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Flexible Belt Drive Linear Axes System FS

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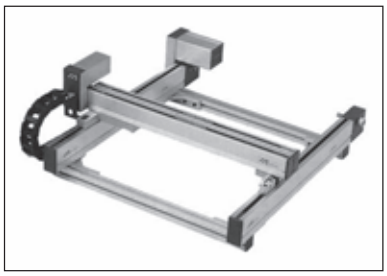
FS

Flexible Belt Drive Linear Axes System

FS Actuator Module & FS Guide Module



Example of FS Gantry System

* Figures above show non-CE compliant product versions with extra motor cover.

Features:

- A wide variety of configurations are possible by simply combining Actuator, Guide Rail and Profile Modules.
- The slim design enables the FS Linear Axes to provide from 300 up to 3000 mm stroke.
- The FS Large Type focuses on 2 main types: A High-Speed Type (max. speed: 2000 mm/s) and a High-Payload Type (max. payload: 60 kg).
- Timing Belt Drive Method provides a quieter motion.
- Gantry-Type Systems with larger work areas are achievable using guide modules also available in this series.

Long Slider Option:

D1 and D2 versions (available as options) have longer slider than the standard FS actuator and come with a dust prevention stainless steel sheet.

FS Series Overview

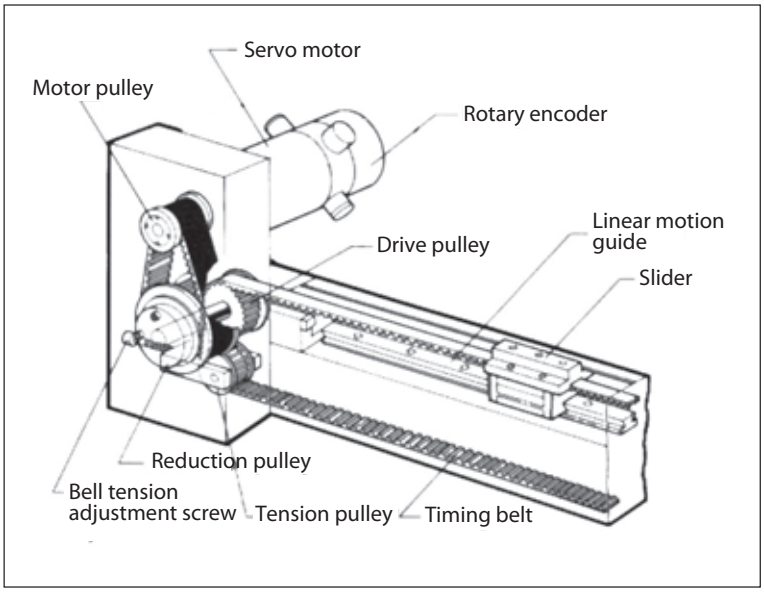
The FS Series is broadly classified into two product categories:

FS Modules (single unit) and FS Units (assembled FS modules)

FS Modules are either a narrow, wide or large frame type and consist of a single guide type actuator module connected to a 60W, 100W, 200W, or 400W AC servo motor and a single extruded guide module.
With the FS Series actuators, generally you would purchase the individual FS Modules to construct one of the three configuration types for the FS Units:

Single-axis Table, Gantry or Cantilever

However, depending on your particular application, you may find it easier to purchase the pre-assembled FS Units. Your FS Unit can be customized according to your specifications and drawings (stroke length, available space, payload, speed, etc.).



Components of FS Single Guide Type Actuator Module

Explanation of Model Description

FS – [ ] – [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Series

FS	Standard Type

Type

11NM	Narrow Single Slider Type	11WO	Wide Single Slider Guide Module		
12NM	Narrow Double Slider Type	12WO	Wide Double Slider Guide Module		
11NO	Narrow Single Slider Guide Module	11LM	Large Single Slider Type		
12NO	Narrow Double Slider Guide Module	12LM	Large Double Slider Type		
11WM	Wide Single Slider Type	11LO	Large Single Slider Guide Module	11HM	Large High-speed Single Slider Type
12WM	Wide Double Slider Type	12LO	Large Double Slider Guide Module	12HM	Large High-speed Double Slider Type

Encoder Type

A	Absolute
I	Incremental

Motor Type

60	60W
100	100W
200	200W
400	400W

Stroke

300	300mm
~	~
3000	3000mm
In 100mm steps	

Applicable Controller

T1	XSEL-KE/KET
T2	SCON-CA/CAL
	MSCON
	SSEL
	XSEL-P/Q

Cable Length

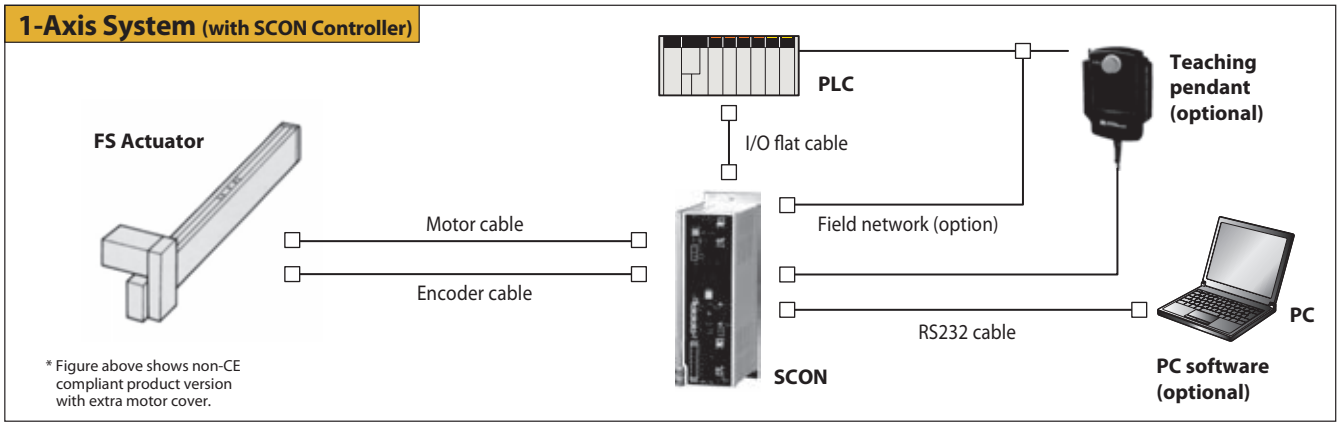
N	No Cable
S	3 m
M	5 m
X□□	Specified Length

Options

D1	Slider Length equal to 2 standard Sliders (200mm)
D2	Slider Length equal to 3 standard Sliders (300mm)
NM	Reverse Home Specification
R	Motor Mounting on Opposite Side
U	Motor Mounting on Bottom
RU	Motor Mounting on Opposite Side on Bottom
EU	Metal Cable Joint Connector
CE	Compliance with CE-Conformity (Standard Option)

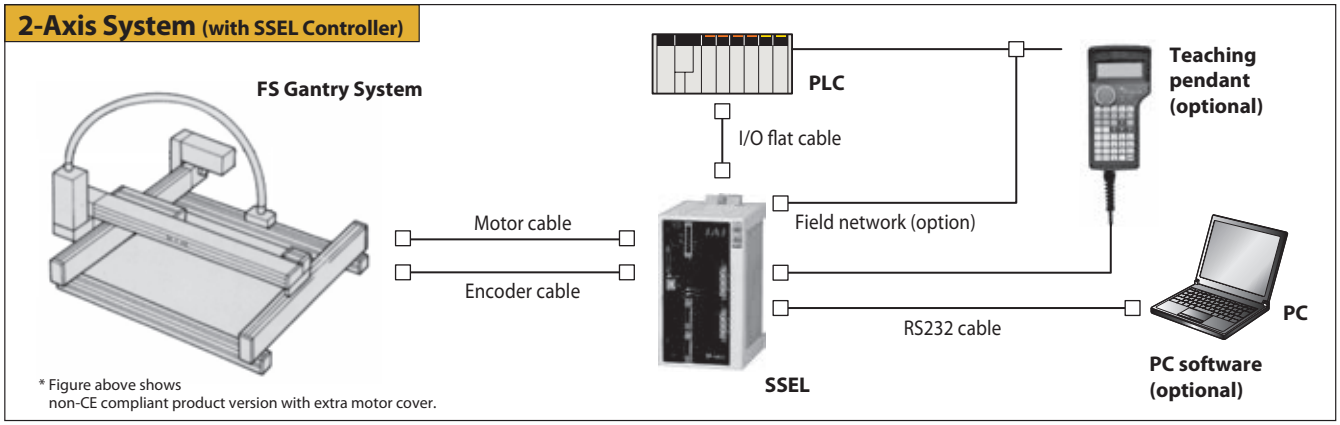
System Configuration Examples

1-Axis System (with SCON Controller)



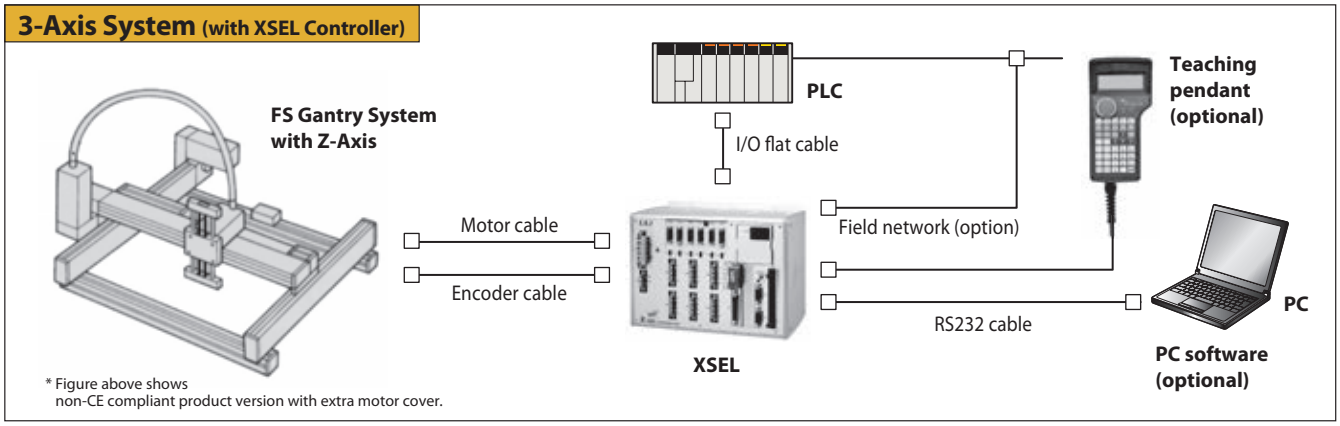
* Figure above shows non-CE compliant product version with extra motor cover.

