
Series	Type		Power/Communication Cable Length		Power · I/O Cable Length		Options		
	VPM	Standard (open to atmosphere)	1	1m	Refer to Power · I/O Cable Length below		Refer to Options below		
			10	10m					

NPN specification is standard. PNP option is available.



Specifications

Specifications	RP-VPM
RCON-EC connection specification (Note 1)	✓
NPN/PNP specification (Note 2)	✓

(Note 1) Be sure to select "ACR" as the option.
(Note 2) Interface box 2 is included.

Options * Please check the Options reference pages to confirm each option.

Name	Option code	Reference page
RCON-EC connection specification (Note 3) (Note 4)	ACR	9
PNP specification (Note 3)	PN	9
Split motor and controller power supply specification (Note 3)	TMD2	9
Wireless communication specification (Note 4)	WL	9

(Note 3) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected.

(Note 4) When selecting RCON-EC connection specification (ACR), the wireless communication specification (WL) is not available. To conduct wireless communication (WL) with RCON-EC connection, acquire interface box 2 and a power · I/O cable. Please refer to P.13 for more information.

Options sold separately

Name	Model	Reference page
Side mounting bracket	RP-BKT-VPM	10
Cable support bracket	RP-FST-VPM	9



- (1) Caution is required depending on the installation method and mounting orientation. Please refer to P.4 for more information.
(2) Product expected life is 10 million times through the suction/release cycle.

Power/Communication Cable Length

Cable code	Cable length
1 ~ 3	1 ~ 3m
4 ~ 5	4 ~ 5m
6 ~ 10	6 ~ 10m (Note 5)

(Note 5) When connecting via interface box 2, the maximum selectable length is 9m.

(Note) Select such that the total length, including power · I/O cable length, is within 10m.

(Note) Robot cable is standard.

Power · I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads)
		CB-EC-PWBIO□□□-RB supplied
0	Without cable	✓ (Note 6)
1 ~ 3	1 ~ 3m	✓
4 ~ 5	4 ~ 5m	✓
6 ~ 9	6 ~ 9m	✓

(Note 6) Only power · I/O connector is included.

When selecting RCON-EC connection specification (ACR) as an option, select "0". Power · I/O connector is not included with ACR option. Please refer to P. 16 for details.

(Note) Robot cable is standard.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads)
		CB-EC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓
S4 ~ S5	4 ~ 5m	✓
S6 ~ S9	6 ~ 9m	✓

(Note) Robot cable is standard.

Main Specifications

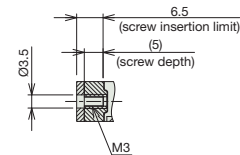
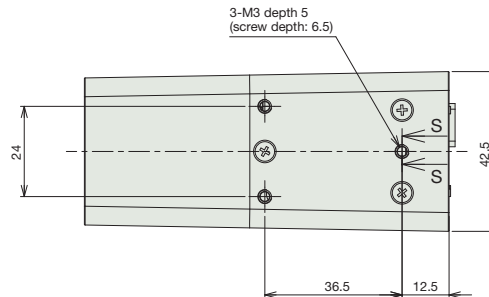
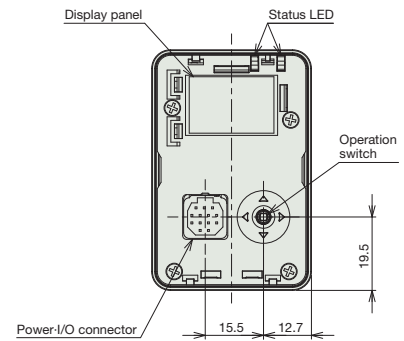
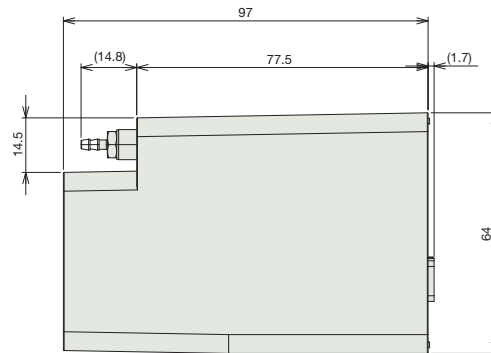
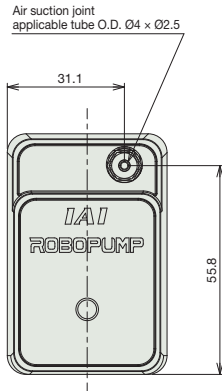
Item	Description
Generated pressure	-50kPa or less
Generated flow rate	1.8L/min or more (20°C/1atm)
Solenoid valve activation (open to atmosphere) time	0.3sec

Item	Description
Release method	Open to atmosphere
Pump type	Diaphragm pump
Ambient operating temperature, humidity	0 to 40°C, 85% RH or less (non-condensing)
Ingress protection	IP20
Overseas standards	CE marking, RoHS directive
Motor type	Stepper motor (Ø35) (Power capacity: Rated 0.8A/maximum 1.3A)
Encoder type	Magnetic encoder
Power supply voltage	24VDC ±10%

