

1nm feedback stage FS-UPX

RoHS **Catalog Code** W9301

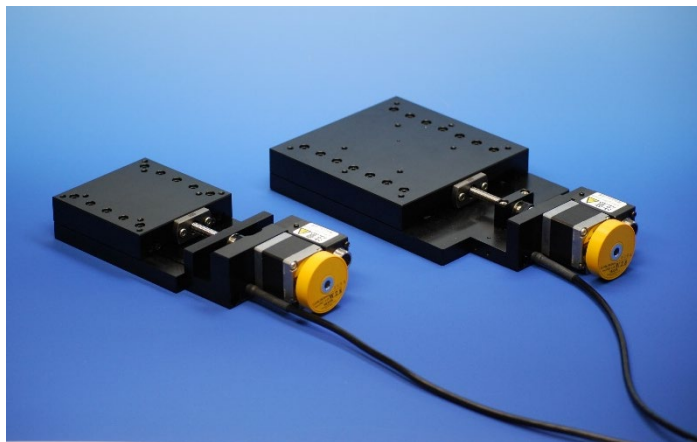
FS-UPX is feedback stage with 1nm resolution positioning.

FS-UPX series operates faster than high torque type FS-SPX series.

In-house optical linear encoder are built-in at the center of stage to detect position.

Positioning to target position, positioning repeatability and holding the position with high resolution is achieved by feedback control using position information of encoder.

There are two types of the stage which travel of 20mm and 50mm.



Applicable controller and cable

Controller	FC-911
Cable	PM-CA- *

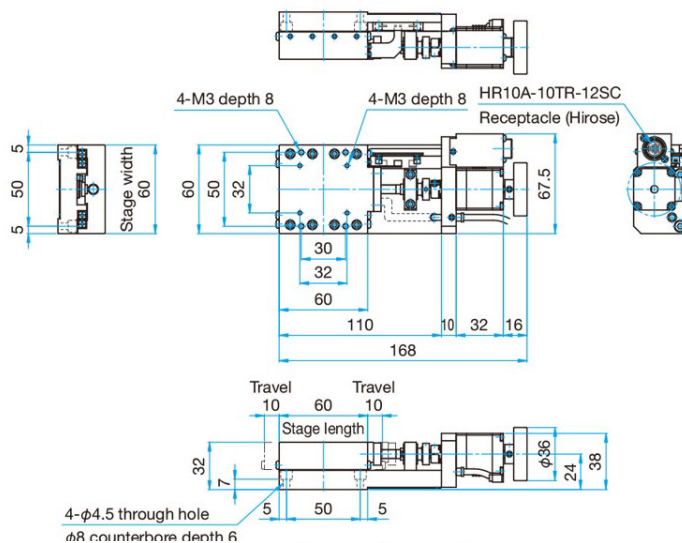
Specifications			
Part Number		FS-1020UPX	FS-1050UPX
JP Price [¥]		700,000	800,000
Mechanical spec	Travel [mm]	20	50
	Size of the stage [mm]	60×60	120×120
	Feed screw [mm]	Ball screw dia. 6, 1mm lead	
	Positioning slide	Crossed roller	
	Primary material	Aluminum	
	Finish	Black anodized	
	Motor type	□28mm 5 phase stepping motor	
	Weight [kg]	0.7	1.6
Accuracy spec	Minimum Resolution [nm] ※1	1	1
	Positional repeatability [nm] ※1	+/- 2	+/- 2
	Load capacity [N]	49(5kgf)	98(10kgf)
	Running parallelism [μm]	10	10
	Max speed [mm/sec]	5	5
Sensor	Limit sensor	Equipped	
	Origin sensor	None	
	Proximity origin sensor	None	
Equipped scale	Signal cycle	2μm	
	Scale cable (※2)	2m	

※1 : Minimum resolution and position repeatability accuracy for built-in scale read.

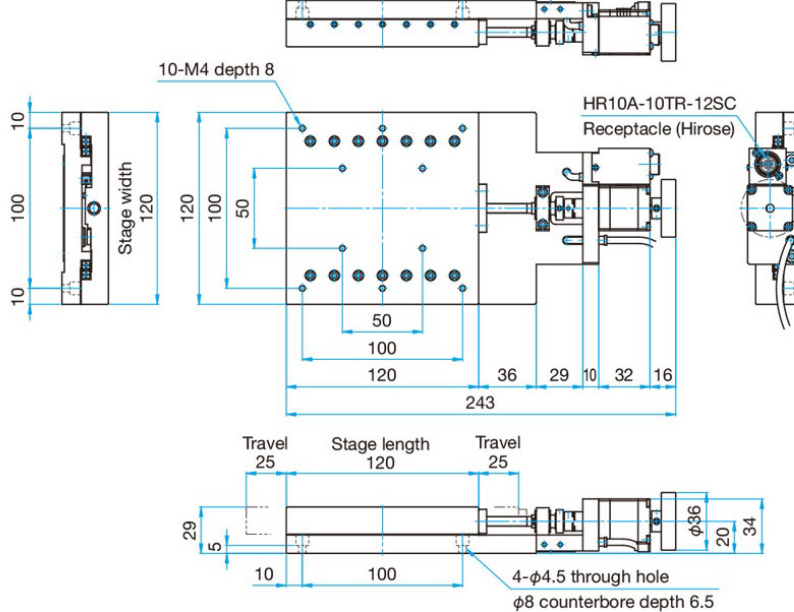
※2 : Scale cable comes directly out of the stage. Please prepare "extension cable for scale" separately if 2m or longer cable are needed.