2-Axis System (with SSEL Controller)



* Figure above shows non-CE compliant product version with extra motor cover.

3-Axis System (with XSEL Controller)



* Figure above shows non-CE compliant product version with extra motor cover.

FS-NM-60

Single-axis robot / Narrow belt type / Actuator width: 40mm / 60W

Model Specification Items

FS — ☐ — ☐ — 60 — ☐ — ☐ — ☐ — ☐

Series	Type	Encoder type	Motor type	Stroke	Applicable controller	Cable length	Options
FS	11NM: Single slider specification 12NM: Double slider specification	A: Absolute specification I: Incremental specification	60: 60W	300: 300mm 〜 1000: 1000mm (in 100mm increments)	T1: XSEL-KE/KET T2: SCON-CA/CAL MSCON SSEL XSEL-P/Q	N: None S: 3m M: 5m X☐☐: Specified length	Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11NM -①-60-②-③-④-⑤	Absolute Incremental	60	Single	300~1000	1~1250	2	Designed exclusively for horizontal use	29
FS-12NM -①-60-②-③-④-⑤			Double			9 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12NM only
Slider length equal to 300mm	D2	Available for 12NM only
Reversed-home specification	NM	
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Refer to P. 12 (Installation/Mounting)
Motor positioned at bottom on opposite side	RU	Refer to P. 12 (Installation/Mounting)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA/CAL, MSCON
Cable length (Note 3)	N: None, S: 3m, M: 5m, X☐☐: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

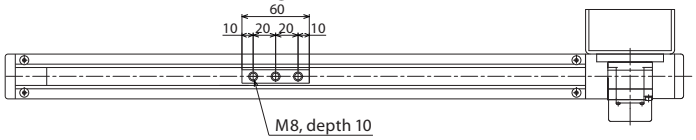
Dimensions

* CAD drawings are available for download from our website.

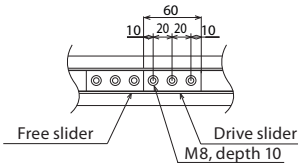
2D CAD

RoHS

11NM (Single slider)



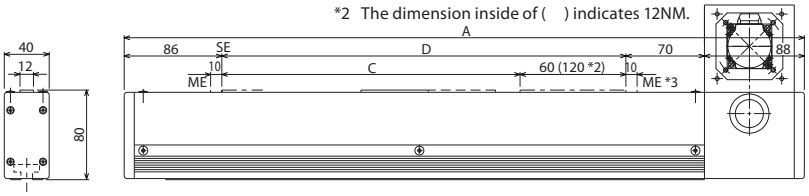
12NM (Double slider)



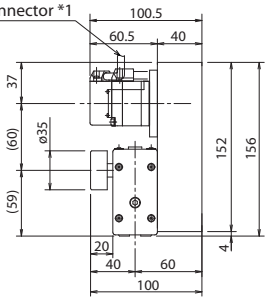
*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

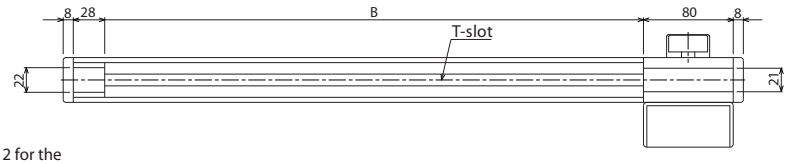
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12NM.

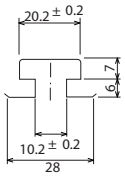


Cable joint connector *1





*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11NM-60

Stroke	300	400	500	600	700	800	900	1000
A	604	704	804	904	1004	1104	1204	1304
B	480	580	680	780	880	980	1080	1180
C	300	400	500	600	700	800	900	1000
D	360	460	560	660	760	860	960	1060
Mass (kg)	5.0	5.4	5.8	6.2	6.6	7.0	7.4	7.8
Payload (kg)	2							

FS-12NM-60

Stroke	300	400	500	600	700	800	900	1000
A	704	804	904	1004	1104	1204	1304	1404
B	580	680	780	880	980	1080	1180	1280
C	340	440	540	640	740	840	940	1040
D	460	560	660	760	860	960	1060	1160
Mass (kg)	5.7	6.0	6.5	6.9	7.3	7.7	8.1	8.5
Payload (kg)	9				7		5	

* 300~1000mm strokes are available in 100mm increments. Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Max. number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
MSCON	6 axes		Positioner control	
SCON-CA/CAL	1 axis			

CAUTION

(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-NM-100

Single-axis robot / Narrow belt type / Actuator width: 40mm / 100W

Model Specification Items

FS — [Type] — [Encoder type] — 100 — [Stroke] — [Applicable controller] — [Cable length] — [Options]

Series	Type	Encoder type	Motor type	Stroke	Applicable controller	Cable length	Options
FS	11NM: Single slider specification 12NM: Double slider specification	A: Absolute specification I: Incremental specification	100: 100W	300: 300mm 〜 1000: 1000mm (in 100mm increments)	T1: XSEL-KE/KET T2: SCON-CA/CAL MSCON SSEL XSEL-P/Q	N : None S : 3m M: 5m X□□: Specified length	Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11NM -①-100-②-③-④-⑤	Absolute Incremental	100	Single	300~1000	1~1250	3	Designed exclusively for horizontal use	49
FS-12NM -①-100-②-③-④-⑤			Double			15 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12NM only
Slider length equal to 300mm	D2	Available for 12NM only
Reversed-home specification	NM	
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Refer to P. 12 (Installation/Mounting)
Motor positioned at bottom on opposite side	RU	Refer to P. 12 (Installation/Mounting)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA/CAL, MSCON
Cable length (Note 3)	N: None, S: 3m, M: 5m, X□□: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

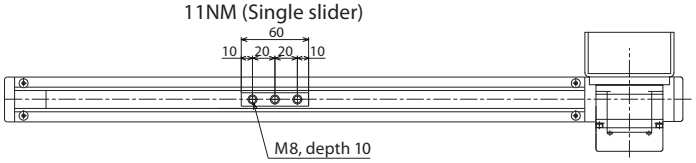
Dimensions

CAD drawings are available for download from our website.

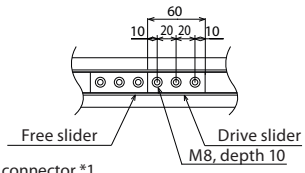
2D CAD

RoHS

11NM (Single slider)



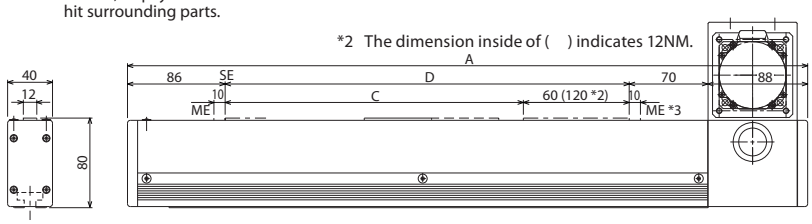
12NM (Double slider)



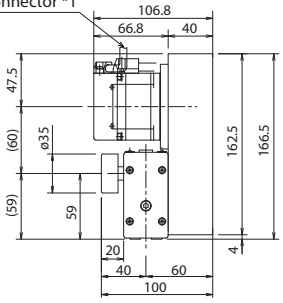
*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

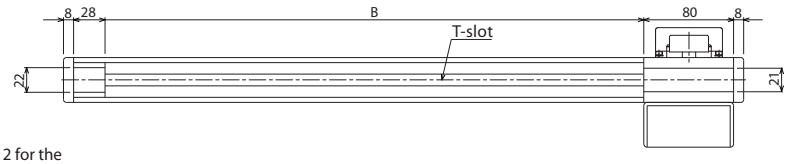
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12NM.