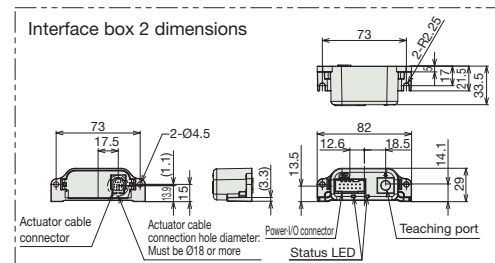
Dimensions

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

2D/3D
CAD



Cross section of S-S



Mass

Item	Description
Mass	320g

RP-VPMV

Pump 24v Stepper Motor

Model Specification Items

RP

VPMV

Series	Type	Power/Communication Cable Length	Power · I/O Cable Length	Options
VPMV	Air blow type (Vacuum release)	1 ~ 10 1m ~ 10m	Refer to Power · I/O Cable Length below	Refer to Options below

NPN specification is standard. PNP option is available.



Specifications

Specifications	RP-VPMV
RCON-EC connection specification (Note 1)	✓
NPN/PNP specification (Note 2)	✓

(Note 1) Be sure to select "ACR" as the option.
(Note 2) Interface box 2 is included.

Options * Please check the Options reference pages to confirm each option.

Name	Option code	Reference page
RCON-EC connection specification (Note 3) (Note 4)	ACR	9
PNP specification (Note 3)	PN	9
Split motor and controller power supply specification (Note 3)	TMD2	9
Wireless communication specification (Note 4)	WL	9

(Note 3) If the RCON-EC connection specification (ACR) is selected, the PNP specification (PN) and split motor and controller power supply specification (TMD2) cannot be selected.

(Note 4) When selecting RCON-EC connection specification (ACR), the wireless communication specification (WL) is not available. To conduct wireless communication (WL) with RCON-EC connection, acquire interface box 2 and a power · I/O cable. Please refer to P.13 for more information.

Options sold separately

Name	Model	Reference page
Side mounting bracket	RP-BKT-VPMV	10
Cable support bracket	RP-FST-VPM	9



- (1) Caution is required depending on the installation method and mounting orientation. Please refer to P.4 for more information.
(2) Product expected life is 10 million times through the suction/release cycle.

Power/Communication Cable Length

Cable code	Cable length
1 ~ 3	1 ~ 3m
4 ~ 5	4 ~ 5m
6 ~ 10	6 ~ 10m (Note 5)

(Note 5) When connecting via interface box 2, the maximum selectable length is 9m.

(Note) Select such that the total length, including power · I/O cable length, is within 10m.

(Note) Robot cable is standard.

Power · I/O Cable Length

Standard connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC2-PWBIO□□□-RB supplied
0	Without cable	✓ (Note 6)
1 ~ 3	1 ~ 3m	✓
4 ~ 5	4 ~ 5m	✓
6 ~ 7	6 ~ 7m	✓
8 ~ 9	8 ~ 9m	✓

(Note 6) Only power · I/O connector is included.

When selecting RCON-EC connection specification (ACR) as an option, select "0". Power · I/O connector is not included with ACR option. Please refer to P. 16 for details.

(Note) Robot cable is standard.

4-way connector cable

Cable code	Cable length	User wiring specification (flying leads) CB-EC2-PWBIO□□□-RB supplied
S1 ~ S3	1 ~ 3m	✓
S4 ~ S5	4 ~ 5m	✓
S6 ~ S9	6 ~ 9m	✓

(Note) Robot cable is standard.

Options

RCON-EC connection specification

*Cannot be selected with the TMD2 and PN options (the ACR option includes the split motor and controller power supply specification)

Model **ACR** **Applicable models** All models

Description This option should be selected to connect over an R-unit to a field network.
*If this option is selected, the power supply must be a split motor and controller power supply and the input/output specification must be NPN. Therefore, it cannot be selected with the TMD2 or PN options.

PNP specification

*Cannot be ordered simultaneously with the ACR option, which is NPN specification.

Model **PN** **Applicable models** All models

Description The standard input/output for connecting external devices is NPN specification.
Specifying this option changes input/output to the PNP specification.

Split motor and controller power supply specification

*Cannot be selected with the ACR option (the RCON-EC connection specification is a split motor and controller power supply specification)

Model **TMD2** **Applicable models** All models

Description Option with ROBO Pump® operation stop input. Select this option to allow shutting down the actuator drive power only.
Please refer to P. 16 for details of wiring.

Wireless communication specification

Model **WL** **Applicable models** All models

Description This option enables support for wireless communication. Specifying this option enables wireless communication with the TB-03 teaching pendant and wireless teaching controller.
Pump drive operation (suction/release) can be tested. Note that this operation device is not designed for automatic operation.