Outline drawing

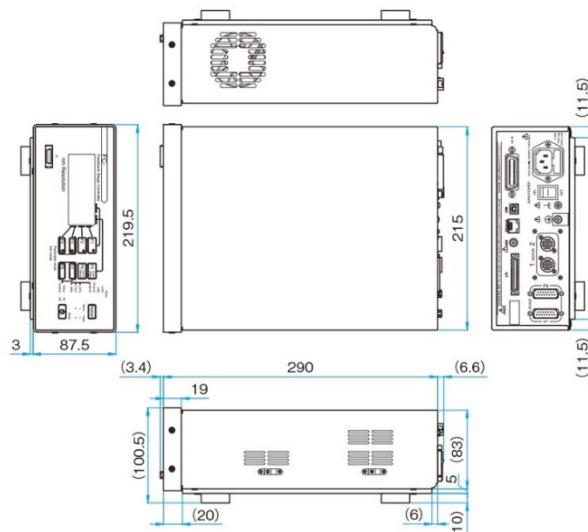
FS-1020UPX



FS-1050UPX



FC-911



FS-UPX dedicated controller for 1nm feedback stage **FC-911**

Dedicated controller for 1nm feedback stage (FS-UPX series) to control with 1nm resolution.

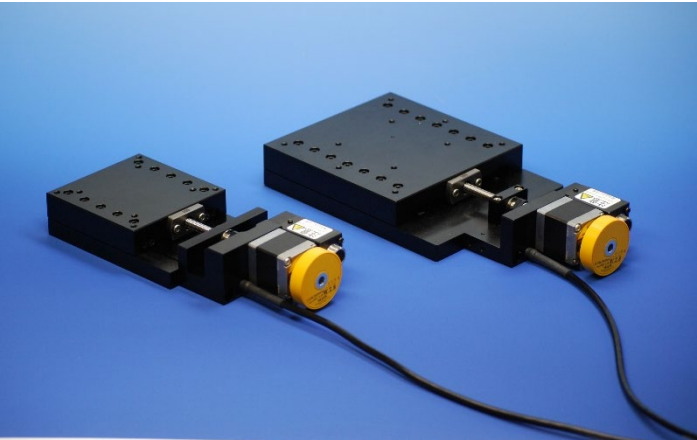


Specifications				
Part number			FC-911	
JP Price [¥]			800,000	
Primary spec	Number of control axes		2	
	Minimum command unit		1nm	
	In position range		+/- 1nm (+/-3, +/-7nm selectable)	
	Max operating speed set value		6mm/sec	
	Max travel range set value		-134.217728~+134.217727mm	
	Number of control interface port	Jog controller	1	
		Emergency stop	1	
		GP-IB	1	
		USB	1	
		Ethernet	1	
		General I/O	1	
	Teaching	Number of register channel	5	
		Number of registered lines per channel	200	
		Operational interface	Controller key operation	
Jog controller key operation				
Communication command				
General I/O				
General spec	Power voltage		AC100~240V 50/60Hz	
	Power supply voltage fluctuation allowable range		AC90V~264V	
	Power consumption		110VA max	
	Fuse		250V, 2.5A, time lag, 2	
	Outer dimensions (W×H×Dmm)		W220×H88×D290mm	
	Weight [kg]		5.2	
	Operating temperature/humidity		0 deg.C to 40 deg.C / 20% to 80%RH(without condensation)	
	Storage temperature/humidity		-10deg.C to 55 deg.C / 20%~80%RH (without condensation)	
	Connectable option		JC-01	
	Communication port	GP-IB	Address	1~30
			Delimiter	CR+LF, EOI, CR, LF
			Service request	Valid or invalid
			Flow control	None (fixed)
		USB	Function	Virtual COM port
			Transfer speed	Full speed transfer(12Mbps max)
			Delimiter	CR+LF, CR, LF
		Ethernet	Standard	IEEE802.3x standard flow control compliant
			Transfer speed	10Mbps and 100Mbps
			Delimiter	CR+LF, CR, LF
	General I/O port	Input	General input	3 port
			Teaching	1 set
		Output	Busy error cancel	1 set
			General output	3 port
			Scale division pulse signal	1 set for each axis
			Alarm signal	1 set for each axis
			In position signal	1 set for each axis
			Teaching status	1 set
	Emergency stop input		B contact (fixed)	

5nm feedback stage FS-SPX

RoHS Catalog Code W9303

FS-SPX is feedback stage with 5nm resolution positioning.
In-house optical linear encoder are built-in at the center of stage to detect position.
Positioning to target position, positioning repeatability and holding the position with high resolution is achieved by feedback control using position information of encoder.
There are two types of the stage which travel of 20mm and 50mm.



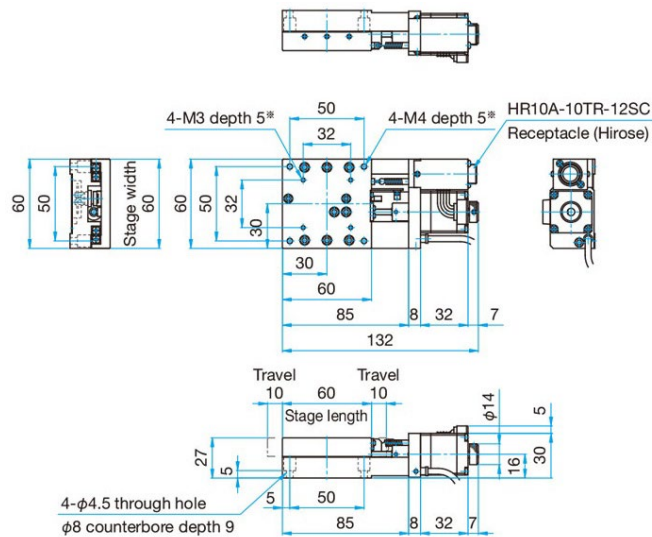
Applicable controller and cable	
Controller	FC-611
Cable	PM-CA- *

Specifications			
Part Number		FS-1020SPX	FS-1050SPX
JP Price [¥]		450,000	550,000
Mechanical spec	Travel [mm]	20	50
	Size of the stage [mm]	60×60	120×120
	Feed screw [mm]	Ball screw dia. 4, 1mm lead	Ball screw dia. 6, 1mm lead
	Positioning slide	Crossed roller	
	Primary material	Aluminum	
	Finish	Black anodized	
	Motor type	□28mm 5 phase stepping motor	
	Weight [kg]	0.5	1.6
Accuracy spec	Minimum Resolution [nm] ※1	5	5
	Positional repeatability [nm] ※1	+/- 10	+/- 10
	Load capacity [N]	49(5kgf)	98(10kgf)
	Running parallelism [μm]	10	10
	Max speed [mm/sec]	5	5
Sensor	Limit sensor	Equipped	
	Origin sensor	None	
	Proximity origin sensor	None	
Equipped scale	Signal cycle	2μm	
	Scale cable (※2)	2m	