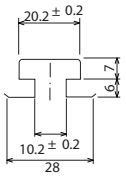


Cable joint connector *1





*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11NM-100

Stroke	300	400	500	600	700	800	900	1000
A	604	704	804	904	1004	1104	1204	1304
B	480	580	680	780	880	980	1080	1180
C	300	400	500	600	700	800	900	1000
D	360	460	560	660	760	860	960	1060
Mass (kg)	5.0	5.4	5.8	6.2	6.6	7.0	7.4	7.8
Payload (kg)	3							

FS-12NM-100

Stroke	300	400	500	600	700	800	900	1000
A	704	804	904	1004	1104	1204	1304	1404
B	580	680	780	880	980	1080	1180	1280
C	340	440	540	640	740	840	940	1040
D	460	560	660	760	860	960	1060	1160
Mass (kg)	5.7	6.0	6.5	6.9	7.3	7.7	8.1	8.5
Payload (kg)	15				11		9	

* 300~1000mm strokes are available in 100mm increments. Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Max. number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
MSCON	6 axes		Positioner control	
SCON-CA/CAL	1 axis			

CAUTION

(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-NO

Single-axis robot / Actuator width: 40mm / Narrow guide module

Model Specification Items

FS	—	☐	—	0	—	☐	—	☐
Series		Type		Motor type		Stroke		Options
		11NO: Single slider specification 12NO: Double slider specification		0: No motor		300: 300mm 〜 1000: 1000mm (in 100mm increments)		Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11NO-0-①-②	—	—	Single	300~1000	—	—	—	—
FS-12NO-0-①-②			Double					

* In the above model numbers, ① indicates the stroke, and ② indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12NO only
Slider length equal to 300mm	D2	Available for 12NO only

Common Specifications

Positioning repeatability	—
Drive method	—
Lost Motion	—
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Cable length	—
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

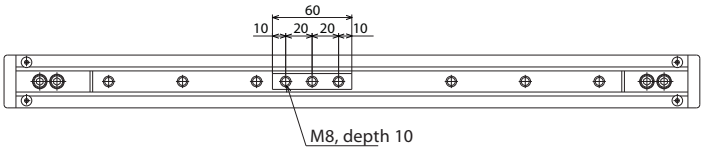
Dimensions

CAD drawings are available for download from our website.

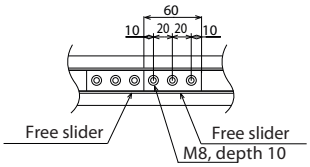
2D CAD

RoHS

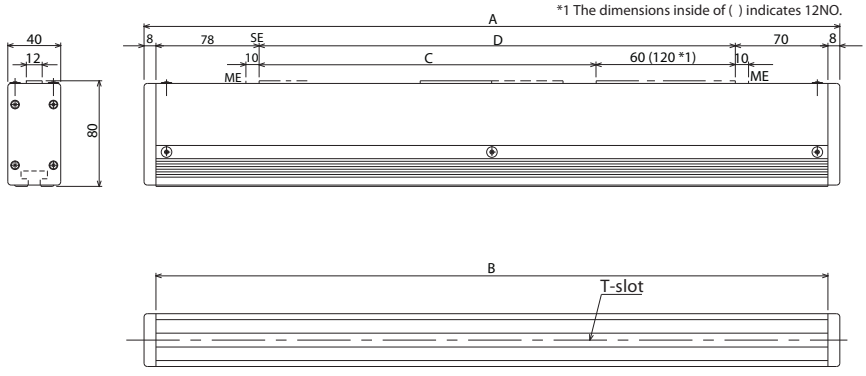
11NO (Single slider)



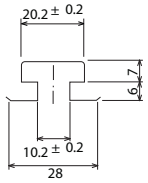
12NO (Double Slider)



*1 The dimensions inside of ( ) indicates 12NO.



SE: Stroke End
ME: Mechanical End



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11NO-0

Stroke	300	400	500	600	700	800	900	1000
A	524	624	724	824	924	1024	1124	1224
B	508	608	708	808	908	1008	1108	1208
C	300	400	500	600	700	800	900	1000
D	360	460	560	660	760	860	960	1060
Mass (kg)	2.4	2.8	3.2	3.6	4.1	4.4	4.8	5.2
Payload (kg)	–							

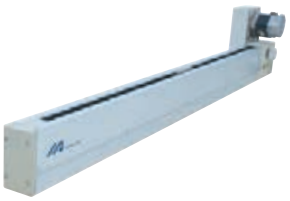
FS-12NO-0

Stroke	300	400	500	600	700	800	900	1000
A	624	724	824	924	1024	1124	1224	1324
B	608	708	808	908	1008	1108	1208	1308
C	340	440	540	640	740	840	940	1040
D	460	560	660	760	860	960	1060	1160
Mass (kg)	3.1	3.5	3.9	4.3	4.8	5.1	5.5	5.9
Payload (kg)	–							

* 300~1000mm strokes are available in 100mm increments.
Dimensions A~D increase by 100mm for every 100mm stroke increment.

FS-WM-100

Single-axis robot / Wide belt type / Actuator width: 52mm / 100W



Model Specification Items

FS	—	☐	—	☐	—	100	—	☐	—	☐	—	☐	—	☐
Series		Type		Encoder type		Motor type		Stroke		Applicable controller		Cable length		Options
		11WM: Single slider specification 12WM: Double slider specification		A: Absolute specification I: Incremental specification		100: 100W		300: 300mm 〜 2500: 2500mm (in 100mm increments)		T1: XSEL-KE/KET T2: SCON-CA/CAL MSCON SSEL XSEL-P/Q		N : None S : 3m M: 5m X☐☐: Specified length		Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11WM-①-100-②-③-④-⑤	Absolute Incremental	100	Single	300~2500	1~1250	3	Designed exclusively for horizontal use	49
FS-12WM-①-100-②-③-④-⑤			Double			15 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12WM only
Slider length equal to 300mm	D2	Available for 12WM only
Reversed-home specification	NM	
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Refer to P. 12 (Installation/Mounting)
Motor positioned at bottom on opposite side	RU	Refer to P. 12 (Installation/Mounting)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA/CAL, MSCON
Cable length (Note 3)	N: None, S: 3m, M: 5m, X☐☐: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

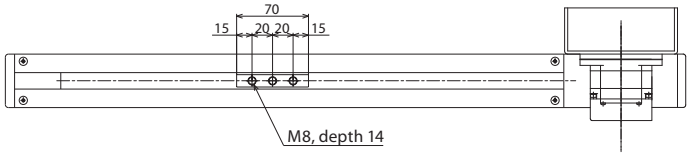
Dimensions

CAD drawings are available for download from our website.

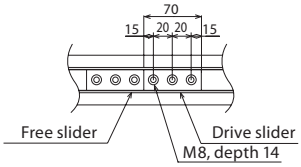
2D CAD

RoHS

11WM (Single slider)



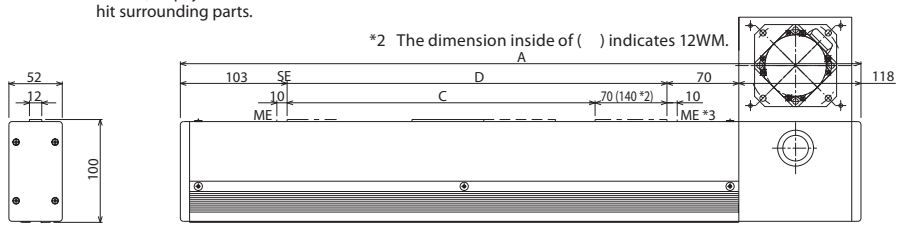
12WM (Double slider)



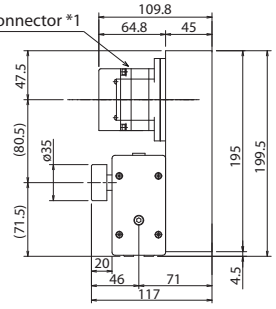
*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

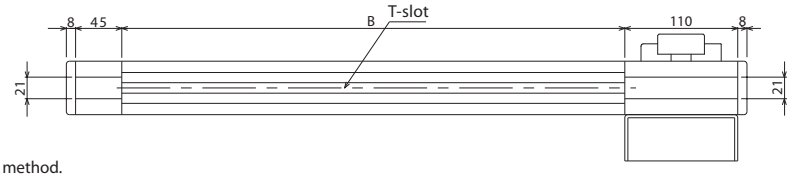
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12WM.

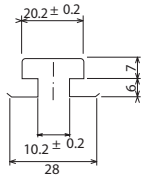


Cable joint connector *1





*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11WM-100

Stroke	300	400	600	800	1000	1500	2000	2500
A	661	761	961	1161	1361	1861	2361	2861
B	490	590	790	990	1190	1690	2190	2690
C	300	400	600	800	1000	1500	2000	2500
D	370	470	670	870	1070	1570	2070	2570
Mass (kg)	8.7	9.3	10.5	11.7	12.9	15.9	18.9	21.9
Payload (kg)	3							

FS-12WM-100

Stroke	300	400	600	800	1000	1500	2000	2500
A	761	861	1061	1261	1461	1961	2461	2961
B	590	690	890	1090	1290	1790	2290	2790
C	330	430	630	830	1030	1530	2030	2530
D	470	570	770	970	1170	1670	2170	2670
Mass (kg)	9.9	10.5	11.7	12.9	14.1	17.1	20.1	23.1
Payload (kg)	15						11	9

* 300~2500mm strokes are available in 100mm increments. Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Max. number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
MSCON	6 axes		Positioner control	
SCON-CA/CAL	1 axis			

CAUTION

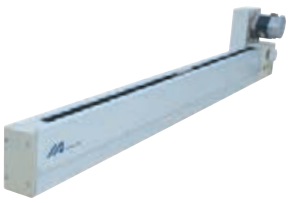
(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-WM-200

Single-axis robot / Wide belt type / Actuator width: 52mm / 200W



Model Specification Items

FS	—		—		—	200	—		—		—		—	
Series		Type		Encoder type		Motor type		Stroke		Applicable controller		Cable length		Options
		11WM: Single slider specification 12WM: Double slider specification		A: Absolute specification I: Incremental specification		200: 200W		300: 300mm 〈 2500: 2500mm (in 100mm increments)		T1: XSEL-KE/KET T2: SCON-CA/CAL MSCON SSEL XSEL-P/Q		N : None S : 3m M: 5m X□□: Specified length		Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11WM-①-200-②-③-④-⑤	Absolute Incremental	200	Single	300~2500	1~1250	6	Designed exclusively for horizontal use	98
FS-12WM-①-200-②-③-④-⑤			Double			30 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12WM only
Slider length equal to 300mm	D2	Available for 12WM only
Reversed-home specification	NM	
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Refer to P. 12 (Installation/Mounting)
Motor positioned at bottom on opposite side	RU	Refer to P. 12 (Installation/Mounting)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA/CAL, MSCON
Cable length (Note 3)	N: None, S: 3m, M: 5m, X□□: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

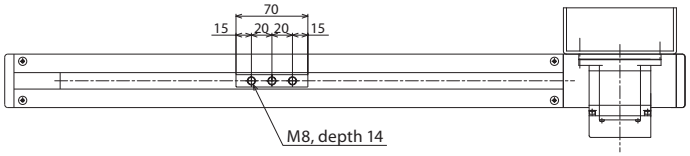
Dimensions

CAD drawings are available for download from our website.

