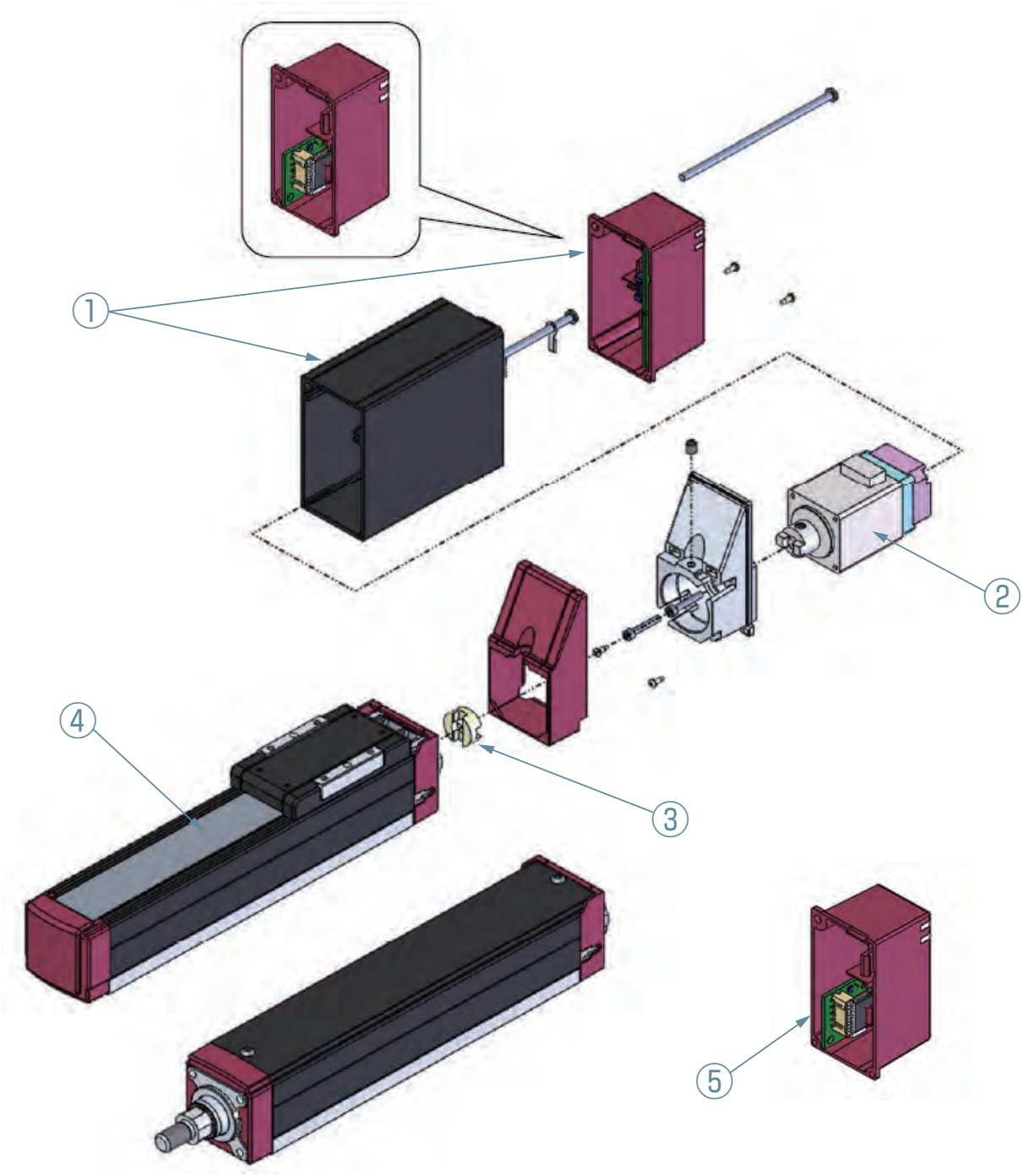
Maintenance Parts

Maintenance part schematics/maintenance part model list

EC maintenance part schematics

S3/S4/RR3/RR4 type



① Controller assembly
(motor cover / end cover / circuit board cable)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly

EC maintenance part model list

S3/RR3/S4/RR4 type

① -1 Controller assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
S3 RR3	Incremental	No	NPN	MWB-EC-SRR3
			PNP	MWB-EC-SRR3-P
		Yes	NPN	MWB-EC-SRR3-B
			PNP	MWB-EC-SRR3-B-P
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA
			PNP	MWB-EC-SRR3-WA-P
		Yes	NPN	MWB-EC-SRR3-WA-B
			PNP	MWB-EC-SRR3-WA-B-P
S4 RR4	Incremental	No	NPN	MWB-EC-SRR4
			PNP	MWB-EC-SRR4-P
		Yes	NPN	MWB-EC-SRR4-B
			PNP	MWB-EC-SRR4-B-P
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA
			PNP	MWB-EC-SRR4-WA-P
		Yes	NPN	MWB-EC-SRR4-WA-B
			PNP	MWB-EC-SRR4-WA-B-P

① -2 Controller assembly (motor cover, end cover, circuit board cable) Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
S3 RR3	Incremental	No	NPN	MWB-EC-SRR3-WL2
			PNP	MWB-EC-SRR3-P-WL2
		Yes	NPN	MWB-EC-SRR3-B-WL2
			PNP	MWB-EC-SRR3-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-WL2
			PNP	MWB-EC-SRR3-WA-P-WL2
		Yes	NPN	MWB-EC-SRR3-WA-B-WL2
			PNP	MWB-EC-SRR3-WA-B-P-WL2
S4 RR4	Incremental	No	NPN	MWB-EC-SRR4-WL2
			PNP	MWB-EC-SRR4-P-WL2
		Yes	NPN	MWB-EC-SRR4-B-WL2
			PNP	MWB-EC-SRR4-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-WL2
			PNP	MWB-EC-SRR4-WA-P-WL2
		Yes	NPN	MWB-EC-SRR4-WA-B-WL2
			PNP	MWB-EC-SRR4-WA-B-P-WL2

① -3 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
S3 RR3	Incremental	No	NPN	MWB-EC-SRR3-TMD2
			PNP	MWB-EC-SRR3-P-TMD2
		Yes	NPN	MWB-EC-SRR3-B-TMD2
			PNP	MWB-EC-SRR3-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-TMD2
			PNP	MWB-EC-SRR3-WA-P-TMD2
		Yes	NPN	MWB-EC-SRR3-WA-B-TMD2
			PNP	MWB-EC-SRR3-WA-B-P-TMD2
S4 RR4	Incremental	No	NPN	MWB-EC-SRR4-TMD2
			PNP	MWB-EC-SRR4-P-TMD2
		Yes	NPN	MWB-EC-SRR4-B-TMD2
			PNP	MWB-EC-SRR4-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-TMD2
			PNP	MWB-EC-SRR4-WA-P-TMD2
		Yes	NPN	MWB-EC-SRR4-WA-B-TMD2
			PNP	MWB-EC-SRR4-WA-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable) Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
S3 RR3	Incremental	No	NPN	MWB-EC-SRR3-TMD2-WL2
			PNP	MWB-EC-SRR3-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR3-B-TMD2-WL2
			PNP	MWB-EC-SRR3-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-TMD2-WL2
			PNP	MWB-EC-SRR3-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR3-WA-B-TMD2-WL2
			PNP	MWB-EC-SRR3-WA-B-P-TMD2-WL2
S4 RR4	Incremental	No	NPN	MWB-EC-SRR4-TMD2-WL2
			PNP	MWB-EC-SRR4-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR4-B-TMD2-WL2
			PNP	MWB-EC-SRR4-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-TMD2-WL2
			PNP	MWB-EC-SRR4-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR4-WA-B-TMD2-WL2
			PNP	MWB-EC-SRR4-WA-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable) RCON-EC connection specification (option model: ACR)

Type	Encoder	Brake	WL2	Model
S3 RR3	Incremental	No	No	MWB-EC-SRR3-ACR
		Yes		MWB-EC-SRR3-B-ACR
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR
		Yes		MWB-EC-SRR3-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR3-ACR-WL2
		Yes		MWB-EC-SRR3-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR-WL2
		Yes		MWB-EC-SRR3-WA-B-ACR-WL2
S4 RR4	Incremental	No	No	MWB-EC-SRR4-ACR
		Yes		MWB-EC-SRR4-B-ACR
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR
		Yes		MWB-EC-SRR4-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR4-ACR-WL2
		Yes		MWB-EC-SRR4-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR-WL2
		Yes		MWB-EC-SRR4-WA-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S3 RR3	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
S4 RR4	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
S3/RR3	CPG-EC-SRR3
S4/RR4	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
S3	ST-EC-S3-○○○
S4	ST-EC-S4-○○○

*○○○ indicates the stroke

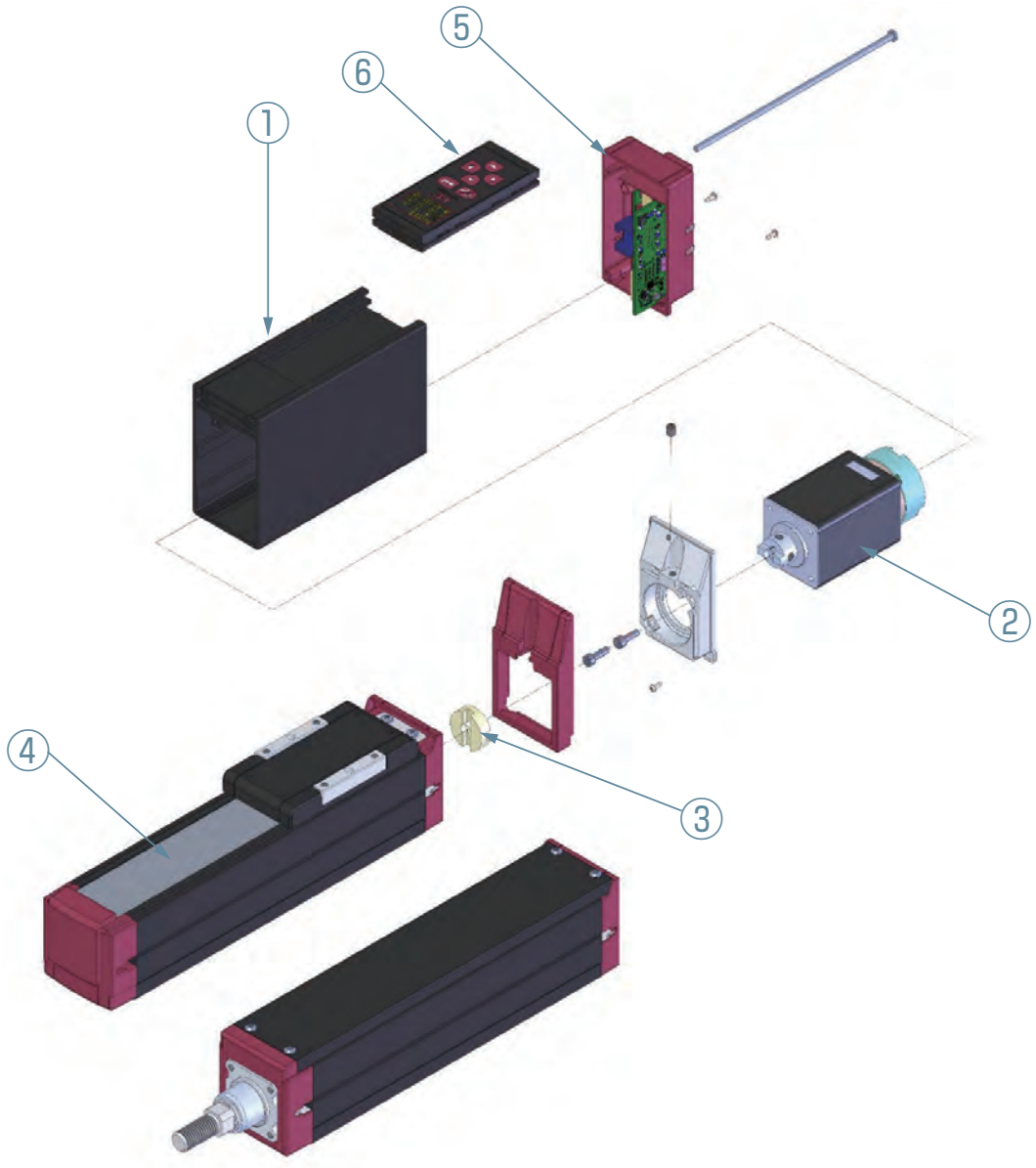
⑤ End cover assembly (with wireless communication circuit board cable)

Type	Model
S3/RR3	EWB-EC-SRR3
S4/RR4	EWB-EC-SRR4

EC maintenance part schematics

[With digital speed controller]

DS3/DRR3/DS4/DRR4 type



① Controller assembly
(motor cover / end cover / circuit board cable)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
⑥ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS3/DRR3/DS4/DRR4 type

① -1 Controller assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
DS3 DRR3	Incremental	No	NPN	MWB-EC-DSRR3
			PNP	MWB-EC-DSRR3-P
		Yes	NPN	MWB-EC-DSRR3-B
			PNP	MWB-EC-DSRR3-B-P
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA
			PNP	MWB-EC-DSRR3-WA-P
		Yes	NPN	MWB-EC-DSRR3-WA-B
			PNP	MWB-EC-DSRR3-WA-B-P
DS4 DRR4	Incremental	No	NPN	MWB-EC-DSRR4
			PNP	MWB-EC-DSRR4-P
		Yes	NPN	MWB-EC-DSRR4-B
			PNP	MWB-EC-DSRR4-B-P
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA
			PNP	MWB-EC-DSRR4-WA-P
		Yes	NPN	MWB-EC-DSRR4-WA-B
			PNP	MWB-EC-DSRR4-WA-B-P

① -2 Controller assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
DS3 DRR3	Incremental	No	NPN	MWB-EC-DSRR3-WL2
			PNP	MWB-EC-DSRR3-P-WL2
		Yes	NPN	MWB-EC-DSRR3-B-WL2
			PNP	MWB-EC-DSRR3-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-WL2
			PNP	MWB-EC-DSRR3-WA-P-WL2
		Yes	NPN	MWB-EC-DSRR3-WA-B-WL2
			PNP	MWB-EC-DSRR3-WA-B-P-WL2
DS4 DRR4	Incremental	No	NPN	MWB-EC-DSRR4-WL2
			PNP	MWB-EC-DSRR4-P-WL2
		Yes	NPN	MWB-EC-DSRR4-B-WL2
			PNP	MWB-EC-DSRR4-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-WL2
			PNP	MWB-EC-DSRR4-WA-P-WL2
		Yes	NPN	MWB-EC-DSRR4-WA-B-WL2
			PNP	MWB-EC-DSRR4-WA-B-P-WL2

① -3 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
DS3 DRR3	Incremental	No	NPN	MWB-EC-DSRR3-TMD2
			PNP	MWB-EC-DSRR3-P-TMD2
		Yes	NPN	MWB-EC-DSRR3-B-TMD2
			PNP	MWB-EC-DSRR3-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-TMD2
			PNP	MWB-EC-DSRR3-WA-P-TMD2
		Yes	NPN	MWB-EC-DSRR3-WA-B-TMD2
			PNP	MWB-EC-DSRR3-WA-B-P-TMD2
DS4 DRR4	Incremental	No	NPN	MWB-EC-DSRR4-TMD2
			PNP	MWB-EC-DSRR4-P-TMD2
		Yes	NPN	MWB-EC-DSRR4-B-TMD2
			PNP	MWB-EC-DSRR4-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-TMD2
			PNP	MWB-EC-DSRR4-WA-P-TMD2
		Yes	NPN	MWB-EC-DSRR4-WA-B-TMD2
			PNP	MWB-EC-DSRR4-WA-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
DS3 DRR3	Incremental	No	NPN	MWB-EC-DSRR3-TMD2-WL2
			PNP	MWB-EC-DSRR3-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR3-B-TMD2-WL2
			PNP	MWB-EC-DSRR3-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-TMD2-WL2
			PNP	MWB-EC-DSRR3-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR3-WA-B-TMD2-WL2
			PNP	MWB-EC-DSRR3-WA-B-P-TMD2-WL2
DS4 DRR4	Incremental	No	NPN	MWB-EC-DSRR4-TMD2-WL2
			PNP	MWB-EC-DSRR4-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR4-B-TMD2-WL2
			PNP	MWB-EC-DSRR4-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-TMD2-WL2
			PNP	MWB-EC-DSRR4-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR4-WA-B-TMD2-WL2
			PNP	MWB-EC-DSRR4-WA-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
RCON-EC connection specification (option model: ACR)

Type	Encoder	Brake	WL2	Model
DS3 DRR3	Incremental	No	No	MWB-EC-DSRR3-ACR
		Yes		MWB-EC-DSRR3-B-ACR
	Battery-less absolute	No		MWB-EC-DSRR3-WA-ACR
		Yes		MWB-EC-DSRR3-WA-B-ACR
	Incremental	No	Yes	MWB-EC-DSRR3-ACR-WL2
		Yes		MWB-EC-DSRR3-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-DSRR3-WA-ACR-WL2
		Yes		MWB-EC-DSRR3-WA-B-ACR-WL2
DS4 DRR4	Incremental	No	No	MWB-EC-DSRR4-ACR
		Yes		MWB-EC-DSRR4-B-ACR
	Battery-less absolute	No		MWB-EC-DSRR4-WA-ACR
		Yes		MWB-EC-DSRR4-WA-B-ACR
	Incremental	No	Yes	MWB-EC-DSRR4-ACR-WL2
		Yes		MWB-EC-DSRR4-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-DSRR4-WA-ACR-WL2
		Yes		MWB-EC-DSRR4-WA-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS3 DRR3	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
DS4 DRR4	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
DS3/DRR3	CPG-EC-SRR3
DS4/DRR4	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
DS3	ST-EC-S3-○○○
DS4	ST-EC-S4-○○○

*○○○ indicates the stroke

⑤ End cover assembly (with wireless communication circuit board cable)

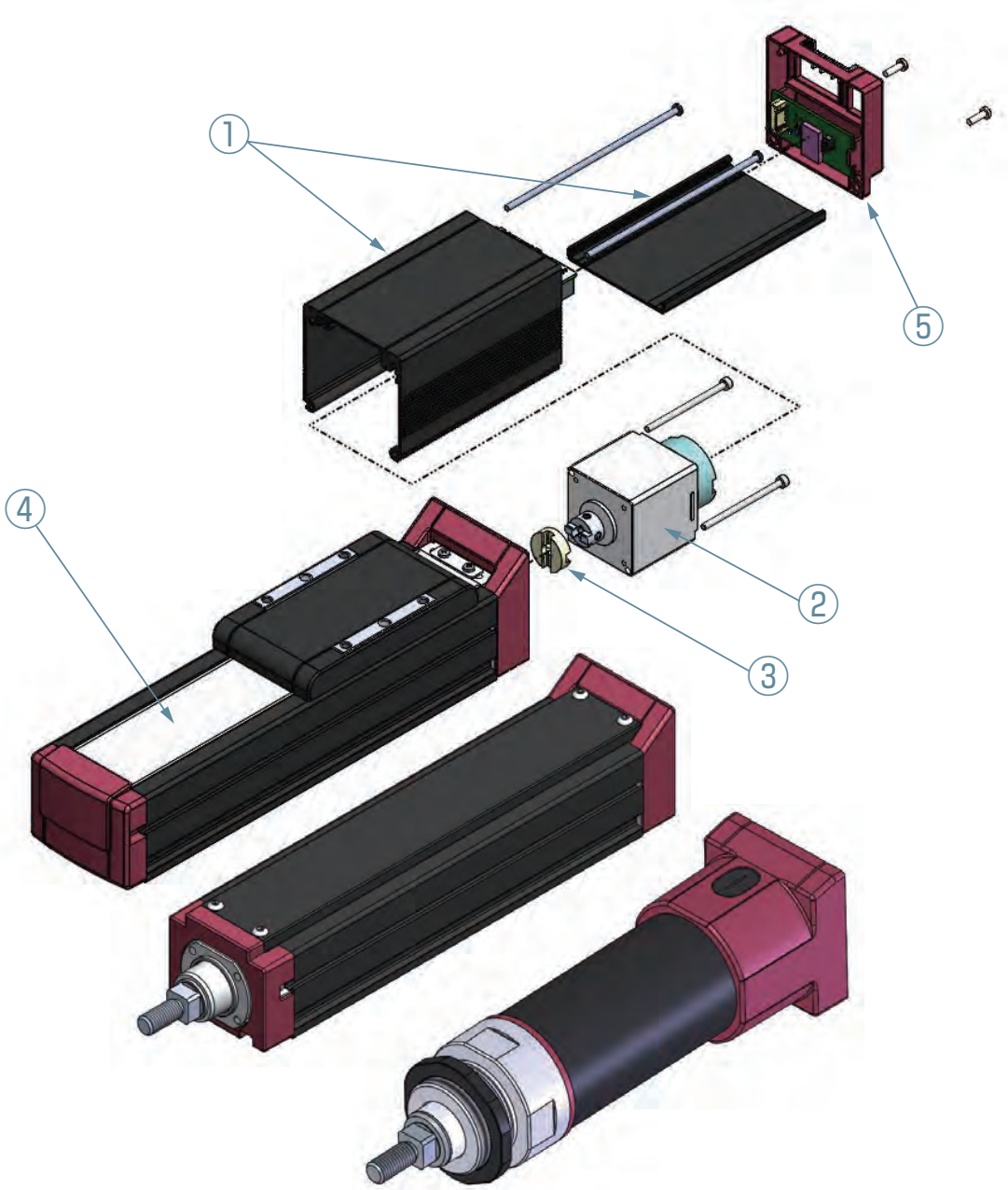
Type	Model
DS3/DRR3	EWB-EC-DSRR3
DS4/DRR4	EWB-EC-DSRR4

⑥ Digital speed controller

Type	Model
DS3/DRR3/DS4/DRR4	DSC-01

EC maintenance part schematics

S6/R6/RR6/S7/R7/RR7 type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly

EC maintenance part model list

S6/R6/RR6/S7/R7/RR7 type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6 R6 RR6	No	NPN	MWB-EC-SR6
		PNP	MWB-EC-SR6-P
	Yes	NPN	MWB-EC-SR6-B
		PNP	MWB-EC-SR6-B-P
S7 R7 RR7	No	NPN	MWB-EC-SR7
		PNP	MWB-EC-SR7-P
	Yes	NPN	MWB-EC-SR7-B
		PNP	MWB-EC-SR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6 R6 RR6	No	NPN	MWB-EC-SR6-WL2
		PNP	MWB-EC-SR6-P-WL2
	Yes	NPN	MWB-EC-SR6-B-WL2
		PNP	MWB-EC-SR6-B-P-WL2
S7 R7 RR7	No	NPN	MWB-EC-SR7-WL2
		PNP	MWB-EC-SR7-P-WL2
	Yes	NPN	MWB-EC-SR7-B-WL2
		PNP	MWB-EC-SR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6 R6 RR6	No	NPN	MWB-EC-SR6-TMD2
		PNP	MWB-EC-SR6-P-TMD2
	Yes	NPN	MWB-EC-SR6-B-TMD2
		PNP	MWB-EC-SR6-B-P-TMD2
S7 R7 RR7	No	NPN	MWB-EC-SR7-TMD2
		PNP	MWB-EC-SR7-P-TMD2
	Yes	NPN	MWB-EC-SR7-B-TMD2
		PNP	MWB-EC-SR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6 R6 RR6	No	NPN	MWB-EC-SR6-TMD2-WL2
		PNP	MWB-EC-SR6-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR6-B-TMD2-WL2
		PNP	MWB-EC-SR6-B-P-TMD2-WL2
S7 R7 RR7	No	NPN	MWB-EC-SR7-TMD2-WL2
		PNP	MWB-EC-SR7-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR7-B-TMD2-WL2
		PNP	MWB-EC-SR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
S6 R6 RR6	No	No	MWB-EC-SR6-ACR
	Yes		MWB-EC-SR6-B-ACR
	No	Yes	MWB-EC-SR6-ACR-WL2
	Yes		MWB-EC-SR6-B-ACR-WL2
S7 R7 RR7	No	No	MWB-EC-SR7-ACR
	Yes		MWB-EC-SR7-B-ACR
	No	Yes	MWB-EC-SR7-ACR-WL2
	Yes		MWB-EC-SR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S6 R6 RR6	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
S7	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
R7 RR7	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
S6/R6/RR6	CPG-EC-SR6
S7/R7/RR7	CPG-EC-SR7

④ Stainless steel sheet

Type	Model
S6	ST-EC-S6-○○○
S7	ST-EC-S7-○○○

*○○○ indicates the stroke

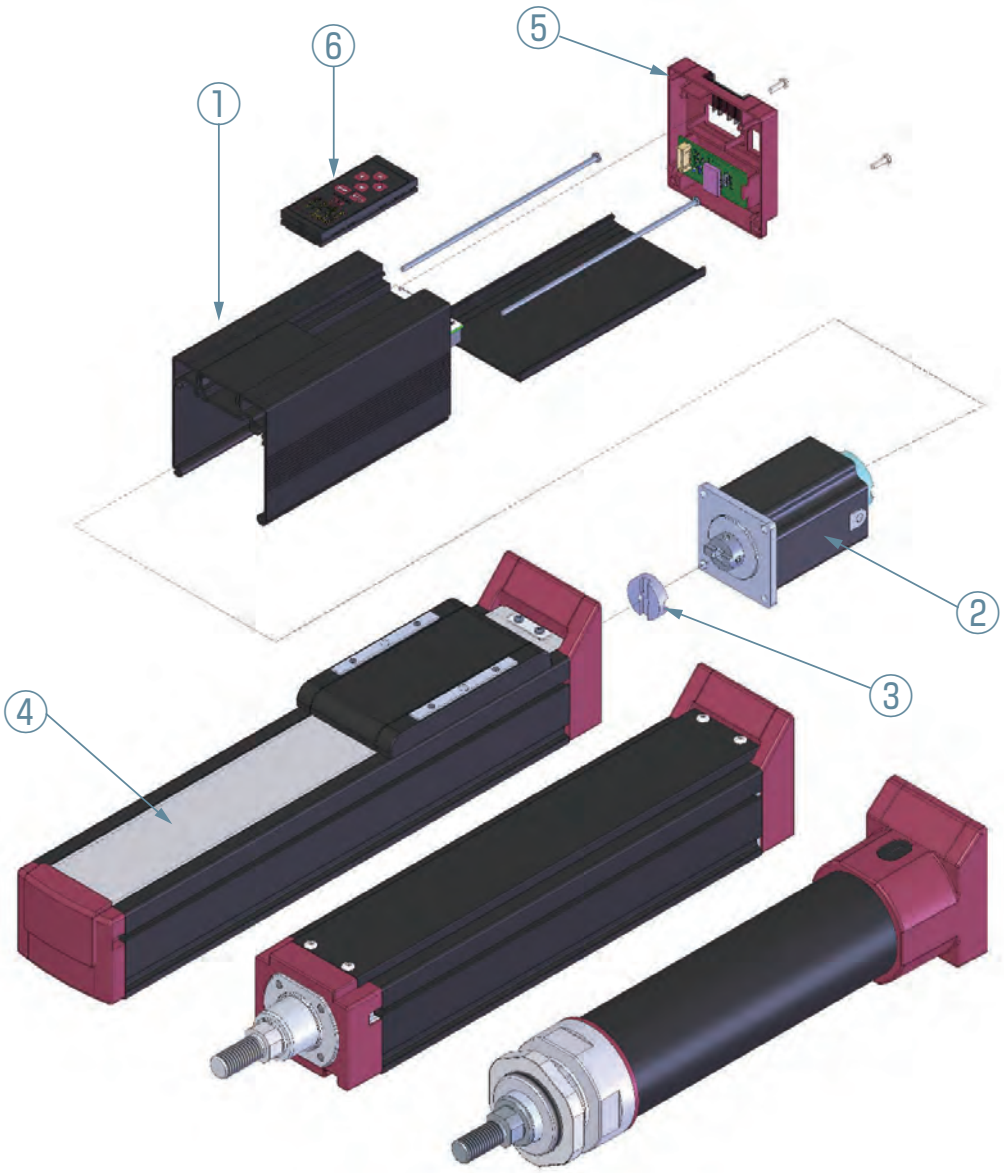
⑤ End cover assembly (with wireless communication circuit board cable)

Type	Model
S6/R6/RR6	EWB-EC-SR6
S7/R7/RR7	EWB-EC-SR7

EC maintenance part schematics

[With digital speed controller]

DS6/DR6/DRR6/DS7/DR7/DRR7 type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
⑥ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS6/DR6/DRR6/DS7/DR7/DRR7 type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6 DR6 DRR6	No	NPN	MWB-EC-DSR6
		PNP	MWB-EC-DSR6-P
	Yes	NPN	MWB-EC-DSR6-B
		PNP	MWB-EC-DSR6-B-P
DS7 DR7 DRR7	No	NPN	MWB-EC-DSR7
		PNP	MWB-EC-DSR7-P
	Yes	NPN	MWB-EC-DSR7-B
		PNP	MWB-EC-DSR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6 DR6 DRR6	No	NPN	MWB-EC-DSR6-WL2
		PNP	MWB-EC-DSR6-P-WL2
	Yes	NPN	MWB-EC-DSR6-B-WL2
		PNP	MWB-EC-DSR6-B-P-WL2
DS7 DR7 DRR7	No	NPN	MWB-EC-DSR7-WL2
		PNP	MWB-EC-DSR7-P-WL2
	Yes	NPN	MWB-EC-DSR7-B-WL2
		PNP	MWB-EC-DSR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6 DR6 DRR6	No	NPN	MWB-EC-DSR6-TMD2
		PNP	MWB-EC-DSR6-P-TMD2
	Yes	NPN	MWB-EC-DSR6-B-TMD2
		PNP	MWB-EC-DSR6-B-P-TMD2
S7 R7 RR7	No	NPN	MWB-EC-DSR7-TMD2
		PNP	MWB-EC-DSR7-P-TMD2
	Yes	NPN	MWB-EC-DSR7-B-TMD2
		PNP	MWB-EC-DSR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6 R6 RR6	No	NPN	MWB-EC-DSR6-TMD2-WL2
		PNP	MWB-EC-DSR6-P-TMD2-WL2
	Yes	NPN	MWB-EC-DSR6-B-TMD2-WL2
		PNP	MWB-EC-DSR6-B-P-TMD2-WL2
DS7 DR7 DRR7	No	NPN	MWB-EC-DSR7-TMD2-WL2
		PNP	MWB-EC-DSR7-P-TMD2-WL2
	Yes	NPN	MWB-EC-DSR7-B-TMD2-WL2
		PNP	MWB-EC-DSR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
DS6 DR6 DRR6	No	No	MWB-EC-DSR6-ACR
	Yes		MWB-EC-DSR6-B-ACR
	No	Yes	MWB-EC-DSR6-ACR-WL2
	Yes		MWB-EC-DSR6-B-ACR-WL2
DS7 DR7 DRR7	No	No	MWB-EC-DSR7-ACR
	Yes		MWB-EC-DSR7-B-ACR
	No	Yes	MWB-EC-DSR7-ACR-WL2
	Yes		MWB-EC-DSR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS6 DR6 DRR6	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
DS7	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
DR7 DRR7	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
DS6/DR6/DRR6	CPG-EC-SR6
DS7/DR7/DRR7	CPG-EC-SR7

④ Stainless steel sheet

Type	Model
DS6	ST-EC-S6-○○○
DS7	ST-EC-S7-○○○

*○○○ indicates the stroke

⑤ End cover assembly (with wireless communication circuit board cable)