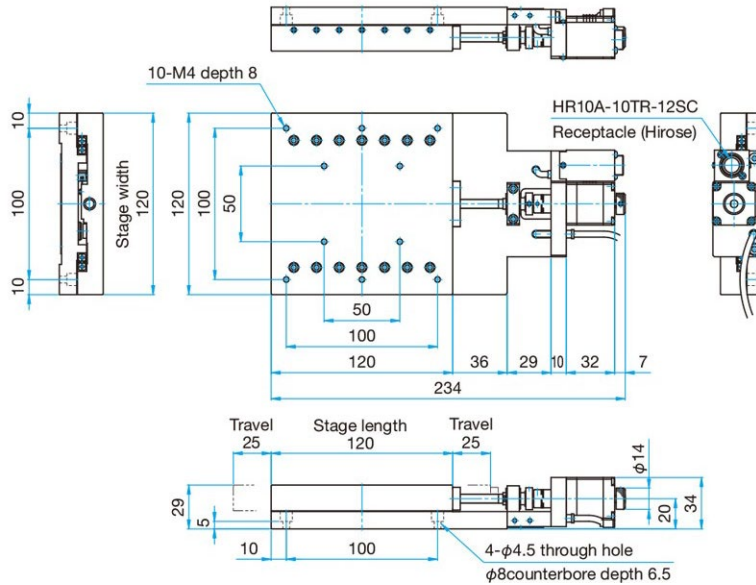
※1 : Minimum resolution and position repeatability accuracy for built-in scale read.
※2 : Scale cable comes directly out of the stage. Please prepare "extension cable for scale" separately if 2m or longer cable are needed.

Outline drawing

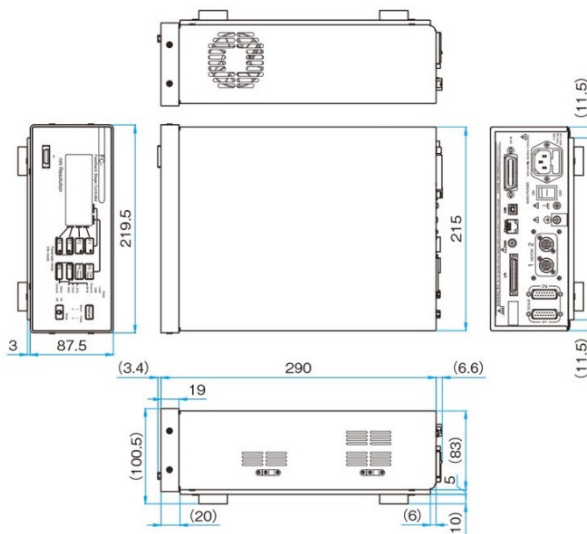
FS-1020SPX



FS-1050SPX

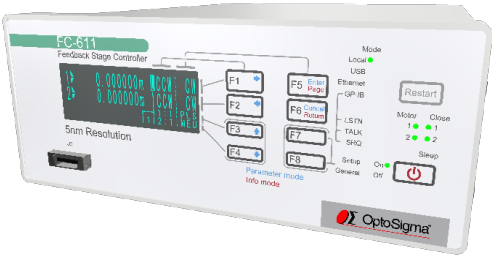


FC-611



FS-SPX dedicated controller for 5nm feedback stage **FC-611**

Dedicated controller for 5nm feedback stage (FS-SPX series) to control with 5nm resolution. Highly safe and easy to operate with various error detection functions, general-purpose I / O, and teaching functions.



Specifications				
Part number			FC-611	
JP Price [¥]			750,000	
Primary spec	Number of control axes		2	
	Minimum command unit		5nm	
	In position range		+/- 5nm (+/- 15,+/- 35nm selectable)	
	Max operating speed set value		30mm/sec	
	Max travel range set value		-671.088640~+671.088635mm	
	Number of control interface port	Jog controller	1	
		Emergency stop	1	
		GP-IB	1	
		USB	1	
		Ethernet	1	
		General I/O	1	
	Teaching	Number of register channel	5	
		Number of registered lines per channel	200	
		Operational interface	Controller key operation	
Jog controller key operation				
Communication command				
General I/O				
General spec	Power voltage		AC100~240V 50/60Hz	
	Power supply voltage fluctuation allowable range		AC90V~264V	
	Power consumption		110VA max	
	Fuse		250V, 2.5A, time lag, 2	
	Outer dimensions (W×H×Dmm)		W220×H88×D290mm	
	Weight [kg]		5.2	
	Operating temperature/humidity		0 deg.C to 40 deg.C / 20% to 80%RH(without condensation)	
	Storage temperature/humidity		-10deg.C to 55 deg.C / 20%~80%RH (without condensation)	
	Connectable option		JC-01	
	Communication port	GP-IB	Address	1~30
			Delimiter	CR+LF, EOI, CR, LF
			Service request	Valid or invalid
			Flow control	None (fixed)
		USB	Function	Virtual COM port
			Transfer speed	Full speed transfer(12Mbps max)
			Delimiter	CR+LF, CR, LF
		Ethernet	Standard	IEEE802.3x standard flow control compliant
			Transfer speed	10Mbps and 100Mbps
			Delimiter	CR+LF, CR, LF
	General I/O port	Input	General input	3 port
			Teaching	1 set
			Busy error cancel	1 set
		Output	General output	3 port
			Scale division pulse signal	1 set for each axis
			Alarm signal	1 set for each axis
			In position signal	1 set for each axis
	Teaching status		1 set	
	Emergency stop input		B contact (fixed)	

10nm feedback stage FS-PX

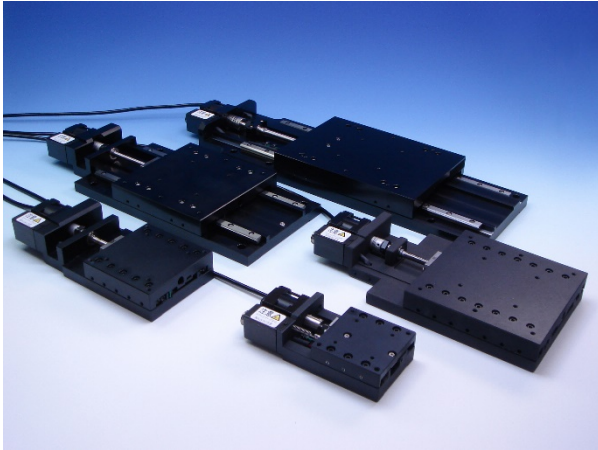
RoHS **Catalog Code** W9305

FS-PX is feedback stage with 10nm resolution positioning.