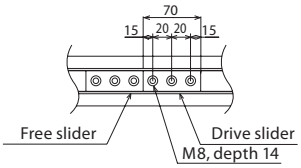
2D CAD

RoHS

11WM (Single slider)



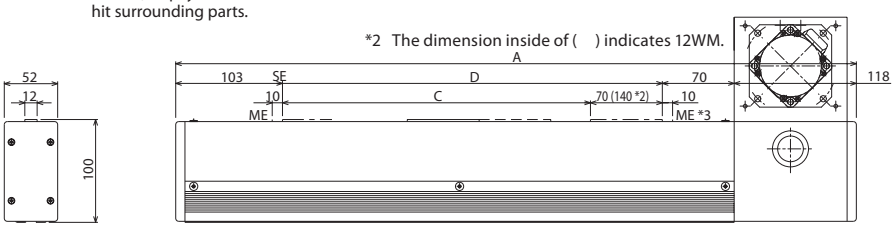
12WM (Double slider)



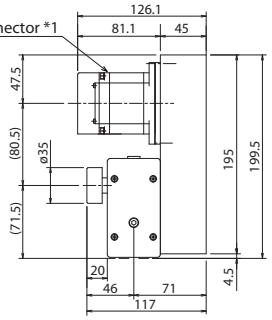
*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

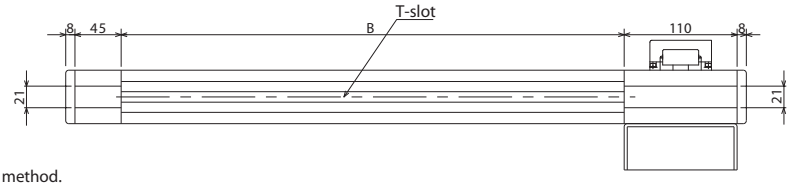
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12WM.

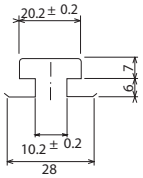


Cable joint connector *1





*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11WM-200

Stroke	300	400	600	800	1000	1500	2000	2500
A	661	761	961	1161	1361	1861	2361	2861
B	490	590	790	990	1190	1690	2190	2690
C	300	400	600	800	1000	1500	2000	2500
D	370	470	670	870	1070	1570	2070	2570
Mass (kg)	9.8	10.4	11.6	12.8	14.0	17.0	20.0	23.0
Payload (kg)	6							

FS-12WM-200

Stroke	300	400	600	800	1000	1500	2000	2500
A	761	861	1061	1261	1461	1961	2461	2961
B	590	690	890	1090	1290	1790	2290	2790
C	330	430	630	830	1030	1530	2030	2530
D	470	570	770	970	1170	1670	2170	2670
Mass (kg)	11.0	11.6	12.8	14.0	15.2	18.2	21.2	24.2
Payload (kg)	30						22	18

* 300~2500mm strokes are available in 100mm increments. Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Max. number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
MSCON	6 axes		Positioner control	
SCON-CA/CAL	1 axis			

CAUTION

(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-WO

Single-axis robot / Actuator width: 52mm / Wide guide module

Model Specification Items

FS	—	☐	—	0	—	☐	—	☐
Series		Type		Motor type		Stroke		Options
		11WO: Single slider specification 12WO: Double slider specification		0: No motor		300: 300mm 〜 2500: 2500mm (in 100mm increments)		Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11WO-0-① - ②	—	—	Single	300~2500	—	—	—	—
FS-12WO-0-① - ②			Double					

* In the above model numbers, ① indicates the stroke, and ② indicates the option(s).

Options

Name	Code	Remarks
Slider length equal to 200mm	D1	Available for 12WO only
Slider length equal to 300mm	D2	Available for 12WO only

Common Specifications

Positioning repeatability	—
Drive method	—
Lost Motion	—
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Cable length	—
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

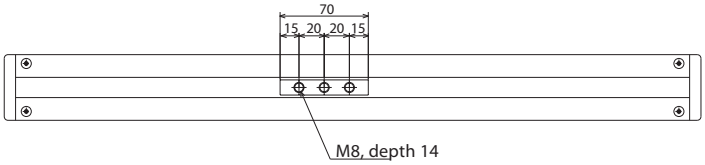
Dimensions

CAD drawings are available for download from our website.

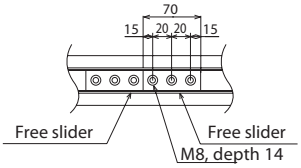
2D CAD

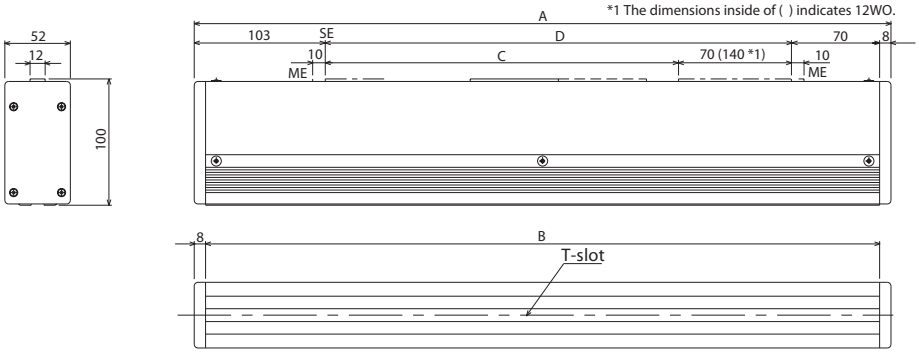
RoHS

11WO (Single slider)

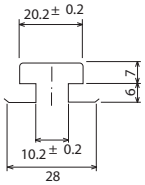


12WO (Double Slider)





SE: Stroke End
ME: Mechanical End



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11WO-0

Stroke	300	400	600	800	1000	1500	2000	2500
A	551	651	851	1051	1251	1751	2251	2751
B	535	635	835	1035	1235	1735	2235	2735
C	300	400	600	800	1000	1500	2000	2500
D	370	470	670	870	1070	1570	2070	2570
Mass (kg)	4.9	5.6	6.7	8.3	9.6	12.9	16.3	19.6
Payload (kg)	–							

FS-12WO-0

Stroke	300	400	600	800	1000	1500	2000	2500
A	651	751	951	1151	1351	1851	2351	2851
B	635	735	935	1135	1335	1835	2335	2835
C	330	430	630	830	1030	1530	2030	2530
D	470	570	770	970	1170	1670	2170	2670
Mass (kg)	5.6	6.2	7.6	8.9	10.2	13.6	16.9	20.3
Payload (kg)	–							

* 300~2500mm strokes are available in 100mm increments.
Dimensions A~D increase by 100mm for every 100mm stroke increment.

FS-LM-400

Single-axis robot / Large belt type / Actuator width: 75mm / 400W

Model Specification Items

FS	—	☐	—	☐	—	400	—	☐	—	☐	—	☐	—	☐
Series		Type		Encoder type		Motor type		Stroke		Applicable controller		Cable length		Options
		11LM: Single slider specification 12LM: Double slider specification		A: Absolute specification I: Incremental specification		400: 400W		1000: 1000mm 〜 3000: 3000mm (in 100mm increments)		T1: XSEL-KE/KET T2: SCON-CA SSEL XSEL-P/Q		N : None S : 3m M: 5m X☐☐: Specified length		Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11LM-①-400-②-③-④-⑤	Absolute Incremental	400	Single	1000~3000	1~1250	15	Designed exclusively for horizontal use	196
FS-12LM-①-400-②-③-④-⑤			Double			60 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Reversed-home specification	NM	Available for 11LM only
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Special order; refer to P. 12 (Install./Mount.)
Motor positioned at bottom on opposite side	RU	Special order; refer to P. 12 (Install./Mount.)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA
Cable length (Note 3)	N: None, S: 3m, M: 5m, X☐☐: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

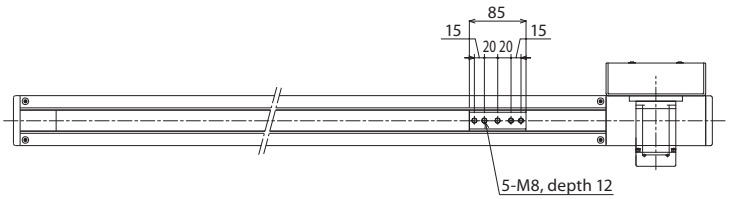
Dimensions

CAD drawings are available for download from our website.