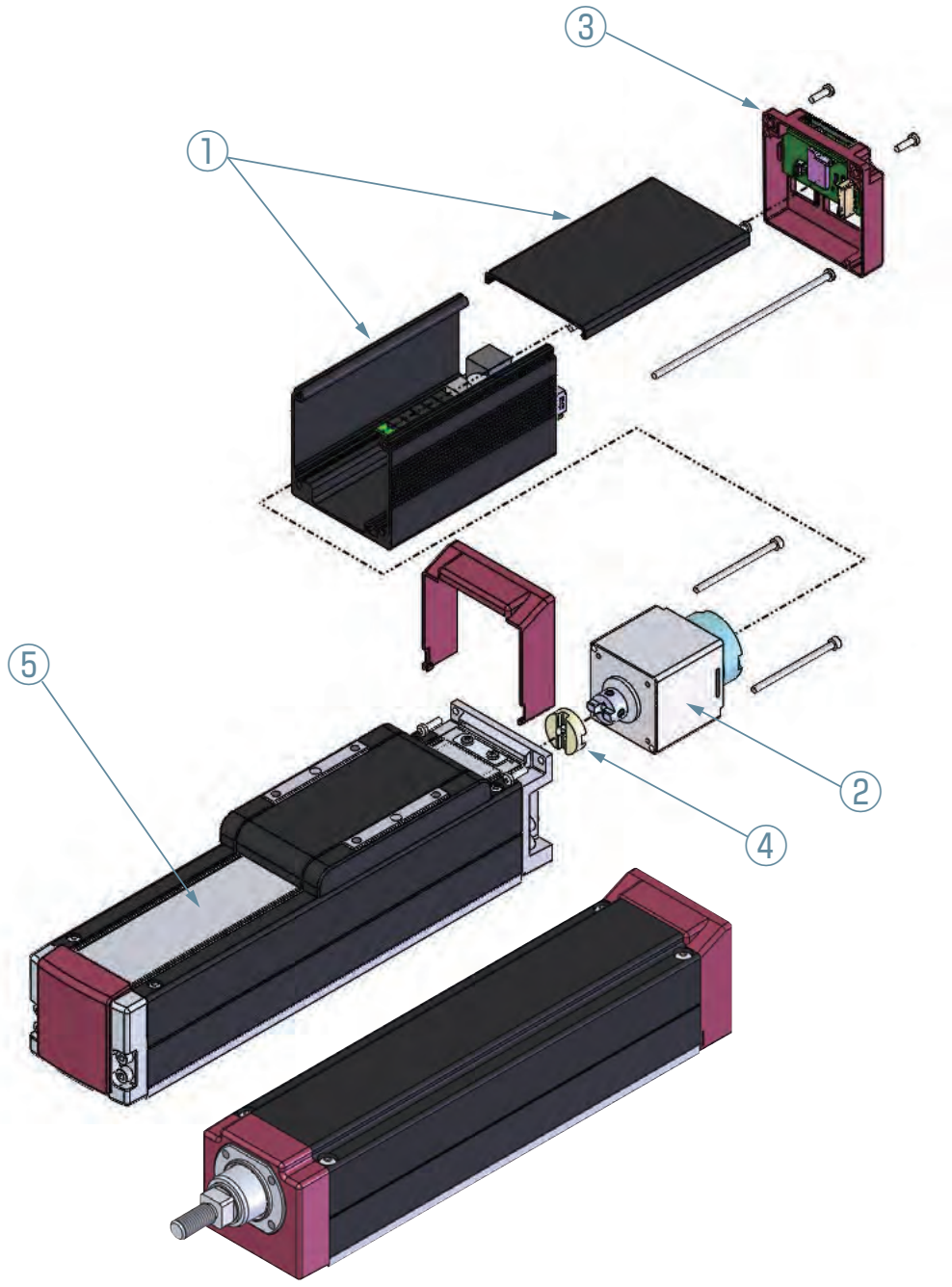
Type	Model
DS6/DR6/DRR6	EWB-EC-DSR6
DS7/DR7/DRR7	EWB-EC-DSR7

⑥ Digital speed controller

Type	Model
DS6/DR6/DRR6/ DS7/DR7/DRR7	DSC-01

EC maintenance part schematics

S6□AH/RR6□AH/S7□AH/RR7□AH type



① Motor cover assembly (controller circuit board)
② Motor unit
③ End cover assembly (with wireless circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet

EC maintenance part model list

S6□AH/RR6□AH/S7□AH/RR7□AH type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□AH RR6□AH	No	NPN	MWB-ECH-SRR6
		PNP	MWB-ECH-SRR6-P
	Yes	NPN	MWB-ECH-SRR6-B
		PNP	MWB-ECH-SRR6-B-P
S7□AH RR7□AH	No	NPN	MWB-ECH-SRR7
		PNP	MWB-ECH-SRR7-P
	Yes	NPN	MWB-ECH-SRR7-B
		PNP	MWB-ECH-SRR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□AH RR6□AH	No	NPN	MWB-ECH-SRR6-WL2
		PNP	MWB-ECH-SRR6-P-WL2
	Yes	NPN	MWB-ECH-SRR6-B-WL2
		PNP	MWB-ECH-SRR6-B-P-WL2
S7□AH RR7□AH	No	NPN	MWB-ECH-SRR7-WL2
		PNP	MWB-ECH-SRR7-P-WL2
	Yes	NPN	MWB-ECH-SRR7-B-WL2
		PNP	MWB-ECH-SRR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□AH RR6□AH	No	NPN	MWB-ECH-SRR6-TMD2
		PNP	MWB-ECH-SRR6-P-TMD2
	Yes	NPN	MWB-ECH-SRR6-B-TMD2
		PNP	MWB-ECH-SRR6-B-P-TMD2
S7□AH RR7□AH	No	NPN	MWB-ECH-SRR7-TMD2
		PNP	MWB-ECH-SRR7-P-TMD2
	Yes	NPN	MWB-ECH-SRR7-B-TMD2
		PNP	MWB-ECH-SRR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□AH RR6□AH	No	NPN	MWB-ECH-SRR6-TMD2-WL2
		PNP	MWB-ECH-SRR6-P-TMD2-WL2
	Yes	NPN	MWB-ECH-SRR6-B-TMD2-WL2
		PNP	MWB-ECH-SRR6-B-P-TMD2-WL2
S7□AH RR7□AH	No	NPN	MWB-ECH-SRR7-TMD2-WL2
		PNP	MWB-ECH-SRR7-P-TMD2-WL2
	Yes	NPN	MWB-ECH-SRR7-B-TMD2-WL2
		PNP	MWB-ECH-SRR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
S6□AH RR6□AH	No	No	MWB-ECH-SRR6-ACR
	Yes		MWB-ECH-SRR6-B-ACR
	No	Yes	MWB-ECH-SRR6-ACR-WL2
	Yes		MWB-ECH-SRR6-B-ACR-WL2
S7□AH RR7□AH	No	No	MWB-ECH-SRR7-ACR
	Yes		MWB-ECH-SRR7-B-ACR
	No	Yes	MWB-ECH-SRR7-ACR-WL2
	Yes		MWB-ECH-SRR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S6□AH RR6□AH	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
S7□AH	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
RR7□AH	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
S6□AH/RR6□AH	EWB-ECH-SRR6
S7□AH/RR7□AH	EWB-ECH-SRR7

④ Coupling spacer

Type	Model
S6□AH/RR6□AH	CPG-EC-SR6
S7□AH/RR7□AH	CPG-EC-SR7

⑤ Stainless steel sheet

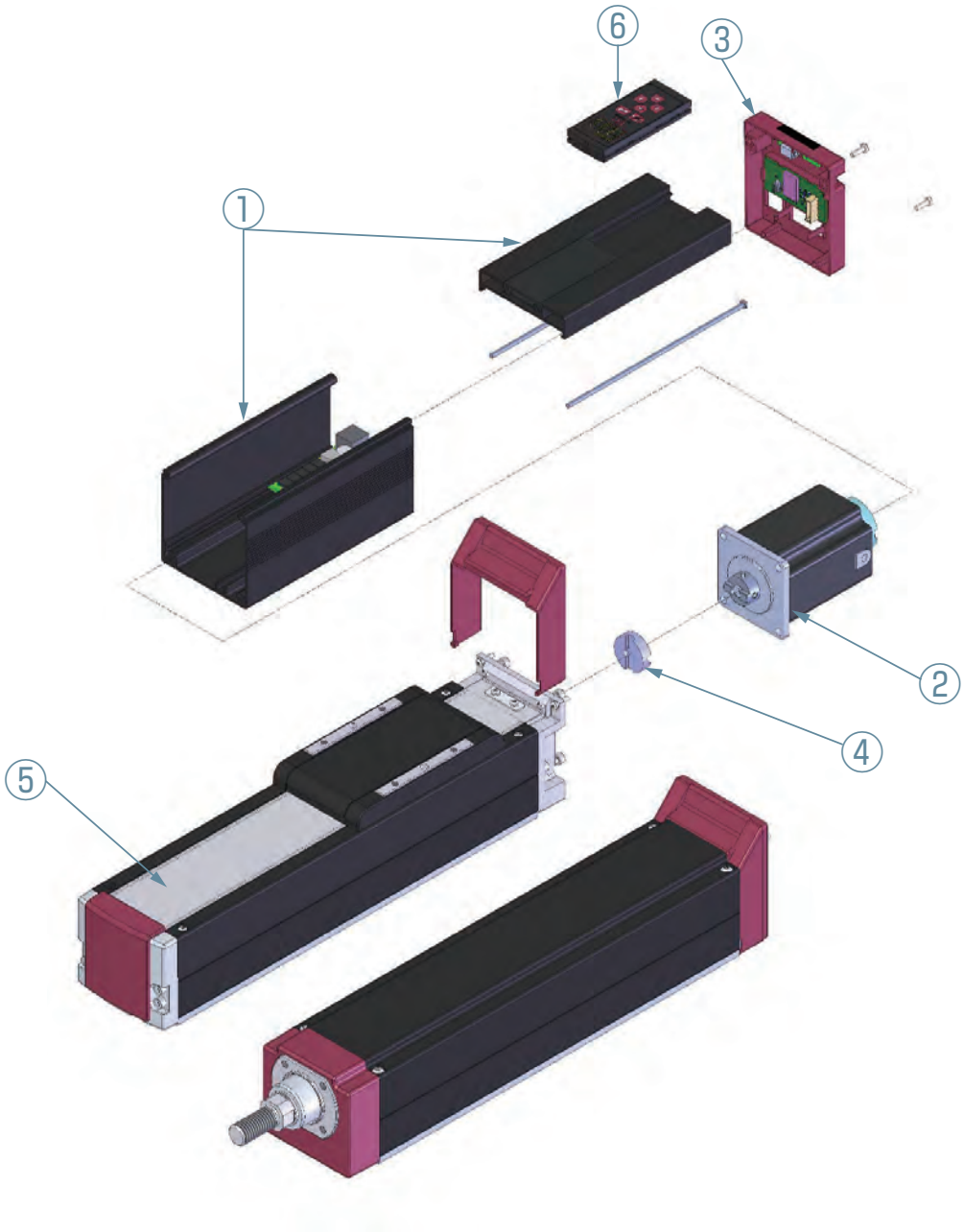
Type	Model
S6□AH	ST-ECH-S6-○○○
S7□AH	ST-ECH-S7-○○○

*○○○ indicates the stroke

EC maintenance part schematics

[With digital speed controller]

DS6□AH/DRR6□AH/DS7□AH/DRR7□AH type



① Motor cover assembly (controller circuit board)
② Motor unit
③ End cover assembly (with wireless circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet
⑥ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS6□AH/DRR6□AH/DS7□AH/DRR7□AH type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□AH DRR6□AH	No	NPN	MWB-ECH-DSRR6
		PNP	MWB-ECH-DSRR6-P
	Yes	NPN	MWB-ECH-DSRR6-B
		PNP	MWB-ECH-DSRR6-B-P
DS7□AH DRR7□AH	No	NPN	MWB-ECH-DSRR7
		PNP	MWB-ECH-DSRR7-P
	Yes	NPN	MWB-ECH-DSRR7-B
		PNP	MWB-ECH-DSRR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□AH DRR6□AH	No	NPN	MWB-ECH-DSRR6-WL2
		PNP	MWB-ECH-DSRR6-P-WL2
	Yes	NPN	MWB-ECH-DSRR6-B-WL2
		PNP	MWB-ECH-DSRR6-B-P-WL2
DS7□AH DRR7□AH	No	NPN	MWB-ECH-DSRR7-WL2
		PNP	MWB-ECH-DSRR7-P-WL2
	Yes	NPN	MWB-ECH-DSRR7-B-WL2
		PNP	MWB-ECH-DSRR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□AH DRR6□AH	No	NPN	MWB-ECH-DSRR6-TMD2
		PNP	MWB-ECH-DSRR6-P-TMD2
	Yes	NPN	MWB-ECH-DSRR6-B-TMD2
		PNP	MWB-ECH-DSRR6-B-P-TMD2
DS7□AH DRR7□AH	No	NPN	MWB-ECH-DSRR7-TMD2
		PNP	MWB-ECH-DSRR7-P-TMD2
	Yes	NPN	MWB-ECH-DSRR7-B-TMD2
		PNP	MWB-ECH-DSRR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□AH DRR6□AH	No	NPN	MWB-ECH-DSRR6-TMD2-WL2
		PNP	MWB-ECH-DSRR6-P-TMD2-WL2
	Yes	NPN	MWB-ECH-DSRR6-B-TMD2-WL2
		PNP	MWB-ECH-DSRR6-B-P-TMD2-WL2
DS7□AH DRR7□AH	No	NPN	MWB-ECH-DSRR7-TMD2-WL2
		PNP	MWB-ECH-DSRR7-P-TMD2-WL2
	Yes	NPN	MWB-ECH-DSRR7-B-TMD2-WL2
		PNP	MWB-ECH-DSRR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
DS6□AH DRR6□AH	No	No	MWB-ECH-DSRR6-ACR
	Yes		MWB-ECH-DSRR6-B-ACR
	No	Yes	MWB-ECH-DSRR6-ACR-WL2
	Yes		MWB-ECH-DSRR6-B-ACR-WL2
DS7□AH DRR7□AH	No	No	MWB-ECH-DSRR7-ACR
	Yes		MWB-ECH-DSRR7-B-ACR
	No	Yes	MWB-ECH-DSRR7-ACR-WL2
	Yes		MWB-ECH-DSRR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS6□AH DRR6□AH	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
DS7□AH	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
DRR7□AH	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
DS6□AH/DRR6□AH	EWB-ECH-DSRR6
DS7□AH/DRR7□AH	EWB-ECH-DSRR7

④ Coupling spacer

Type	Model
DS6□AH/DRR6□AH	CPG-EC-SR6
DS7□AH/DRR7□AH	CPG-EC-SR7

⑤ Stainless steel sheet

Type	Model
DS6□AH	ST-ECH-S6-○○○
DS7□AH	ST-ECH-S7-○○○

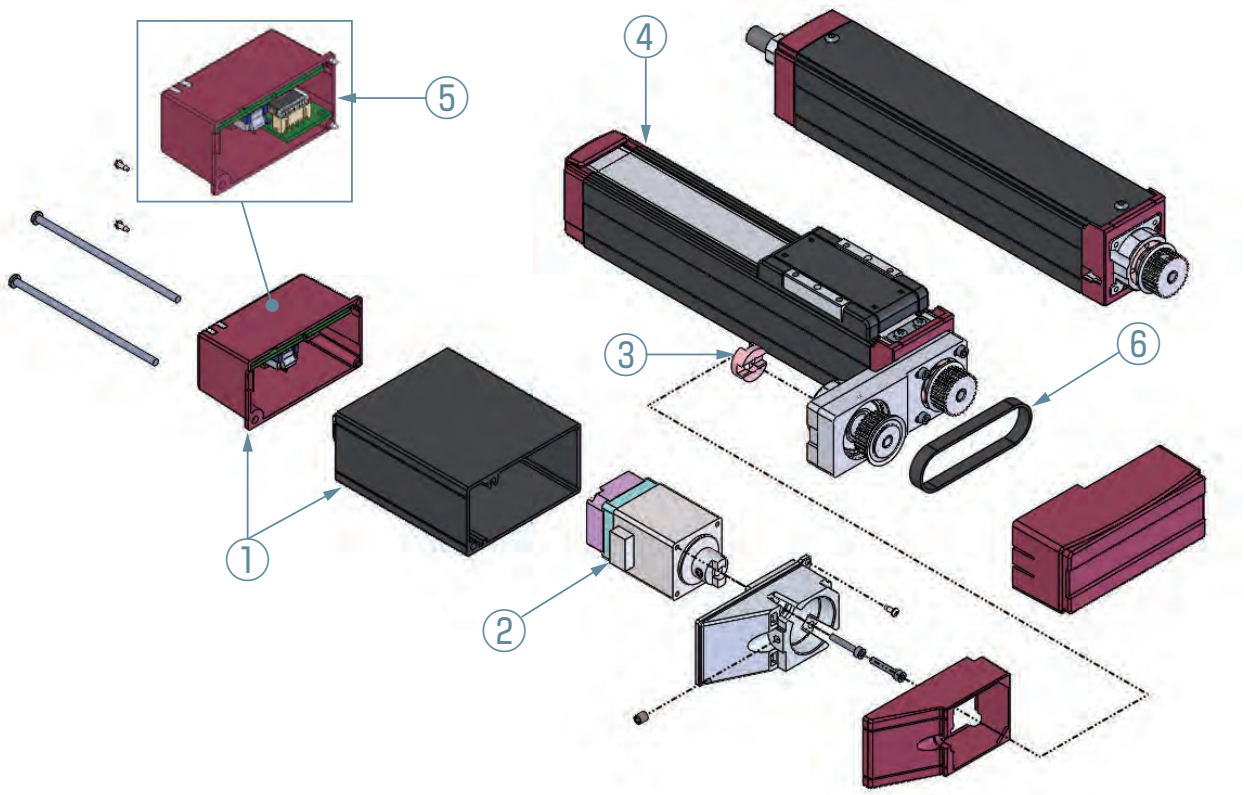
*○○○ indicates the stroke

⑥ Digital speed controller

Type	Model
DS6□AH/DS7□AH/ DRR6□AH/DRR7□AH	DSC-01

EC maintenance part schematics

S3□R/RR3□R/S4□R/RR4□R type



① Controller assembly
(motor cover / end cover / circuit board cable)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
⑥ Timing belt

EC maintenance part model list

S3□R/RR3□R/S4□R/RR4□R type

① -1 Controller assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
S3□R RR3□R	Incremental	No	NPN	MWB-EC-SRR3
			PNP	MWB-EC-SRR3-P
		Yes	NPN	MWB-EC-SRR3-B
			PNP	MWB-EC-SRR3-B-P
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA
			PNP	MWB-EC-SRR3-WA-P
		Yes	NPN	MWB-EC-SRR3-WA-B
			PNP	MWB-EC-SRR3-WA-B-P
S4□R RR4□R	Incremental	No	NPN	MWB-EC-SRR4
			PNP	MWB-EC-SRR4-P
		Yes	NPN	MWB-EC-SRR4-B
			PNP	MWB-EC-SRR4-B-P
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA
			PNP	MWB-EC-SRR4-WA-P
		Yes	NPN	MWB-EC-SRR4-WA-B
			PNP	MWB-EC-SRR4-WA-B-P

① -2 Controller assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
S3□R RR3□R	Incremental	No	NPN	MWB-EC-SRR3-WL2
			PNP	MWB-EC-SRR3-P-WL2
		Yes	NPN	MWB-EC-SRR3-B-WL2
			PNP	MWB-EC-SRR3-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-WL2
			PNP	MWB-EC-SRR3-WA-P-WL2
		Yes	NPN	MWB-EC-SRR3-WA-B-WL2
			PNP	MWB-EC-SRR3-WA-B-P-WL2
S4□R RR4□R	Incremental	No	NPN	MWB-EC-SRR4-WL2
			PNP	MWB-EC-SRR4-P-WL2
		Yes	NPN	MWB-EC-SRR4-B-WL2
			PNP	MWB-EC-SRR4-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-WL2
			PNP	MWB-EC-SRR4-WA-P-WL2
		Yes	NPN	MWB-EC-SRR4-WA-B-WL2
			PNP	MWB-EC-SRR4-WA-B-P-WL2

① -3 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
S3□R RR3□R	Incremental	No	NPN	MWB-EC-SRR3-TMD2
			PNP	MWB-EC-SRR3-P-TMD2
		Yes	NPN	MWB-EC-SRR3-B-TMD2
			PNP	MWB-EC-SRR3-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-TMD2
			PNP	MWB-EC-SRR3-WA-P-TMD2
		Yes	NPN	MWB-EC-SRR3-WA-B-TMD2
			PNP	MWB-EC-SRR3-WA-B-P-TMD2
S4□R RR4□R	Incremental	No	NPN	MWB-EC-SRR4-TMD2
			PNP	MWB-EC-SRR4-P-TMD2
		Yes	NPN	MWB-EC-SRR4-B-TMD2
			PNP	MWB-EC-SRR4-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-TMD2
			PNP	MWB-EC-SRR4-WA-P-TMD2
		Yes	NPN	MWB-EC-SRR4-WA-B-TMD2
			PNP	MWB-EC-SRR4-WA-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
S3□R RR3□R	Incremental	No	NPN	MWB-EC-SRR3-TMD2-WL2
			PNP	MWB-EC-SRR3-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR3-B-TMD2-WL2
			PNP	MWB-EC-SRR3-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR3-WA-TMD2-WL2
			PNP	MWB-EC-SRR3-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR3-WA-B-TMD2-WL2
			PNP	MWB-EC-SRR3-WA-B-P-TMD2-WL2
S4□R RR4□R	Incremental	No	NPN	MWB-EC-SRR4-TMD2-WL2
			PNP	MWB-EC-SRR4-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR4-B-TMD2-WL2
			PNP	MWB-EC-SRR4-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-SRR4-WA-TMD2-WL2
			PNP	MWB-EC-SRR4-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-SRR4-WA-B-TMD2-WL2
			PNP	MWB-EC-SRR4-WA-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
RCON-EC connection specification (option model: ACR)

Type	Encoder	Brake	WL2	Model
S3□R RR3□R	Incremental	No	No	MWB-EC-SRR3-ACR
		Yes		MWB-EC-SRR3-B-ACR
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR
		Yes		MWB-EC-SRR3-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR3-ACR-WL2
		Yes		MWB-EC-SRR3-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR-WL2
		Yes		MWB-EC-SRR3-WA-B-ACR-WL2
S4□R RR4□R	Incremental	No	No	MWB-EC-SRR4-ACR
		Yes		MWB-EC-SRR4-B-ACR
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR
		Yes		MWB-EC-SRR4-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR4-ACR-WL2
		Yes		MWB-EC-SRR4-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR-WL2
		Yes		MWB-EC-SRR4-WA-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S3□R RR3□R	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
S4□R RR4□R	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
S3□R/RR3□R	CPG-EC-SRR3
S4□R/RR4□R	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
S3□R	ST-EC-S3-○○○
S4□R	ST-EC-S4-○○○

*○○○ indicates the stroke

⑤ End cover assembly (with wireless communication circuit board cable)

Type	Model
S3□R/RR3□R	EWB-EC-SRR3
S4□R/RR4□R	EWB-EC-SRR4

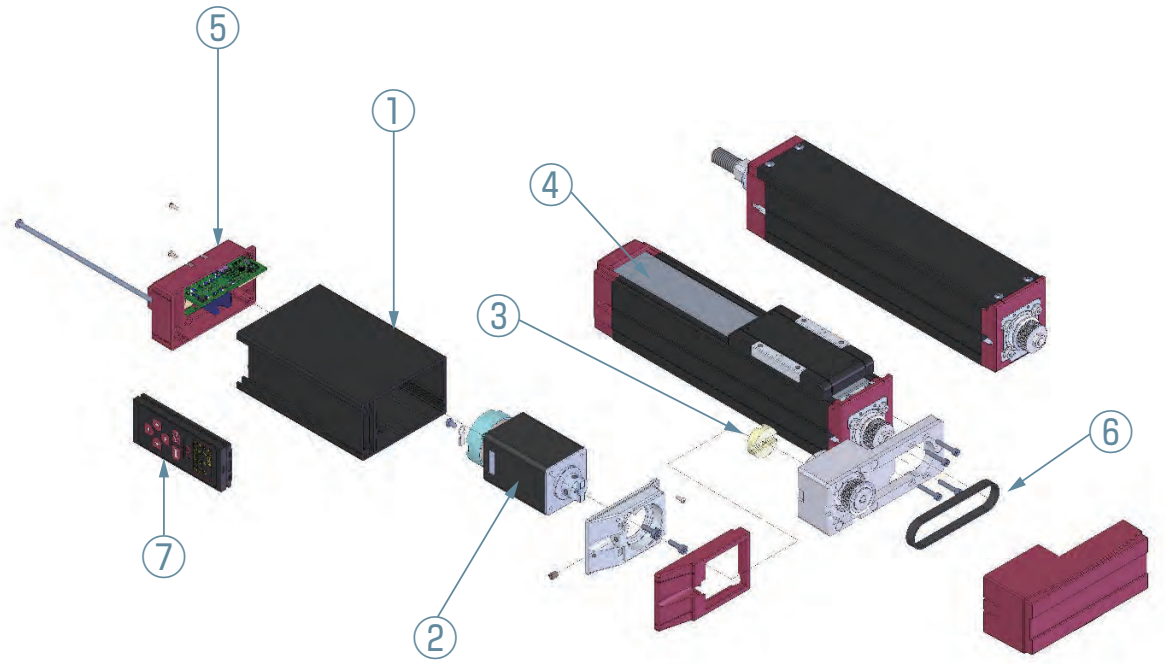
⑥ Timing belt

Type	Model
S3□R/RR3□R	TB-RCP6-STRA4R
S4□R/RR4□R	TB-RCP5-SA4R

EC maintenance part schematics

[With digital speed controller]

DS3□R/DRR3□R/DS4□R/DRR4□R type



① Controller assembly
(motor cover / end cover / circuit board cable)
② Motor unit
③ Coupling spacer
④ Stainless steel sheet
⑤ End cover assembly
⑥ Timing belt
⑦ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS3□R/DRR3□R/DS4□R/DRR4□R type

① -1 Controller assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
DS3□R DRR3□R	Incremental	No	NPN	MWB-EC-DSRR3
			PNP	MWB-EC-DSRR3-P
		Yes	NPN	MWB-EC-DSRR3-B
			PNP	MWB-EC-DSRR3-B-P
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA
			PNP	MWB-EC-DSRR3-WA-P
		Yes	NPN	MWB-EC-DSRR3-WA-B
			PNP	MWB-EC-DSRR3-WA-B-P
DS4□R DRR4□R	Incremental	No	NPN	MWB-EC-DSRR4
			PNP	MWB-EC-DSRR4-P
		Yes	NPN	MWB-EC-DSRR4-B
			PNP	MWB-EC-DSRR4-B-P
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA
			PNP	MWB-EC-DSRR4-WA-P
		Yes	NPN	MWB-EC-DSRR4-WA-B
			PNP	MWB-EC-DSRR4-WA-B-P

① -2 Controller assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
DS3□R DRR3□R	Incremental	No	NPN	MWB-EC-DSRR3-WL2
			PNP	MWB-EC-DSRR3-P-WL2
		Yes	NPN	MWB-EC-DSRR3-B-WL2
			PNP	MWB-EC-DSRR3-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-WL2
			PNP	MWB-EC-DSRR3-WA-P-WL2
		Yes	NPN	MWB-EC-DSRR3-WA-B-WL2
			PNP	MWB-EC-DSRR3-WA-B-P-WL2
DS4□R DRR4□R	Incremental	No	NPN	MWB-EC-DSRR4-WL2
			PNP	MWB-EC-DSRR4-P-WL2
		Yes	NPN	MWB-EC-DSRR4-B-WL2
			PNP	MWB-EC-DSRR4-B-P-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-WL2
			PNP	MWB-EC-DSRR4-WA-P-WL2
		Yes	NPN	MWB-EC-DSRR4-WA-B-WL2
			PNP	MWB-EC-DSRR4-WA-B-P-WL2

① -3 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
*Same for WL specification

Type	Encoder	Brake	I/O	Model
DS3□R DRR3□R	Incremental	No	NPN	MWB-EC-DSRR3-TMD2
			PNP	MWB-EC-DSRR3-P-TMD2
		Yes	NPN	MWB-EC-DSRR3-B-TMD2
			PNP	MWB-EC-DSRR3-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-TMD2
			PNP	MWB-EC-DSRR3-WA-P-TMD2
		Yes	NPN	MWB-EC-DSRR3-WA-B-TMD2
			PNP	MWB-EC-DSRR3-WA-B-P-TMD2
DS4□R DRR4□R	Incremental	No	NPN	MWB-EC-DSRR4-TMD2
			PNP	MWB-EC-DSRR4-P-TMD2
		Yes	NPN	MWB-EC-DSRR4-B-TMD2
			PNP	MWB-EC-DSRR4-B-P-TMD2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-TMD2
			PNP	MWB-EC-DSRR4-WA-P-TMD2
		Yes	NPN	MWB-EC-DSRR4-WA-B-TMD2
			PNP	MWB-EC-DSRR4-WA-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
Wireless axis operation specification WL2

Type	Encoder	Brake	I/O	Model
DS3□R DRR3□R	Incremental	No	NPN	MWB-EC-DSRR3-TMD2-WL2
			PNP	MWB-EC-DSRR3-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR3-B-TMD2-WL2
			PNP	MWB-EC-DSRR3-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR3-WA-TMD2-WL2
			PNP	MWB-EC-DSRR3-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR3-WA-B-TMD2-WL2
			PNP	MWB-EC-DSRR3-WA-B-P-TMD2-WL2
DS4□R DRR4□R	Incremental	No	NPN	MWB-EC-DSRR4-TMD2-WL2
			PNP	MWB-EC-DSRR4-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR4-B-TMD2-WL2
			PNP	MWB-EC-DSRR4-B-P-TMD2-WL2
	Battery-less absolute	No	NPN	MWB-EC-DSRR4-WA-TMD2-WL2
			PNP	MWB-EC-DSRR4-WA-P-TMD2-WL2
		Yes	NPN	MWB-EC-DSRR4-WA-B-TMD2-WL2
			PNP	MWB-EC-DSRR4-WA-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (motor cover, end cover, circuit board cable)
RCON-EC connection specification (option model: ACR)

Type	Encoder	Brake	WL2	Model
DS3□R DRR3□R	Incremental	No	No	MWB-EC-SRR3-ACR
		Yes		MWB-EC-SRR3-B-ACR
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR
		Yes		MWB-EC-SRR3-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR3-ACR-WL2
		Yes		MWB-EC-SRR3-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR3-WA-ACR-WL2
		Yes		MWB-EC-SRR3-WA-B-ACR-WL2
DS4□R DRR4□R	Incremental	No	No	MWB-EC-SRR4-ACR
		Yes		MWB-EC-SRR4-B-ACR
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR
		Yes		MWB-EC-SRR4-WA-B-ACR
	Incremental	No	Yes	MWB-EC-SRR4-ACR-WL2
		Yes		MWB-EC-SRR4-B-ACR-WL2
	Battery-less absolute	No		MWB-EC-SRR4-WA-ACR-WL2
		Yes		MWB-EC-SRR4-WA-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS3□R DRR3□R	Incremental	No	EC-MUSRR3
		Yes	EC-MUSRR3-B
	Battery-less absolute	No	EC-MUSRR3-WA
		Yes	EC-MUSRR3-WA-B
DS4□R DRR4□R	Incremental	No	EC-MUSRR4
		Yes	EC-MUSRR4-B
	Battery-less absolute	No	EC-MUSRR4-WA
		Yes	EC-MUSRR4-WA-B

③ Coupling spacer

Type	Model
DS3□R/DRR3□R	CPG-EC-SRR3
DS4□R/DRR4□R	CPG-EC-SRR4

④ Stainless steel sheet

Type	Model
DS3□R	ST-EC-S3-○○○
DS4□R	ST-EC-S4-○○○

*○○○ indicates the stroke

⑤ End cover assembly (with wireless communication circuit board cable)