In-house optical linear encoder are built-in at the center of stage to detect position.

Positioning to target position, positioning repeatability and holding the position with high resolution is achieved by feedback control using position information of encoder.

There are five types of the stages. It is ideal for collecting the data in a wide range or for performing precise positioning and movement of a sample on a single stage by the large travel range.



Applicable controller and cable	
Controller	FC-511 (except FS-3200PX)
Cable	PM-CA (except FS-3200PX)

Applicable controller and cable	
Controller	FC-514 (FS-3200PX only)
Cable	PM4N-CA-*SD (except FS-3200PX)

Specifications						
Part number		FS-1020PX	FS-1050PX	FS-1100PX	FS-3150PX	FS-3200PX
JP Price [¥]		350,000	450,000	550,000	750,000	770,000
Mechanical spec	Travel [mm]	20	50	100	150	200
	Size of the stage [mm]	60×60	120×120	120×120	120×170	160×230
	Feed screw [mm]	Ball screw dia.4, 1mm lead	Ball screw dia.6, 1mm lead	Ball screw dia.6, 1mm lead	Ball screw dia.8, 1mm lead	Ball screw dia.10, 2mm lead
	Positioning slide	Crossed roller	Crossed roller	LM guide	LM guide	LM guide
	Primary material	Aluminum				
	Finish	Black anodized				
	Motor type	□28mm 5 phase stepping motor				
Accuracy spec	Weight [kg]	0.5	1.6	2.1	2.8	5
	Minimum Resolution [nm] ※1	10	10	10	10	10
	Positional repeatability [nm] ※1	+/- 20	+/- 20	+/- 20	+/- 20	+/- 20
	Load capacity [N]	49(5kgf)	98(10kgf)	98(10kgf)	98(10kgf)	196(20kgf)
	Running parallelism [μm]	10	10	10	10※2	10※2
	Max speed [mm/sec]	10	10	10	10	20
Sensor	Limit sensor	Equipped	Equipped	Equipped	Equipped	Equipped
	Slow down sensor	None	None	None	None	Equipped
	Origin sensor	None	None	None	None	None
	Proximity origin sensor	None	None	None	None	None
Equipped scale	Signal cycle	4μm	4μm	4μm	4μm	4μm
	Scale cable (※3)	2m	2m	2m	2m	2m

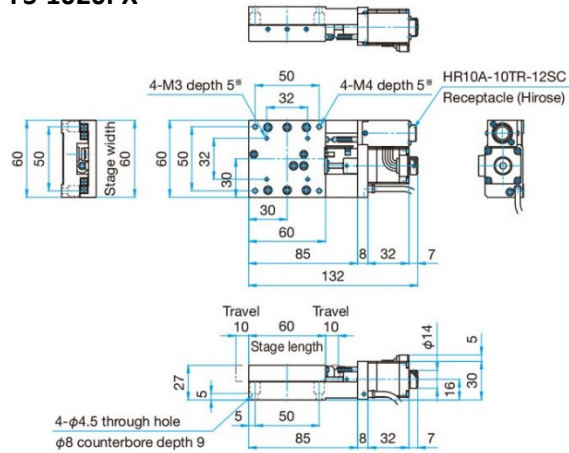
※1 : Minimum resolution and position repeatability accuracy for built-in scale read.

※2 : Running parallelism per 100mm travel.

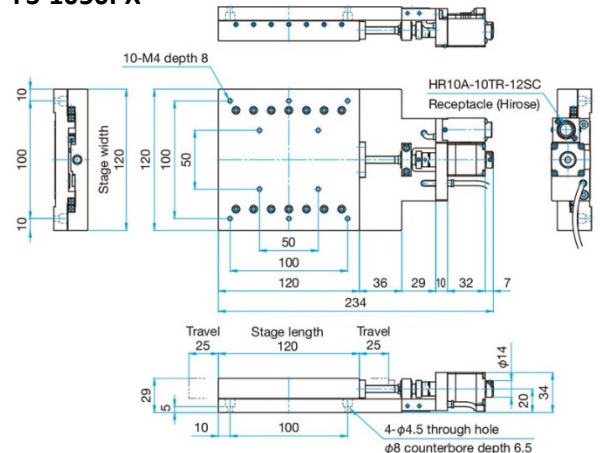
※3 : Scale cable comes directly out of the stage. Please prepare "extension cable for scale" separately if 2m or longer cable are needed.