Individual Options

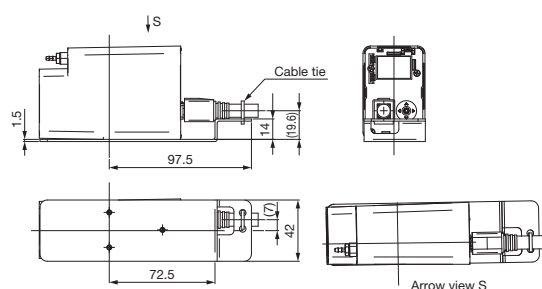
Cable support bracket

Model **RP-FST-VPM**

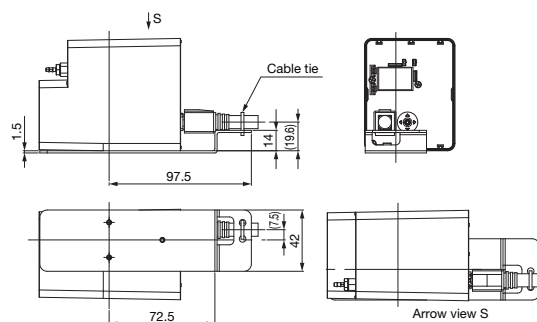
Description This is a bracket used to fix the cable near the connector with a cable tie.
*Not assembled before shipment. Refer to the drawings for mounting instructions.

(Individual mass: 0.074kg / Material: Stainless steel)

[Standard]



[Air blow type]

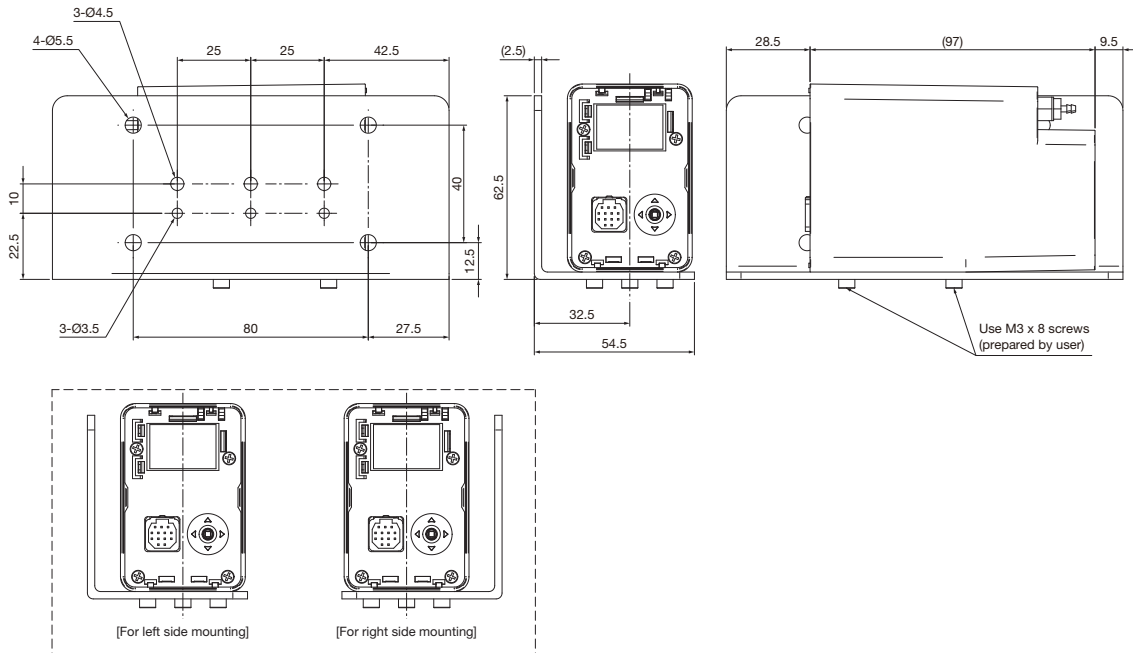


Side mounting bracket

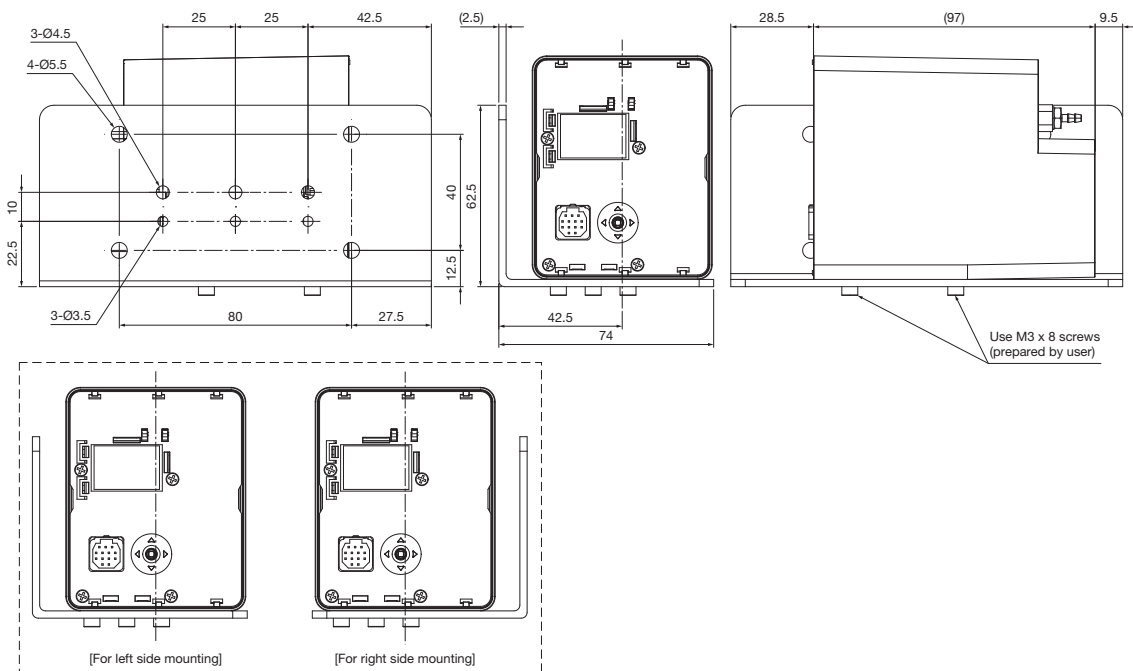
Model **RP-BKT-VPM** (for standard)
RP-BKT-VPMV (for air blow)