Type	Model
DS3□R/DRR3□R	EWB-EC-DSRR3
DS4□R/DRR4□R	EWB-EC-DSRR4

⑥ Timing belt

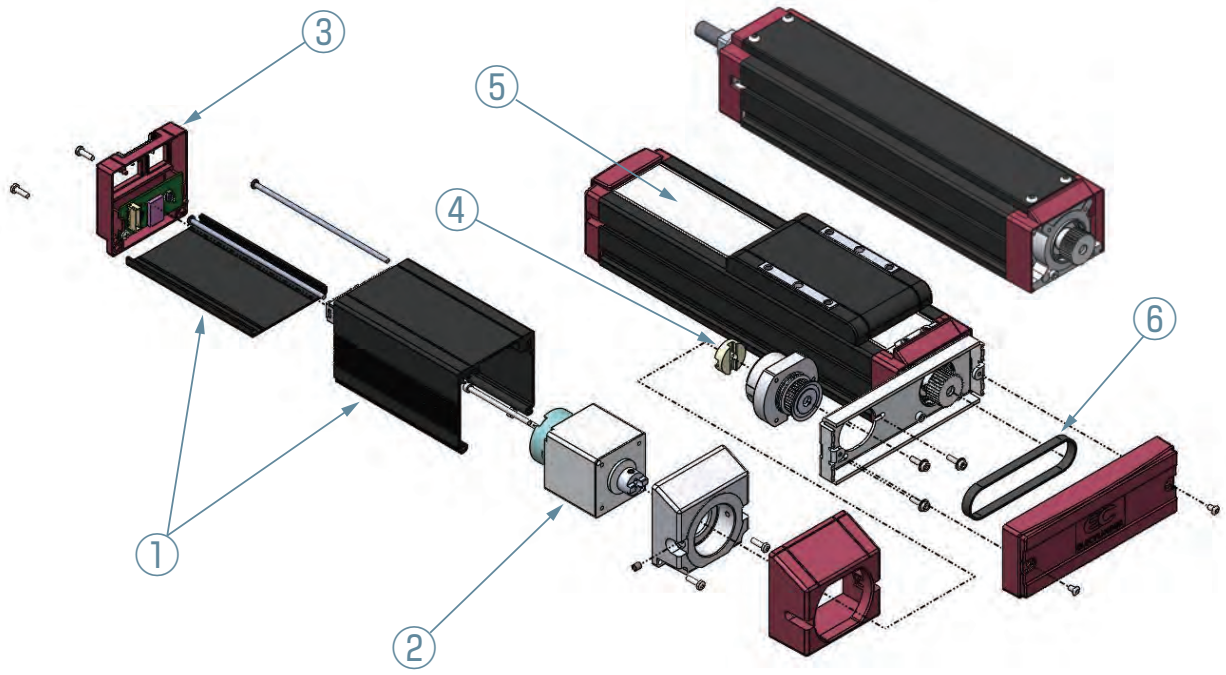
Type	Model
DS3□R/DRR3□R	TB-RCP6-STRA4R
DS4□R/DRR4□R	TB-RCP5-SA4R

⑦ Digital speed controller

Type	Model
DS3□R/DRR3□R/ DS4□R/DRR4□R	DSC-01

EC maintenance part schematics

S6□R/RR6□R type
S7□R/RR7□R type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet
⑥ Timing belt

EC maintenance part model list

S6□R/RR6□R type
S7□R/RR7□R type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□R RR6□R	No	NPN	MWB-EC-SR6
		PNP	MWB-EC-SR6-P
	Yes	NPN	MWB-EC-SR6-B
		PNP	MWB-EC-SR6-B-P
S7□R RR7□R	No	NPN	MWB-EC-SR7
		PNP	MWB-EC-SR7-P
	Yes	NPN	MWB-EC-SR7-B
		PNP	MWB-EC-SR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□R RR6□R	No	NPN	MWB-EC-SR6-WL2
		PNP	MWB-EC-SR6-P-WL2
	Yes	NPN	MWB-EC-SR6-B-WL2
		PNP	MWB-EC-SR6-B-P-WL2
S7□R RR7□R	No	NPN	MWB-EC-SR7-WL2
		PNP	MWB-EC-SR7-P-WL2
	Yes	NPN	MWB-EC-SR7-B-WL2
		PNP	MWB-EC-SR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□R RR6□R	No	NPN	MWB-EC-SR6-TMD2
		PNP	MWB-EC-SR6-P-TMD2
	Yes	NPN	MWB-EC-SR6-B-TMD2
		PNP	MWB-EC-SR6-B-P-TMD2
S7□R RR7□R	No	NPN	MWB-EC-SR7-TMD2
		PNP	MWB-EC-SR7-P-TMD2
	Yes	NPN	MWB-EC-SR7-B-TMD2
		PNP	MWB-EC-SR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□R RR6□R	No	NPN	MWB-EC-SR6-TMD2-WL2
		PNP	MWB-EC-SR6-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR6-B-TMD2-WL2
		PNP	MWB-EC-SR6-B-P-TMD2-WL2
S7□R RR7□R	No	NPN	MWB-EC-SR7-TMD2-WL2
		PNP	MWB-EC-SR7-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR7-B-TMD2-WL2
		PNP	MWB-EC-SR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
S6□R RR6□R	No	No	MWB-EC-SR6-ACR
	Yes		MWB-EC-SR6-B-ACR
	No	Yes	MWB-EC-SR6-ACR-WL2
	Yes		MWB-EC-SR6-B-ACR-WL2
S7□R RR7□R	No	No	MWB-EC-SR7-ACR
	Yes		MWB-EC-SR7-B-ACR
	No	Yes	MWB-EC-SR7-ACR-WL2
	Yes		MWB-EC-SR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S6□R RR6□R	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
S7□R	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
RR7□R	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
S6□R RR6□R	EWB-EC-SR6
S7□R RR7□R	EWB-EC-SR7

④ Coupling spacer

Type	Model
S6□R RR6□R	CPG-EC-SR6
S7□R RR7□R	CPG-EC-SR7

⑤ Stainless steel sheet

Type	Model
S6□R	ST-EC-S6-○○○
S7□R	ST-EC-S7-○○○

*○○○ indicates the stroke

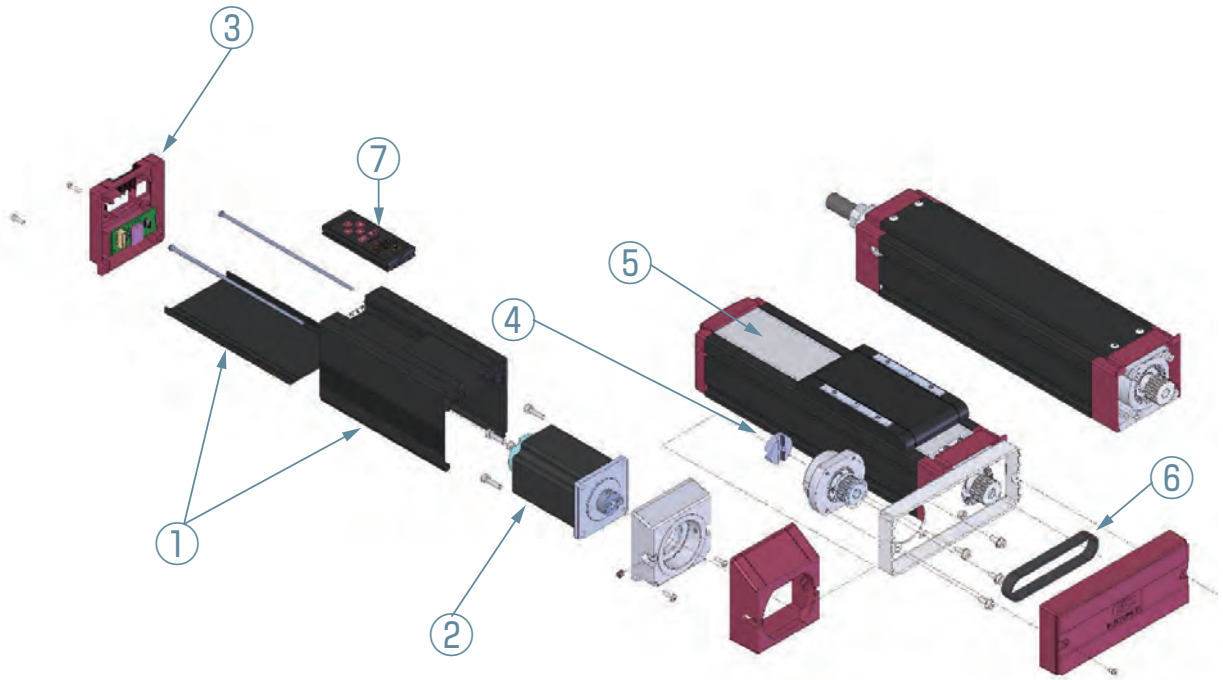
⑥ Timing belt

Type	Model
S6□R RR6□R	TB-EC-SRR6R
S7□R RR7□R	TB-EC-SRR7R

EC maintenance part schematics

[With digital speed controller]

DS6□R/DRR6□R type
DS7□R/DRR7□R type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet
⑥ Timing belt
⑦ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS6□R/DRR6□R type
DS7□R/DRR7□R type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□R DRR6□R	No	NPN	MWB-EC-DSR6
		PNP	MWB-EC-DSR6-P
	Yes	NPN	MWB-EC-DSR6-B
		PNP	MWB-EC-DSR6-B-P
DS7□R DRR7□R	No	NPN	MWB-EC-DSR7
		PNP	MWB-EC-DSR7-P
	Yes	NPN	MWB-EC-DSR7-B
		PNP	MWB-EC-DSR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□R DRR6□R	No	NPN	MWB-EC-DSR6-WL2
		PNP	MWB-EC-DSR6-P-WL2
	Yes	NPN	MWB-EC-DSR6-B-WL2
		PNP	MWB-EC-DSR6-B-P-WL2
DS7□R DRR7□R	No	NPN	MWB-EC-DSR7-WL2
		PNP	MWB-EC-DSR7-P-WL2
	Yes	NPN	MWB-EC-DSR7-B-WL2
		PNP	MWB-EC-DSR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□R DRR6□R	No	NPN	MWB-EC-DSR6-TMD2
		PNP	MWB-EC-DSR6-P-TMD2
	Yes	NPN	MWB-EC-DSR6-B-TMD2
		PNP	MWB-EC-DSR6-B-P-TMD2
DS7□R DRR7□R	No	NPN	MWB-EC-DSR7-TMD2
		PNP	MWB-EC-DSR7-P-TMD2
	Yes	NPN	MWB-EC-DSR7-B-TMD2
		PNP	MWB-EC-DSR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□R DRR6□R	No	NPN	MWB-EC-DSR6-TMD2-WL2
		PNP	MWB-EC-DSR6-P-TMD2-WL2
	Yes	NPN	MWB-EC-DSR6-B-TMD2-WL2
		PNP	MWB-EC-DSR6-B-P-TMD2-WL2
DS7□R DRR7□R	No	NPN	MWB-EC-DSR7-TMD2-WL2
		PNP	MWB-EC-DSR7-P-TMD2-WL2
	Yes	NPN	MWB-EC-DSR7-B-TMD2-WL2
		PNP	MWB-EC-DSR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
DS6□R DRR6□R	No	No	MWB-EC-DSR6-ACR
	Yes		MWB-EC-DSR6-B-ACR
	No	Yes	MWB-EC-DSR6-ACR-WL2
	Yes		MWB-EC-DSR6-B-ACR-WL2
DS7□R DRR7□R	No	No	MWB-EC-DSR7-ACR
	Yes		MWB-EC-DSR7-B-ACR
	No	Yes	MWB-EC-DSR7-ACR-WL2
	Yes		MWB-EC-DSR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS6□R DRR6□R	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
DS7□R	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
DRR7□R	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
DS6□R DRR6□R	EWB-EC-DSR6
DS7□R DRR7□R	EWB-EC-DSR7

④ Coupling spacer

Type	Model
DS6□R DRR6□R	CPG-EC-SR6
DS7□R DRR7□R	CPG-EC-SR7

⑤ Stainless steel sheet

Type	Model
DS6□R	ST-EC-S6-○○○
DS7□R	ST-EC-S7-○○○

*○○○ indicates the stroke

⑥ Timing belt

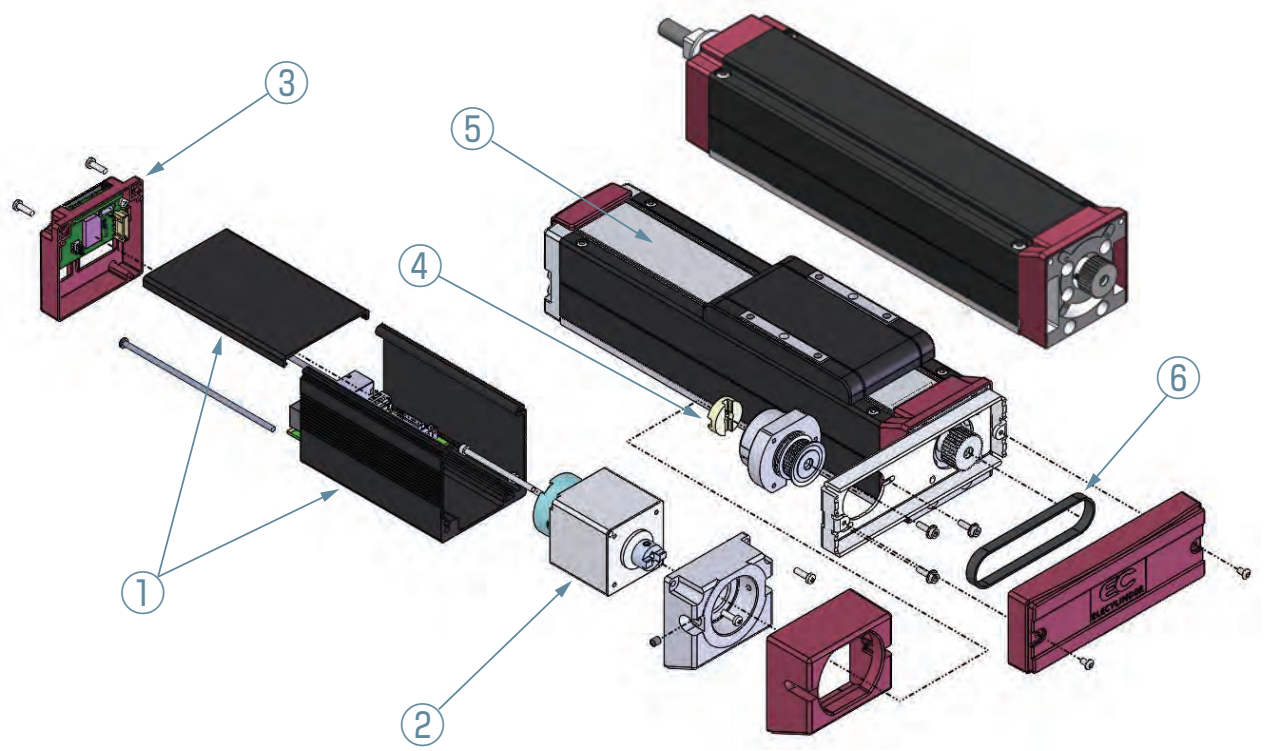
Type	Model
DS6□R DRR6□R	TB-EC-SRR6R
DS7□R DRR7□R	TB-EC-SRR7R

⑦ Digital speed controller

Type	Model
DS6□R/DRR6□R/ DS7□R/DRR7□R	DSC-01

EC maintenance part schematics

S6□AHR/RR6□AHR type
S7□AHR/RR7□AHR type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet
⑥ Timing belt

EC maintenance part model list

S6□AHR/RR6□AHR type
S7□AHR/RR7□AHR type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□AHR RR6□AHR	No	NPN	MWB-ECH-SRR6
		PNP	MWB-ECH-SRR6-P
	Yes	NPN	MWB-ECH-SRR6-B
		PNP	MWB-ECH-SRR6-B-P
S7□AHR RR7□AHR	No	NPN	MWB-ECH-SRR7
		PNP	MWB-ECH-SRR7-P
	Yes	NPN	MWB-ECH-SRR7-B
		PNP	MWB-ECH-SRR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□AHR RR6□AHR	No	NPN	MWB-ECH-SRR6-WL2
		PNP	MWB-ECH-SRR6-P-WL2
	Yes	NPN	MWB-ECH-SRR6-B-WL2
		PNP	MWB-ECH-SRR6-B-P-WL2
S7□AHR RR7□AHR	No	NPN	MWB-ECH-SRR7-WL2
		PNP	MWB-ECH-SRR7-P-WL2
	Yes	NPN	MWB-ECH-SRR7-B-WL2
		PNP	MWB-ECH-SRR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
S6□AHR RR6□AHR	No	NPN	MWB-ECH-SRR6-TMD2
		PNP	MWB-ECH-SRR6-P-TMD2
	Yes	NPN	MWB-ECH-SRR6-B-TMD2
		PNP	MWB-ECH-SRR6-B-P-TMD2
S7□AHR RR7□AHR	No	NPN	MWB-ECH-SRR7-TMD2
		PNP	MWB-ECH-SRR7-P-TMD2
	Yes	NPN	MWB-ECH-SRR7-B-TMD2
		PNP	MWB-ECH-SRR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
S6□AHR RR6□AHR	No	NPN	MWB-ECH-SRR6-TMD2-WL2
		PNP	MWB-ECH-SRR6-P-TMD2-WL2
	Yes	NPN	MWB-ECH-SRR6-B-TMD2-WL2
		PNP	MWB-ECH-SRR6-B-P-TMD2-WL2
S7□AHR RR7□AHR	No	NPN	MWB-ECH-SRR7-TMD2-WL2
		PNP	MWB-ECH-SRR7-P-TMD2-WL2
	Yes	NPN	MWB-ECH-SRR7-B-TMD2-WL2
		PNP	MWB-ECH-SRR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
S6□AHR RR6□AHR	No	No	MWB-ECH-SRR6-ACR
	Yes		MWB-ECH-SRR6-B-ACR
	No	Yes	MWB-ECH-SRR6-ACR-WL2
	Yes		MWB-ECH-SRR6-B-ACR-WL2
S7□AHR RR7□AHR	No	No	MWB-ECH-SRR7-ACR
	Yes		MWB-ECH-SRR7-B-ACR
	No	Yes	MWB-ECH-SRR7-ACR-WL2
	Yes		MWB-ECH-SRR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
S6□AHR RR6□AHR	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
S7□AHR	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
RR7□AHR	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
S6□AHR RR6□AHR	EWB-ECH-SRR6
S7□AHR RR7□AHR	EWB-ECH-SRR7

④ Coupling spacer

Type	Model
S6□AHR RR6□AHR	CPG-EC-SR6
S7□AHR RR7□AHR	CPG-EC-SR7

⑤ Stainless steel sheet

Type	Model
S6□AHR	ST-ECH-S6-○○○
S7□AHR	ST-ECH-S7-○○○

*○○○ indicates the stroke

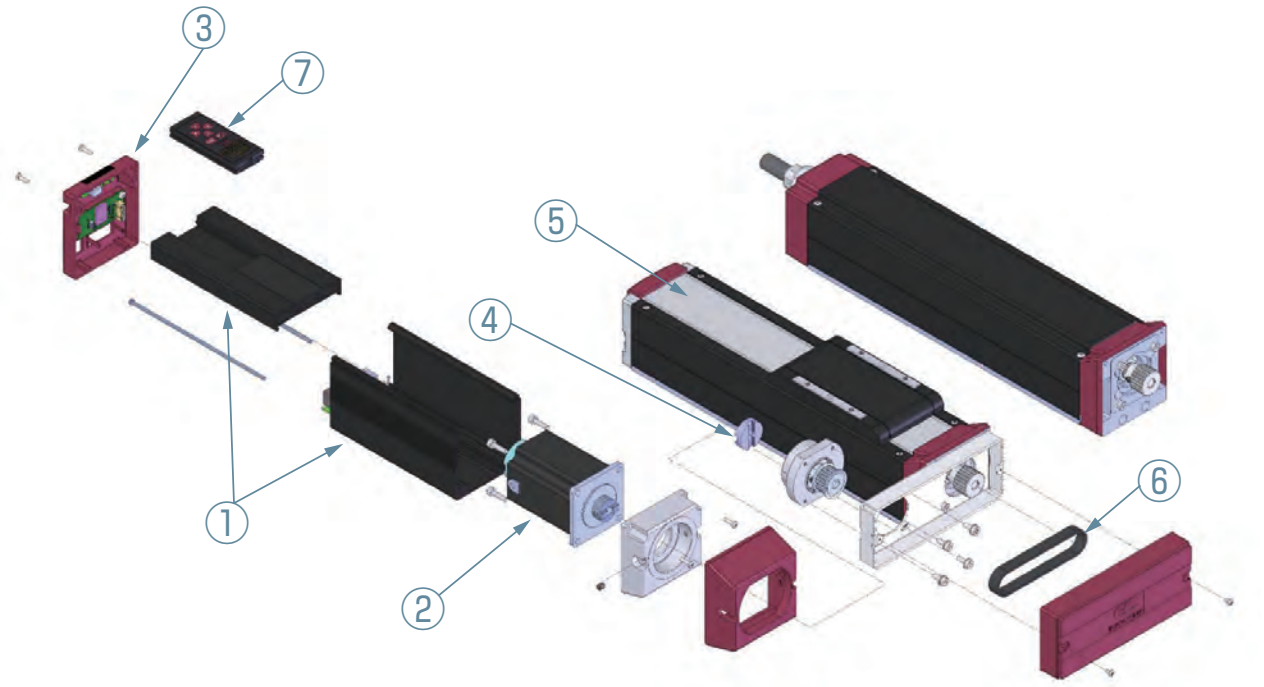
⑥ Timing belt

Type	Model
S6□AHR RR6□AHR	TB-EC-SRR6R
S7□AHR RR7□AHR	TB-EC-SRR7R

EC maintenance part schematics

[With digital speed controller]

DS6□AHR/DRR6□AHR/ DS7□AHR/DRR7□AHR type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Coupling spacer
⑤ Stainless steel sheet
⑥ Timing belt
⑦ Digital speed controller

EC maintenance part model list

[With digital speed controller]

DS6□AHR/DRR6□AHR/ DS7□AHR/DRR7□AHR type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□AHR DRR6□AHR	No	NPN	MWB-ECH-DSRR6
		PNP	MWB-ECH-DSRR6-P
	Yes	NPN	MWB-ECH-DSRR6-B
		PNP	MWB-ECH-DSRR6-B-P
DS7□AHR DRR7□AHR	No	NPN	MWB-ECH-DSRR7
		PNP	MWB-ECH-DSRR7-P
	Yes	NPN	MWB-ECH-DSRR7-B
		PNP	MWB-ECH-DSRR7-B-P

① -2 Motor cover assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□AHR DRR6□AHR	No	NPN	MWB-ECH-DSRR6-WL2
		PNP	MWB-ECH-DSRR6-P-WL2
	Yes	NPN	MWB-ECH-DSRR6-B-WL2
		PNP	MWB-ECH-DSRR6-B-P-WL2
DS7□AHR DRR7□AHR	No	NPN	MWB-ECH-DSRR7-WL2
		PNP	MWB-ECH-DSRR7-P-WL2
	Yes	NPN	MWB-ECH-DSRR7-B-WL2
		PNP	MWB-ECH-DSRR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
DS6□AHR DRR6□AHR	No	NPN	MWB-ECH-DSRR6-TMD2
		PNP	MWB-ECH-DSRR6-P-TMD2
	Yes	NPN	MWB-ECH-DSRR6-B-TMD2
		PNP	MWB-ECH-DSRR6-B-P-TMD2
DS7□AHR DRR7□AHR	No	NPN	MWB-ECH-DSRR7-TMD2
		PNP	MWB-ECH-DSRR7-P-TMD2
	Yes	NPN	MWB-ECH-DSRR7-B-TMD2
		PNP	MWB-ECH-DSRR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
DS6□AHR DRR6□AHR	No	NPN	MWB-ECH-DSRR6-TMD2-WL2
		PNP	MWB-ECH-DSRR6-P-TMD2-WL2
	Yes	NPN	MWB-ECH-DSRR6-B-TMD2-WL2
		PNP	MWB-ECH-DSRR6-B-P-TMD2-WL2
DS7□AHR DRR7□AHR	No	NPN	MWB-ECH-DSRR7-TMD2-WL2
		PNP	MWB-ECH-DSRR7-P-TMD2-WL2
	Yes	NPN	MWB-ECH-DSRR7-B-TMD2-WL2
		PNP	MWB-ECH-DSRR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
DS6□AHR DRR6□AHR	No	No	MWB-ECH-DSRR6-ACR
	Yes		MWB-ECH-DSRR6-B-ACR
	No	Yes	MWB-ECH-DSRR6-ACR-WL2
	Yes		MWB-ECH-DSRR6-B-ACR-WL2
DS7□AHR DRR7□AHR	No	No	MWB-ECH-DSRR7-ACR
	Yes		MWB-ECH-DSRR7-B-ACR
	No	Yes	MWB-ECH-DSRR7-ACR-WL2
	Yes		MWB-ECH-DSRR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
DS6□AHR DRR6□AHR	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
DS7□AHR	Incremental	No	EC-MUS7
		Yes	EC-MUS7-B
	Battery-less absolute	No	EC-MUS7-WA
		Yes	EC-MUS7-WA-B
DRR7□AHR	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
DS6□AH/DRR6□AH	EWB-ECH-SRR6
DS7□AH/DRR7□AH	EWB-ECH-SRR7

④ Coupling spacer

Type	Model
DS6□AHR/DRR6□AHR	CPG-EC-SR6
DS7□AHR/DRR7□AHR	CPG-EC-SR7

⑤ Stainless steel sheet

Type	Model
DS6□AHR	ST-ECH-S6-○○○
DS7□AHR	ST-ECH-S7-○○○

*○○○ indicates the stroke

⑥ Timing belt

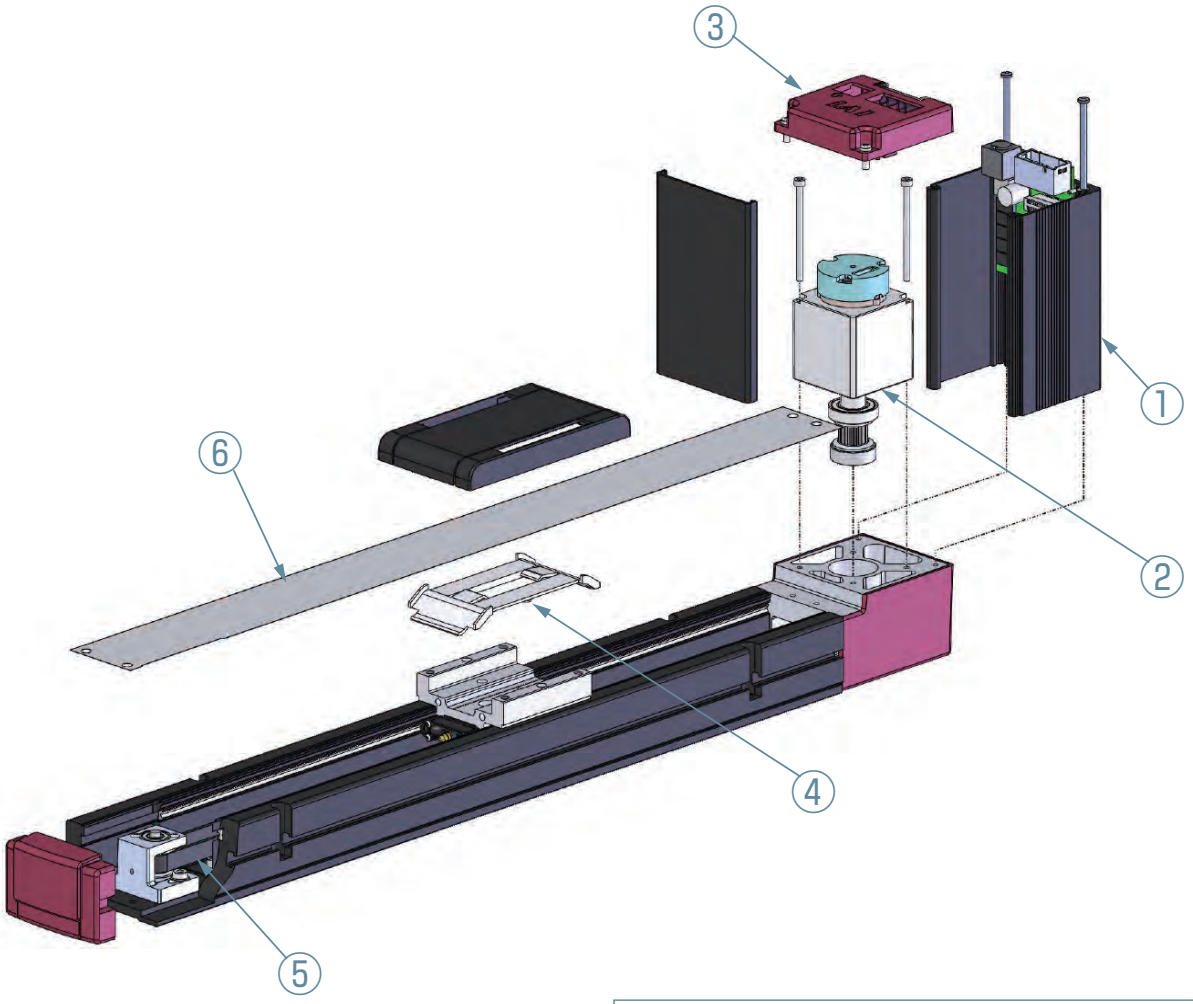
Type	Model
DS6□AHR/DRR6□AHR	TB-EC-SRR6R
DS7□AHR/DRR7□AHR	TB-EC-SRR7R

⑦ Digital speed controller

Type	Model
DS6□AHR/DS7□AHR/ DRR6□AHR/DRR7□AHR	DSC-01

EC maintenance part schematics

B6/B7 type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Sheet slider
⑤ Slider belt/drive belt
⑥ Stainless steel sheet

EC maintenance part model list

B6/B7 type

① -1 Motor cover assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
B6	No	NPN	MWB-EC-SR6
		PNP	MWB-EC-SR6-P
	Yes	NPN	MWB-EC-SR6-B
		PNP	MWB-EC-SR6-B-P
B7	No	NPN	MWB-EC-SR7
		PNP	MWB-EC-SR7-P
	Yes	NPN	MWB-EC-SR7-B
		PNP	MWB-EC-SR7-B-P

① -2 Motor cover assembly (controller circuit board) *Same for WL specification Wireless axis operation specification

Type	Brake	I/O	Model
B6	No	NPN	MWB-EC-SR6-WL2
		PNP	MWB-EC-SR6-P-WL2
	Yes	NPN	MWB-EC-SR6-B-WL2
		PNP	MWB-EC-SR6-B-P-WL2
B7	No	NPN	MWB-EC-SR7-WL2
		PNP	MWB-EC-SR7-P-WL2
	Yes	NPN	MWB-EC-SR7-B-WL2
		PNP	MWB-EC-SR7-B-P-WL2

① -3 Split motor and controller power supply specification assembly (controller circuit board) *Same for WL specification

Type	Brake	I/O	Model
B6	No	NPN	MWB-EC-SR6-TMD2
		PNP	MWB-EC-SR6-P-TMD2
	Yes	NPN	MWB-EC-SR6-B-TMD2
		PNP	MWB-EC-SR6-B-P-TMD2
B7	No	NPN	MWB-EC-SR7-TMD2
		PNP	MWB-EC-SR7-P-TMD2
	Yes	NPN	MWB-EC-SR7-B-TMD2
		PNP	MWB-EC-SR7-B-P-TMD2

① -4 Split motor and controller power supply specification assembly (controller circuit board) Wireless axis operation specification WL2

Type	Brake	I/O	Model
B6	No	NPN	MWB-EC-SR6-TMD2-WL2
		PNP	MWB-EC-SR6-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR6-B-TMD2-WL2
		PNP	MWB-EC-SR6-B-P-TMD2-WL2
B7	No	NPN	MWB-EC-SR7-TMD2-WL2
		PNP	MWB-EC-SR7-P-TMD2-WL2
	Yes	NPN	MWB-EC-SR7-B-TMD2-WL2
		PNP	MWB-EC-SR7-B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly (controller circuit board) RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
B6	No	No	MWB-EC-SR6-ACR
	Yes		MWB-EC-SR6-B-ACR
	No	Yes	MWB-EC-SR6-ACR-WL2
	Yes		MWB-EC-SR6-B-ACR-WL2
B7	No	No	MWB-EC-SR7-ACR
	Yes		MWB-EC-SR7-B-ACR
	No	Yes	MWB-EC-SR7-ACR-WL2
	Yes		MWB-EC-SR7-B-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
B6	Incremental	No	EC-MUB6
		Yes	EC-MUB6-B
	Battery-less absolute	No	EC-MUB6-WA
		Yes	EC-MUB6-WA-B
B7	Incremental	No	EC-MUB7
		Yes	EC-MUB7-B
	Battery-less absolute	No	EC-MUB7-WA
		Yes	EC-MUB7-WA-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
B6	EWB-EC-SR6
B7	EWB-EC-SR7