Outline drawing

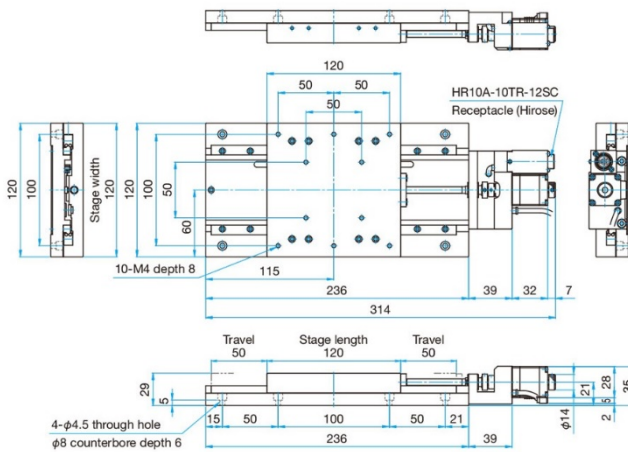
FS-1020PX



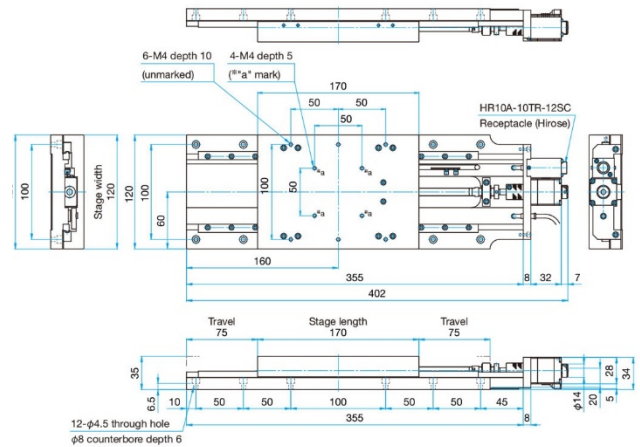
FS-1050PX



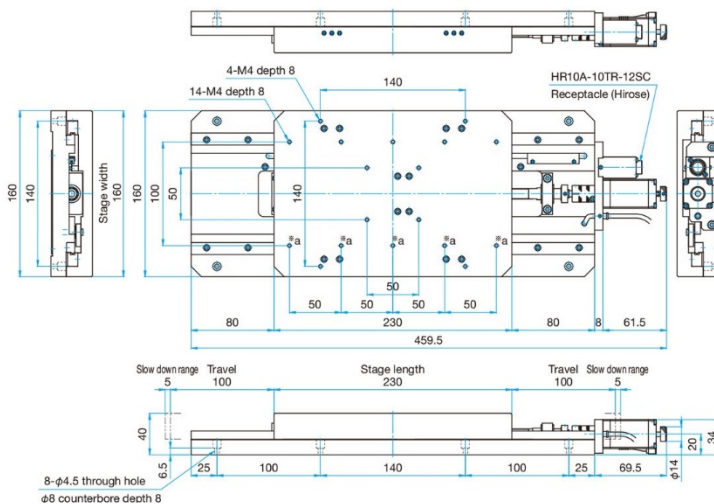
FS-1100PX



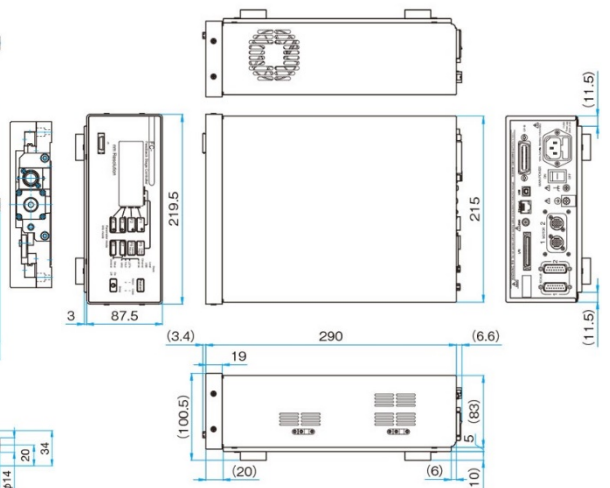
FS-3150PX



FS-3200PX



FC-511/514



FS-PX dedicated controller for 10nm feedback stage **FC-511/FC-514**

RoHS **Catalog Code** W9306

Dedicated controller for 10nm feedback stage (FS-PX series) to control with 10nm resolution. Highly safe and easy to operate with various error detection functions, general-purpose I / O, and teaching functions.



Specifications				FC-511		FC-514		
Part number				700,000		700,000		
JP Price [¥]				700,000		700,000		
Primary spec	Number of control axes			2				
	Minimum command unit			10nm				
	In position range			+/- 10nm (+/- 30, +/- 70nm selectable)				
	Max operating speed set value			50mm/sec				
	Max travel range set value			−1342.17728~+1342.17727mm				
	Number of control interface port	Jog controller		1				
		Emergency stop		1				
		GP-IB		1				
		USB		1				
		Ethernet		1				
		General I/O		1				
	Teaching	Number of register channel		5				
		Number of registered lines per channel		200				
		Operational interface	Controller key operation		Controller key operation		Controller key operation	
Jog controller key operation			Jog controller key operation		Jog controller key operation			
Communication command			Communication command		Communication command			
General I/O			General I/O		General I/O			
Power voltage				AC100~240V 50/60Hz		AC100~240V 50/60Hz		
Power supply voltage fluctuation allowable range				AC90V~264V		AC90V~264V		
Power consumption				110VA max		110VA max		
Fuse				250V, 2.5A, time lag, 2		250V, 2.5A, time lag, 2		
Outer dimensions (W×H×Dmm)				W220×H88×D290mm		W220×H88×D290mm		
Weight [kg]				5.2		5.2		
Operating temperature/humidity				0 deg.C to 40 deg.C / 20% to 80%RH(without condensation)		0 deg.C to 40 deg.C / 20% to 80%RH(without condensation)		
Storage temperature/humidity				-10deg.C to 55 deg.C / 20%~80%RH (without condensation)		-10deg.C to 55 deg.C / 20%~80%RH (without condensation)		
Connectable option				JC-01		JC-01		
Slow down sensor input				N/A		Applicable		
General spec	Communication port		GP-IB	Address		1~30		
				Delimiter		CR+LF, EOI, CR, LF		
				Service request		Valid or invalid		
				Flow control		None (fixed)		
			USB	Function		Virtual COM port		
				Transfer speed		Full speed transfer (12Mbps max)		
				Delimiter		CR+LF, CR, LF		
				Standard		IEEE802.3x standard flow control compliant		
	Ethernet	Transfer speed		10Mbps and 100Mbps				
		Delimiter		CR+LF, CR, LF				
		General I/O port		Input	General input		3 port	
					Teaching		1 set	
	Output			Busy error cancel		1 set		
				General output		3 port		
				Scale division pulse signal		1 set for each axis		
				Alarm signal		1 set for each axis		
				In position signal		1 set for each axis		
				Teaching status		1 set		
Emergency stop input				B contact (fixed)				