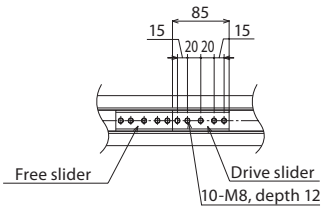
2D CAD

RoHS

11LM (Single slider)

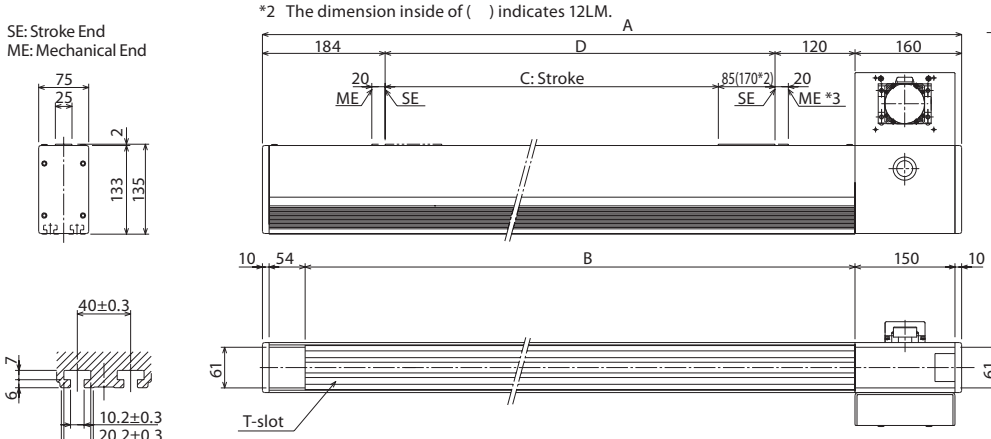


12LM (Double slider)



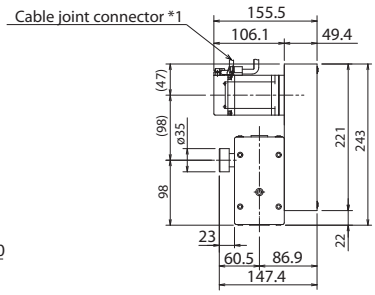
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12LM.



T-slot dimension

Cable joint connector *1



*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.

*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

* Refer to P. 12 for the actuator installation method.

FS-11LM-400

Stroke	1000	1500	2000	2500	3000
A	1549	2049	2549	3049	3549
B	1325	1825	2325	2825	3325
C	1000	1500	2000	2500	3000
D	1085	1585	2085	2585	3085
Mass (kg)	28	34	40	47	53
Payload (kg)	15				

FS-12LM-400

Stroke	1000	1500	2000	2500	3000
A	1649	2149	2649	3149	3649
B	1425	1925	2425	2925	3425
C	1015	1515	2015	2515	3015
D	1185	1685	2185	2685	3185
Mass (kg)	31	37	43	49	56
Payload (kg)	60		44	36	28

* 1000~3000mm strokes are available in 100mm increments.
Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Maximum number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
SCON-CA	1 axis		Positioner control	

CAUTION

(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-HM-400

Single-axis robot / Large belt type / Actuator width: 75mm / 400W
High-speed specification

Model Specification Items

FS — ☐ — ☐ — 400 — ☐ — ☐ — ☐ — ☐ — ☐

Series	Type	Encoder type	Motor type	Stroke	Applicable controller	Cable length	Options
FS	11HM: Single slider specification 12HM: Double slider specification	A: Absolute specification I: Incremental specification	400: 400W	1000: 1000mm 〜 3000: 3000mm (in 100mm increments)	T1: XSEL-KE/KET T2: SCON-CA SSEL XSEL-P/Q	N: None S: 3m M: 5m X☐☐: Specified length	Refer to the options table below.

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload (Note 1)		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11HM-①-400-②-③-④-⑤	Absolute Incremental	400	Single	1000~3000	1~2000	10	Designed exclusively for horizontal use	127
FS-12HM-①-400-②-③-④-⑤			Double			40 (Note 2)		

* In the above model numbers, ① indicates the encoder type, ② indicates the stroke, ③ indicates the applicable controller, ④ indicates the cable length, and ⑤ indicates the option(s).

Options

Name	Code	Remarks
Reversed-home specification	NM	Available for 11HM only
Motor positioned on the opposite side	R	Refer to P. 12 (Installation/Mounting)
Motor positioned at the bottom	U	Special order; refer to P. 12 (Install./Mount.)
Motor positioned at bottom on opposite side	RU	Special order; refer to P. 12 (Install./Mount.)
Metal Cable Joint Connector	EU	
Compliance with CE Conformity	CE	Standard option

Common Specifications

Positioning repeatability	±0.08mm
Drive method	Timing belt
Lost Motion	0.1mm max.
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Applicable controller	T1: XSEL-KE/KET T2: XSEL-P/Q, SSEL, SCON-CA
Cable length (Note 3)	N: None, S: 3m, M: 5m, X☐☐: Specified length
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

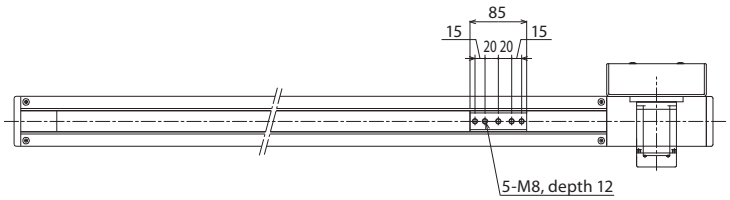
Dimensions

CAD drawings are available for download from our website.

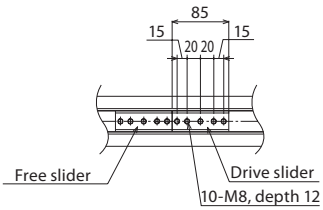
2D CAD

RoHS

11HM (Single slider)

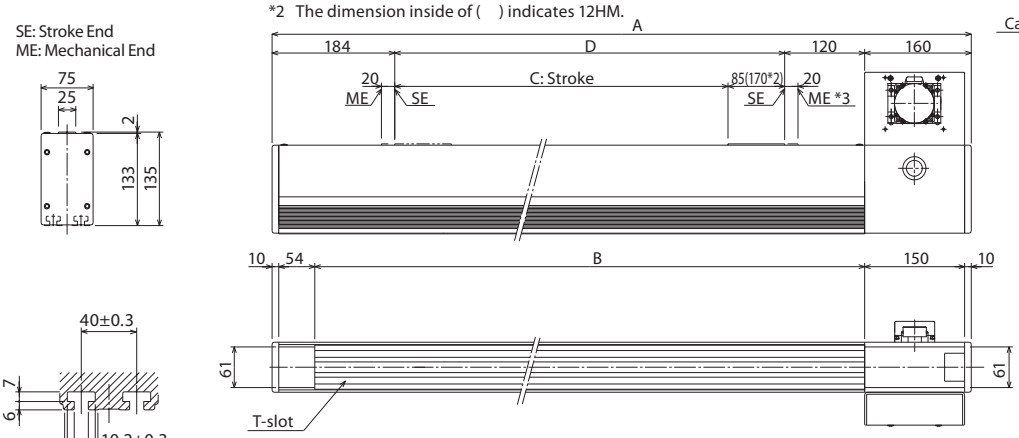


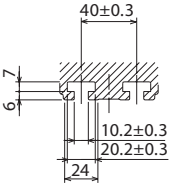
12HM (Double slider)



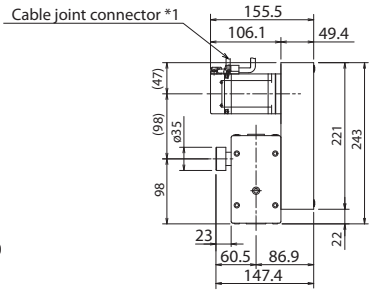
SE: Stroke End
ME: Mechanical End

*2 The dimension inside of ( ) indicates 12HM.





T-slot dimension



*1
Connect the motor cable and encoder cable. Refer to the back page for the cables.

*3
During the home return, the slider moves to the ME, so pay attention not to let the slider hit surrounding parts.

* Refer to P. 12 for the actuator installation method.

FS-11HM-400

Stroke	1000	1500	2000	2500	3000
A	1549	2049	2549	3049	3549
B	1325	1825	2325	2825	3325
C	1000	1500	2000	2500	3000
D	1085	1585	2085	2585	3085
Mass (kg)	28	34	40	47	53
Payload (kg)	10				

FS-12HM-400

Stroke	1000	1500	2000	2500	3000
A	1649	2149	2649	3149	3649
B	1425	1925	2425	2925	3425
C	1015	1515	2015	2515	3015
D	1185	1685	2185	2685	3185
Mass (kg)	31	37	43	49	56
Payload (kg)	40		30	25	20

* 1000~3000mm strokes are available in 100mm increments.
Dimensions A~D increase by 100mm for every 100mm stroke increment.

Applicable Controller Specifications

Applicable Controller	Maximum number of controlled axes	Connectable encoder type	Operating method	Power-supply voltage
X-SEL-P/Q	6 axes	Absolute/ incremental	Program	Single/three-phase 230 VAC
X-SEL-KE/KET	4 axes			Single-phase 115/230 VAC
SSEL	2 axes			
SCON-CA	1 axis		Positioner control	

CAUTION

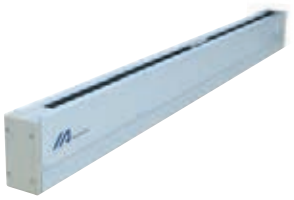
(Note 1) The payload is the value when operated at 0.3 G acceleration.

(Note 2) Note that when the stroke increases, the payload will drop. (Refer to the tables above for payload by stroke.)

(Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example. X08 = 8 m)

FS-LO

Single-axis robot / Actuator width: 75mm / Large guide module



Model Specification Items

FS	—	☐	—	0	—	☐
Series		Type		Motor type		Stroke
		11LO: Single slider specification 12LO: Double slider specification		0: No motor		1000: 1000mm ⌇ 3000: 3000mm (in 100mm increments)

Models/Specifications

Model	Encoder type	Motor output (W)	Slider	Stroke in 100mm increments (mm)	Speed (mm/s)	Payload		Rated thrust (N)
						Horizontal (kg)	Vertical (kg)	
FS-11LO-0-①	—	—	Single	1000~3000	—	—	—	—
FS-12LO-0-①			Double					

* In the above model numbers, ① indicates the stroke.

Common Specifications

Positioning repeatability	—
Drive method	—
Lost Motion	—
Allowable static load moment	Refer to P. 14 (Technical Reference)
Allowable dynamic load moment	Refer to P. 13 (Technical Reference)
Overhang load length	Refer to P. 13 (Technical Reference)
Base	Material: Aluminum, with white alumite treatment
Cable length	—
Ambient operating temperature/humidity	0 to 40°C, 85%RH max. (non-condensing)

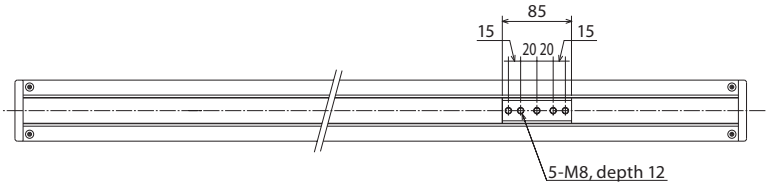
Dimensions

CAD drawings are available for download from our website.

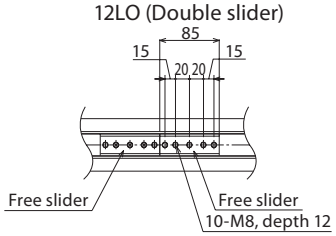
2D CAD

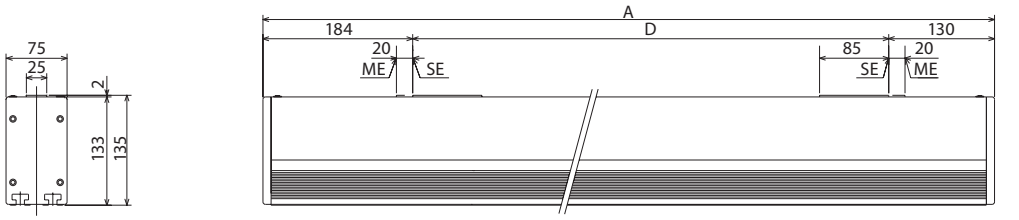
RoHS

11LO (Single slider)

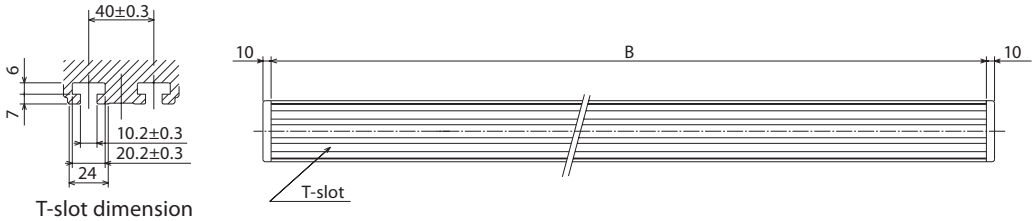


12LO (Double slider)





SE: Stroke End
ME: Mechanical End



T-slot dimension

* Refer to P. 12 for the actuator installation method.

FS-11LO-0

Stroke	1000	1500	2000	2500	3000
A	1403	1903	2403	2903	3403
B	1379	1879	2379	2879	3379
C	1000	1500	2000	2500	3000
D	1085	1585	2085	2585	3085
Mass (kg)	19	25	31	38	44
Payload (kg)	–				

FS-12LO-0

Stroke	1000	1500	2000	2500	3000
A	1503	2003	2503	3003	3503
B	1479	1979	2479	2979	3479
C	1015	1515	2015	2525	3025
D	1185	1685	2185	2685	3185
Mass (kg)	22	28	34	40	46
Payload (kg)	–				

* 1000~3000mm strokes are available in 100mm increments.
Dimensions A~D increase by 100mm for every 100mm stroke increment.

Installation & Mounting of FS Actuator

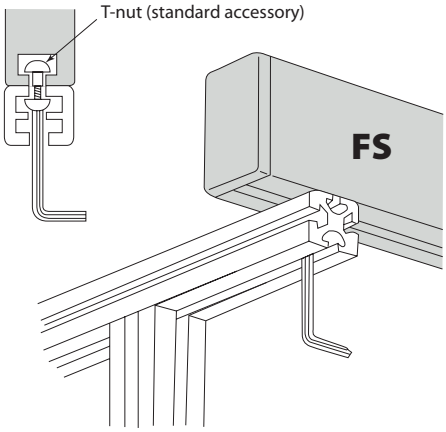
Installation method

FS Series

NM, NO, WM, WO, LM, LO, HM

■ Using the T-groove on the back of the base, secure the body with the T-nut supplied with the actuator.

- FS-NM (T-slot 1 line) : T-nut M8
- FS-NO (T-slot 1 line) : T-nut M8
- FS-WM (T-slot 1 line) : T-nut M8
- FS-WO (T-slot 1 line) : T-nut M8
- FS-LM (T-slot 2 lines) : T-nut M8
- FS-LO (T-slot 2 lines) : T-nut M8
- FS-HM (T-slot 2 lines) : T-nut M8



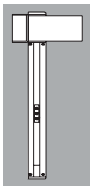
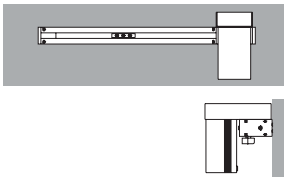
■ Quantity of T-nut included

Stroke	Quantity
300~1000	5
1100~1500	6
1600~2000	7
2100~2500	8
2600~3000	9

* Double the numbers for LM/LO/HM models.

Actuator installation posture

○: Installable —: Not installable (*) Except for types with D1/D2 option

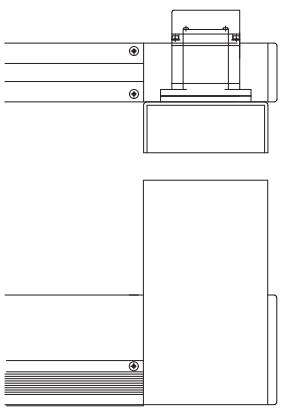
Installation posture			
			
Horizontal	Vertical	Side-mounted	Ceiling mounted
○	—	—	○ (*)

Motor mounting position options

The position of the motor can be optional changed to the 3 types as shown in the following figures, depending on the actuator requirements.
With these changes, the motor position can be changed according to the installation environment. Note, that in case of the motor on bottom, the motor position becomes lower than the slider and there is thus no risk of contacting the load.

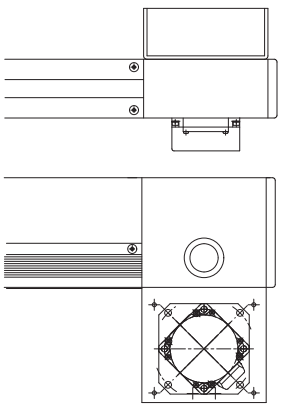
Motor on Top (Left/Reversed-mounted)

• Option code : R



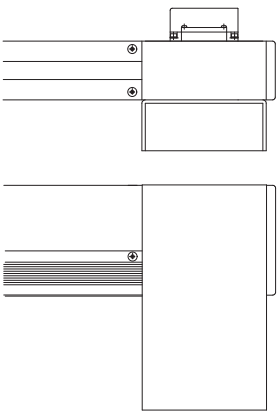
Motor on Bottom (Right-mounted)

• Option code : U



Motor on Bottom (Left/Reversed-mounted)

• Option code : R-U



FS Series Technical Reference

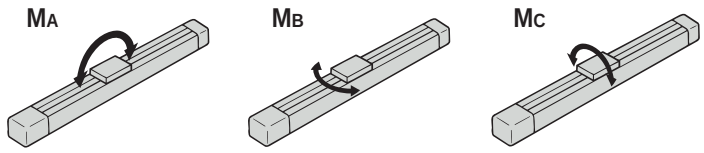
Allowable dynamic moment, Overhang load length

With each type of FS Series, a single or double slider can be selected.
The allowable dynamic moment and overhang load length vary depending on the length of the slider.
Refer to the typical examples shown below.

Directions of allowable dynamic moments

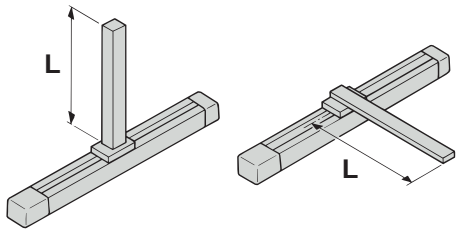
■ Allowable dynamic moment values are based on a 20000 km service life. Please note that applying a moment exceeding the allowable value will reduce the service life of the guide.

Directions of load moments

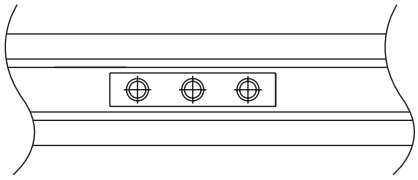


Overhang load length

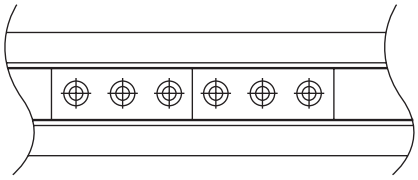
■ When each model is used with an overhang load exceeding the allowable length, vibration may occur. Be sure to keep the overhang load length within the allowable value.