④ Sheet slider

Type	Model
B6	SHS-EC-B6
B7	SHS-EC-B7

⑤ Slider belt/drive belt

Type	Model
B6	LB-EC-B6-○○○
B7	LB-EC-B7-○○○

*○○○ indicates the stroke

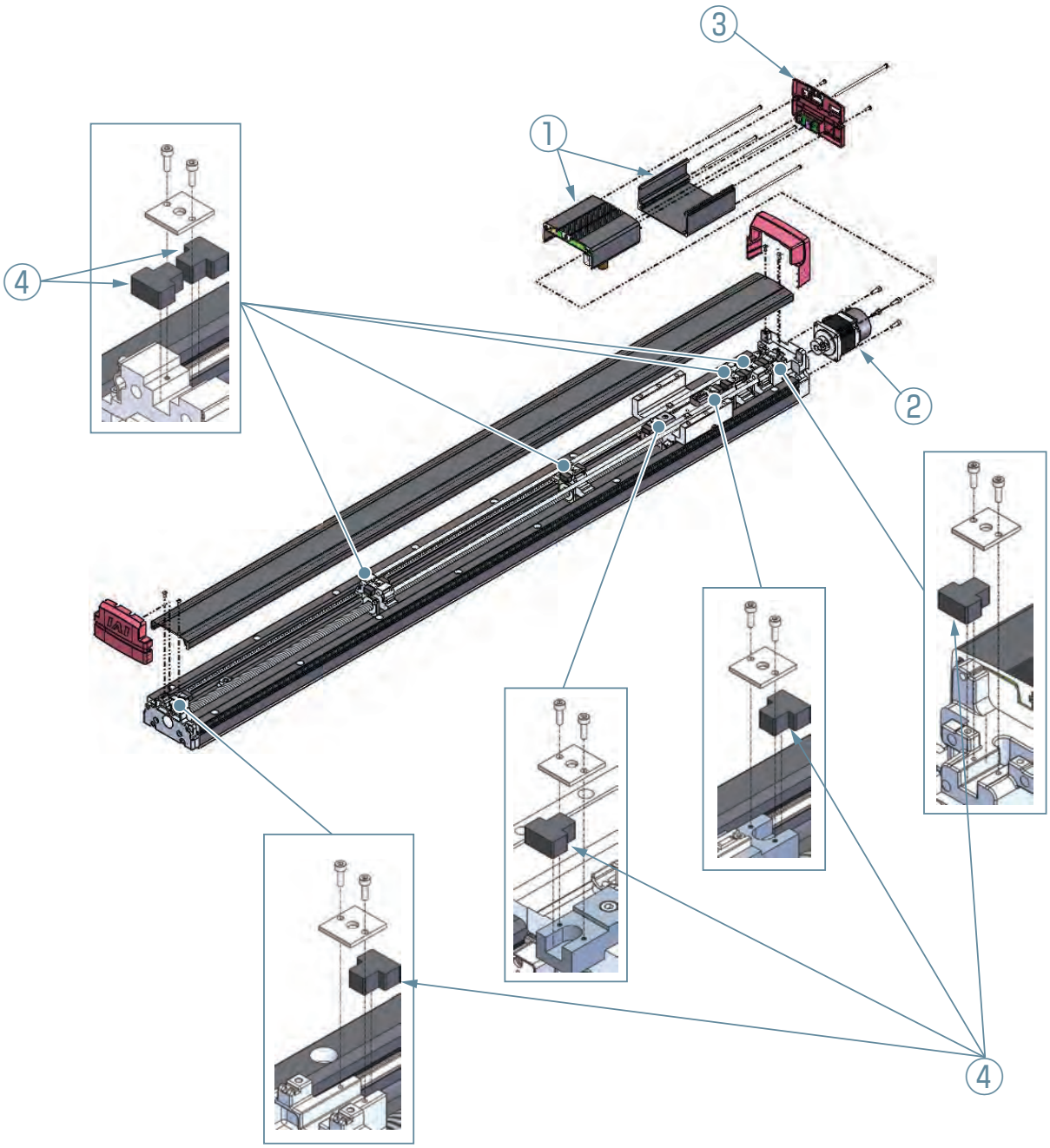
⑥ Stainless steel sheet

Type	Model
B6	ST-EC-B6-○○○
B7	ST-EC-B7-○○○

*○○○ indicates the stroke

EC maintenance part schematics

S13/S13X/S15/S15X type



① Motor cover assembly (including controller circuit board)
② Motor unit
③ End cover assembly (with wireless communication circuit board cable)
④ Intermediate support cushion

EC maintenance part model list

S13/S13X/S15/S15X type

① -1 Motor cover assembly *Same for WL specification

Type	Brake	I/O	Model
S13 S13X	No	NPN	MWB-EC-S13
		PNP	MWB-EC-S13-P
	Yes	NPN	MWB-EC-S13BS15
		PNP	MWB-EC-S13BS15-P
S15 S15X	No	NPN	MWB-EC-S13BS15
		PNP	MWB-EC-S13BS15-P
	Yes	NPN	MWB-EC-S15B
		PNP	MWB-EC-S15B-P

① -2 Motor cover assembly Wireless axis operation specification WL2

Type	Brake	I/O	Model
S13 S13X	No	NPN	MWB-EC-S13-WL2
		PNP	MWB-EC-S13-P-WL2
	Yes	NPN	MWB-EC-S13BS15-WL2
		PNP	MWB-EC-S13BS15-P-WL2
S15 S15X	No	NPN	MWB-EC-S13BS15-WL2
		PNP	MWB-EC-S13BS15-P-WL2
	Yes	NPN	MWB-EC-S15B-WL2
		PNP	MWB-EC-S15B-P-WL2

① -3 Split motor and controller power supply specification assembly *Same for WL specification

Type	Brake	I/O	Model
S13 S13X	No	NPN	MWB-EC-S13-TMD2
		PNP	MWB-EC-S13-P-TMD2
	Yes	NPN	MWB-EC-S13BS15-TMD2
		PNP	MWB-EC-S13BS15-P-TMD2
S15 S15X	No	NPN	MWB-EC-S13BS15-TMD2
		PNP	MWB-EC-S13BS15-P-TMD2
	Yes	NPN	MWB-EC-S15B-TMD2
		PNP	MWB-EC-S15B-P-TMD2

① -4 Split motor and controller power supply specification assembly Wireless axis operation specification WL2

Type	Brake	I/O	Model
S13 S13X	No	NPN	MWB-EC-S13-TMD2-WL2
		PNP	MWB-EC-S13-P-TMD2-WL2
	Yes	NPN	MWB-EC-S13BS15-TMD2-WL2
		PNP	MWB-EC-S13BS15-P-TMD2-WL2
S15 S15X	No	NPN	MWB-EC-S13BS15-TMD2-WL2
		PNP	MWB-EC-S13BS15-P-TMD2-WL2
	Yes	NPN	MWB-EC-S15B-TMD2-WL2
		PNP	MWB-EC-S15B-P-TMD2-WL2

① -5 Split motor and controller power supply specification assembly RCON-EC connection specification (option model: ACR)

Type	Brake	WL2	Model
S13 S13X	No	No	MWB-EC-S13-ACR
	Yes		MWB-EC-S13BS15-ACR
	No	Yes	MWB-EC-S13-ACR-WL2
	Yes		MWB-EC-S13BS15-ACR-WL2
S15 S15X	No	No	MWB-EC-S13BS15-ACR
	Yes		MWB-EC-S15B-ACR
	No	Yes	MWB-EC-S13BS15-ACR-WL2
	Yes		MWB-EC-S15B-ACR-WL2

② Motor unit

Type	Brake	Model
S13 S13X	No	EC-MUS13
	Yes	EC-MUS13-B
S15 S15X	No	EC-MUS15
	Yes	EC-MUS15-B

③ End cover assembly (with wireless communication circuit board cable)

Type	Model
S13 S13X S15 S15X	EWB-EC-S13S15

④ Intermediate support cushion

Type	Model
S13X S15X	IMSC-EC-S13S15

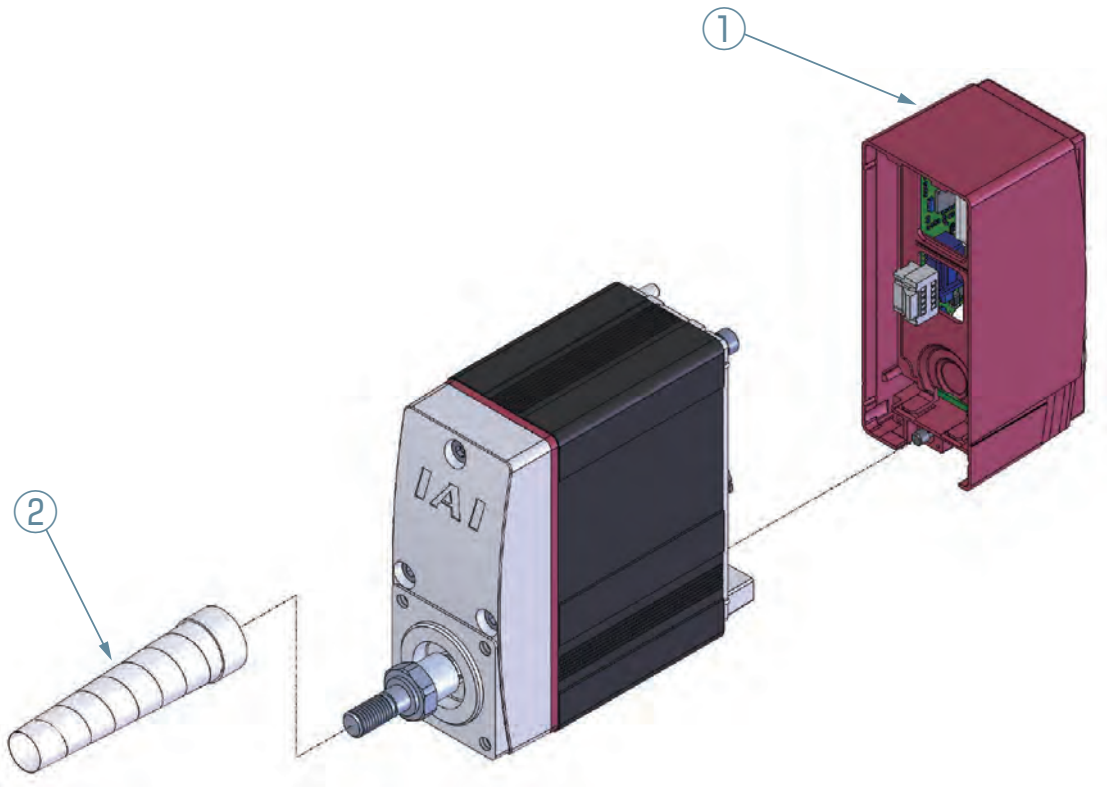
*Quantity used varies by type and stroke.
The model above is enough for one, so be sure to prepare the required quantity.

Intermediate support cushion quantity

Type	Stroke (mm)	Quantity
S13X	800 ~ 1000	8
	1050 ~ 2000	12
S15X	1000 ~ 1200	8
	1250 ~ 2500	12

EC maintenance part schematics

RP4/GS4/GD4/TC4/TW4 type



Pictured in diagram: RP4

① Controller cover assembly
(same for RP4/GS4/GD4/TC4/TW4)
② Spiral cover

EC maintenance part model list

RP4/GS4/GD4/TC4/TW4 type

① -1 Controller cover assembly

Type	I/O	Wireless	Model
RP4, GS4, GD4 TC4, TW4	NPN	No	CCA-EC-N
		WL	CCA-EC-NWL
		WL2	CCA-EC-NWL2
	PNP	No	CCA-EC-P
		WL	CCA-EC-PWL
		WL2	CCA-EC-PWL2

① -2 Split motor and controller power supply specification assembly

Type	I/O	Wireless	Model
RP4, GS4, GD4 TC4, TW4	NPN	No	CCA-EC-N-TMD2
		WL	CCA-EC-NWL-TMD2
		WL2	CCA-EC-NWL2-TMD2
	PNP	No	CCA-EC-P-TMD2
		WL	CCA-EC-PWL-TMD2
		WL2	CCA-EC-PWL2-TMD2

① -3 Split motor and controller power supply specification board RCON-EC connection specification (option model: ACR)

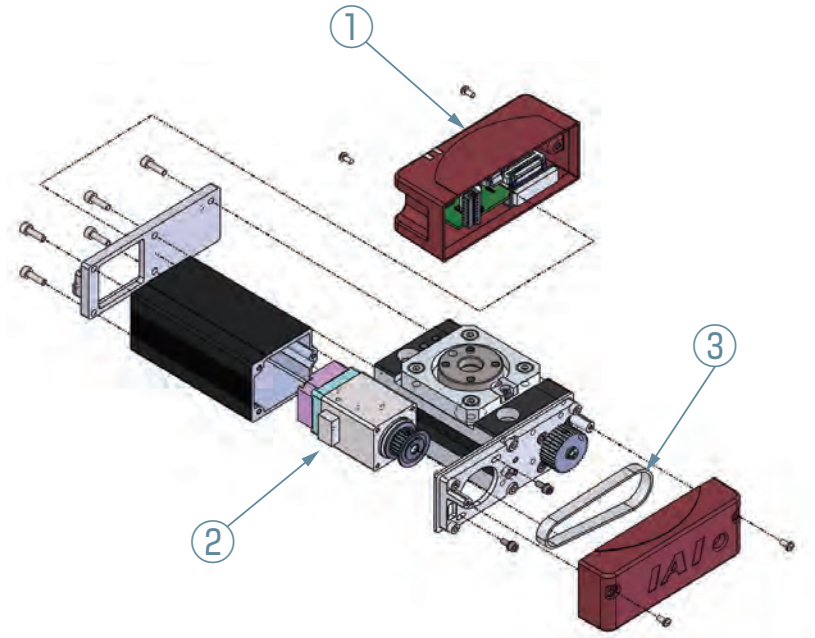
Type	I/O	Wireless	Model
RP4, GS4, GD4 TC4, TW4	NPN_REC	No	CCA-EC-N-ACR
		WL	CCA-EC-NWL-ACR
		WL2	CCA-EC-NWL2-ACR

② Spiral cover

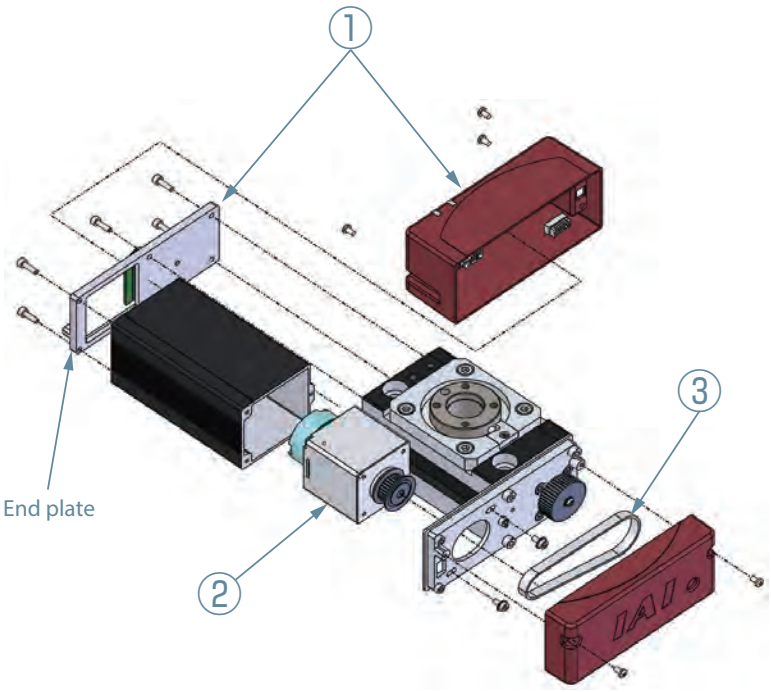
Type	Model
RP4, GS4, GD4 TC4, TW4	RCA2-SPC-50

EC maintenance part schematics

RTC9 type



RTC12 type



① Controller cover assembly
(RTC9: Controller cover / circuit board cable / circuit board heat dissipation plate / heat dissipation sheet)
(RTC12: Controller cover / circuit board cable / end plate)
② Motor unit
③ Timing belt

EC maintenance part model list

RTC9/RTC12 type

① -1 Controller cover assembly

*RTC9: Controller cover / circuit board cable / circuit board heat dissipation plate / heat dissipation sheet
RTC12: Controller cover / circuit board cable / end plate

Type	Wireless	I/O	Model
RTC9	No	NPN	CCA-EC-RTC9
		PNP	CCA-EC-RTC9-P
	WL	NPN	CCA-EC-RTC9-WL
		PNP	CCA-EC-RTC9-P-WL
	WL2	NPN	CCA-EC-RTC9-WL2
		PNP	CCA-EC-RTC9-P-WL2
RTC12	No	NPN	CCA-EC-RTC12
		PNP	CCA-EC-RTC12-P
	WL	NPN	CCA-EC-RTC12-WL
		PNP	CCA-EC-RTC12-P-WL
	WL2	NPN	CCA-EC-RTC12-WL2
		PNP	CCA-EC-RTC12-P-WL2

① -2 Split motor and controller power supply specification assembly

*RTC9: Controller cover / circuit board cable / circuit board heat dissipation plate / heat dissipation sheet
RTC12: Controller cover / circuit board cable / end plate

Type	Wireless	I/O	Model
RTC9	No	NPN	CCA-EC-RTC9-TMD2
		PNP	CCA-EC-RTC9-P-TMD2
	WL	NPN	CCA-EC-RTC9-TMD2-WL
		PNP	CCA-EC-RTC9-P-TMD2-WL
	WL2	NPN	CCA-EC-RTC9-TMD2-WL2
		PNP	CCA-EC-RTC9-P-TMD2-WL2
RTC12	No	NPN	CCA-EC-RTC12-TMD2
		PNP	CCA-EC-RTC12-P-TMD2
	WL	NPN	CCA-EC-RTC12-TMD2-WL
		PNP	CCA-EC-RTC12-P-TMD2-WL
	WL2	NPN	CCA-EC-RTC12-TMD2-WL2
		PNP	CCA-EC-RTC12-P-TMD2-WL2

① -3 Split motor and controller power supply specification assembly RCON-EC connection specification (option model: ACR)

Type	Wireless	I/O	Model
RTC9	No	NPN_REC	CCA-EC-RTC9-ACR
	WL		CCA-EC-RTC9-ACR-WL
	WL2		CCA-EC-RTC9-ACR-WL2
RTC12	No		CCA-EC-RTC12-ACR
	WL		CCA-EC-RTC12-ACR-WL
	WL2		CCA-EC-RTC12-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
RTC9	Incremental	No	EC-MURTC9
	Battery-less absolute	No	EC-MURTC9-WA
RTC12	Incremental	No	EC-MURTC12
	Battery-less absolute	No	EC-MURTC12-WA

*Please contact IAI if a motor unit with brake needs to be replaced.

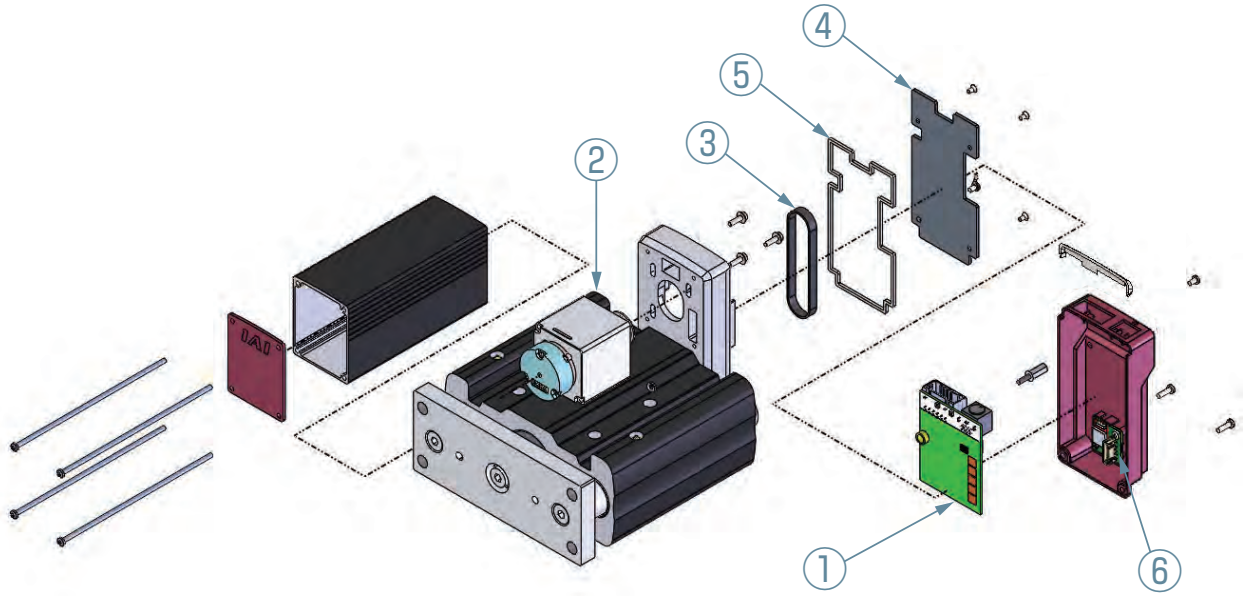
③ Timing belt

Type	Model
RTC9	TB-EC-RTC9
RTC12	TB-EC-RTC12

*Please contact IAI if a timing belt with brake needs to be replaced.

EC maintenance part schematics

ST15 type



① Controller board
② Motor unit
③ Timing belt
④ Side-mounted cover
⑤ Gasket
⑥ Controller cover (end cover assembly)

EC maintenance part model list

ST15 type

① -1 Controller board

Type	Wireless	I/O	Model
ST15	No	NPN	MB-EC-ST15
		PNP	MB-EC-ST15-P
	WL/WL2	NPN	MB-EC-ST15-WL2
		PNP	MB-EC-ST15-P-WL2

① -2 Split motor and controller power supply specification board

Type	Wireless	I/O	Model
ST15	No	NPN	MB-EC-ST15-TMD2
		PNP	MB-EC-ST15-P-TMD2
	WL/WL2	NPN	MB-EC-ST15-TMD2-WL2
		PNP	MB-EC-ST15-P-TMD2-WL2

① -3 Split motor and controller power supply specification board RCON-EC connection specification (option model: ACR)

Type	Wireless	I/O	Model
ST15	No	NPN_ REC	MB-EC-ST15-ACR
	WL/WL2		MB-EC-ST15-ACR-WL2

② Motor unit

Type	Encoder	Brake	Model
ST15	Incremental	No	EC-MUST15
		Yes	EC-MUST15-B
	Battery-less absolute	No	EC-MUST15-WA
		Yes	EC-MUST15-WA-B

③ Timing belt

Type	Model
ST15	TB-EC-ST15

④ Side-mounted cover

Type	Model
ST15	PT-EC-ST15

⑤ Gasket

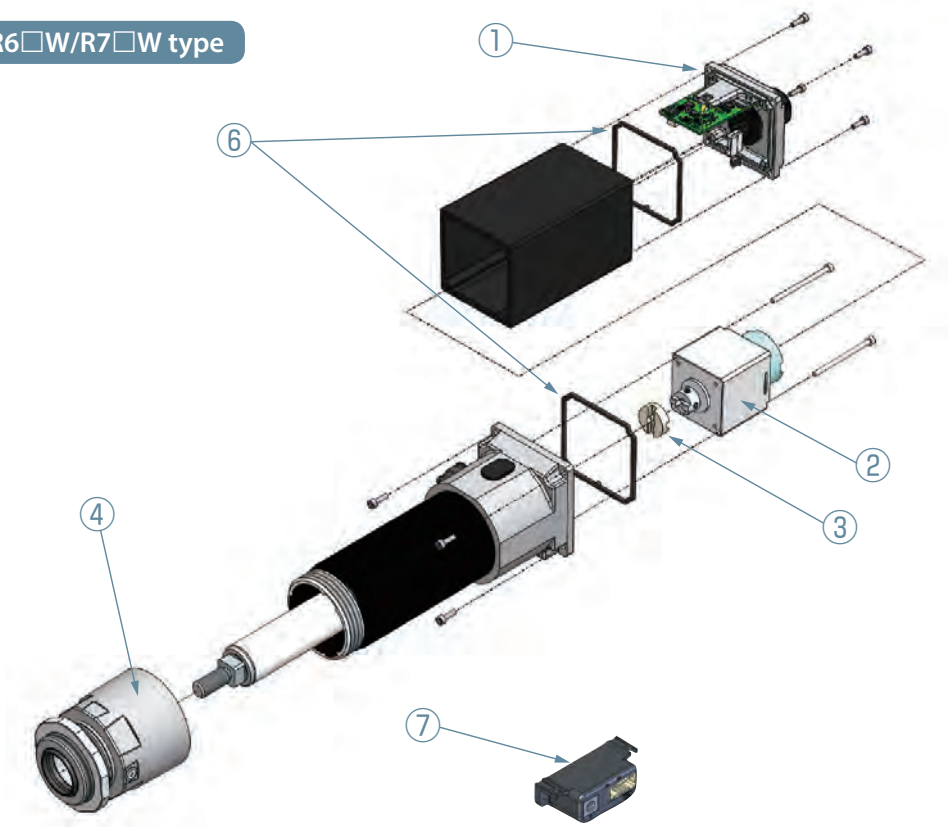
Type	Model
ST15	ECST-GK-ST15

⑥ Controller cover (end cover assembly)

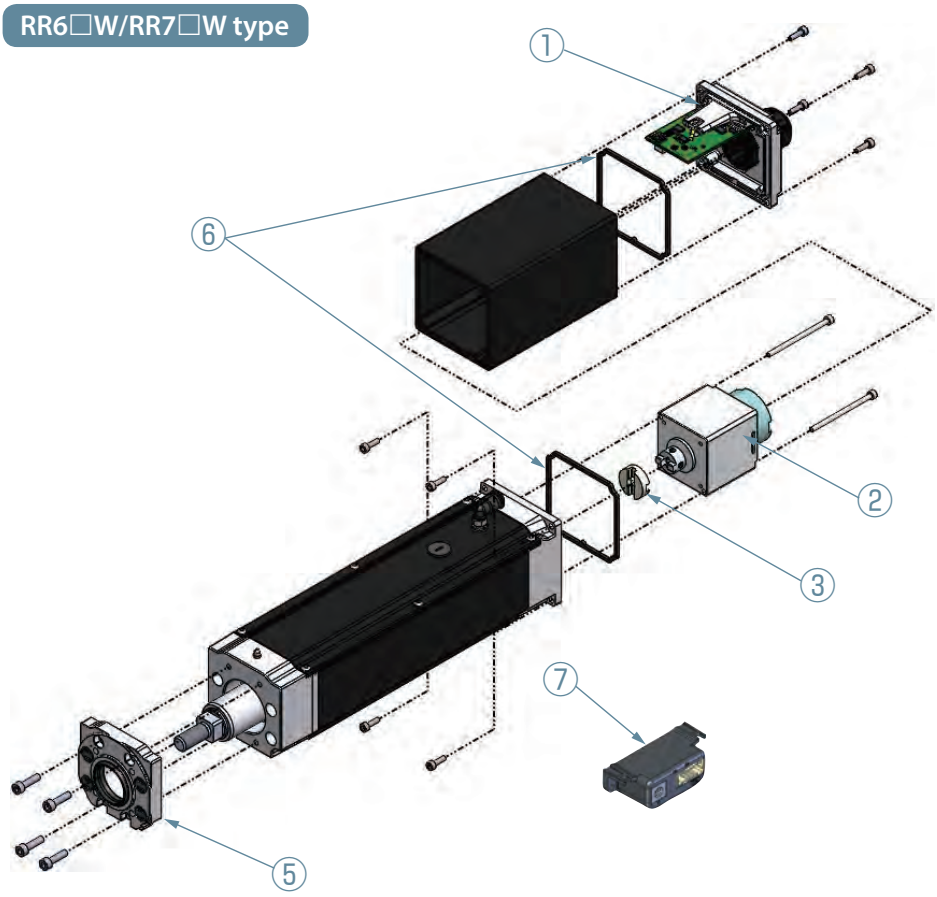
Type	Model
ST15	MWB-EC-ST15

EC maintenance part schematics

R6□W/R7□W type



RR6□W/RR7□W type



① End cover assembly
② Motor unit
③ Coupling spacer
④ Front bracket assembly
⑤ Scraper case assembly
⑥ Gasket (1 set of 2)
⑦ Interface box

EC maintenance part model list

R6□W/R7□W/ RR6□W/RR7□W type

① -1 End cover assembly

Type	Actuator cable length	Seal part	Model
R6□W RR6□W	Standard (2m)	Standard	EWB-ECW-R6
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-SLF
	5m (option: AC5)	Standard	EWB-ECW-R6-AC5
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-AC5-SLF
	Fluoro-rubber covered cable 2m, fluoro-rubber seal specification (option: ACF2)		EWB-ECW-R6-ACF2
	Fluoro-rubber covered cable 5m, fluoro-rubber seal specification (option: ACF5)		EWB-ECW-R6-ACF5
R7□W RR7□W	Standard (2m)	Standard	EWB-ECW-R7
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-SLF
	5m (option: AC5)	Standard	EWB-ECW-R7-AC5
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-AC5-SLF
	Fluoro-rubber covered cable 2m, fluoro-rubber seal specification (option: ACF2)		EWB-ECW-R7-ACF2
	Fluoro-rubber covered cable 5m, fluoro-rubber seal specification (option: ACF5)		EWB-ECW-R7-ACF5

① -2 End cover assembly Wireless axis operation specification WL2

Type	Actuator cable length	Seal part	Model
R6□W RR6□W	Standard (2m)	Standard	EWB-ECW-R6-WL2
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-SLF-WL2
	5m (option: AC5)	Standard	EWB-ECW-R6-AC5-WL2
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R6-AC5-SLF-WL2
	Fluoro-rubber covered cable 2m, fluoro-rubber seal specification (option: ACF2)		EWB-ECW-R6-ACF2-WL2
	Fluoro-rubber covered cable 5m, fluoro-rubber seal specification (option: ACF5)		EWB-ECW-R6-ACF5-WL2
R7□W RR7□W	Standard (2m)	Standard	EWB-ECW-R7-WL2
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-SLF-WL2
	5m (option: AC5)	Standard	EWB-ECW-R7-AC5-WL2
		Fluoro-rubber seal specification (option: SLF)	EWB-ECW-R7-AC5-SLF-WL2
	Fluoro-rubber covered cable 2m, fluoro-rubber seal specification (option: ACF2)		EWB-ECW-R7-ACF2-WL2
	Fluoro-rubber covered cable 5m, fluoro-rubber seal specification (option: ACF5)		EWB-ECW-R7-ACF5-WL2

① -3 Split motor and controller power supply specification end cover assembly

Type	Actuator cable length	Seal part	Model
R6□W	Standard (2m)	Standard	EWB-ECW-R6-TMD2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -1 above
	5m (option: AC5)	Standard	EWB-ECW-R6-AC5-TMD2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -1 above
R7□W	Standard (2m)	Standard	EWB-ECW-R7-TMD2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -1 above
	5m (option: AC5)	Standard	EWB-ECW-R7-AC5-TMD2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -1 above

*For fluoro-rubber covered cable and fluoro-rubber seal specification (ACF2/ACF5), same as ① -1 above
*For all RR6□W/RR7□W products, same as ① -1 above

① -4 Split motor and controller power supply specification end cover assembly Wireless axis operation specification WL2

Type	Actuator cable length	Seal part	Model
R6□W	Standard (2m)	Standard	EWB-ECW-R6-TMD2-WL2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -2 above
	5m (option: AC5)	Standard	EWB-ECW-R6-AC5-TMD2-WL2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -2 above
R7□W	Standard (2m)	Standard	EWB-ECW-R7-TMD2-WL2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -2 above
	5m (option: AC5)	Standard	EWB-ECW-R7-AC5-TMD2-WL2
		Fluoro-rubber seal specification (option: SLF)	Same as ① -2 above

*For fluoro-rubber covered cable and fluoro-rubber seal specification (ACF2/ACF5), same as ① -2 above
*For all RR6□W/RR7□W products, same as ① -2 above

② Motor unit

Type	Encoder	Brake	Model
R6□W RR6□W	Incremental	No	EC-MUSR6
		Yes	EC-MUSR6-B
	Battery-less absolute	No	EC-MUSR6-WA
		Yes	EC-MUSR6-WA-B
R7□W RR7□W	Incremental	No	EC-MUR7
		Yes	EC-MUR7-B
	Battery-less absolute	No	EC-MUR7-WA
		Yes	EC-MUR7-WA-B

③ Coupling spacer

Type	Model
R6□W/RR6□W	CPG-EC-SR6
R7□W/RR7□W	CPG-EC-SR7

④ Front bracket assembly

Type	Options	Model
R6□W	No	ECW-FBA-R6
	SLF, ACF2, ACF5	ECW-FBA-R6-SLF
R7□W	No	ECW-FBA-R7
	SLF, ACF2, ACF5	ECW-FBA-R7-SLF

⑤ Scraper case assembly

Type	Options	Model
RR6□W	No	ECW-FBA-RR6
	SLF, ACF2, ACF5	ECW-FBA-RR6-SLF
RR7□W	No	ECW-FBA-RR7
	SLF, ACF2, ACF5	ECW-FBA-RR7-SLF

⑥ Gasket

Type	Options	Model
R6□W RR6□W	No	ECW-GK-R6
	SLF, ACF2, ACF5	ECW-GK-R6-SLF
R7□W RR7□W	No	ECW-GK-R7
	SLF, ACF2, ACF5	ECW-GK-R7-SLF

⑦ -1 Interface box

Type	Wireless	I/O	Model
R6□W R7□W RR6□W RR7□W	No	NPN	ECW-CVN-CB
		PNP	ECW-CVP-CB
	WL/WL2	NPN	ECW-CVNWL-CB
		PNP	ECW-CVPWL-CB

⑦ -2 Split motor and controller power supply specification interface box

Type	Wireless	I/O	Model
R6□W R7□W RR6□W RR7□W	No	NPN	ECW-CVN-CB-TMD2
		PNP	ECW-CVP-CB-TMD2
	WL/WL2	NPN	ECW-CVNWL-CB-TMD2
		PNP	ECW-CVPWL-CB-TMD2

⑦ -3 RCON-EC connection specification (option model: ACR) split motor and controller power supply specification interface box

Type	Wireless	I/O	Model (tentative)
R6□W R7□W RR6□W RR7□W	No	NPN_ REC	ECW-CVN-CB-ACR
	WL/WL2		ECW-CVNWL-CB-ACR

Reference Data/Other

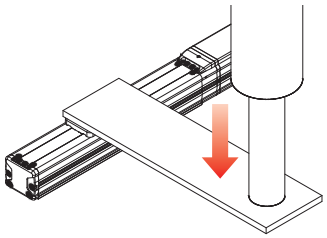
Allowable moment

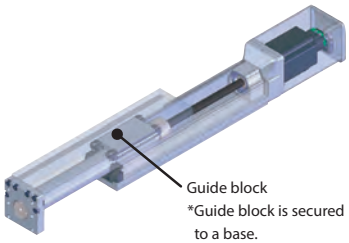
The allowable moment of a single-axis actuator indicates the load capability of the built-in linear guide. There are two types of allowable moment: static allowable moment and dynamic allowable moment (explained below).