Sub micron feedback stage FS-X

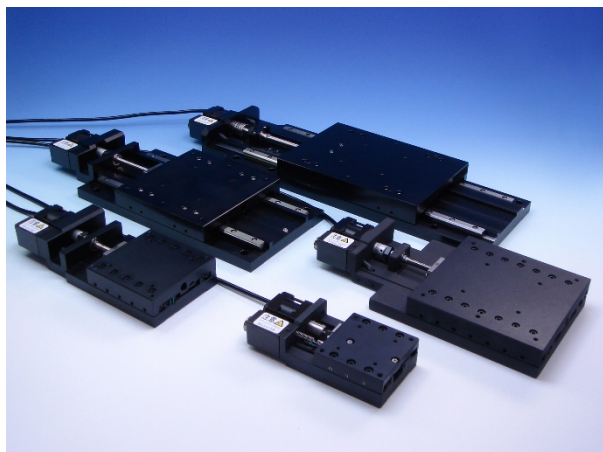
RoHS **Catalog Code** W9307

FS-X is feedback stage with sub-micron resolution positioning.

In-house optical linear encoder are built-in at the center of stage to detect position.

Positioning to target position, positioning repeatability and holding the position with high resolution is achieved by feedback control using position information of encoder.

There are seven types of the stages. It is ideal for collecting the data in a wide range or for performing precise positioning and movement of a sample on a single stage by the large travel range.



Applicable controller and cable

Controller	FC-411
Cable	PM-CA

Specifications			FS-1020X	FS-1050X	FS-1100X	FS-3150X
Part number						
JP Price [¥]			320,000	400,000	485,000	680,000
Mechanical spec	Travel [mm]		20	50	100	150
	Size of the stage [mm]		60×60	120×120	120×120	120×170
	Feed screw [mm]		Ball screw dia.4, 1mm lead	Ball screw dia.6, 1mm lead	Ball screw dia.6, 1mm lead	Ball screw dia.8, 1mm lead
	Positioning slide		Crossed roller	Crossed roller	LM guide	LM guide
	Primary material		Aluminum			
	Finish		Black anodized			
	Motor type		□28mm 5 phase stepping motor			
	Weight [kg]		0.5	1.6	2.1	2.8
Accuracy spec	Minimum resolution [nm] ※1	FC-411	50	50	50	50
		FC-414	-	-	-	-
	Positioning repeatability [nm] ※1	FC-411	+/- 100	+/- 100	+/- 100	+/- 100
		FC-414	-	-	-	-
	Load capacity [N]		49(5kgf)	98(10kgf)	98(10kgf)	98(10kgf)
	Running parallelism[μm]		10	10	10	10※2
Sensor	Max speed [mm/sec]		10	10	10	10
	Limit sensor		Equipped	Equipped	Equipped	Equipped
	Slow down sensor		None	None	None	None
	Origin sensor		None	None	None	None
Equipped scale	Proximity origin sensor		None	None	None	None
	Signal cycle		4μm	4μm	4μm	4μm
	Scale cable (※3)		2m	2m	2m	2m

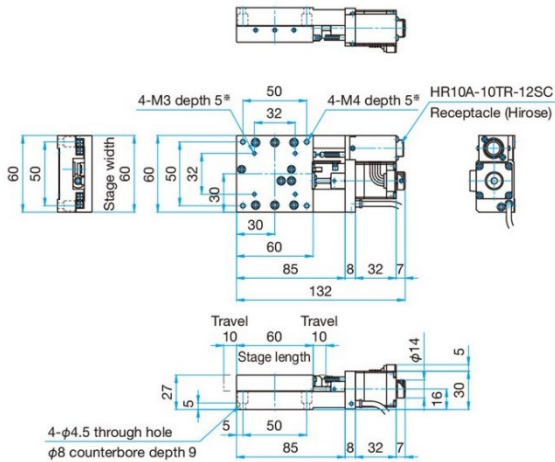
※1 : Minimum resolution and position repeatability accuracy for built-in scale read.

※2 : Running parallelism per 100mm travel.

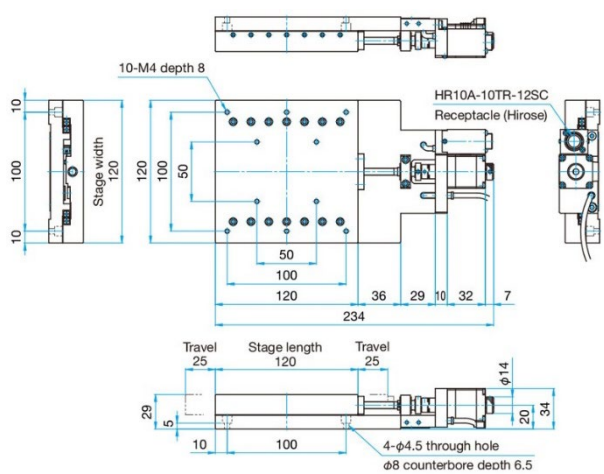
※3 : Scale cable comes directly out of the stage. Please prepare "extension cable for scale" separately if 2m or longer cable are needed.