Description Bracket used when side mounting the ROBO Pump®.
When also using the cable support bracket (RP-FST-VPM), mount the cable support bracket between the ROBO Pump® body and the side mounting bracket.
* Not shipped assembled. Refer to the drawing to mount.

[Standard] (Individual mass: 0.305kg / Material: Stainless steel)

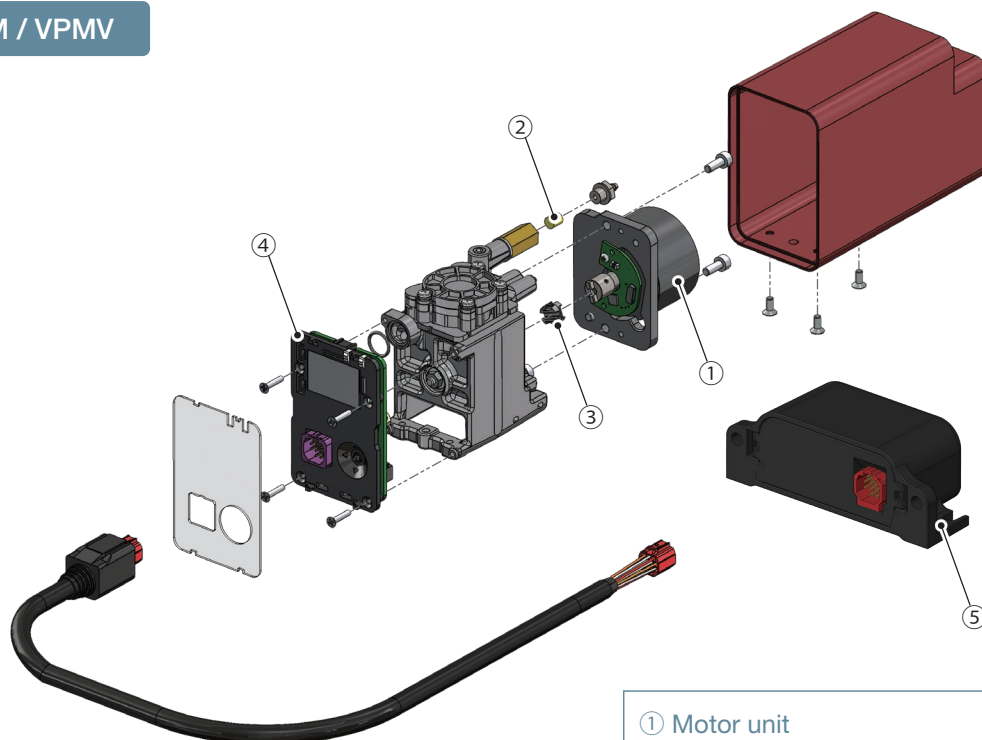


[Air blow type] (Individual mass: 0.358kg / Material: Stainless steel)



Maintenance Parts

VPM / VPMV



- ① Motor unit
- ② Suction part filter
- ③ Coupling spacer
- ④ Front panel assembly
- ⑤ Interface box 2

The numbers (e.g. ①② ...) in each table name correspond to those in the illustrations.

(Note) Mounting screws are not included with maintenance parts. Please contact our sales department before making any modifications.

① Motor unit

Type	Model
VPM / VPMV	RP-MUVPM

② Suction part filter

Type	Model
VPM / VPMV	RP-FL-VPM

③ Coupling spacer

Type	Model
VPM / VPMV	CPG-RP-VPM

④ Front panel assembly

Type	Model
VPM	FPA-RP-VPM
VPMV	FPA-RP-VPMV

⑤-1 Interface box 2

Type	Wireless	I/O	Model
VPM / VPMV	No	NPN	EC-CVN-CB
		PNP	EC-CVP-CB
	WL	NPN	EC-CVNW-L-CB
		PNP	EC-CVPWL-CB