Static allowable moment

The static allowable moment is an indicator for damage. It is the maximum moment that can be applied to a single-axis actuator at rest.
This indicator is calculated based on the condition under which indentations are left on the orbital surface of the built-in linear guide (that is, the basic static load rating) and the strength of the parts used. When a moment exceeding this indicator is applied, it could cause a malfunction or damage.
The static allowable moment used by IAI takes the strength of parts into consideration, and cannot be directly compared with a moment calculated solely from the basic static load rating (that is, the static moment rating). The strength of parts has been verified through analysis and testing, and IAI products can be safely used as long as they are used within allowable values. However, products must not be subject to excessive vibration or shock.

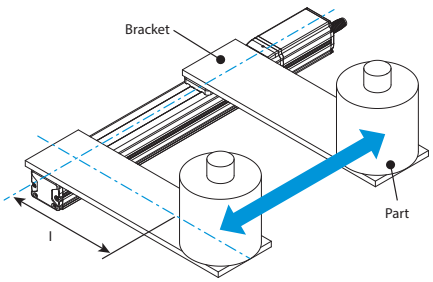
(Notes on table type actuators)
The static allowable moment for table type actuators is the allowable value for the linear guide on the top surface of the surface and directly above the guide block. Here, directly above the guide block means directly above the allowable moment offset reference position. Please refer to the applicable product page for information on the offset reference position.
If the point of action of a moment load is far away, it could result in excessive deflection, twisting, or damage to the table.





Dynamic allowable moment

The dynamic allowable moment is an indicator for operation life. It indicates the moment at which the operation life of a single-axis actuator is the same as the standard rated operation life. IAI sets the standard rated operation life of ELECYLINDER® at 5,000km (10,000km for EC-S13/S13X and S15/S15X).
This indicator is calculated based on the condition under which spalling occurs due to fatigue in the orbital surface of the built-in linear guide (that is, the basic dynamic load rating). If a moment exceeding this indicator is applied, it could cause operation life to drop below the standard value.
The dynamic allowable moment used by IAI takes the effect of operating conditions on operation life into consideration (that is, the standard load coefficient), and cannot be directly compared with a moment calculated solely from the basic dynamic load rating (that is, the dynamic moment rating). A simple formula can be used to calculate operation life for use in a standard usage environment.
A moment is applied on a single-axis actuator in three directions (Ma [pitching], Mb, [yawing], and Mc [rolling]), so the allowable moment is calculated for each direction.

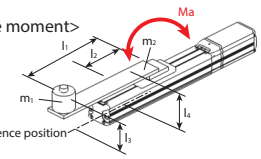


Applied moment M = m × l

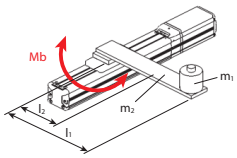
m: Load mass (mass including part and bracket)

l: Load length (length to center of gravity including part and bracket)

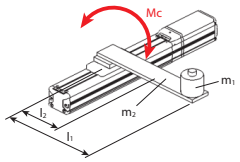
<How to calculate moment>



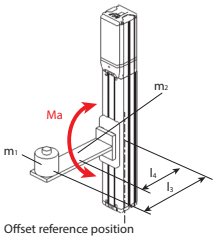
$Ma = (m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000) + a\{(m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000)\}$



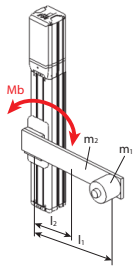
$Mb = a\{(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)\}$



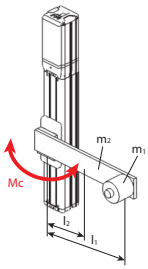
$Mc = (m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)$



$Ma = (m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000) + a\{(m_1 \times 9.8 \times l_3/1000) + (m_2 \times 9.8 \times l_4/1000)\}$



$Mb = (m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000) + a\{(m_1 \times 9.8 \times l_1/1000) + (m_2 \times 9.8 \times l_2/1000)\}$



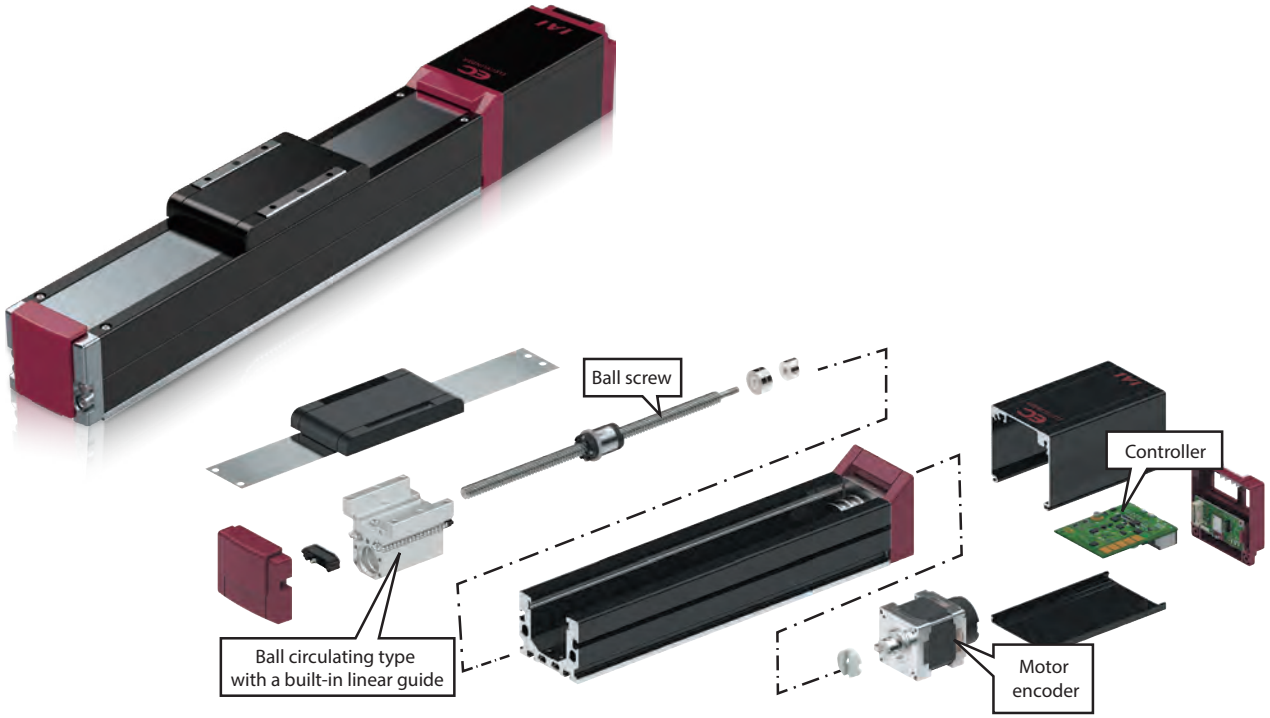
a = From 0

Mc = 0

a : Acceleration (G)
m_1: Part weight (kg)
m_2: Bracket weight (kg)
l_1: Distance from slider center to center of gravity of part (mm)
l_2: Distance from slider center to center of gravity of bracket (mm)
l_3: Distance from offset reference position to center of gravity of part (mm)
l_4: Distance from offset reference position to center of gravity of bracket (mm)

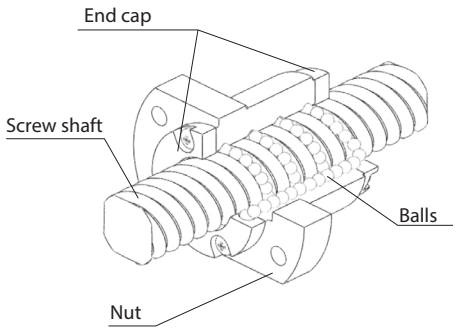
ELECYLINDER® structure/operating principles

ELECYLINDER® products are generally structured as shown below.
When the motor turns, the ball screw turns and the slider moves.
The encoder detects the amount of movement and speed,
and controls the rotation of the motor (ball screw) in order to perform positioning.



■ Ball screws

As shown below, in a ball screw the screw and slider make contact with balls,
allowing for rotation with little friction resistance (as in a bearing).



Ball screw accuracy

ELECYLINDER® ball screws have a lead accuracy of JIS Standard Grade C10 (JIS B 1192).
C10 accuracy means a representative movement amount error of ±210μm for 300mm.
We also offer single-axis robots and ROBO Cylinder Series products with an accuracy equivalent to Grade C5

Operation life

The operation life of a linear guide indicates the total distance that can be traveled by a group of products each under the same conditions, without flaking (spalling in the orbital surface) occurring in 90% of the products. Operation life can be calculated as follows.

Calculating operation life

The operation life of a linear guide can be calculated with the following formula using the dynamic allowable moment determined for the particular model.

$$L = \left(\frac{C_M}{M} \right)^3 \cdot URL$$

L: Operation life (km), C_M: Dynamic allowable moment (N·m),
M: Applied moment (N·m), URL: Standard rated operation life (km)

Use the following formula to calculate the operation life in applications where operation life would be reduced due to vibration and mounting status.

$$L = \left(\frac{C_M}{M} \cdot \frac{f_{WS}}{f_W} \cdot \frac{1}{f_\alpha} \right)^3 \cdot URL$$

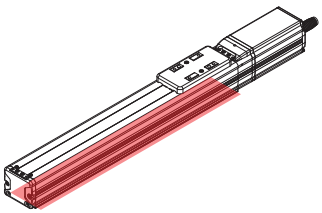
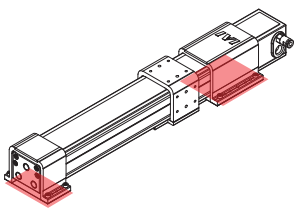
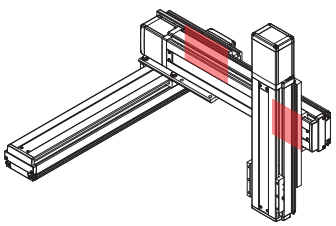
L: Operation life (km), C_M: Dynamic allowable moment (N·m), M: Applied moment (N·m),
f_{WS}: Standard load coefficient, f_W: Load coefficient, f_α: Mounting coefficients, URL: Standard rated operation life (km)

Load coefficient f_w is the coefficient used to factor in the decrease to operation life due to operating conditions. Standard load coefficient f_{ws} is the standard value of the load coefficient determined for the applicable model. This coefficient is generally set to 1.2. If not, the value will be indicated in the specifications for the applicable model. Mounting coefficient f_α is the coefficient used to factor in the decrease to operation life caused by the mounting status of ELECYLINDER®.

Load coefficients

Operating conditions	Load coefficient fw	Acceleration/deceleration guideline
Gentle operation with little vibration/shock	1.0 ~ 1.5	1.0G or less
Sudden braking/sudden acceleration with moderate vibration/shock	1.5 ~ 2.0	1.0G ~ 2.0G
Operation with sudden acceleration/deceleration and significant vibration/shock	2.0 ~ 3.0	2.0G or more

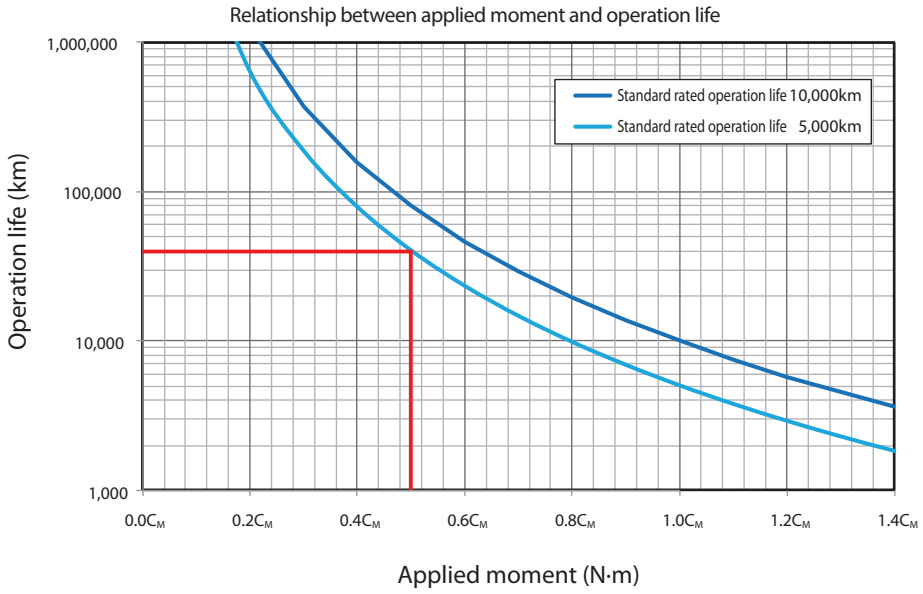
Mounting coefficients

Mounting status	 Entire surface secured	 Both ends secured	 Partially secured
Mounting coefficient f_α	1.0	1.2	1.5

***As a general rule, use all tapped mounting holes (counterbored holes) on mounting surfaces to secure products in place.**

***A mounting coefficient of 1.2 or 1.5 may be needed depending on the positions of fixing bolts, even if the entire length of the product is mounted.**

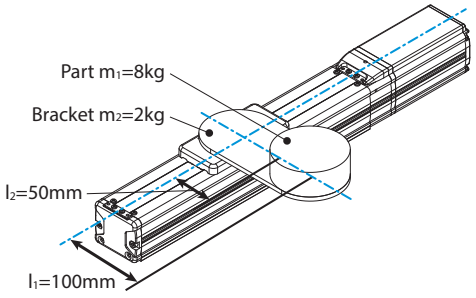
The previous formula shows that the operation life depends on the applied moment. Under a light load, the operation life would actually be longer than the standard rated operation life. For example, consider a model with a standard rated operation life of 5,000km. If a moment of 0.5CM (half the dynamic allowable moment) is applied to this model, its operation life would be 40,000km, which is 8 times the standard rated operation life (as shown below).



*f_{WS} = f_W & f_α = 1.0 (assumed), so C_M indicates the dynamic allowable moment

Example: Calculating operation life

In the following example, the operation life of a product is calculated using the following usage conditions.



Model	EC-S6M
Installation status	Horizontal mount
Mounting status	Entire surface secured
Acceleration/deceleration	0.5G

m_1: Part weight
m_2: Bracket weight
l_1: Length to part center of gravity
l_2: Length to bracket center of gravity

When a moment is applied to ELECYLINDER® the Mc direction is dominant, so the moment applied in the Mc direction will be used for calculation. The moment applied in the Mc direction is calculated as follows.

$$M=\left(m_1\times 9.8\times\frac{l_1}{1{,}000}\right)+\left(m_2\times 9.8\times\frac{l_2}{1{,}000}\right)=\left(8\times 9.8\times\frac{100}{1{,}000}\right)+\left(2\times 9.8\times\frac{50}{1{,}000}\right)=8.82\text{N·m}$$

Acceleration/deceleration is 0.5G, so a load coefficient of 1.25 is used. The entire surface is secured, so a mounting coefficient of 1.0 is used. For this model, the dynamic allowable moment in the Mc direction is 23N·m, the standard rated operation life is 5,000km, and the standard load coefficient is 1.2.

The operation life can therefore be calculated as follows.

$$L=\left(\frac{C_M}{M}\cdot\frac{f_{WS}}{f_W}\cdot\frac{1}{f_\alpha}\right)^3\cdot URL=\left(\frac{23\text{N·m}}{8.82\text{N·m}}\times\frac{1.2}{1.25}\times\frac{1}{1}\right)^3\times 5{,}000\text{km}=78{,}444\text{km}$$

The operation life is therefore 78,444km under the usage conditions described above.

Intermediate support mechanism (free support structure)

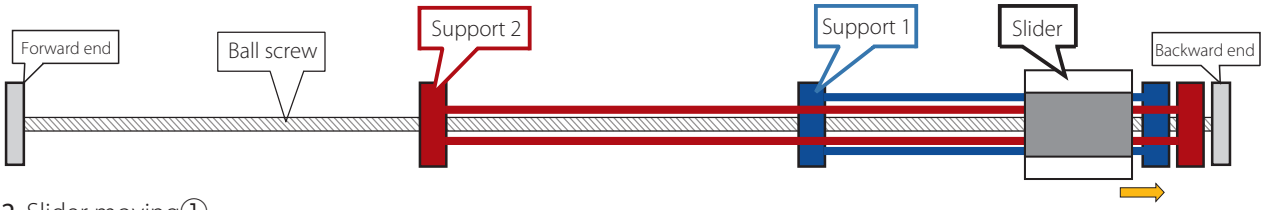
Adding an intermediate support mechanism (a ball screw support mechanism that moves along with the slider) can control ball screw runout even at a long stroke and greatly improve the maximum speed.

An intermediate support mechanism consists of a coupling rod passing through the slider and a number of support blocks.

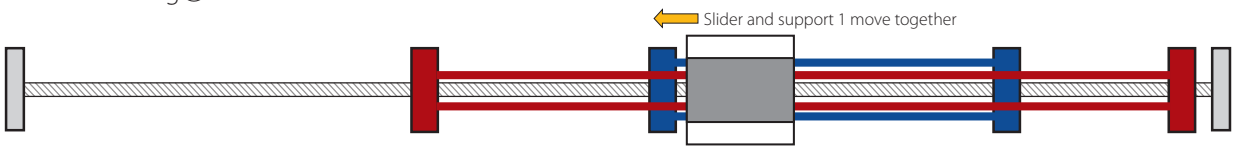
Models with an intermediate support
EC-S13X/S15X

Intermediate support mechanism **(free support structure)** operation (with two supports)

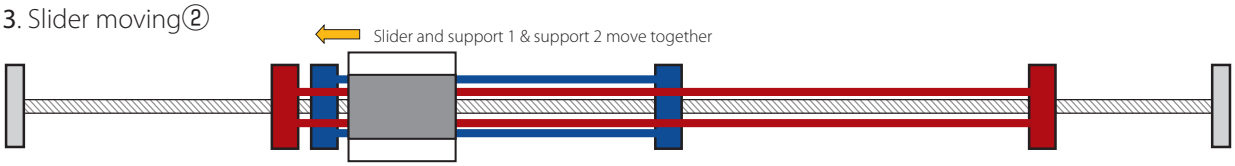
1. Slider backward end



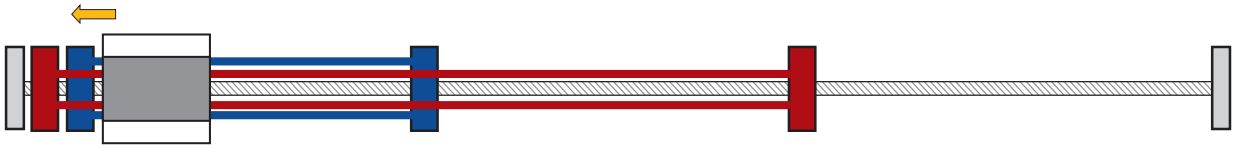
2. Slider moving①



3. Slider moving②



4. Slider forward end



Types of robot feedback control

Feedback control refers to checking whether a robot is operating as commanded, and then calibrating it if it is not.
There are several methods to accomplish this.
IAI ELECYLINDER® products use semi-closed loop control.
This method uses standard servo control. An encoder picks up the movement of the actuator and provides feedback.
Other types of control (open loop control and fully-closed loop control) offer the following features.

Open loop control

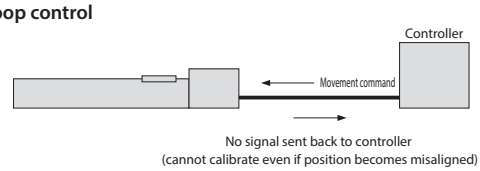
There is no encoder when a standard stepper motor is used, which results in a less expensive product. However, no feedback control is provided and calibration cannot be performed if operation falls out of synchronization with operation commands.

Fully-closed loop control

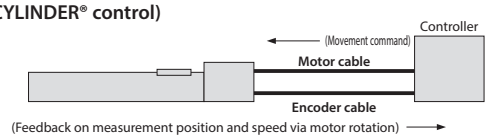
The absolute position of the slider is measured and feedback is provided, making it possible to accurately determine the position of the slider. Semi-closed loop control can result in an error within standards between the position information provided through encoder feedback and the actual actuator position, due to accuracy errors in the actuator.

Types of feedback

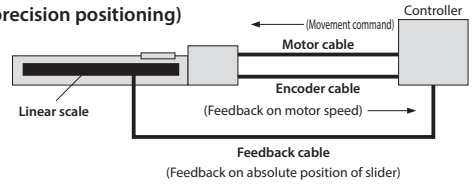
■ **Open loop control**



■ **Semi-closed loop control (ELECYLINDER® control)**



■ **Fully-closed loop control (high-precision positioning)**



Notes on use with rod type guides

There are two major types of rod type actuators: "radial cylinder type" and "rotation stop rod type."
There are considerations to keep in mind for each type when supporting radial loads or using them with external guides. These considerations are listed below.

"Radial cylinder type"

· Ball circulating type with a built-in linear guide structure built into body
No external guide and capable of handling a radial load
<Applicable models>
· EC-RR3/DRR3/RR3□R/DRR3□R
· EC-RR4/DRR4/RR4□R/DRR4□R
· EC-RR6/DRR6/RR6□R/DRR6□R/RR6□W
· EC-RR7/DRR7/RR7□R/DRR7□R/RR7□W
· EC-RR6□AH/DRR6□AH/RR6□AHR/DRR6□AHR
· EC-RR7□AH/DRR7□AH/RR7□AHR/DRR7□AHR

Radial load

Radial load less than allowable radial load
External guide not required!!

Radial load greater than allowable radial load
Use with external guide

"Rotation stop rod type"

· Rotation stop built into body
Use with external guide if radial load is applied
<Applicable models>
· EC-R6/DR6/R6□W · EC-RP4
· EC-R7/DR7/R7□W

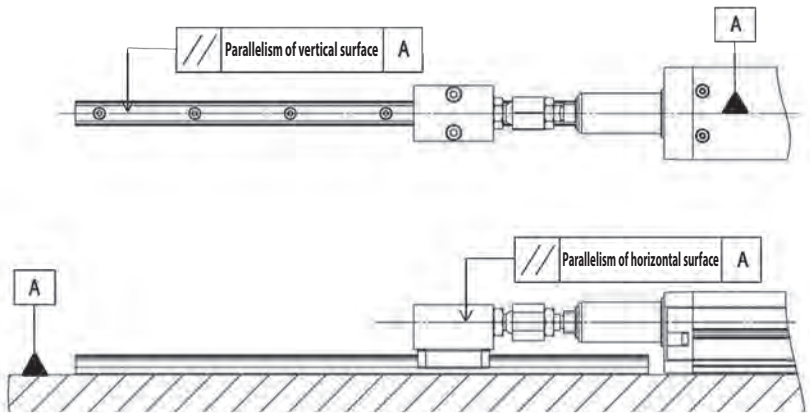
Radial load

Use with external guide

[Notes for using external guide with rod type actuator]

· Parallelism of actuator and external guide

When using an external guide, parallel misalignment (in the horizontal and vertical planes) between the actuator and the external guide could result in a malfunction, premature wear, or premature damage to the actuator. When mounting a guide, align the center of the actuator parallel to the guide. Following installation, make sure that the sliding resistance is constant over the entire stroke. Sliding resistance can be confirmed by checking that the value for current shown by the electrical current monitor function on the controller is at the specified value.



・**Method for securing to external guide**

The method used to secure the part to the external guide differs by type.

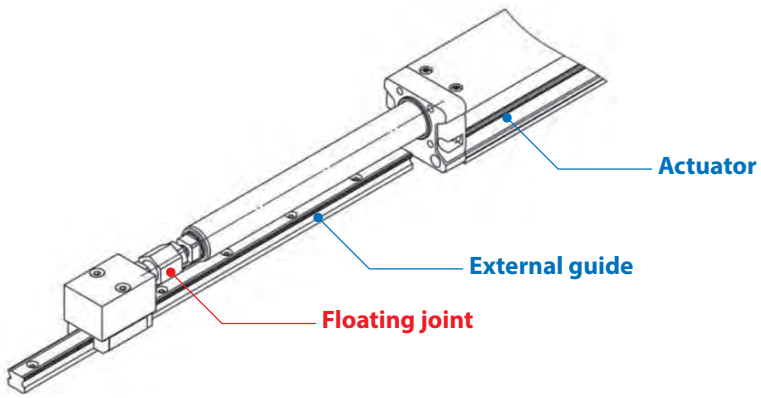
Securing the part incorrectly risks premature damage to the actuator, even if parallelism has been adjusted between the guide and the actuator.

"Radial cylinder type"

A "floating joint" is recommended to secure a radial cylinder type actuator to an external guide.

The floating joint absorbs parallel misalignment between the built-in guide and external guide, making adjustment easier.

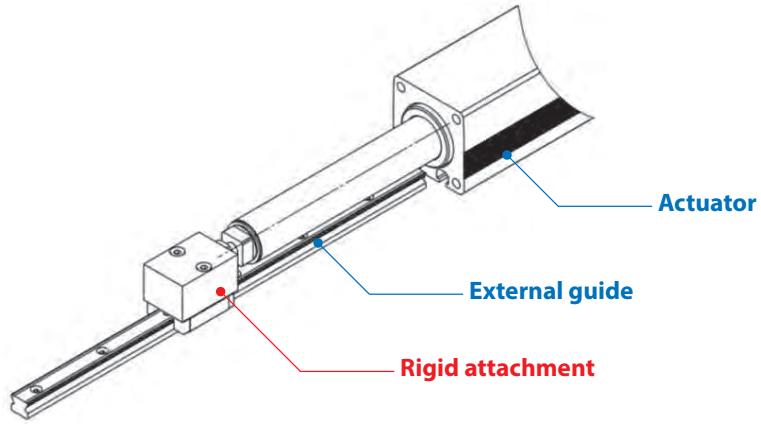
With "rigid attachment," it is difficult to adjust parallelism between the built-in guide and external guide. Even a slight deviation in parallelism applies load to the guide, which may cause premature damage.



"Rotation stop rod type"

"Rigid attachment" is recommended to secure a rotation stop rod type actuator to an external guide. Rotation stop rod type actuators cannot bear the rotational force of the rod, so the rotation direction of the rod must be restricted.

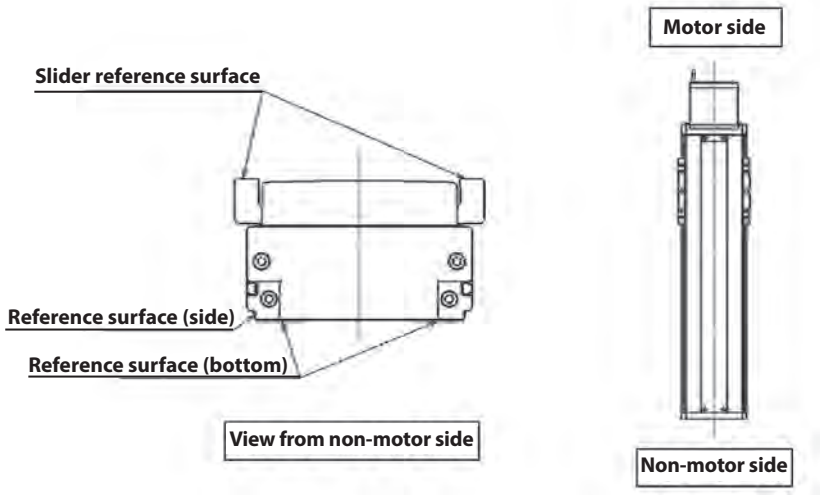
A "floating joint" does not restrict rotation of the rod and will create force on the rotation stop during operation. This could result in premature wear on the rotation stop (floating joints with rotation direction restrictions are acceptable).



Notes on use with slider type guides

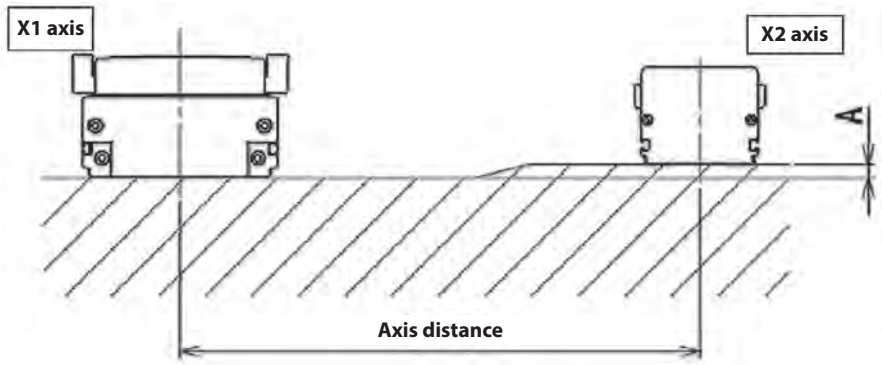
X-axis installation reference surface

Use the following reference surface when installing an actuator.



X1-axis and X2-axis installation surface height

Use a difference in installation height between the X1-axis and X2-axis (measurement A in the figure below) of "0.05mm or less" at a distance between axes of 500mm.