Outline drawing

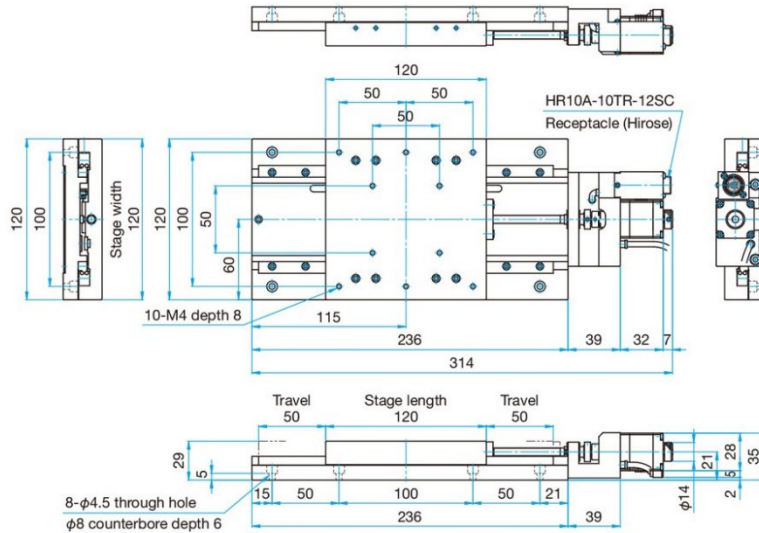
FS-1020X



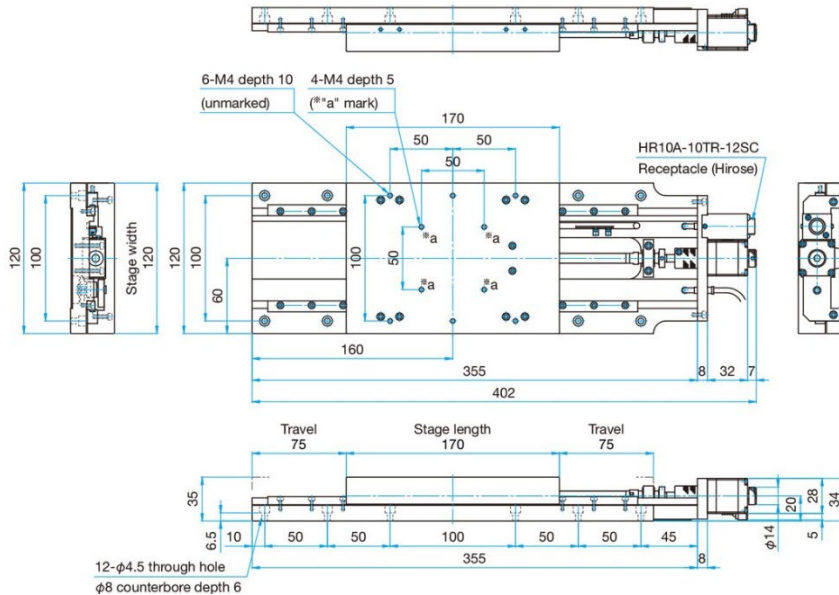
FS-1050X



FS-1100X

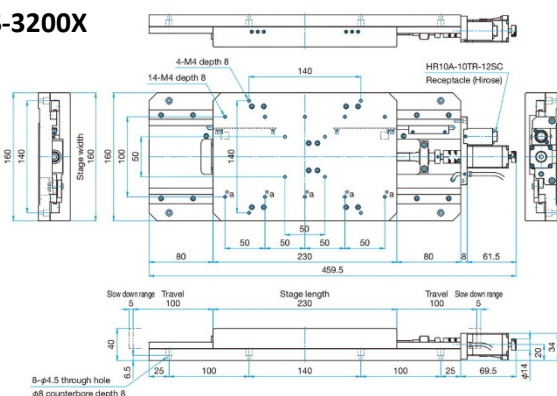


FS-3150X

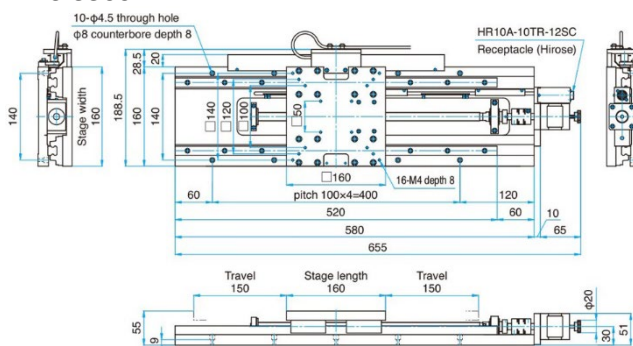


Outline drawing

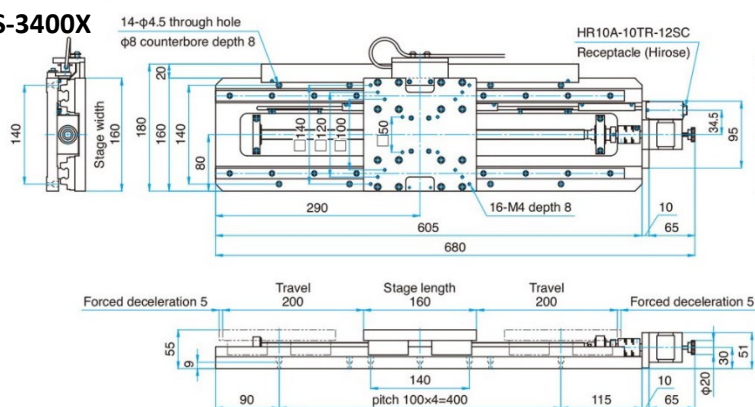
FS-3200X



FS-3300X



FS-3400X



Applicable controller and cable

Controller	FC-414
Cable	PM4N-CA-*SD

Specifications

Part number		FS-3200X	FS-3300X	FS-3400X
JP Price [¥]		700,000	750,000	850,000
Mechanical spec	Travel [mm]	200	300	400
	Size of the stage [mm]	160×230	160×160	160×160
	Feed screw [mm]	Ball screw dia. 10, 2mm lead	Ball screw dia. 14, 5mm lead	Ball screw dia. 14, 5mm lead
	Positioning slide	LM guide	LM guide	LM guide
	Primary material	Aluminum		
	Finish	Black anodized		
	Motor type	□28mm 5 phase stepping motor	□42mm 5 phase stepping motor	
Accuracy spec	Weight [kg]	5	8.5	9.5
	Minimum resolution [nm] ※1	FC-411 - FC-414 50	— 50	— 50
	Positioning repeatability [nm] ※1	FC-411 - FC-414 +/- 100	— +/- 100	— +/- 100
	Load capacity [N]	196(20kgf)	196(20kgf)	196(20kgf)
	Running parallelism[μm]	10※2	10※2	10※2
	Max speed [mm/sec]	10	20	20
Sensor	Limit sensor	Equipped	Equipped	Equipped
	Slow down sensor	Equipped	Equipped	Equipped
	Origin sensor	None	None	None
	Proximity origin sensor	None	None	None
Equipped scale	Signal cycle	4μm	4μm	4μm
	Scale cable (※3)	2m	2m	2m

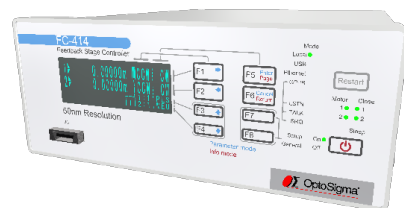
※1 : Minimum resolution and position repeatability accuracy for built-in scale read.