Single slider (Fig. 1)



Double slider (Fig. 2)



Type			Allowable dynamic moment (*) N•m (Kgf•m)	Overhang L mm
FS-11NM FS-11NO	Fig. 1	Single slider	Ma: 2.9(0.3) Mb: 2.9(0.3) Mc: 4.5(0.46)	Ma, Mb, Mc directions: 200mm or less
FS-12NM FS-12NO	Fig. 2	Double slider (when sliders are joined together)	Ma: 20.5(2.1) Mb: 18.6(1.9) Mc: 9.1(0.93)	Ma, Mb, Mc directions: 500mm or less
FS-11WM FS-11WO	Fig. 1	Single slider	Ma: 4.4(0.45) Mb: 3.9(0.4) Mc: 5.8(0.6)	Ma, Mb, Mc directions: 240mm or less
FS-12WM FS-12WO	Fig. 2	Double slider (when sliders are joined together)	Ma: 27.4(2.8) Mb: 25.4(2.6) Mc: 11.7(1.2)	Ma, Mb, Mc directions: 600mm or less
FS-11LM FS-11LO FS-11HM	Fig. 1	Single slider	Ma: 8.8(0.9) Mb: 7.8(0.8) Mc: 12.7(1.3)	Ma, Mb, Mc directions: 300mm or less
FS-12LM FS-12LO FS-12HM	Fig. 2	Double slider (when sliders are joined together)	Ma: 51.9(5.3) Mb: 47.0(4.8) Mc: 25.4(2.6)	Ma, Mb, Mc directions: 750mm or less

(*) For case of 20000km service life (fw=1.2)

Calculation of allowable moments

There are two types of moment that can be applied to the the guide: the allowable dynamic moment and the allowable static moment.
The allowable dynamic moment is calculated from the travel life (when flaking occurs) when moved with the moment load applied.
In contrast, the static moment is calculated from the load that causes permanent deformation to the steel ball or its rolling surface (i.e. rated static moment), taking into account the rigidity and deformity of the base.

[Allowable Dynamic Moment]

IAI's catalog contains the allowable dynamic moments based on a load coefficient of 1.2 and 10000km or 5000km.
This value is different from the so-called basic rated dynamic moment, which is based on a 50km travel life.
To calculate the basic rated dynamic moment for a 50km travel life, use the following equation.

$$M_{50} = f_w \times M_S \div \left(\frac{50}{S}\right)^{\frac{1}{3}} \quad \cdots\cdots \text{Equation 1}$$

M_S : Allowable dynamic moment at an assumed travel distance (catalog value)
S : IAI catalog assumed travel life (5000km or 10000km)
f_w : Load coefficient (=1.2)
M_{50} : Basic rated dynamic moment (50km travel life)

The allowable dynamic moments mentioned in the catalog (10,000km or 5,000km life) are based on a load coefficient fw=1.2. To calculate the service life of a guide with a different load coefficient, use Table 1 below to determine the load coefficient that matches your requirements.

Table 1: Load Coefficients

Operation and Load Requirements	Load Coefficient fw
Slow operation with light vibration/shock (1500mm/s or less, 0.3G or less)	1.0～1.5
Moderate vibration/shock, abrupt braking and accelerating (2500mm/s or less, 1.0G or less)	1.5～2.0
Operation with abrupt acceleration/deceleration with heavy vibration/shock (2500mm/s or faster, 1.0G or faster)	2.0～3.5

$$L_{10} = \left(\frac{C_{IA}}{P} \cdot \frac{1.2}{f_w}\right)^3 \times S \quad \cdots\cdots \text{Equation (2)}$$

L_{10} : Service life (90% Survival Probability)
C_{IA} : Allowable dynamic moment in IAI Catalog (5000km or 10000km)
P : Moment used (≤ CIA)
S : IAI catalog assumed travel life (5000km or 10000km)
f_w : Load coefficient (from Table 1)

[Allowable Static Moment]

The maximum moment that can be applied to a slider at rest.
These values are calculated by taking the basic rated static moment of the slider and multiplying with the safety rate that takes into consideration any effects from the rigidity and deformity of the base.
Therefore, if a moment load is applied to the slider at rest, keep the moment within this allowable static moment. However, use caution to avoid adding any unexpected shock load from any inertia that reacts on the load.

[Basic Rated Static Moment]

The basic rated static moment is the moment value at which the sum of the permanent deformation at the center of contact between the rolling body (steel ball) and the rolling surface (rail) is 0.0001 times the diameter of the rolling body.
These values are simply calculated strictly from the permanent deformation done to the steel ball and its rolling surface. However, the actual moment value is restricted by the rigidity and deformation of the base. Hence, the allowable static moment the actual moment that can be applied statically, taking into account those factors.

Motor / Encoder / PIO Cables

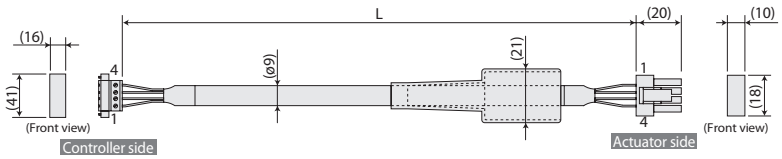
To connect the actuator cable joint connector and the controller there are a motor cable for the motor power, and an encoder cable for the encoder signals. All the motor/encoder cables are high-flexible robot cables, selectable with plastic connector or metal connector (EU version).

Motor Cable / EU Motor Cable for XSEL-KE/KET/P/Q, SSEL, MSCON, SCON-CA/CAL

Model: **CB-X-MA□□□ / CB-XEU-MA□□□**

* □□□ is the cable length (L); supports up to 30m.
Example: 080 = 8m

(Fig.: Motor cable CB-X-MA□□□ with plastic connector)

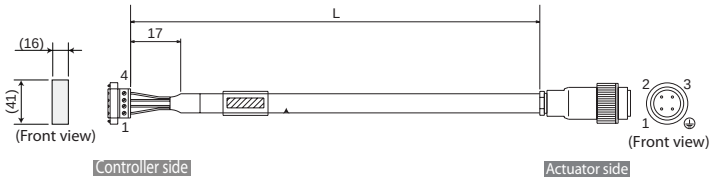


Wire	Color	Signal	No.
0.75sq	Green	PE	1
	Red	U	2
	White	V	3
	Black	W	4

No.	Signal	Color	Wire
1	U	Red	0.75sq (crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Minimum bending R: r = 51 mm or more (for movable use)

(Fig.: EU motor cable CB-XEU-MA□□□, EU version with M18 plastic round connector)



Wire	Color	Signal	No.
0.75sq	Green/yellow	PE	1
	Black/white"1"	U	2
	Black/white"2"	V	3
	Black/white"3"	W	4

No.	Signal	Color	Wire
⏚	PE	Green/yellow	0.75sq (crimped)
1	U	Black/white"1"	
2	V	Black/white"2"	
3	W	Black/white"3"	

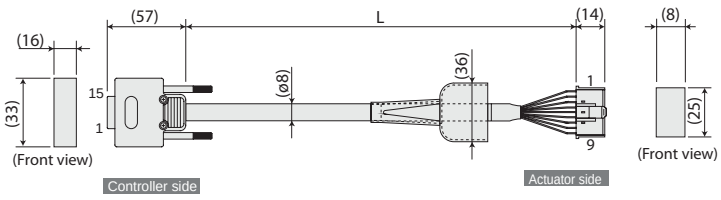
Minimum bending R: r = 51 mm or more (for movable use)

Encoder Cable / EU Encoder Cable for XSEL-KE/KET

Model: **CB-X-PA□□□ / CB-XEU-PA□□□**

* □□□ is the cable length (L); supports up to 30m.
Example: 080 = 8m

(Fig.: Encoder cable CB-X-PA□□□ with plastic connector)



Minimum bend radius R: r = 44mm or larger (for movable use)

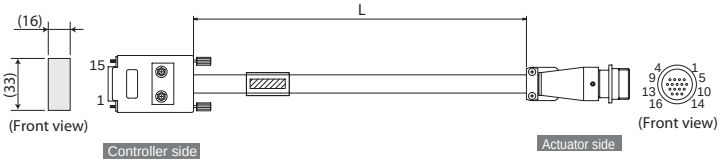
Wire	Color	Signal	No.
0.15sq (crimped)	—	—	1
	—	—	2
	—	—	3
	—	—	4
	—	—	5
	—	—	6
	Blue	SD	7
	Orange	$\overline{SD}$	8
	Black	BAT+	9
	Yellow	BAT-	10
	Green	VCC	11
	Brown	GND	12
	Gray	BK-	13
	Red	BK+	14
	—	—	15

The shield is clamped to the hood

No.	Signal	Color	Wire
1	BAT+	Black	0.15sq (crimped)
2	BAT-	Yellow	
3	SD	Blue	
4	$\overline{SD}$	Orange	
5	VCC	Green	
6	GND	Brown	
7	FG	Ground	
8	BK-	Gray	
9	BK+	Red	

Braided ground & shield wire

(Fig.: Encoder cable CB-XEU-PA□□□, EU version with metal connector)



Minimum bend radius R: r = 44mm or larger (for movable use)

Wire	Color	Signal	No.
0.15sq (crimped)	-	-	1
	-	-	2
	-	-	3
	-	-	4
	-	-	5
	-	-	6
	Blue	SD	7
	Orange	$\overline{SD}$	8
	Black	BAT+	9
	Yellow	BAT-	10
	Green	VCC	11
	Brown	GND	12
	Gray	BK-	13
	Red	BK+	14
	-	-	15

Connect the shielded wire to the hood using a clamp.