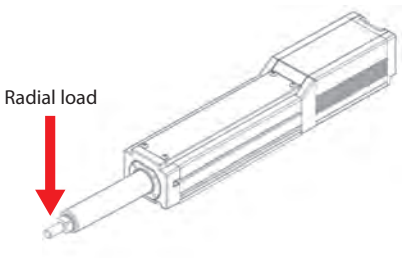


MEMO

Radial loads acting on rods

Radial cylinders have a linear guide built into the body so that radial and moment loads can be applied to the rod. The allowable radial and moment loads must meet the following three conditions.

1. The radial load acting on the rod must not exceed the allowable value.

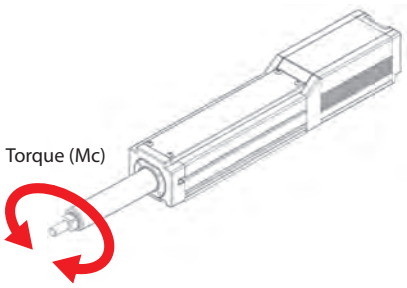


Type	Rod tip static allowable radial load	Rod tip dynamic allowable radial load (*1)
RR3/DRR3/RR3□R/DRR3□R RR4/DRR4/RR4□R/DRR4□R	40N	20N
RR6/DRR6/RR6□R/DRR6□R/ RR6□W	90N	45N
RR7/DRR7/RR7□R/DRR7□R/ RR7□W	120N	60N

Type	Rod tip static allowable radial load	Rod tip dynamic allowable radial load (*1)					
		Stroke (mm)					
		50 ~ 250	300	350	400	450	500
RR6□AH/DRR6□AH/RR6□AHR/ DRR6□AHR	190N	130N	40N	35N	25N	-	-
RR7□AH/DRR7□AH/RR7□AHR/ DRR7□AHR	250N	170N	50N	45N	40N	35N	30N

(*1) Value at a standard rated operation life of 5,000km.

2. The torque (Mc) acting on the rod must not exceed the allowable value.



Type	Rod tip static allowable torque	Rod tip dynamic allowable torque (*2)
RR3/DRR3/RR3□R/DRR3□R RR4/DRR4/RR4□R/DRR4□R	3.5N·m	3.5N·m
RR6/DRR6/RR6□R/DRR6□R/RR6□W	5.5N·m	5.5N·m
RR7/DRR7/RR7□R/DRR7□R/RR7□W	10.5N·m	10.5N·m
RR6□AH/DRR6□AH/RR6□AHR/DRR6□AHR	9N·m	5.5N·m
RR7□AH/DRR7□AH/RR7□AHR/DRR7□AHR	17.6N·m	10.5N·m

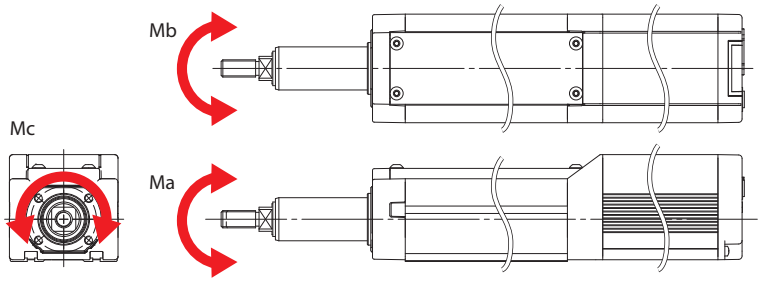
(*2) Value at a standard rated operation life of 5,000km.

3. The uniform load acting on the rod must not exceed the allowable value.
The uniform load is obtained by the following formula.
Uniform load = Ma · Ka + Mb · Kb + Mc · Kc

Type	Static allowable uniform load	Dynamic allowable uniform load (*3)	Load uniform coefficient Ka	Load uniform coefficient Kb	Load uniform coefficient Kc
RR3/DRR3/RR3□R/DRR3□R	1440N	580N	209/m	147/m	131/m
RR4/DRR4/RR4□R/DRR4□R	1720N	660N	181/m	127/m	93/m
RR6/DRR6/RR6□R/DRR6□R/RR6□W	4400N	1050N	124/m	87/m	62/m
RR7/DRR7/RR7□R/DRR7□R/RR7□W	5680N	1260N	98/m	69/m	50/m
RR6□AH/DRR6□AH/RR6□AHR/DRR6□AHR	6700N	2400N	104/m	87/m	62/m
RR7□AH/DRR7□AH/RR7□AHR/DRR7□AHR	11400N	3000N	90/m	76/m	50/m

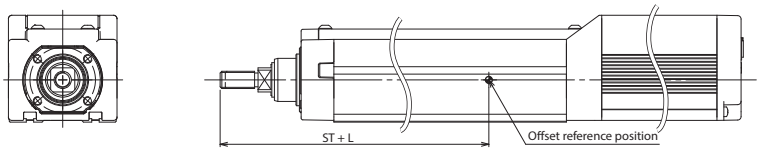
(*3) Value at a standard rated operation life of 5,000km.

Ma, Mb, Mc: Moment load

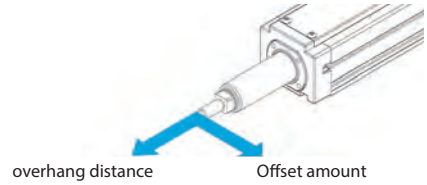


Type	L
RR3/DRR3/RR3□R/DRR3□R	73mm
RR4/DRR4/RR4□R/DRR4□R	102mm
RR6/DRR6/RR6□R/DRR6□R	111mm
RR7/DRR7/RR7□R/DRR7□R	144.5mm
RR6□W	131.3mm
RR7□W	161.5mm
RR6□AH/DRR6□AH/ RR6□AHR/DRR6□AHR	126mm
RR7□AH/DRR7□AH/ RR7□AHR/DRR7□AHR	153.5mm

Moment offset reference position



(Caution) Ensure that the radial load applied to a rod does not exceed the allowable offset amount and allowable overhang distance.



Type	Allowable offset amount	Allowable overhang distance
RR3/DRR3/RR3□R/DRR3□R RR4/DRR4/RR4□R/DRR4□R	100mm	100mm
RR6/DRR6/RR6□R/DRR6□R/RR6□W	100mm	100mm
RR7/DRR7/RR7□R/DRR7□R/RR7□W	100mm	100mm
RR6□AH/DRR6□AH/RR6□AHR/DRR6□AHR	100mm	100mm
RR7□AH/DRR7□AH/RR7□AHR/DRR7□AHR	150mm	150mm

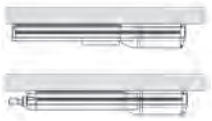
· Even if the radial load and torque load are within allowable values, the operating conditions should be moderated if some abnormal vibration or noise is observed.
· The center mass location of the attached object should not exceed 1/2 the offset amount or overhang distance.

Actuator mounting orientation

Some mounting orientations cannot be used or require caution depending on the model.

Check the following table for the mounting orientations to use for each model.

○: Can be mounted ×: Cannot be mounted

			Mounting orientation			
						
Classification	Series	Type	Horizontal mounting on flat surface	Vertical mounting (*1)	Side mounting	Ceiling mounting
Slider type	EC	S□/DS□/S□AH/ DS□AH (other than S13/S15 type)	○	○	○*2	○*2
		B6/B7	○	×	○*2	○*2
		S13/S13X/S15/S15X	○	○	○*3	○*4
Rod type		R6/DR6/R7/DR7	○	○	○	○
		RR3/DRR3/RR4/DRR4/ RR6/DRR6/RR7/DRR7	○	○	○	○
		RR6AH/DRR6AH/ RR7AH/DRR7AH	○	○	○	○
		RP4	○	○	○	○
		GS4/GD4	○	○	○	○
Table type		TC4/TW4	○	○	○	○
Rotary		RTC9/RTC12	○	○	○	○
Stopper cylinder		ST15	○	○	○	○
Dust/ splash-proof		R6W/R7W	○	○	○	○
		RR6W/RR7W	○	○	○	○

Mounting orientation precautions

(*1) When mounting vertically, make sure to install the motor on the top if possible.
Installing the motor on the bottom will not cause problems during normal operation. However, long periods of inactivity may rarely cause the grease to separate, flow into the motor unit, and cause problems.

(*2) Products may be installed on the side or from a ceiling. However, this may cause slack or misalignment in the stainless steel sheet.
Continued use can cause the stainless steel sheet to break.
Make sure to inspect it daily and adjust the sheet if any slack or misalignment is found.

(*3) Oils may separate from grease and drip from the opening on the side of the actuator. Parts and other small objects may also fall from within the device into the opening on the side of the actuator. A protective part should be installed if needed.

(*4) Mounting an actuator with screw cover to the ceiling may cause the screw cover to bend and interfere with parts. Parts should therefore be attached away from the slider seating surface.

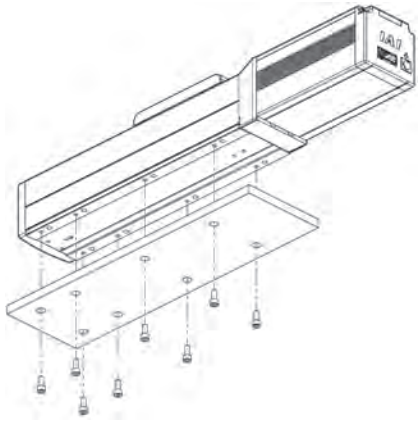
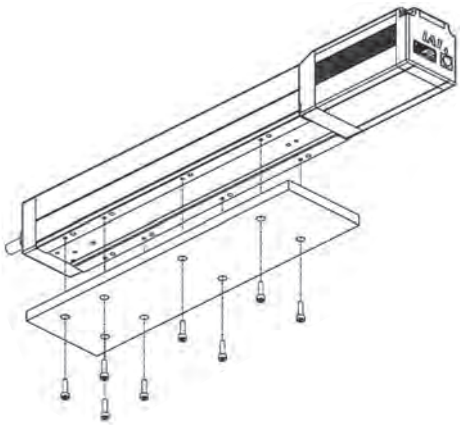
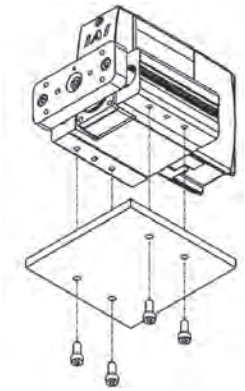
Mounting actuators

The method for mounting an actuator depends on the model. The following table lists the mounting methods for each model.

***Please check the applicable product page for products mounted using options.**

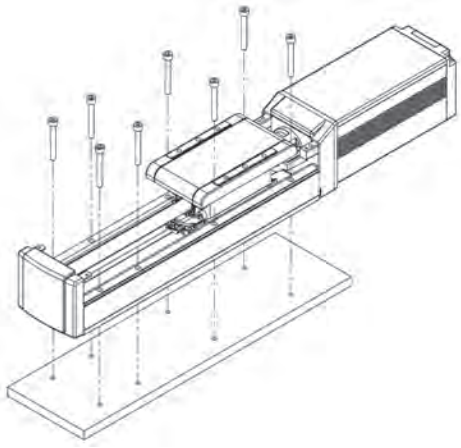
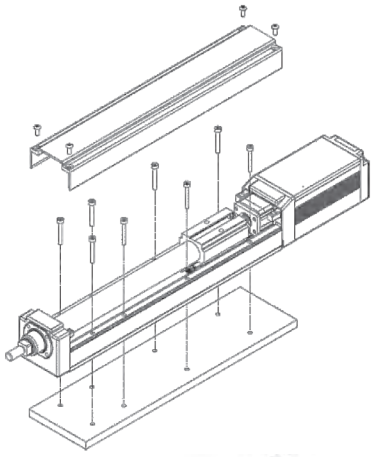
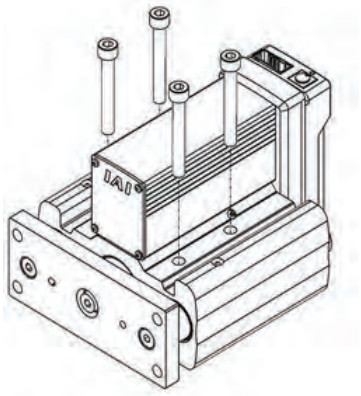
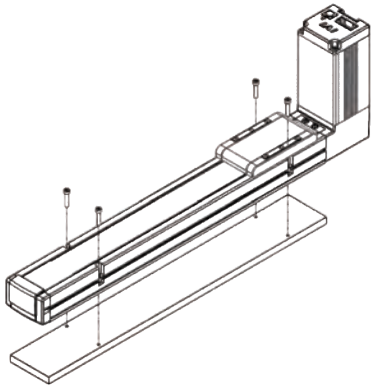
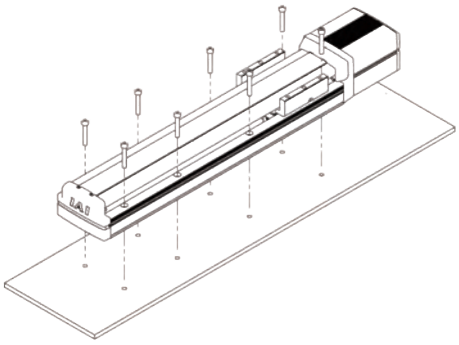
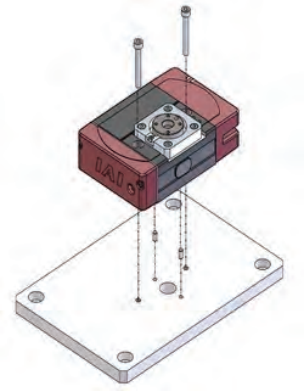
Classification	Type	Secured via base bottom surface screw hole	Secured via base upper surface through hole (counterbored)	Secured via T-slot	Secured via body front surface	Secured via body side surface	Secured via body rear surface	Options	
								Secured via foot bracket (model: FL)	Secured via body front surface flange (front) (model: FL)
Slider type	S3/DS3/S4/DS4/ S6/DS6/S7/DS7	-	-	○	-	-	-	○	-
	S6AH/DS6AH/ S7AH/DS7AH	○	○	-	-	-	-	○ (Side-mounted only)	-
	B6/B7	-	○	-	-	-	-	-	-
	S13/S13X/S15/S15X	-	○	-	-	-	-	-	-
Rod type	R6/DR6/R7/DR7	-	-	-	○	-	-	○	○
	RR3/DRR3/RR4/DRR4/RR6/DRR6/ RR7/DRR7	-	-	○	○	-	-	○	○
	RR6AH/DRR6AH/ RR7AH/DRR7AH	○	○	-	-	-	-	○ (Side-mounted only)	○
	RP4	-	-	-	P.362	-	-	-	-
	GS4/GD4	○	-	-	-	○(GS)	-	-	-
Table type	TC4/TW4	○	-	-	-	○(TC)	-	-	-
Rotary	RTC9/RTC12	○	○	-	-	-	-	-	-
Stopper cylinder	ST15	○	○	○	-	-	○	-	-
Dust/splash-proof	R6W/R7W	-	-	-	○	-	-	○	○
	RR6W/RR7W	○	-	-	○	-	-	○	○

Secured via base bottom surface screw hole

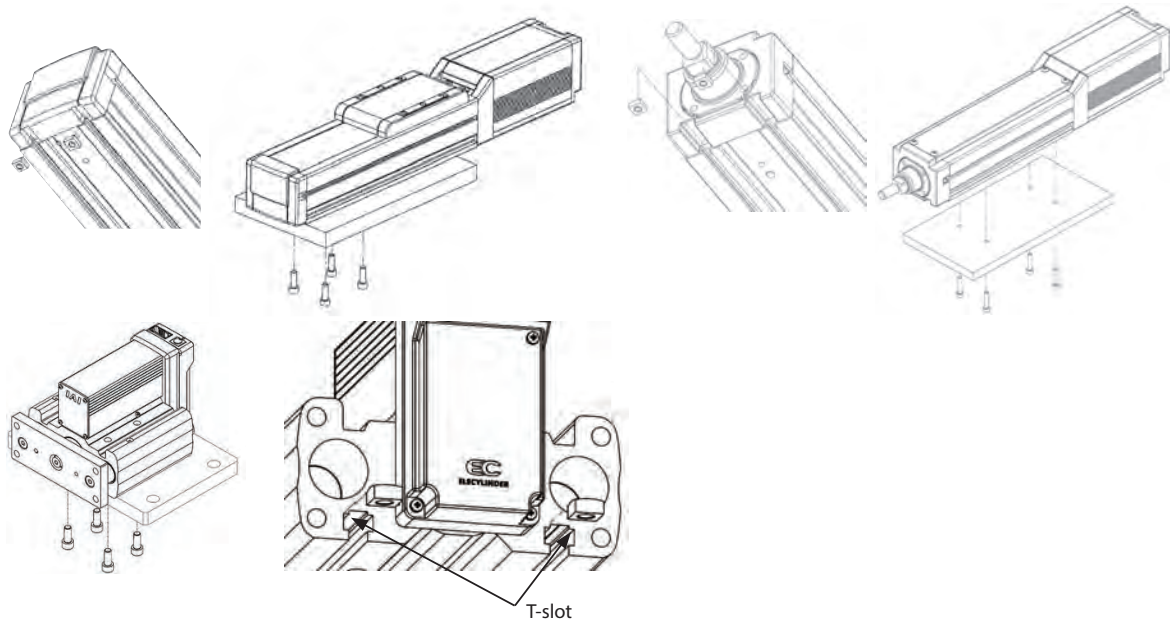
*Refer to the Dimensions table on the product page for information on the screw hole size.

Secured via base upper surface through hole (counterbored)

Mounting actuators

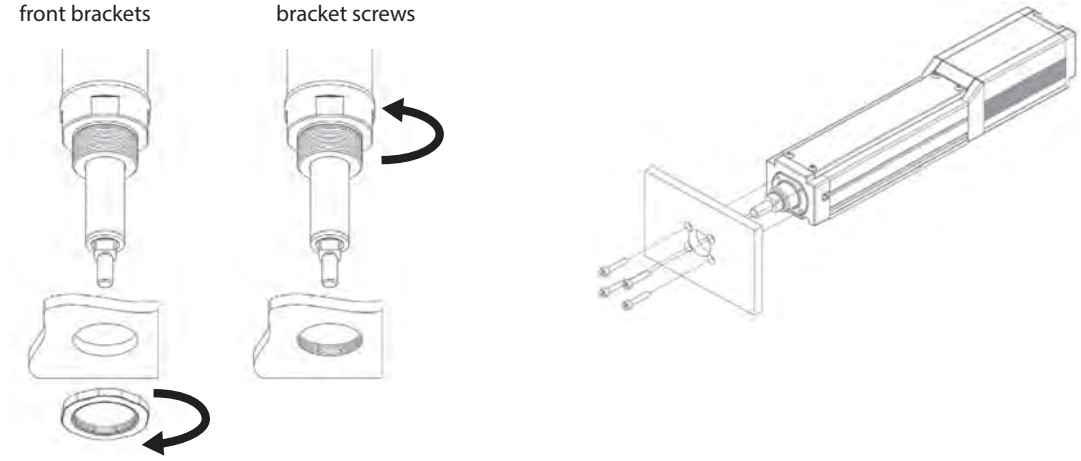
Secured via T-slot



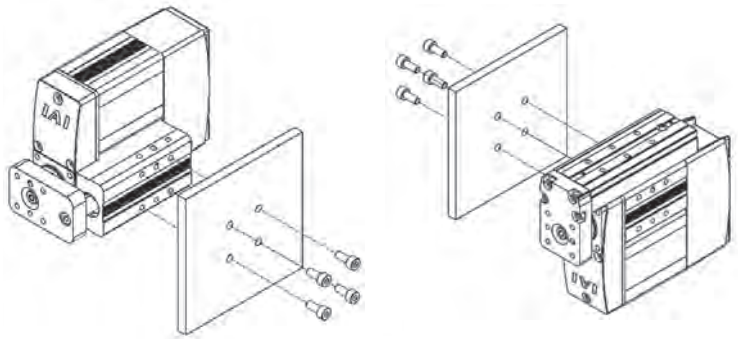
Secured via body front surface

■ When using front brackets

■ When using bracket screws

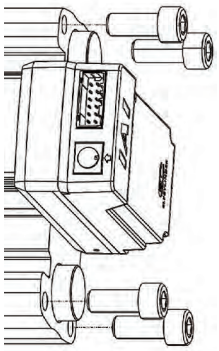


Secured via body side surface



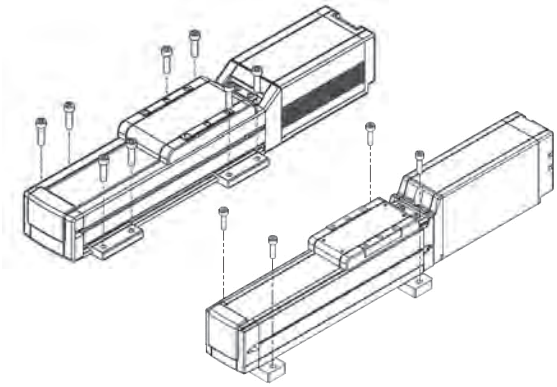
*Can also be installed from the opposite side.

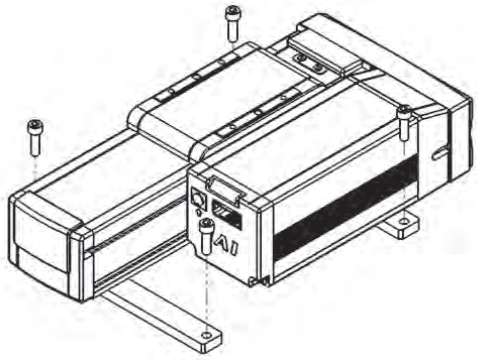
Secured via body rear surface

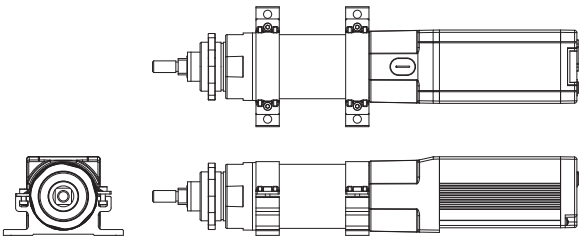


Secured via foot bracket (option model: FT)

*The shape and mounting method of the foot bracket varies by model. For details, please see **P.247**.

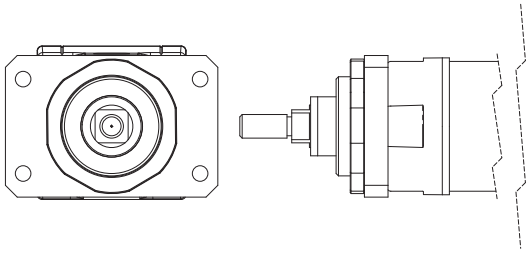


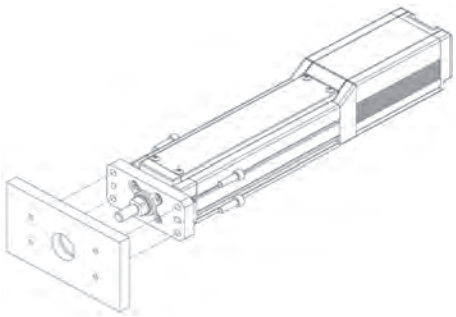




Secured using flange (front) (option model: FL)

*The shape and mounting method of the flange varies by model. For details, please see **P.246**.





Precautions for installation

General

● **For vertical mounting, it is recommended to have the motor installed on top.**
Installing the motor on the bottom will not cause problems during normal operation. However, long periods of activity may rare cause the grease to separate, flow into the motor unit, and cause problems.

Sliders, high rigidity sliders, radial cylinders, high rigidity radial cylinders, rods (GS4/GD4), tables

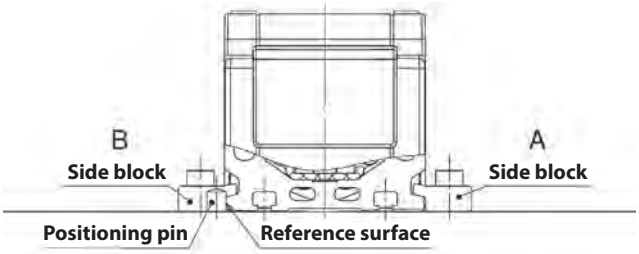
● **Keep the body installation surface and part mounting surface flatness at 0.05mm/m or lower.**
Uneven flatness will increase the sliding resistance of the slider and may cause a malfunction.

Sliders, high rigidity sliders

● **Products may be installed on the side or from a ceiling. However, this may cause slack or misalignment in the stainless steel sheet.**
Continued use can cause the stainless steel sheet to break.
Be sure to inspect it daily and adjust the sheet if any slack or misalignment is found.

Sliders, radial cylinders

● **Actuators cannot be accurately positioned in the width direction when secured with side blocks (foot bracket: FT), so positioning pins, etc. should be used.**
To mount:
① Press the reference surface of the actuator against the positioning pin, etc.
② While maintaining pressure, fix side block A on the opposite side.
③ Finally, secure side block B on the positioning pin side.
*** Note that there may be cases where sufficient fastening force cannot be obtained when mounting with methods other than the procedure above.**



Radial cylinders, high rigidity radial cylinders

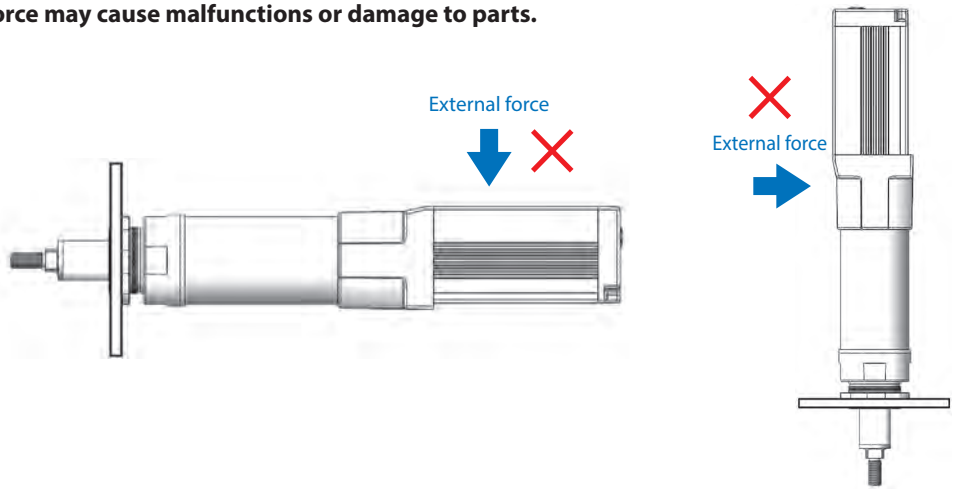
● **When applying a radial load/moment load, it is recommended to secure the entire surface of the base bottom.**
Securing with a front bracket may cause deflection or reflexion throughout the product due to the radial load/ moment load, leading to vibration, reduced operation life, or breakdown.
● **If both the brake option and flange (front) option are selected with the minimum stroke of the side-mounted specification, there may be no gap between the flange mounting surface and motor, preventing the bolt securing the flange from entering.**

High rigidity slider type side-mounted specification, high rigidity radial cylinder side-mounted specification

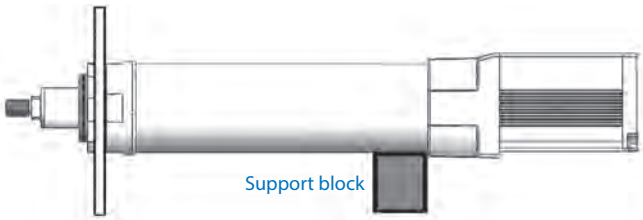
● **The side cover on the motor cannot be removed from the motor side-mounted specification model when the stroke is 200mm or less.**
If using the through hole on the upper surface of the body, the front bracket or motor unit assembly will need to be removed.
If you would rather not remove the front bracket or motor unit assembly, use a foot bracket (option model: FT) to secure from the upper surface.

Rod types, radial cylinders, high rigidity radial cylinders

● **Do not attempt to apply any external force to the body during front bracket mounting or flange (front) mounting. External force may cause malfunctions or damage to parts.**

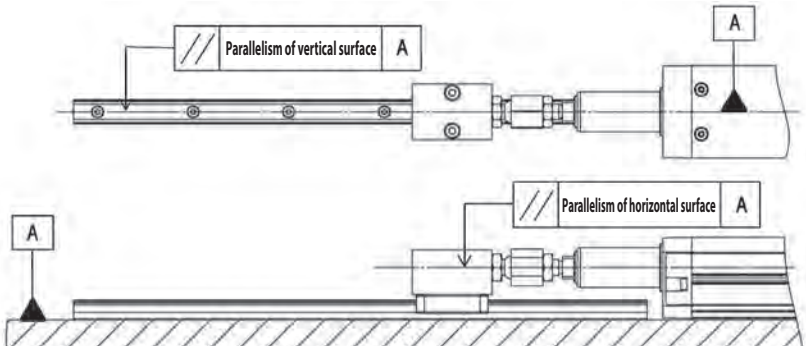


● **When using front bracket mounting, flange (front) mounting, etc., if the device is mounted horizontally, secured at a single point, and has a stroke of 150mm or more, prepare a support block as shown in the figure below even if there is no external force applied on the body.**
Even when the stroke is less than 150mm, a support block is strongly recommended in order to avoid vibration generated due to the operation conditions or installation environment, which may lead to abnormal operation or damage to parts. If using a support block, it is recommended to either use an optional foot bracket or keep the support block (aluminum alloy, etc.) close against the block. The installation position should be on the frame motor side.



[Notes for using external guide with rod type]

● **Parallelism of actuator and external guide**
When using an external guide, parallel misalignment (in the horizontal and vertical planes) between the actuator and the external guide could result in a malfunction, premature wear, or premature damage to the actuator. When mounting a guide, align the center of the actuator parallel to the guide. After installation, make sure that the sliding resistance is constant over the entire stroke.



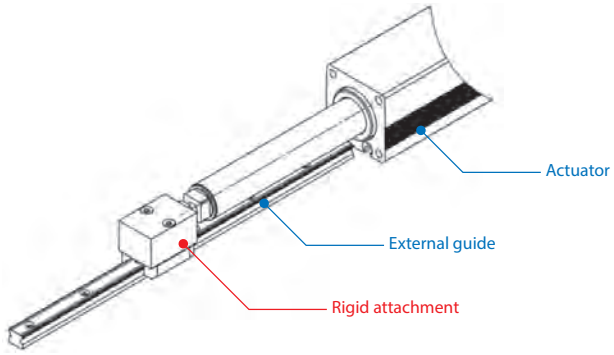
Precautions for installation

● **Method for securing to external guide**

Securing the part incorrectly risks premature damage to the actuator, even if parallelism has been adjusted between the guide and the actuator. See below for details.

Rod type

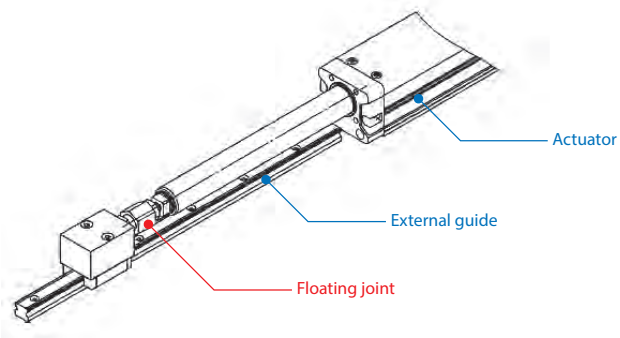
"Rigid attachment" is recommended to secure the product to an external guide. Rotation stop rod type actuators cannot bear the rotational force of the rod, so the rotation direction of the rod must be restricted. A "floating joint" does not restrict rotation of the rod and will create force on the rotation stop during operation. This could result in premature wear on the rotation stop (floating joints with rotation direction restrictions are acceptable).



Radial cylinders, high rigidity radial cylinders

A "floating joint" is recommended to secure these products to an external guide.