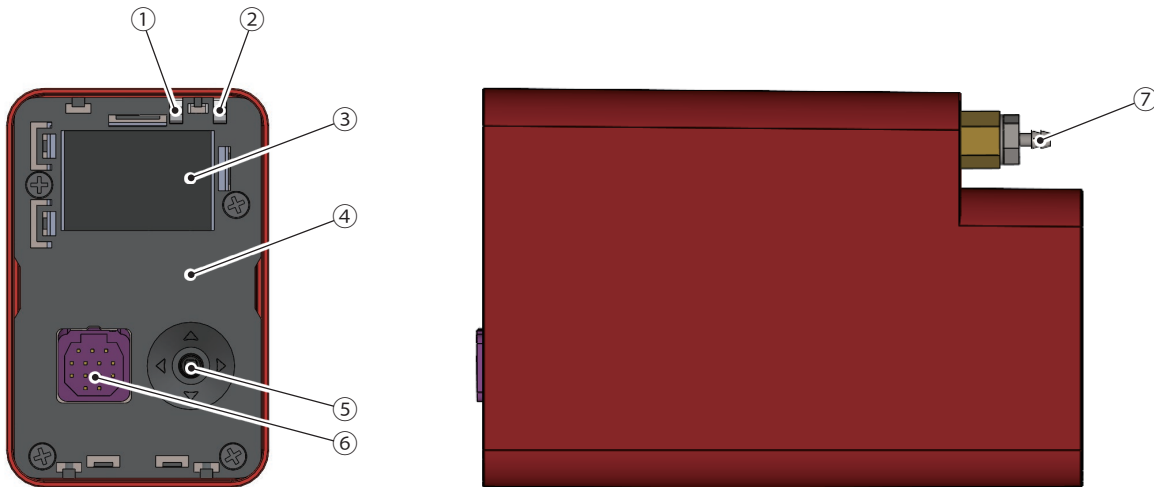
⑤-2 Split motor and controller power supply interface box 2

Type	Wireless	I/O	Model
VPM / VPMV	No	NPN	EC-CVN-CB-TMD2
		PNP	EC-CVP-CB-TMD2
	WL	NPN	EC-CVNW-L-CB-TMD2
		PNP	EC-CVPWL-CB-TMD2

⑤-3 RCON-EC connection specification (option model: ACR) Split motor and controller power supply interface box 2

Type	Wireless	I/O	Model
VPM / VPMV	WL	NPN REC	EC-CVNW-L-CB-ACR

Name of Each Component



① Wireless status LED

Display information	LED status	Function
Wireless status display (WL)	Green light ON	Wireless connection status (ON 150ms/OFF 150ms)
	Red light ON	Wireless hardware error (ON 200ms/OFF 200ms)
	Orange light ON	Initializing when power comes ON (green/red lights ON)
	Light OFF	Wireless hardware initializing, wireless not connected or connecting from TP board

② Status indicator LED

Display information	LED status	Function
Status LED	Green light ON	Current pressure at or below suction confirmation level
	Red light ON	Alarm generated or stop from teaching pendant*1 Motor voltage dropping
	Orange light ON	Initializing when power comes ON (green/red lights ON)
	Light OFF	Power off

*1 Stop is enabled only through wired connection with the teaching pendant.

③ Display panel

Organic EL display.
Displays current pressure, alarm codes, etc.

④ Front panel sheet

Protective cover for front panel.

⑤ Operation switch

Lever type operation switch with 4 directions + 1 push button.

⑥ Connector

Connector for power/communication cable.