No.	Signal	Color	Wire
1	SD	Blue	0.15sq soldered
2	$\overline{SD}$	Orange	
3	-	-	
4	-	-	
5	-	-	
6	-	-	
7	-	-	
8	-	-	
9	-	-	
10	VCC	Green	
11	GND	Brown	
12	BAT+	Black	
13	BAT-	Yellow	
14	-	-	
15	BK-	Gray	
16	BK+	Red	

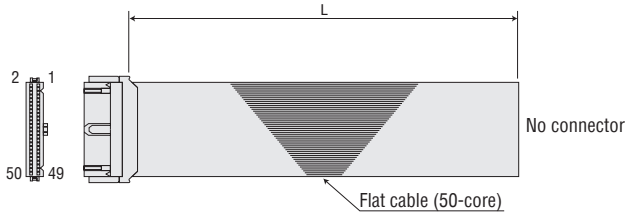
A shield is conected to shield soldered part.

Drain line or shield braided wire

PIO Flat Cable for XSEL-KE/KET/P/Q

Model: **CB-X-PIO□□□**

* □□□ is the cable length (L); supports up to 10m.
Example: 080 = 8m



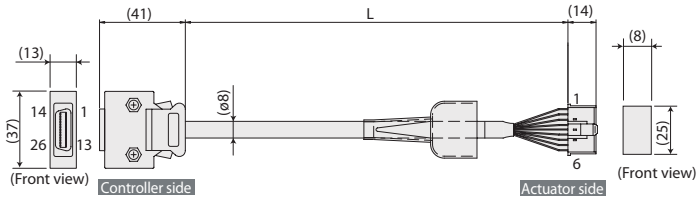
Number	Color	Wire	Number	Color	Wire	Number	Color	Wire	Number	Color	Wire	Number	Color	Wire
1	Brown 1	Flat cable crimped	11	Brown-2	Flat cable crimped	21	Brown-3	Flat cable crimped	31	Brown-4	Flat cable crimped	41	Brown-5	Flat cable crimped
2	Red 1		12	Red 2		22	Red 3		32	Red 4		42	Red 5	
3	Orange 1		13	Orange 2		23	Orange 3		33	Orange 4		43	Orange 5	
4	Yellow 1		14	Yellow 2		24	Yellow 3		34	Yellow 4		44	Yellow 5	
5	Green 1		15	Green 2		25	Green 3		35	Green 4		45	Green 5	
6	Blue1		16	Blue 2		26	Blue 3		36	Blue 4		46	Blue 5	
7	Purple 1		17	Purple 2		27	Purple 3		37	Purple 4		47	Purple 5	
8	Gray 1		18	Gray 2		28	Gray 3		38	Gray 4		48	Gray 5	
9	White 1		19	White 2		29	White 3		39	White 4		49	White 5	
10	Black 1		20	Black 2		30	Black 3		40	Black 4		50	Black 5	

Encoder Cable / EU Encoder Cable for XSEL-P/Q, SSEL, MSCON, SCON-CA/CAL

Model: **CB-X1-PA□□□ / CB-XEU1-PA□□□**

* □□□ is the cable length (L); supports up to 30m.
Example: 080 = 8m

(Fig.: Encoder cable CB-X1-PA□□□ with plastic connector)



Minimum bend radius R: r = 44mm or larger (for movable use)

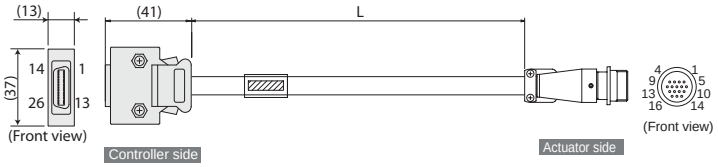
Wire	Color	Signal	No.
AWG26 (soldered)	–	–	10
	–	–	11
	–	E24V	12
	–	0V	13
	–	LS	26
	–	CREEP	25
	–	OT	24
	–	RSV	23
	–	–	9
	–	–	18
	–	–	19
	–	A+	1
	–	A-	2
	–	B+	3
	–	B-	4
	–	Z+	5
	–	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Grey	BAT–	15
	Red	VCC	16
	Black	GND	17
	Blue	BKR-	20
	Yellow	BKR+	21
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

The shield is clamped to the hood.

No.	Signal	Color	Wire
1	BAT+	Purple	AWG26 (crimped)
2	BAT-	Grey	
3	SD	Orange	
4	$\overline{SD}$	Green	
5	VCC	Red	
6	GND	Black	
7	FG	Ground	
8	BK-	Blue	
9	BK+	Yellow	

Braided ground & shield wire

(Fig.: EU encoder cable CB-XEU1-PA□□□, EU version with metal connector)



Minimum bend radius R: r = 44mm or larger (for movable use)

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

Connect the shield to the hood via a clamp.

No.	Signal	Color	Wire
1	SD	Orange	AWG26 (soldered)
2	$\overline{SD}$	Green	
3	-	-	
4	-	-	
5	-	-	
6	-	-	
7	-	-	
8	-	-	
9	-	-	
10	VCC	Red	
11	GND	Black	
12	BAT+	Purple	
13	BAT-	Grey	
14	-	-	
15	BK-	Blue	
16	BK+	Yellow	

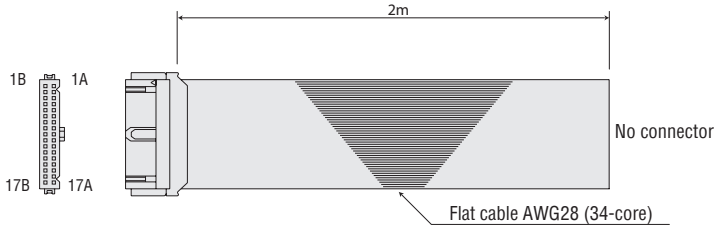
A shield is conected to shield soldered part.

Drain line or shield braided wire

PIO Flat Cable for SSEL

Model: **CB-DS-PIO□□□**

* □□□ is the cable length (L); supports up to 10m.
Example: 080 = 8m

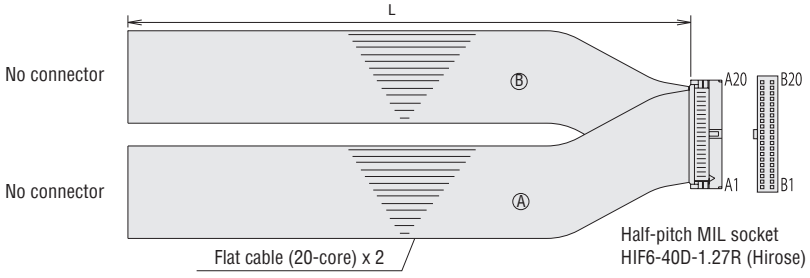


Pin No.	Color	Wire	Pin No.	Color	Wire
1A	Brown 1	Flat cable crimped	9B	Gray 2	Flat cable crimped
1B	Red 1		10A	White 2	
2A	Orange 1		10B	Black 2	
2B	Yellow 1		11A	Brown-3	
3A	Green 1		11B	Red 3	
3B	Blue1		12A	Orange 3	
4A	Purple 1		12B	Yellow 3	
4B	Gray 1		13A	Green 3	
5A	White 1		13B	Blue 3	
5B	Black 1		14A	Purple 3	
6A	Brown-2		14B	Gray 3	
6B	Red 2		15A	White 3	
7A	Orange 2		15B	Black 3	
7B	Yellow 2		16A	Brown-4	
8A	Green 2		16B	Red 4	
8B	Blue 2		17A	Orange 4	
9A	Purple 2		17B	Yellow 4	

PIO Flat Cable for MSCON, SCON-CA/CAL

Model: **CB-PAC-PIO□□□**

* □□□ is the cable length (L); supports up to 10m.
Example: 080 = 8m



HIF6-40D-1.27R

No.	Signal name	Cable color	Wiring
A1	24V	Brown-1	Flat cable Ⓐ (pressure-welded)
A2	24V	Red-1	
A3	—	Orange-1	
A4		Yellow-1	
A5	IN0	Green-1	
A6	IN1	Blue-1	
A7	IN2	Purple-1	
A8	IN3	Gray-1	
A9	IN4	White-1	
A10	IN5	Black-1	
A11	IN6	Brown-2	
A12	IN7	Red-2	
A13	IN8	Orange-2	
A14	IN9	Yellow-2	
A15	IN10	Green-2	
A16	IN11	Blue-2	
A17	IN12	Purple-2	
A18	IN13	Gray-2	
A19	IN14	White-2	
A20	IN15	Black-2	

No.	Signal name	Cable color	Wiring
B1	OUT0	Brown-3	Flat cable Ⓑ (pressure-welded)
B2	OUT1	Red-3	
B3	OUT2	Orange-3	
B4	OUT3	Yellow-3	
B5	OUT4	Green-3	
B6	OUT5	Blue-3	
B7	OUT6	Purple-3	
B8	OUT7	Gray-3	
B9	OUT8	White-3	
B10	OUT9	Black-3	
B11	OUT10	Brown-4	
B12	OUT11	Red-4	
B13	OUT12	Orange-4	
B14	OUT13	Yellow-4	
B15	OUT14	Green-4	
B16	OUT15	Blue-4	
B17	—	Purple-4	
B18		Gray-4	
B19	0V	White-4	
B20	0V	Black-4	

FS Series V3
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