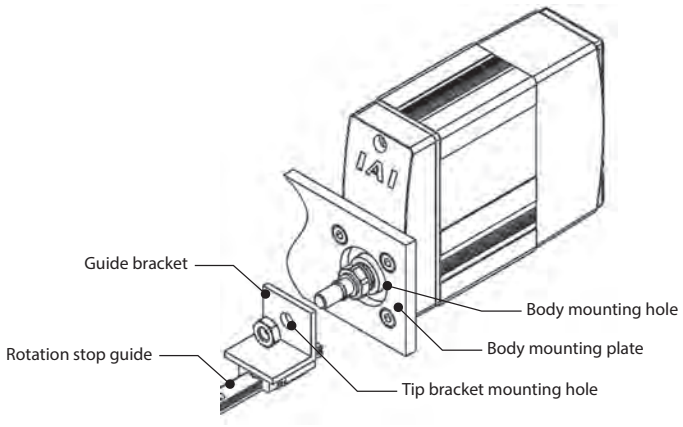
The floating joint absorbs misalignment between the built-in guide and external guide, making adjustment easier With "rigid attachment," it is difficult to adjust parallelism between the built-in guide and external guide. Even a slight deviation in parallelism applies load to the guide, which may cause premature damage.



Rod type (EC-RP4)

EC-RP4 does not have a rotation stop. Be sure to provide an rotation stop mounted as shown in the figure below.

If a rotation stop is not mounted, the motor will idle and the tip will be unable to move forward and backward properly.



[Caution]

Do not connect a rotation stop to the actuator body using a floating joint.
A radial load may be applied due to screw shaft eccentricity, causing the actuator to malfunction or fail prematurely.

The axis angle of the body mounting hole on the body mounting plate and the tip bracket mounting hole on the guide bracket should be within 0.05. The degree of parallelism should be within 0.02.
Please refer to the instruction manual for details on how to install.

Duty

The duty ratio is the operating rate shown as the actuator's operating time during one cycle, expressed as a percentage.

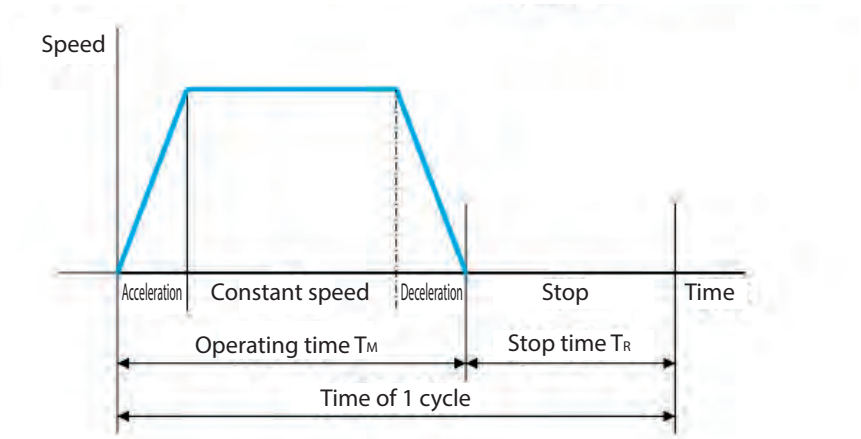
The duty ratio for each ELECYLINDER® type is limited to the values below.
The data below is applicable even during operation at maximum speed and maximum acceleration/deceleration.

[Duty cycle]

The duty ratio is the operating rate shown as the operating time of ELECYLINDER® during one cycle, expressed as a percentage.

$$D = \frac{T_M}{T_M + T_R} \times 100(\%)$$

D : Duty
T_M : Operating time (including push-motion operation)
T_R : Dwell time

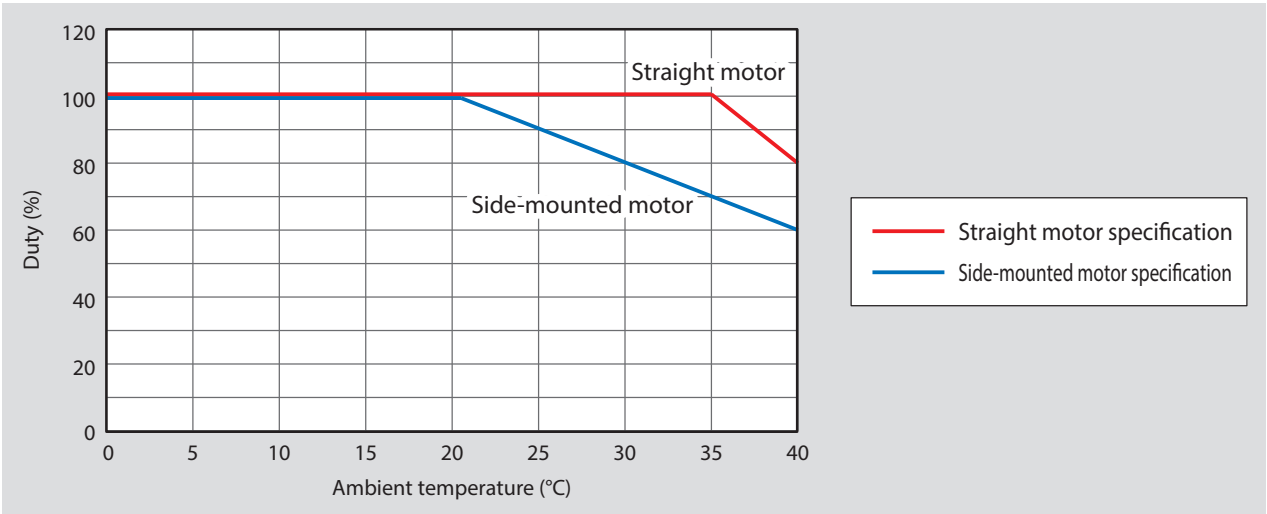


Note that the method for calculating duty cycle differs for stepper motor and AC servo motor types.

<Stepper motors>

For S3/S4, B6/B7, RR3/RR4, RP, GS, GD, TC, TW, RTC9/RTC12, ST15, the duty is 100% at ambient temperatures of 0 to 40°C.
Confirm the following for models that require a duty ratio limit.

■ **Ambient temperature and duty ratio**



<Servo motors>

EC-S13/S15 type

Calculate the load factor and acceleration/deceleration time ratio, and read the duty ratio from the graph.

When the load factor is less than 50%, operation with duty ratio of 100% (continuous operation) is possible.

1 Load factor (LF)

Please refer to the product specification page for the maximum payload at rated acceleration and the rated acceleration/deceleration.

When the command acceleration/deceleration is lower than the rated acceleration/deceleration

$$\text{Load factor: LF} = \frac{M \times \alpha}{M_r \times \alpha_r}\ [\%]$$

- Max. payload at rated acceleration : M_r [kg]
- Rated acceleration/deceleration : α_r [G]
- Payload during operation : M (kg)
- Acceleration/deceleration during operation : α (G)

When the command acceleration/deceleration is higher than the rated acceleration/deceleration

$$\text{Load factor: LF} = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d}\ [\%]$$

- Command acceleration payload : M_d[kg]
- Payload during operation : M (kg)
- Acceleration/deceleration during operation : α (G)

2 Acceleration/deceleration time ratio tod

$$\text{Acceleration/deceleration time ratio tod} = \frac{\text{Acceleration time during operation + deceleration time during operation}}{\text{Operating time}}\ [\%]$$

$$\text{Acceleration time} = \frac{\text{Speed during operation [mm/s]}}{\text{Acceleration during operation [mm/s}^2\text{]}}\ [\text{sec.}]$$

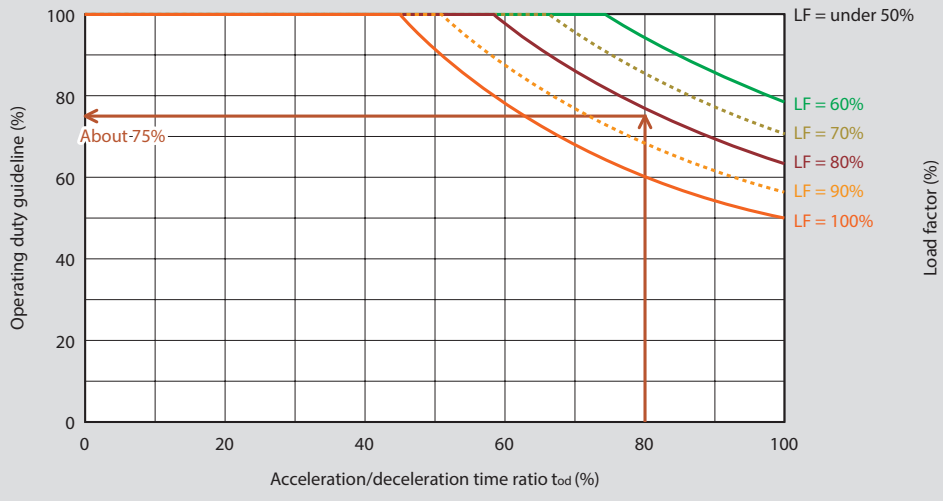
$$\text{Deceleration time} = \frac{\text{Speed during operation [mm/s]}}{\text{Deceleration during operation [mm/s}^2\text{]}}\ [\text{sec.}]$$

$$\text{Acceleration [mm/s}^2\text{]} = \text{Acceleration (G)} \times 9{,}800\text{mm/s}^2$$

$$\text{Deceleration [mm/s}^2\text{]} = \text{Deceleration (G)} \times 9{,}800\text{mm/s}^2$$

3 Read the duty ratio from duty ratio calculated load factor LF and acceleration/deceleration time ratio tod

Example: When load factor (LF) is 80% and acceleration/deceleration time ratio (tod) is 80%, the duty ratio guideline will be approximately 75%.



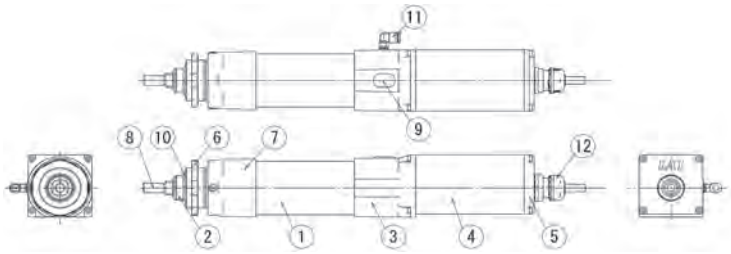
⚠ Note: If an overload error occurs, increase the dwell time to lower the duty or decrease the acceleration/deceleration.

EC dust-proof/splash-proof specification: Exterior component materials

■EC-R6□W/R7□W

	Name			Material	Treatment
Exterior components	① Frame			Extruded aluminum	Black alumite
	② Rod			Drawn aluminum	Hard alumite
	③ Rear bracket			Aluminum die cast	
	④ Motor cover			Extruded aluminum	Black alumite
	⑤ End cover			Aluminum die cast	
	⑥ Front fixing nut			Steel	Trivalent chromate
	⑦ Front bracket			Aluminum die cast	
	⑧ Tip bracket			Stainless steel	
	⑨ Rubber cap (greasing port)		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑩ Scraper		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑪ Exhaust/intake port		Standard	NBR + resin (PBT/POM) + brass	Nickel plated
			Option	FKM + resin (PBT/POM) + brass	Nickel plated
	⑫ Actuator cable	Cap cone	Standard	Rubber (NBR) + PBT resin + nylon	
			Option	Rubber (FKM) + PBT resin + PP	
		Cable sheath	Standard	Vinyl chloride (PVC)	
			Option	Rubber (FKM)	
	Exterior bolts			Stainless steel	
	Sealing materials		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	

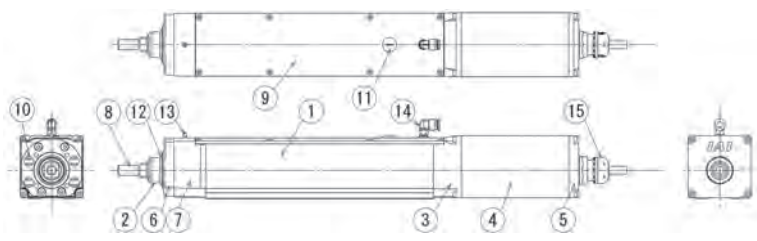
R□W



■EC-RR6□W/RR7□W

	Name			Material	Treatment
Exterior components	① Base			Extruded aluminum	Black alumite
	② Rod			Drawn aluminum	Hard alumite
	③ Bare housing			Aluminum die cast	
	④ Motor cover			Extruded aluminum	Black alumite
	⑤ End cover			Aluminum die cast	
	⑥ Scraper case			Aluminum die cast	
	⑦ Front bracket			Aluminum die cast	
	⑧ Tip bracket			Stainless steel	
	⑨ Frame cover			Extruded aluminum	Black alumite
	⑩ Cap		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑪ Rubber cap (greasing port)		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑫ Scraper		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	
	⑬ Grease port		Standard	Brass (C3604)	
			Option	Stainless steel	
	⑭ Exhaust/intake port		Standard	NBR + resin (PBT/POM) + brass	Nickel plated
			Option	FKM + resin (PBT/POM) + brass	Nickel plated
	⑮ Actuator cable	Cap cone	Standard	Rubber (NBR) + PBT resin + nylon	
			Option	Rubber (FKM) + PBT resin + PP	
		Cable sheath	Standard	Vinyl chloride (PVC)	
			Option	Rubber (FKM)	
	Exterior bolts			Stainless steel	
	Sealing materials		Standard	Rubber (NBR)	
			Option	Rubber (FKM)	

RR□W



EC dust-proof/splash-proof specification: Solvent resistance of materials used

■ EC-R□W/RR□W

Name		NBR (nitrile rubber)	PVC (polyvinyl chloride)	FKM (fluoro-rubber)
		Standard specification	Standard specification	Option
Water-soluble cutting oil		○	○	△
Water-insoluble cutting oil		△	○	○
Cleaning fluid		○	○	○
Lubricating oil	Engine oil	○	○	○
	Gear oil	○	○	○
	Torque converter oil	○		○
	Brake oil (glycol-based)	△		×
	Brake oil (silicone-based)	○		○
	Machine oil	○		○
	Spindle oil	○		○
	Refrigerant oil (mineral-based)	○		○
	Cap grease	○		○
	Lithium grease	○	○	○
	Silicon grease	○	○	○
Hydraulic oil	Standard petroleum oil-based	○	○	○
	Low temperature petroleum oil-based	○	○	○
	Fatty acid ester-based	○		○
	Phosphate ester-based	×		△
	Water/glycol-based	○	○	△
	Water/oil emulsion-based	○	○	△
	Type II turbine oil	○		○
	Silicone-based	○		○
	Brake oil	△		△
Chemicals	10% hydrochloric acid fluid	○	○	○
	30% sulphuric acid fluid	△		△
	10% nitric acid fluid	×		△
	40% sodium hydroxide fluid	○		×
	Benzene	×	×	×
	Alcohol	○		○
	Methyl ethyl ketone	×	×	×
	Trichlene	×	×	△
	Ethylene glycol	○	×	○
	Acetone	×	×	×
Other	Gasoline	△	×	○
	Light oil/kerosene	△		○
	Heavy oil	○		○
	Antifreeze (ethylene glycol-based)	○		×
	Cold/warm water	○	○	○
	Saltwater	○		○

Rating	Effect on solvent sealing materials
○	Minor effect, can be used
△	Moderate effect, use must be confirmed
×	Major effect, use not recommended

*1 Rating may differ by brand.

*2 Resistance table created based on internal IAI evaluations and standard evaluations. Use this data as a selection guideline.

*3 Rating may differ by environmental conditions and operating conditions. Select solutions only after confirming any effects they may have.

*4 We can conduct resistance tests for specified solutions. Please contact us for details.

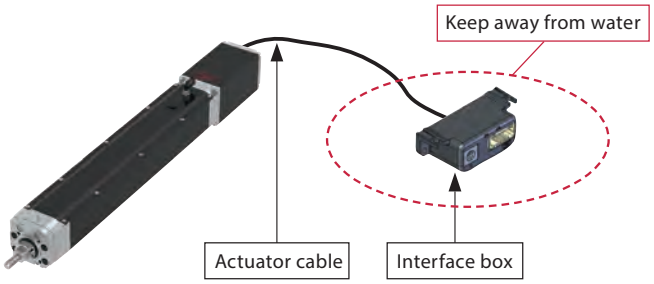
Protective structure

"Protective structure" indicates the degree of protection provided against liquids, the human body, and solid foreign matter.
It is displayed as follows, based on IEC (International Electrotechnical Commission),
JIS (Japanese Industrial Standards), and JEMA (Japan Electrical Manufacturers' Association) standards.

IEC standard

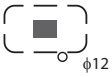
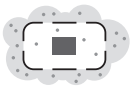
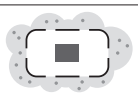
IP□□

- Second indicative number: Protection against ingress of water
- First indicative number: Protection against human bodies and solid foreign matter

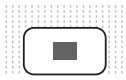
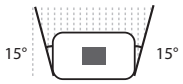
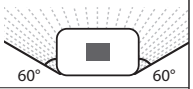
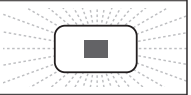
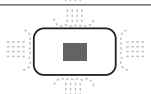
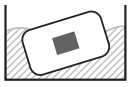
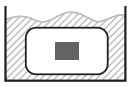


Caution
Protective structures are regulated up to and including their cables.
However, the interface box is not splash-proof.
It is not a protective structure and must be installed in a location not exposed to water.

■ Level of protection indicated by first indicative number

First indicative number	Description
0	No protection.
1	No contact between hands and internal electrically charged parts (ϕ50mm). 
2	No contact between fingertips and internal electrically charged parts (ϕ12mm). 
3	Tools exceeding a diameter or width of 2.5mm, wires, and other solid objects cannot be inserted. 
4	Tools exceeding a diameter or width of 1.0mm, wires, and other solid objects cannot be inserted. 
5	Dust large enough to impair operation does not enter. 
6	Dust does not enter (completely protected). 

■ Level of protection indicated by second indicative number

Second indicative number	JIS standard	Description
0		No protection.
1	Splash-proof I	No harmful effects from water drops falling from the vertical. 
2	Splash-proof II	No harmful effects from water drops falling within 15° from the vertical. 
3	Rain-proof	No harmful effects from water drops falling within 60° from the vertical. 
4	Droplet-proof	No harmful effects from splashing water from any direction. 
5	Jet-proof	No harmful effects from direct water jets from any direction. 
6	Waterproof	Water does not enter even if exposed to direct water jets from any direction. 
7	Watertight	Water does not enter even if submerged in water under certain conditions. 
8	Submersible	Can be used permanently submerged in water of specified pressure. 

MEMO

Push-motion operation

Push-motion operation is a function that keeps the rod or slider pushed up against a part, as with an air cylinder.

This function is available only for certain actuator models.

Please check the usage instructions and precautions below prior to use.

[Support for push-motion operations]

Motor type	Series	Model	Supported	Remarks
Stepper motor	EC	Rod type	◎	Suited for push-motion operation (see precaution 1 below).
		Belt type	×	Belts do not provide a stable torque and are incapable of pushing.
		Other models	○	Push-motion operation possible.
Servo motor (200V)	EC	Slider type (S13/S15)	△	Lower stopping stability when pushing compared with a stepper motor.

[Precautions]

- **If pushing with a slider type or table type, the dynamic allowable moment of the guide will need to be taken into consideration.**

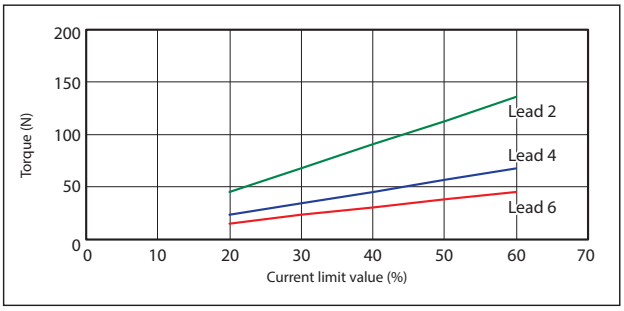
[Torque adjustment]

- **The torque during a push-motion operation can be adjusted by changing the current limit value of the controller.**
- **Please check the torque for the applicable model in the "Correlation between Torque and Current Limit" diagram on the production specification page, and select a model that matches your conditions.**

*Refer to the cautionary information below on the "Correlation between Torque and Current Limit" diagrams.

(Example)

EC-S3/RR3



<Correlation between Torque and Current Limit>

Caution

The "Correlation between Torque and Current Limit" diagram show lower guidelines for torque for each current limit value. Even if the current limit value is the same, individual differences in the motor and variations in machine operation may cause the torque lower limit to be exceeded by around 40% for the device.

When push-motion operation is performed, there is no thrust feedback and the torque is controlled by the current limit value. Individual differences or fluctuations may therefore occur in torque due to fluctuations in the motor holding torque, individual differences in ball screws or bearings, or changes in the lubrication state. Motor holding torque may vary by around 30% due to rod differences.

If an accurate torque is required, use an actuator and controller that provide force control.

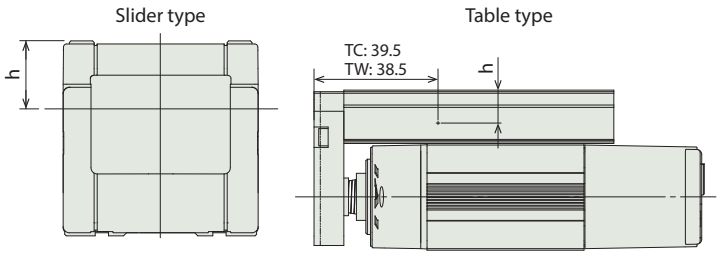
Notes on use of slider type and table type actuators for push-motion operation

When performing a push-motion operation using a slider type or table type actuator, be sure to limit the push current so that the reactive moment caused by the torque does not exceed the dynamic allowable moment (Ma, Mb) listed in the catalog.

Refer to the figures below, which show the working point of the guide moment, for help with calculating the moment. When doing so, take the offset amount of the torque working point into consideration.

Note that applying excessive force that exceeds the dynamic allowable moment may damage the guide and reduce its operation life.

Select a push current that is safely within its limits.



Guide moment working point

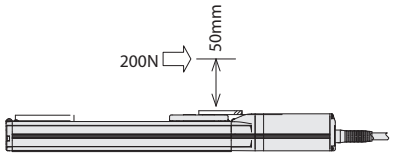
h dimension			
Slider type		Table type	
S3	16	TC4	10.5
S4	18	TW4	10.5
S6/S6□R	22		
S7/S7□R	22		
S6□AH/S6□AHR	50.5		
S7□AH/S7□AHR	58		

*Unit: mm

Calculation example:

When a 200N pushing operation is performed with EC-S7 type at the position shown in the figure to the right,
the moment applied to the guide is:

$$Ma = (22 + 50) \times 200 = 14400 \text{ (N·mm)}$$
$$= 14.4 \text{ (N·m)}$$



The dynamic allowable moment for EC-S7 is Ma = 17 (N·m); this is acceptable as 17 > 14.4.
If pushing would cause an Mb moment, calculate from the overhang and ensure that it is within range of the dynamic allowable moment.

Selecting rotary type actuators

The following conditions must be satisfied for use. Confirm by performing the calculations in procedures 1 and 2.

If an optional shaft adapter or table adapter is installed, make sure to add the weight and moment of inertia (see P. 254).

Procedure 1

Check the moment of inertia
(1) If there is no load torque
(2) If there is load torque
*The method for checking the moment of inertia differs depending on whether or not there is a load torque.

(1) If there is no load torque

When used as shown in the figure below, there will be no load torque due to gravity.

Therefore, calculate the moment of inertia of the load only, and then confirm that it does not exceed the allowable inertia moment.

Use the calculation method for the applicable typical shape (P. 372) to calculate the moment of inertia for the tooling or part that will be used.

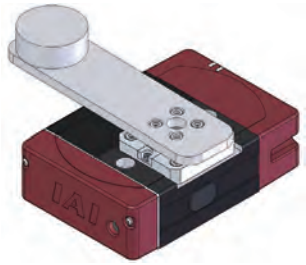
Example 1

Center mass location of load: Output shaft center
Installation orientation: Horizontal on flat surface/suspended

Example 2

Center mass location of load: Output shaft center
Installation orientation: Side or vertical mounted

Example 3



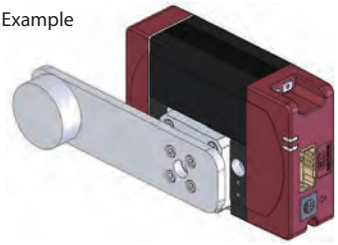
Center mass location of load: Offset from output shaft center
Installation orientation: Horizontal on flat surface/suspended

(2) If there is load torque

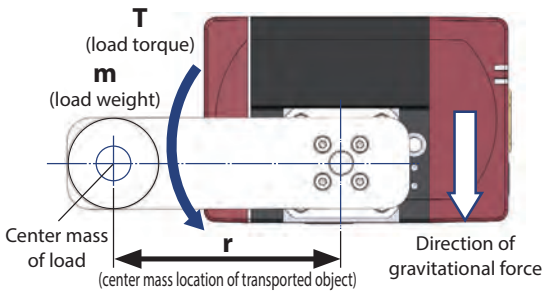
When used as shown in the figure below, there will be a load torque due to gravity. This will cause the allowable moment of inertia to decrease by that amount.

First, calculate the load torque and obtain the corrected allowable moment of inertia. Then, calculate the moment of inertia and confirm that it does not exceed the corrected allowable moment of inertia.

Example



Center mass location of load: Offset from output shaft center
Installation orientation: On side/vertical



Step 1 Calculate load torque T

$T = mgr \times 10^{-3}$ [N·m]

m : Weight of transported object [kg]

g : Gravitational acceleration [m/s²]

r : Center mass location of transported object [mm]

Step 2 Calculate allowable moment of inertia correction coefficient Cj

$$Cj = \frac{Tmax - T}{Tmax}$$

Tmax : Output torque [N·m]

***For the value of output torque Tmax see the individual product page.**

Step 3 Calculate corrected allowable moment of inertia Jtl

Jtl = Jmax× Cj [kg·m²]

Jmax: Allowable moment of inertia [kg·m²]

***For the value of allowable moment of inertia Jmax see the individual product page.**

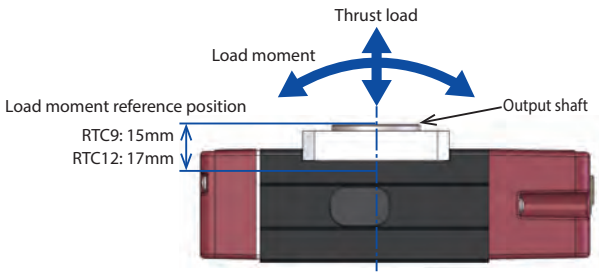
Step 4 Check moment of inertia of transported object

Use the "Formulas for calculating moment of inertia of typical shapes" below to calculate the moment of inertia of the load, and confirm that it does not exceed the corrected moment of inertia calculated during Step 3.

Procedure 2

Check the moment load and thrust load

Confirm that the moment load and thrust load on the output shaft are within the allowable range. Use in excess of the allowable range could reduce operation life or cause failure.
See the individual product page for the values of the allowable dynamic thrust load and allowable dynamic load moment.



Formulas for calculating moment of inertia of typical shapes

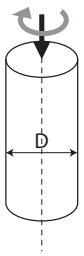
1. When the rotational axis passes through the center of the object

(1) Moment of inertia of cylinder 1

*The same formula can be applied irrespective of the height of the cylinder (also for circular plate)

<Formula> $J = M \times (D \times 10^{-3})^2 / 8$

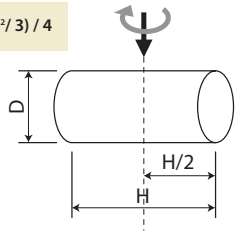
Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (unit: kg)
Cylinder diameter: D (mm)



(2) Moment of inertia of cylinder 2

<Formula> $J = M \times ((D \times 10^{-3})^2 / 4 + (H \times 10^{-3})^2 / 3) / 4$

Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (mm)
Cylinder length: H (mm)

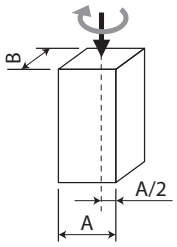


(3) Moment of inertia of prism 1

*The same formula can be applied irrespective of the height of the prism (also for rectangular plate)

<Formula> $J = M \times ((A \times 10^{-3})^2 + (B \times 10^{-3})^2) / 12$

Moment of inertia of prism: J (kg·m²)
One side of prism: A (mm)
One side of prism: B (mm)



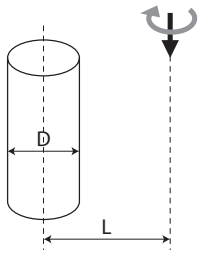
2. When the center of the object is offset from the rotational axis

(4) Moment of inertia of cylinder 3

*The same formula can be applied irrespective of the height of the cylinder (also for circular plate)

<Formula> $J = M \times (D \times 10^{-3})^2 / 8 + M \times (L \times 10^{-3})^2$

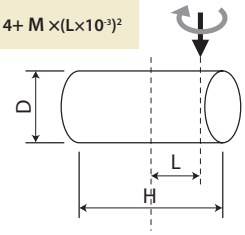
Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (mm)
Distance from rotational axis to center: L (mm)



(5) Moment of inertia of cylinder 4

<Formula> $J = M \times ((D \times 10^{-3})^2 / 4 + (H \times 10^{-3})^2 / 3) / 4 + M \times (L \times 10^{-3})^2$

Moment of inertia of cylinder: J (kg·m²)
Cylinder weight: M (kg)
Cylinder diameter: D (mm)
Cylinder length: H (mm)
Distance from rotational axis to center: L (mm)

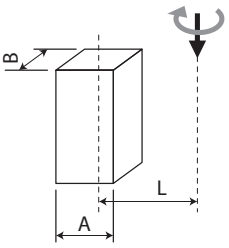


(6) Moment of inertia of prism 2

*The same formula can be applied irrespective of the height of the prism (also for rectangular plate)

<Formula> $J = M \times ((A \times 10^{-3})^2 + (B \times 10^{-3})^2) / 12 + M \times (L \times 10^{-3})^2$

Moment of inertia of prism: J (kg·m²)
Prism weight: M (kg)
One side of prism: A (mm)
One side of prism: B (mm)
Distance from rotational axis to center: L (mm)



Overseas standards

1. RoHS Directive

The RoHS Directive is a European Union (EU) directive on "restricting the use of specified hazardous substances contained in electric/electronic devices."
RoHS stands for "Restriction of Hazardous Substances."
The purpose of RoHS is to define hazardous substances contained in electric/electronic devices and prohibit the use of certain substances in order to minimize their impact on people and the environment. Use of the following six types of substances has been prohibited or restricted since July 2006.

1. Lead
2. Mercury
3. Cadmium
4. Hexavalent chromium
5. Polybrominated biphenyl (PBB)
6. Polybrominated diphenyl ether (PBDE)

IAI continues its efforts to completely eliminate its use of RoHS Directive substances, and since January 2006 has been switching products out for RoHS-compliant products (with some exceptions).
Please refer to our compliance list (later in this document) for the current status.

2. CE Marking

Products sold within the European Union (EU) are required to display the CE Marking.
The CE Marking is used to indicate compliance with EU (EC) safety requirements. It is voluntarily displayed on products by manufacturers.
The adoption of the New Approach Directive in 1985 saw directives such as the "EMC Directive," "Low Voltage Directive," and "Machinery Directive" being defined.
These directives each stipulate safety requirements and the provisions required to comply with them.

(1) EMC Directive

This directive concerns products that emit electromagnetic waves, or whose functionality could be affected by external electromagnetic waves.
It requires that products be designed so as to not emit strong electromagnetic waves or be affected by external electromagnetic waves.
IAI products are designed based on controller, actuator, and peripheral device wiring/installation models (conditions), and are compliant with standards related to the EMC Directive.

(2) Low Voltage Directive

This directive concerns the safety of electrical products operating at 50 to 1000VAC, or at 75 to 1500VDC.
ELECYLINDER® large slider type S13/S13X/S15/S15X actuators are designed to comply with the Low Voltage Directive.
This directive does not apply for 24V ELECYLINDER® products.

(3) Machinery Directive

This directive covers machinery recognized as dangerous even when used in the moving parts of general products, and focuses on industrial machinery.
It concerns safety required for machine products.
IAI ELECYLINDER® products do not comply with the Machinery Directive (as of January 15, 2018).

(4) IAI CORPORATION and the EC Directive

IAI actuators and controllers ("IAI components" below) are treated as parts (embedded devices) that are used embedded in customer devices.
Although some individual IAI components are declared to be compliant with "Machinery Directive 2006/42/EC" as "semi-finished products," this does not guarantee that a customer device will necessarily comply with the EC Directive.
If you will be shipping a product to Europe, or using a product in Europe, as an end product consisting of a completed device with an embedded IAI component, it is your responsibility to confirm that the device complies with the EC Directive.