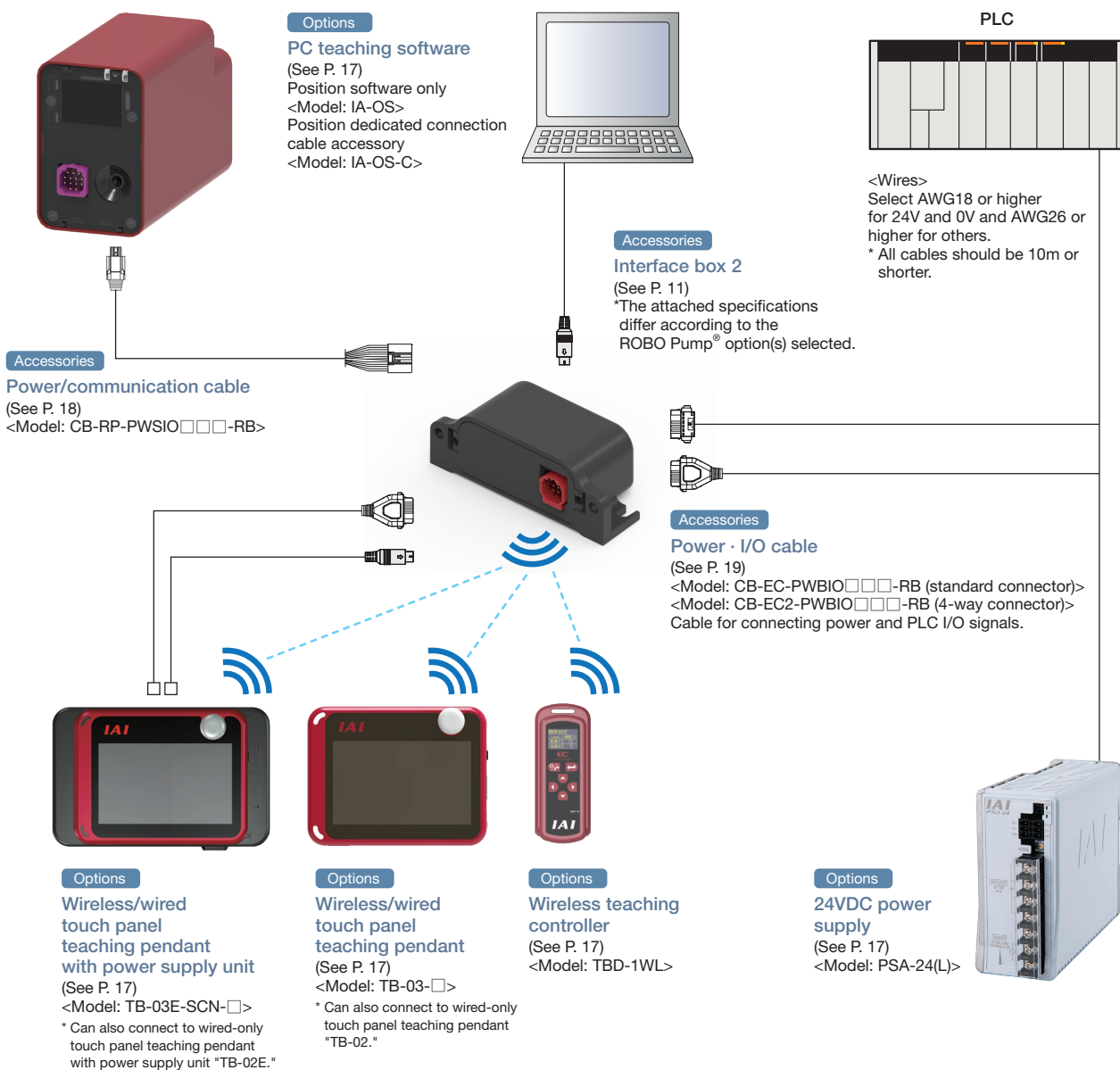
⑦ Air suction fitting

Fitting connecting the suction tube.

System Configuration

<PLC direct connection>

*Even without teaching tools, setting can be done with the body operation switch.



List of Accessories

■ Power · I/O Cable, Connectors

[Standard connector]

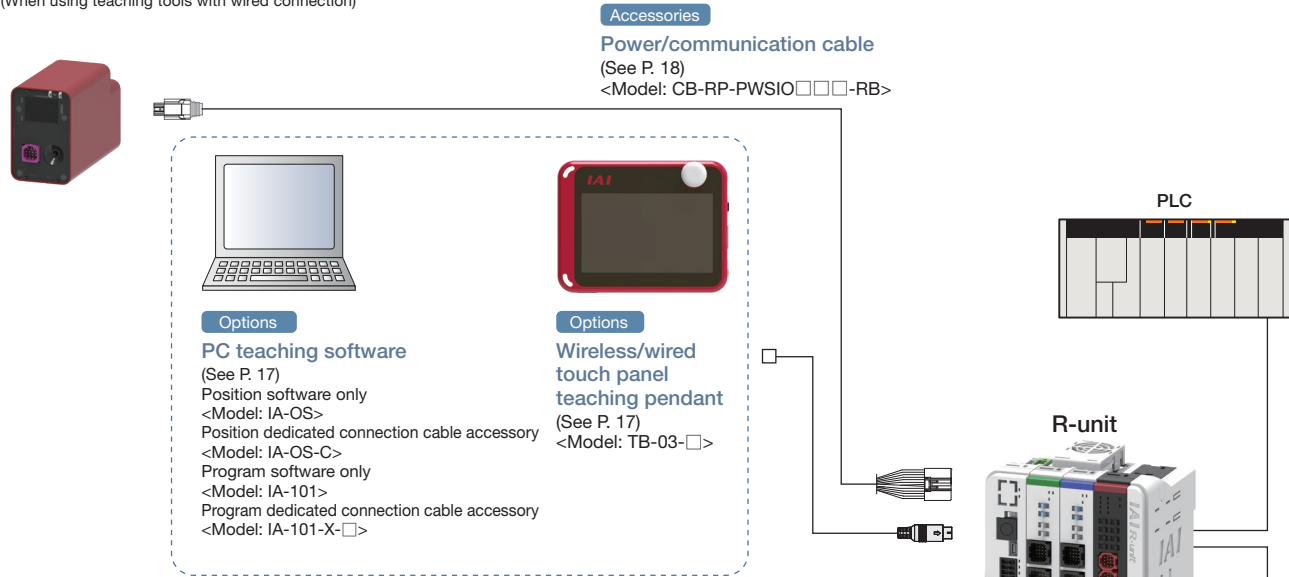
Product category		Accessories
Power · I/O cable length (selected with actuator model)	RCON-EC connection specification (ACR) selection	
0	No	Power · I/O connector (1-1871940-6)
	Yes	-
1 ~ 10	No	Power · I/O cable (CB-EC-PWBIO□□□-RB)

[4-way connector]