In order for your device to comply with EN60204-1 (a harmonized standard for the Machinery Directive that regulates the electrical safety of industrial devices), any IAI components must comply with "Low Voltage Directive 2014/35/EU" and "EMC Directive 2014/30/EU."

With regard to "Low Voltage Directive 2014/35/EU," IAI components can be largely classified into those that operate only at 24VDC, and those that operate at 200VAC. The former operate at a voltage lower than that covered by the Low Voltage Directive (50 to 1000VAC, or 75 to 1500VDC) and therefore are not applicable. The latter can be regarded as complying with the Low Voltage Directive assuming they are used as described in the Overseas Standards Manual (MJ0287-8A 1.3.1 Note 1).

With regard to "EMC Directive 2014/30/EU," IAI declares compliance with this directive when radio wave interference is handled as indicated by this overseas standard under the limited usage conditions of IAI. However, it will ultimately be your responsibility to confirm compliance with any IAI components installed in your device.

Another EC Directive that applies to IAI components is the so-called RoHS Directive, which requires that specified hazardous substances be kept within specified values.
The revised RoHS Directive (Directive 2011/65/EU) released in the July 1, 2011 official report requires a declaration of compliance indicating that none of the 6 specified hazardous substances are included in products released to market on or after January 2, 2013 (July 22, 2017 for controllers), and also requires that such products carry the CE Marking.

This means that the CE Marking on individual IAI components indicates a declaration of compliance under restricted usage conditions with the RoHS Directive/EMC Directive (24VDC products) or RoHS Directive/EMC Directive and Low Voltage Directive (200V products).
English is considered the original language used for IAI component instruction manuals and caution labels.
Please contact our sales personnel if you require support for another language.
Some caution and warning labels may also include Japanese text when there are accompanying notes.
If CE is required for your device, please be sure to select a product (such as a safety relay) based on the safety category required for your device, and then build an external safety circuit for it.

3. UL Standard

UL (Underwriters Laboratories Inc.) is a US non-profit organization formed by the National Board of Fire Underwriters in 1894.
It is involved in research, testing, and inspections with the goal of protecting people and property from fire, disasters, theft, and other accidents.
The UL Standard is a product safety standard that concerns functionality and safety. Products tested and evaluated by UL that meet UL Standard requirements may be shipped with the UL Mark displayed.
Some IAI models are certified. For details, please contact our sales personnel.

4. KCs Marking

Industrial robots began being covered by the Korean Autonomous Safety Confirmation Reporting System on March 1, 2013.
Products used in Korea or exported from Japan to Korea are now regulated by this system.
As defined by KCs, industrial robots are "robots including a controller with 3 or more axes."
These models must be reported to KOSHA (Korea Occupational Safety & Health Agency) for registration, and are registered assuming there are no issues preventing registration.

RoHS Directive/CE Mark/UL Overseas standards table

(as of May 2020)

■ Actuators

◎ : Supported (standard), ○: Optional
△: Supported (special order), ×: No support planned

Product configuration	Series name	Type	Model	RoHS Directive	CE Marking	UL Standard
ELECYLINDER®	EC	Slider (standard)	S3□/DS3□/S4□/DS4□	◎	◎	
			S6□/DS6□/S7□/DS7□	◎	◎	
			S3□R/DS3□R/S4□R/DS4□R	◎	◎	
			S6□R/DS6□R/S7□R/DS7□R	◎	◎	
		Slider (high rigidity)	S6□AH/DS6□AH/S7□AH/DS7□AH	◎	◎	
			S6□AHR/DS6□AHR/S7□AHR/DS7□AHR	◎	◎	
		Slider (belt-driven)	B6/B7	◎	◎	
		Slider (large)	S13/S13X/S15/S15X	◎	◎	
		Rod (standard)	R6□/DR6□/R7□/DR7□	◎	◎	
		Rod (short length)	RP4□/GS4□/GD4□	◎	◎	
		Radial cylinder (standard)	RR3□/DRR3□/RR4□/DRR4□	◎	◎	
			RR6□/DRR6□/RR7□/DRR7□	◎	◎	
			RR3□R/DRR3□R/RR4□R/DRR4□R	◎	◎	
			RR6□R/DRR6□R/RR7□R/DRR7□R	◎	◎	
		Radial cylinder (high rigidity)	RR6□AH/DRR6□AH/RR7□AH/DRR7□AH	◎	◎	
			RR6□AHR/DRR6□AHR/RR7□AHR/DRR7□AHR	◎	◎	
		Table (short length)	TC4□/TW4□	◎	◎	
		Rotary	RTC9/RTC12	◎	◎	
		Stopper cylinder	ST15	◎	◎	
		Rod (dust-proof/splash-proof)	R6W/R7W	◎	◎	
			RR6W/RR7W	◎	◎	

■ Controllers

◎ : Supported (standard), ○: Optional
△: Supported (special order), ×: No support planned

Product configuration	Series name	Type	Model	RoHS Directive	CE Marking	UL Standard
ELECYLINDER® controller	R-unit	Master unit	RCON-GW/GWG	◎	◎	◎
			REC-GW	◎	◎	To be acquired
		EC connection unit	RCON-EC-4	◎	◎	To be acquired

■ Options

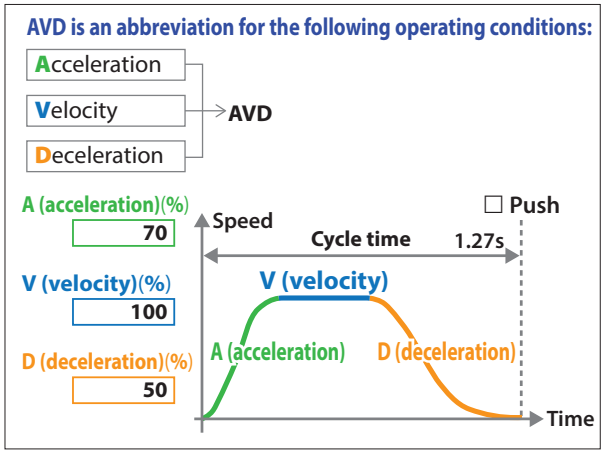
◎ : Supported (standard), ○: Optional
△: Supported (special order), ×: No support planned

Product configuration	Series name	Type	Model	RoHS Directive	CE Marking	UL Standard
Teaching pendant	Position controller/ program controller dual use	Standard	TB-02	◎	◎	×
			TB-03	◎	◎	×
		With dead man's switch	TB-02D	◎	◎	×
Power / I/O cable	EC	PIO type power supply	CB-EC-PWBIO***-RB	To be acquired	To be acquired	×
RCON-EC connection cable	—	Standard connector cable	CB-REC-PWBIO***-RB	To be acquired	To be acquired	×
		Four-way connector cable	CB-REC2-PWBIO***-RB	To be acquired	To be acquired	×
Other	RC/EC	PC software	RCM-101-MW	◎		
			RCM-101-USB	◎		
		External communication cable	CB-RCA-SIO***	◎	◎	
		RS232C conversion cable	RCB-CV-MW	◎		
		USB cable	CB-SEL-USB	◎		
		USB conversion adapter	RCB-CV-USB	◎		
		Link cable	CB-RCB-CTL***	◎	◎	
24VDC power supply	—	PSA-24	—	◎	◎	◎
		PS-241/242	—	◎	◎	◎
Regenerative resistance unit	EC200V specification	Standard specification	RESU-1	◎	×	×
		DIN rail mounting specification	RESUD-1	◎	×	×
Fan unit	RCON	RCON-FU	—	◎	×	×
SIO converter	—	RCB-TU-SIO-A/B	—	◎	×	×

Explanation of terms (these are terms used for IAI products, and are therefore defined more narrowly than usual)

AVD

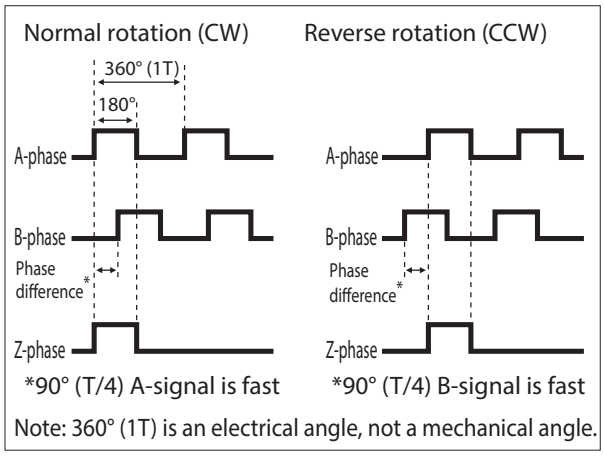
When an object is moved, that object accelerates from a stop, reaches a certain level of acceleration, decelerates from that level of acceleration, and then stops.
"AVD" is used to refer to the operating conditions for acceleration, velocity, and deceleration. IAI uses this as an abbreviation for operating conditions. ELECYLINDER® allows for AVD settings to be individually set.



A-phase/B-phase (signal) output

The difference in phase between the A-phase and B-phase during incremental output is used to determine whether the axis is rotating normally or in reverse. When rotating normally (CW), the A-phase will be ahead of the B-phase.

■ Output modes



Note: 360° (1T) is an electrical angle, not a mechanical angle.

Bluetooth

A standard for short-distance wireless communication.

CT effect

Replacing an air cylinder installed in equipment with ELECYLINDER® can reduce the cycle time and eliminate momentary stops, improving productivity. This can reduce equipment investment and labor costs, and provides greater benefits to the customer. CT stands for cycle time and "choco tei" (Japanese for momentary stop).

G

A unit used to indicate the amount of acceleration. It is not an SI unit. Speed is indicated with standard gravitational acceleration as reference (1G = 9.807m/s²).

I/O

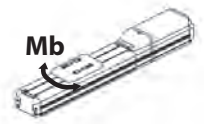
Input/output. An interface used for sending/receiving information (signals) with an external device connected to the system.

Ma direction

Forward/reverse direction versus the moving direction.

Mb direction

Left/right direction versus the moving direction.



Mc direction

Rotation direction versus the moving direction.

N

The unit used for force in the SI unit system. Indicates a force accelerating a 1kg mass at 1m/s² (1kgf = 9.807N).

N·m

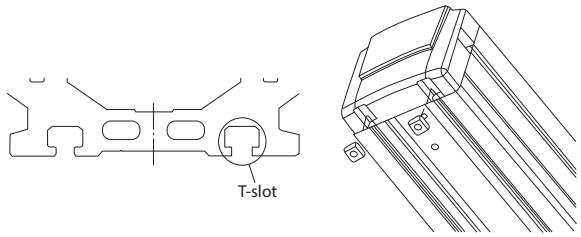
The unit used for moment (torque) in the SI unit system. 1N·m is the moment of force around the center point, when 1N of force is applied in the perpendicular direction facing the center point at a point 1m away from the center point.

PLC

An abbreviation for "programmable logic controller." These controllers can be programmed to control production facilities and systems.

T-slot

A groove for body mounting.



Ground

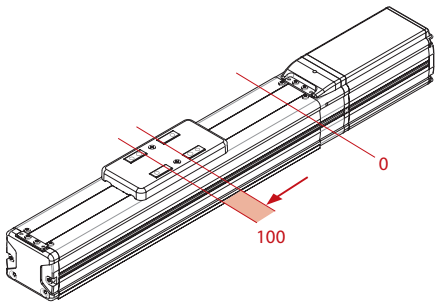
Refers to connecting the device housing, electronic device reference potential wiring, etc. to a standard potential point. It can also refer to the standard potential point itself. This is used to prevent noise and electric shock.

Signal detection range

The range (pend band) at which positioning is considered to be complete for the coordinate that is to be measured.

Positioning accuracy

The degree to which the actual stop position matches the stop position that was commanded.



Inertia ratio

The ratio of the load moment of inertia versus the moment of inertia of the motor axis.

Incremental encoder

An encoder with functionality to detect relative position. Homing must be performed each time the power is turned on, as it is only capable of determining the relative position.

Inching

Refers to moving to a relative position at a predetermined distance.

Air pressure

Compressed air pressure. In an air cylinder, the speed is changed by adjusting the air pressure.

Air purge

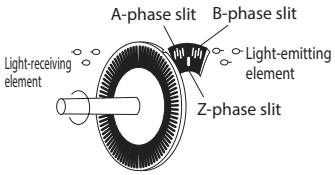
Refers to preventing dust, etc. from entering the actuator by applying air pressure inside the actuator, in order to ensure dust-proof/splash-proof performance in a dust-proof/splash-proof actuator.

Explanation of terms

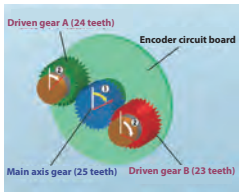
Encoder

A sensor used to detect the position of a motor.

● **Incremental encoder**



● **Battery-less absolute encoder**



An incremental encoder...

detects the rotation angle or rotation speed based on the number of output pulses. A counter is therefore needed to total the number of output pulses used to detect the rotation angle or rotation speed. However, a benefit of this is that the rising and falling points of the pulse waveform can be used to increase the pulse generation frequency 2 or 4 times over, allowing the resolution to be increased electrically.

A battery-less absolute encoder...

① Reads axis angle information from the main axis gear.
② Combines the angle information for driven gear A and driven gear B to calculate the rotation speed from the home position.
③ Calculates the present position from the information combining ① and ②.

Number of encoder pulses

The number of pulses output when an encoder is rotated once.

Push home return

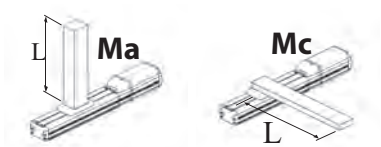
A method of determining the home position by pressing up against a stopper. This allows for home return to be performed without using a home sensor.

Overshoot

Refers to a response exceeding the target value.

Overhang

Refers to an object loaded on an actuator that is sticking out forward/backward, left/right, or up/down.



Regenerative energy

The energy created by a motor as it rotates.

Regenerative resistance

Resistance that discharges regenerative current.

Regenerative brake

Refers to braking in which rotational resistance generated as the motor decelerates is used as braking force.

External operation mode

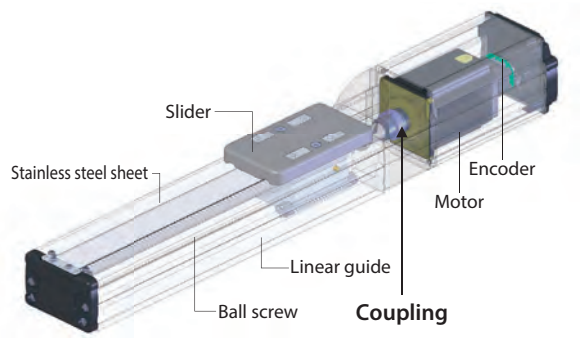
An operation mode (automatic operation) that starts when a start signal is received from an external device (such as a PLC).

Load coefficient

The coefficient used to factor in the decrease to operation life caused by operating conditions, when calculating the operation life.

Coupling

An axis coupling. A machine element that connects one axis to another.

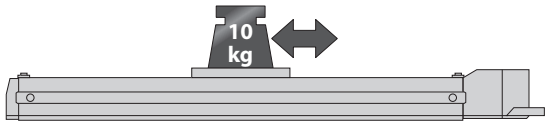


Overvoltage

A voltage exceeding the standard value being applied to a motor.

Payload

The weight that can be transported by an actuator slider, rod, or table.



Inertia

The quality of an object that keeps it in its current state unless an external force is applied.

Moment of inertia

An amount that represents how difficult something is to rotate (stop).

Key groove

An axis for key mounting, or a groove machined into a mounted part ("key" here refers to a part used to prevent position misalignment in the rotation direction of the axis and mounted part).

Mechanical loss

Force or energy loss that occurs due to mechanical factors such as internal friction.

Critical speed

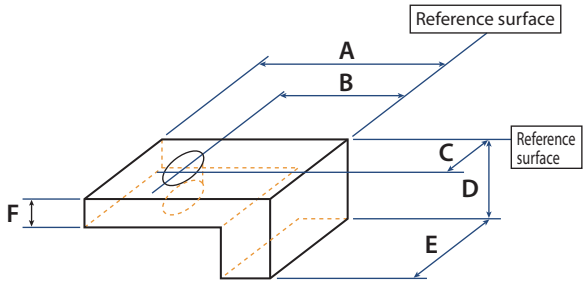
The slider speed (ball screw rotation speed) at which the ball screw resonates.

Standard rated operation life

The standard operation life value. IAI sets the standard rated operation life of ELECYLINDER® at 5,000km (10,000km for EC-S13/S13X and S15/S15X).

Reference surface

The surface used as an indicator for determining length or position with a given surface (point) as reference, when machining a product.



Ground

The location used as the reference potential to ensure safety when installed on the ground.

<Ground symbols>

Frame ground

Ground

Grease

A substance that breaks up thickener in lubricating oil into a semisolid or solid state.

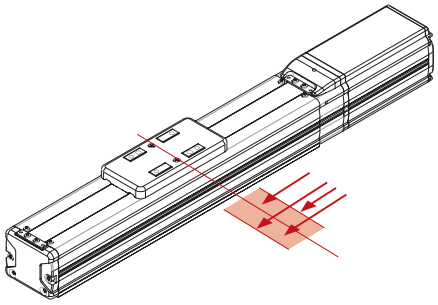
Greasing

Refers to inserting or coating sliding parts with grease.

Explanation of terms

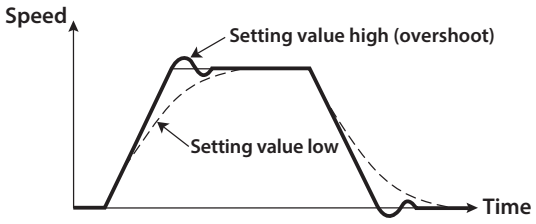
Positioning repeatability

Reproducibility when positioning is repeatedly performed under the same conditions and using the same commands. Positioning is performed 7 times in the same direction from a given point, the stop position is measured, and then the maximum distance that was read is determined. Measurements are taken in the center of the movement range and at each approximate end. The accuracy is then indicated as one-half the value of the highest value calculated, with a "±" symbol in front.



Gain

The value used to adjust response when a controller is controlling a servo motor. Generally, a higher gain will provide better speed response.



Home

The reference point used for actuator operation.

Home return

Refers to returning to the point used as a reference for actuator operation.

Coil

A part that generates electromotive force in proportion to the change in current per unit of time, when the flowing current changes. It allows only direct current, or alternating current of a low frequency, to pass, and prevents as many electrical signals of high frequency from passing as possible.

Capacitor

A passive element used to store an electric charge. It is also sometimes referred to as capacitance or a capacity condenser.

Controller

A mechanical operation device.

Servo control

A control method in which the actual result is compared with the command value and the difference between the two is kept as small as possible, by detecting the current speed and position from the motor and applying feedback upward.

Servo motor

A motor controlled through applying feedback.

Cycle time

The time required for a single process.

3-phase AC

An alternating current formed from 3 phases. It is capable of transmitting power at a lower current than single phase, so it is often used for motive power.

Shielded wire

An electrical wire with electrostatic shielding (aluminum tape, webbing, etc.) covering the core wire. This helps to block noise.

Operation life

The approximate total operation distance possible if ELECYLINDER® is operated according to its specifications.

Jog feed

Refers to manually feeding an object at the predetermined feeding speed.

Switch

An element that allows the flow of electricity to be connected and disconnected through the use of a lever or button.

<Major types of switches>

1 Toggle switch (flick switch)
A switch that is turned ON/OFF using a lever. There are 2P, 3P, and 6P switches, each with a different number of terminal pins.

2 Momentary switch
A switch that turns ON when the control is pressed, and then turns OFF when released.

3 Alternating switch
A switch that stays ON when released, but then turns OFF when pressed again.

Thrust

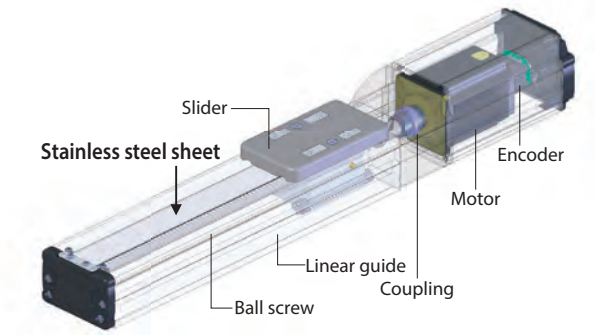
The force pressing an object in the direction of movement.

Stepper motor

A motor that performs angle positioning based on input pulse signals. It is also sometimes called a pulse motor.

Stainless steel sheet

A dust-proof sheet used for slider type actuators.

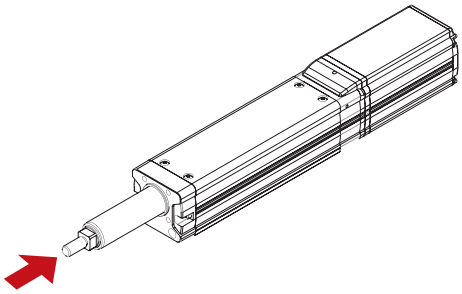


Stroke

The operation range of an actuator.

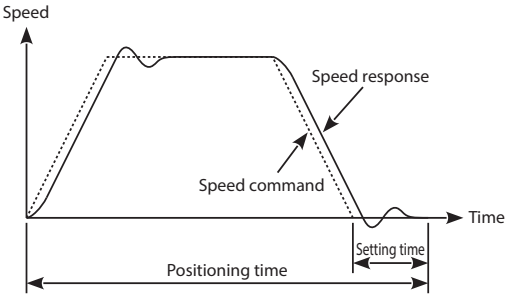
Thrust load

A load applied in the axial direction (axial load).



Settling time

The amount of time it takes during a positioning operation for an object to stop once the speed command value is zero.



Static allowable moment

When a slider is stopped, the value calculated based on the static load rating (N)*1 that can be added to the slider.

*1 When a certain load is applied, the load at which a slight indentation (when the total permanent deformation of the guide ball is approximately 1/10000 the diameter of the ball) is left on the contact surfaces of the guide and ball (steel ball).

Operation range adjustment

An operation range limitation set in software.

Diode

A part that allows electrical current to flow in only one direction.

<Types of diodes>

1. Switching diode
The type of diode used most often for small signals. Small and glass-sealed.

2. Light-emitting diode
An LED. Often used for displays and infrared remotes.

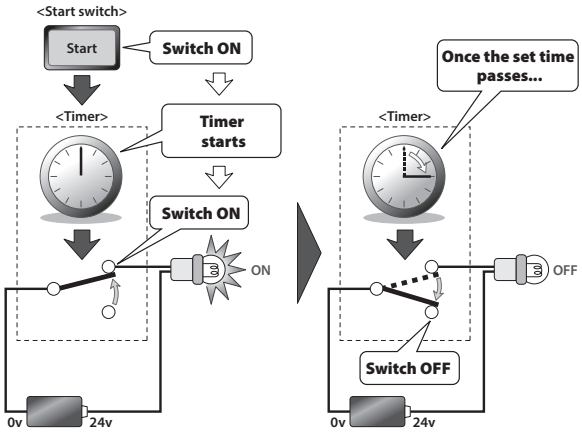
Explanation of terms

Vibration/shock resistance

The degree to which vibration/shock can be withstood.

Timer

An electronic component that starts when it receives an electric start signal and that can switch circuits after a predetermined amount of time has passed.



Tact time

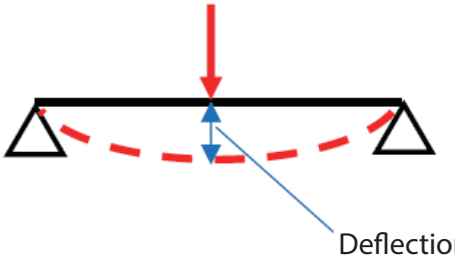
The work time per unit assigned for producing a target production quantity within a certain amount of time on a production line (planned value).

Deviation

A state where the input pulse signal (command position) and motor rotation (position after movement) have lost synchronization due to factors such as shock or overload. Deviation cannot be detected with open loop control, so operation will continue with the position misaligned.

Deflection

Refers to a level material (such as a ball screw) deforming under a weight (load).



Single-phase AC

An alternating current formed from 1 phase. It is often used for power in homes.

Intermediate support mechanism

A ball screw support groove that moves together with a slider.
It controls ball screw runout at a long stroke and greatly improves maximum speed (see P. 345).

Teaching

Refers to storing information in a controller required to perform work.

Rated thrust

Thrust that can be continuously generated.

Rated torque

Torque that can be continuously generated.

Duty

The proportion between the operating time of an actuator and the elapsed time.

Dynamic allowable moment

An indicator for operation life. IAI sets the standard rated operation life of ELECYLINDER® at an operation distance of 5,000km (10,000km for EC-S13/S13X and S15/S15X).

Heat loss

Energy loss that occurs when electrical energy is converted into mechanical energy.

Inrush current

The current flowing to charge a capacitor the moment the power is turned on. It is much higher than stationary current.

Parameter

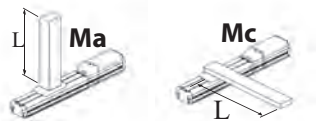
Data stored in a controller to operate an actuator. Examples includes signal input/output settings, or instructions on changing voltage or current in order to run a motor.

Transistor

An element that acts as a switch when current flows between a collector (C) and emitter (E) when a slight current flows to the base (B) area. There are two types: PNP and NPN.

Overhang load length

The approximate maximum length at which something can overhang from a slider.



Transformer

An electric device or part that converts AC voltage or current.

Transported load setting

The setting of the load on ELECYLINDER®.

Noise

Electrical signal distortion caused by unneeded electromagnetic waves leaking from a device.

Hunting

A phenomenon that occurs near the target value, where response begins oscillating.

Noise filter

A device used to prevent noise leaking or intrusion in a power supply or signal.

Emergency stop circuit

A circuit used to stop a system either manually or automatically when the system is in a dangerous state.

Backlash

A gap between two mechanical elements that operate while fit together.

Pitching

An angle indicating the inclination of the forward/backward direction (Ma direction) versus the moving direction.

Explanation of terms

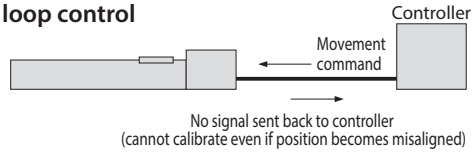
Standard load coefficient

The standard value of the load coefficient determined for a model.

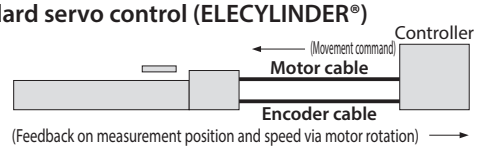
Feedback control

Used to ensure that control results match for commands from the controller and encoder.
The following types of actuator controls are available.

■ **Open loop control**



■ **Semi-closed loop control**
Standard servo control (ELECYLINDER®)



Load factor

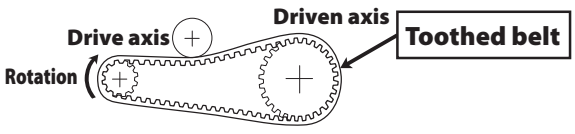
The proportion of a load versus the rated output of the motor.

Frame ground

The location holding a stable charge formed from a large conductor such as the system frame.

Belt-driven

A driving system in which motive power is transmitted over a belt from the drive axis to the driven axis. IAI mainly uses toothed belts.



Bore diameter

The inner diameter of a cylinder.

Ball screw

A machine part in which the screw axis and nut operate along balls.

Protective structure (IP☐☐)

The degree of protection provided against liquids, the human body, and solid foreign matter.
It is based on IEC (International Electrotechnical Commission), JIS (Japanese Industrial Standards), and JEMA (Japan Electrical Manufacturers' Association) standards.

Mechanical end

The position at which a slider reaches its mechanical limit of movement.

Moment

The force that attempts to rotate an object.

Leakage current

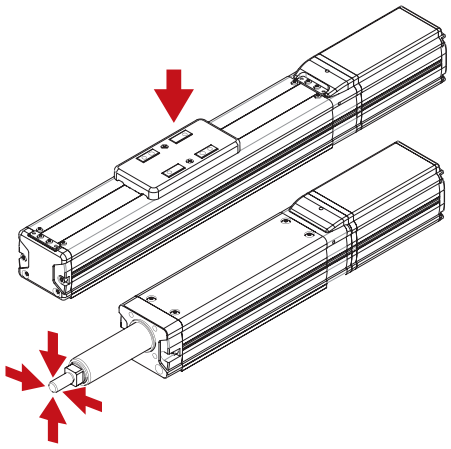
A slight current that leaks from a part used in a system that uses high-voltage power (100VAC, etc.), into a surrounding conductor (generally the frame).

Yawing

An angle indicating the inclination of the left/right direction (Mb direction) versus the moving direction.

Radial load

The load applied vertically versus the operation direction of a direct-acting actuator.



Lead

The distance a slider moves when the feed screw is rotated once. A larger lead will result in a faster slider, but less thrust.

Linear guide

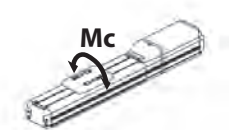
A mechanism that guides the actuator slider.

Relay

An element consisting of an electromagnet and contact mechanism, where the magnetic attraction generated when a current of a certain value or higher is applied to the electromagnet is used to operate the contact mechanism. The voltage and current (input signal) applied to a coil cause the contact to open and close.

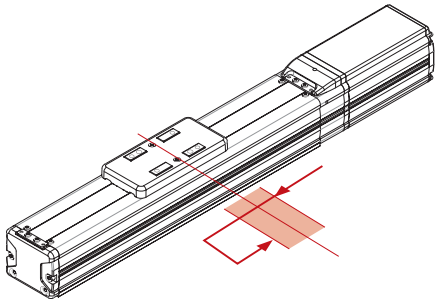
Rolling

An angle indicating the inclination of the rotation direction (Mc direction) versus the moving direction.



Lost motion

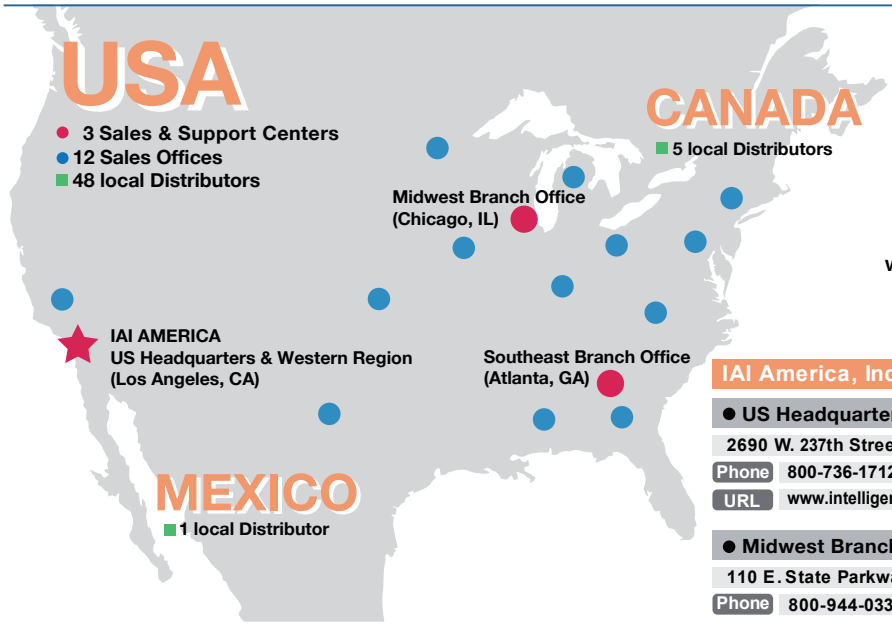
The difference in the stop positions for positioning with positive facing and positioning with negative facing, for a given position.
Positioning is performed 7 times in both the positive and negative direction from a given point, the stop position is measured, and then the average differences are calculated for both the positive and negative measurement values. Measurements are taken in the center of the movement range and at each approximate end. The largest average distance is then used as the measurement value.



Robot cable

A cable that offers excellent resistance to bending and twisting.

Support for phase of planning, product selection, quotation, problem solving, maintenance, training, etc.



The information contained in this booklet may change without prior notice due to product improvement.

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Catalog Parts/Term List <Alphabetical order>

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