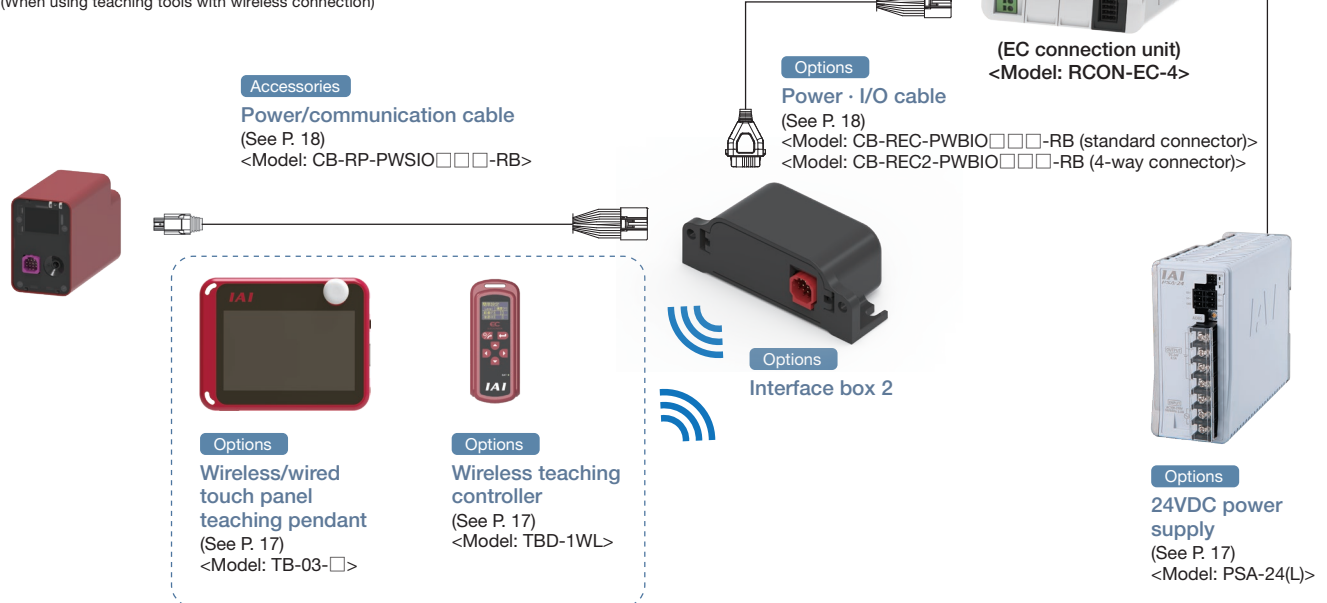
Product category		Accessories
Power · I/O cable length (selected with actuator model)	RCON-EC connection specification (ACR) selection	
S1 ~ S10	No	Power · I/O cable (CB-EC2-PWBIO□□□-RB)

<R-unit (EC connection unit) connection>

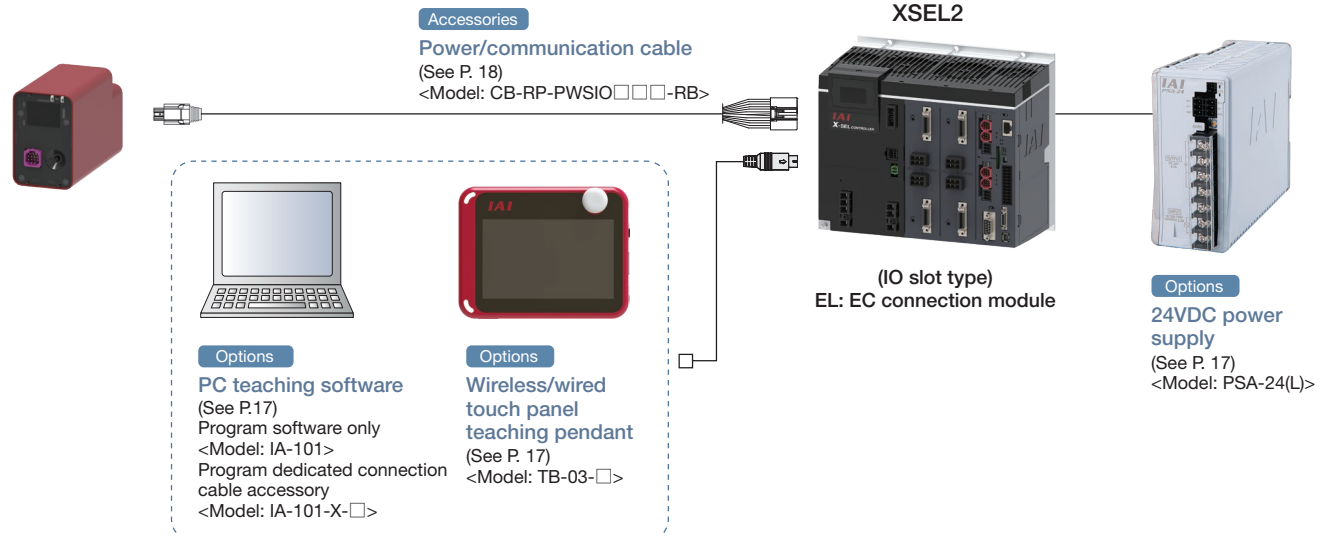
(When using teaching tools with wired connection)



(When using teaching tools with wireless connection)



<XSEL2 (EC connection module) connection>



Electrical Specifications

Item	Specification
Power supply voltage	24VDC $\pm 10\%$
Power supply current ^(Note 1)	Rated 0.8A, max. 1.3A
Power capacity	Rated 19.2W, max. 32.2W
Generated heat	2W
Inrush current ^(Note 2)	2A
Momentary power failure resistance	Max. 500 μ s
Motor size	$\varnothing 35$
Motor rotation speed	3,600rpm
Motor output rated current	0.5A
Encoder type	Incremental (resolution: 14-bit)
Teaching port specification	RS-485 1ch (Modbus protocol compliant) (when using interface box)
Interface specification (power input is common with body)	Inputs: Release command, suction command, alarm reset Outputs: Release check signal, suction check signal, alarm
Display	OLED (29 $\times$ 22.5 $\times$ 1.65mm)
Data setting/input method	· PC teaching software (IA-OS/IA-101) · Teaching pendant TB-02, TB-03 · Body display panel and operation switch
Overvoltage category	I
Pollution degree	II
Insulation resistance	500VDC 10M Ω
Electric shock protection mechanism	Class 3
Cooling method	Natural air cooling

(Note 1) Power supply current includes control power of 0.3A.

(Note 2) Inrush current flows for approx. 5msec after the power is input (at 40°C). Inrush current value differs depending on the impedance on the power supply line.

Solenoid Valve Specifications

The ROBO Pump® normally uses a double solenoid.

For single solenoid or double solenoid 2, change parameter No. 5 "PIO pattern selection".

<Caution>

Operation cannot be performed using the single solenoid method when connected to RCON-EC.

I/O (Input/Output) Specifications

I/O		Input		Output	
Specifications		Input voltage	24VDC $\pm 10\%$	Load voltage	24VDC $\pm 10\%$
		Input current	5mA per circuit	Maximum load current	50mA/1 point
		ON/OFF Voltage	ON voltage: Min. 18VDC OFF voltage: Max. 6VDC	Residual voltage	2V or less
		Leakage current	Max. 1mA/1 point	Leakage current	Max. 0.1mA/1 point
Isolation method		Non-isolated from external circuit		Non-isolated from external circuit	
I/O logic	NPN				
	PNP				

(Note) Isolation method is non-isolated. Use a common ground for the ROBO Pump® and the external devices connected thereto (PLC, etc.).

I/O Signal Wiring Diagram

I/O		Standard specification	Split motor and controller power supply specification (option model: TMD2)
Power · I/O connector			Drive power and control power are separate for the TMD2 specification.
I/O logic	NPN		
	PNP		

(Note 1) For single solenoid, B3 is not used and B4 is "Suction/release command"; for double solenoid 2, A3 is "Release check".

I/O Signal Table

Power · I/O connector pin assignment			
Pin No.	Connector nameplate name	Signal abbreviation	Function overview
B3 (Note 1)	Release command	ST0	Release command signal ON: Release mode
B4 (Note 1)	Suction command	ST1	Suction command signal ON: Suction mode
B5	Alarm clear	RES	Alarm clear when ON
A3 (Note 1)	-	-	-
A4	Suction check	PE1	Suction check signal ON: Vacuum pressure has reached suction check level OFF: Vacuum pressure has reached release check level
A5	Alarm	*ALM	Alarm detection (b-contact)
B1 (Note 2)	24V	24V	24V input
A1	0V	0V	0V input
A2 (Note 2)	(24V)	(24V)	24V input

(Note 1) For single solenoid, B3 is not used and B4 is "Suction/release command"; for double solenoid 2, A3 is "Release check" (PEO).

Note that the power · I/O connector display remains B3: release and B4: suction.

(Note 2) B1 is 24V (drive) and A2 is 24V (control) for the split motor and controller power supply specification (TMD2).

Options

Teaching pendant

For detailed specifications, please contact IAI.

Name	Model	Image
Wireless teaching controller	TBD-1WL-□	
Wireless/wired touch panel teaching pendant	TB-03-□	
Wired/wireless touch panel teaching pendant with power supply unit	TB-03E-□	

PC teaching software

For detailed specifications, please contact IAI.

Specification		Model	Image
Position	Software only (no connection cable) <i>* Please purchase through your distributor and a download link will be sent to your valid email address.</i>	IA-OS	
	With external device communication cable + USB conversion adapter + USB cable <i>* Please purchase through your distributor and a download link will be sent to your valid email address.</i>	IA-OS-C	
Program	Software only <i>* Please purchase through your distributor and a download link will be sent to your valid email address.</i>	IA-101-N	
	With RS232C cable + connector conversion cable + USB conversion adapter + USB cable <i>* Please purchase through your distributor and a download link will be sent to your valid email address.</i>	IA-101-X-USBMW-JS	

24V power

For detailed specifications, please contact IAI.

Specification	Model	Image
Without fan	PSA-24	
With fan	PSA-24L	

Maintenance Parts (Cables)

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

Type	Model	External view
Power · I/O cable (user-wired specification)	CB-EC-PWBIO□□□-RB	
Power · I/O cable (user-wired specification, 4-way connector)	CB-EC2-PWBIO□□□-RB	
Power · I/O cable (RCON-EC connection specification)	CB-REC-PWBIO□□□-RB	
Power · I/O cable (RCON-EC connection specification, 4-way connector)	CB-REC2-PWBIO□□□-RB	
Power/communication cable	CB-RP-PWSIO□□□-RB	

*Please indicate the cable length (L) in □□□. Available: Min. 1m, Max. 10m (e.g., 010=1m)

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