※2 : Running parallelism per 100mm travel.

※3 : Scale cable comes directly out of the stage. Please prepare "extension cable for scale" separately if 2m or longer cable are needed.

FS-X dedicated controller for Sub micron feedback stage **FC-411/FC-414**

Dedicated controller for sub micron feedback stage (FS-X series) to control with sub micron resolution. Highly safe and easy to operate with various error detection functions, general-purpose I / O, and teaching functions.



Specification						
Part number				FC-411		
JP Price [¥]				550,000		
Primary spec	Number of control axis			2		
	Minimum command unit			50nm		
	In position range			+/- 50nm (+/- 150, +/- 350nm selectable)		
	Max operating speed set value			100mm/sec		
	Max travel range set value			-6710.88640~+6710.88635mm		
	Number of control interface port	Jog controller		1		
		Emergency stop		1		
		GP-IB		1		
		USB		1		
		Ethernet		1		
		General I/O		1		
	Teaching	Number of register channel		5		
		Number of registered lines per channel		200		
		Operational interface		Controller key operation		
				Jog control key operation		
				Communication command		
General I/O						
General spec	Power voltage			AC100~240V 50/60Hz		
	Power supply voltage fluctuation allowable range			AC90V~264V		
	Power consumption			110VA		
	Fuse			250V, 2.5A, time lag, 2		
	Outer dimensions (W×H×Dmm)			W220×H88×D290mm		
	Weight [kg]			5.2		
	Operating temperature/humidity			0 deg.C to 40 deg.C / 20% to 80%RH(without condensation)		
	Storage temperature/humidity			-10deg.C to 55 deg.C / 20%~80%RH (without condensation)		
	Connectable option			JC-01		
	Slow down sensor input			N/A	Applicable	
	Communication port	GP-IB	Address		1~30	
			Delimiter		CR+LF, EOI, CR, LF	
			Service request		Valid or invalid	
			Flow control		None (fixed)	
		USB	Function		Virtual COM port	
			Transfer speed		Full speed transfer (12Mbps max)	
			Delimiter		CR+LF, CR, LF	
		Ethernet	Standard		IEEE802.3x standard flow control compliant	
			Transfer speed		10Mbps and 100Mbps	
			Delimiter		CR+LF, CR, LF	
General I/O port	Input	General input		3 port		
		Teaching		1 set		
		Busy error cancel		1 set		
	Output	General output		3 port		
		Scale division pulse signal		1 set for each axis		
		Alarm signal		1 set for each axis		
		In position signal		1 set for each axis		
		Teaching status		1 set		
Emergency stop input			B contact (fixed)			

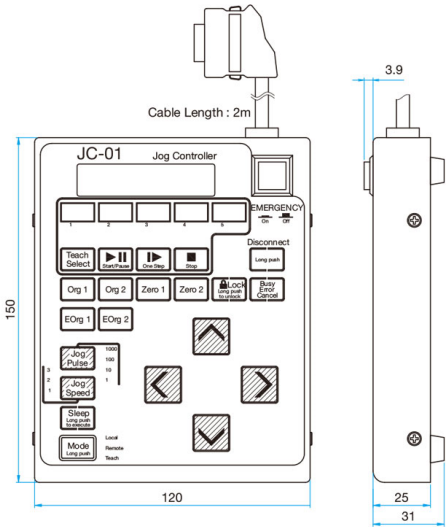
Jog controller JC-01

RoHS Catalog Code W9309

JC-01 is used by connecting the feedback controller of feedback stage(FS series).
JC-01 can be operated at hand by connecting a dedicated controller (FC series).
It allows stage operation, teaching operation, emergency stop, mode switching or run sleep.

Outline drawing

JC-01



Specification		
Part number		JC-01
JP Price [¥]		50,000
Primary spec	Controller connection number	1
	Controller	FC-911、FC-611、FC-511、FC-514、FC-411、FC-414
	Number of control axis	2 axes (Simultaneous control available)
	Stage operation	Cross JOG operation, JOG speed step switching, JOG command pulse amount switching
		Mechanical origin return, electrical origin return
		Coordinate value zero clear, busy error cancel
	Teaching	Select teaching channel, execute start, pause or one step
		Execute and stop
	Others	Mode switching, run sleep, key operation invalid, power supply cut off
Emergency stop		
General spec	Power voltage	DC5V
	Weight [kg]	0.8
	Outer dimensions (W×H×Dmm)	120×31×150
	Cable length [m]	2
	Operating temperature/humidity	0 deg.C to 40 deg.C / 20% to 80%RH (without condensation)
	Storage temperature/humidity	-10deg.C to 55 deg.C / 20%~80%RH (without condensation)

Cable for feedback stage **F-CABLE**

RoHS **Catalog Code** W9310

Dedicated cables for feedback stage system.

The cables are Lead free and susceptible to noise by a braided shield robot cable.

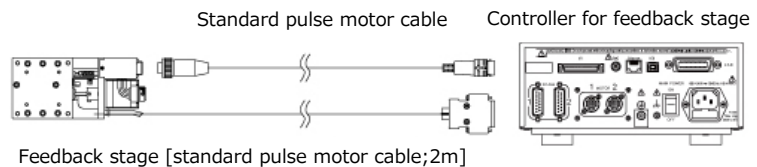
Both the cable for motor and scale are required to connect the feedback stage and dedicated controller.

Please refer the connection example to select the cable.

■ Connection example

Minimum configuration to connect stage and controller. It consists of standard pulse motor cable (2m) and scale cable (2m) directly connected with stage.

Standard pulse motor cable is required other than stage and controller.

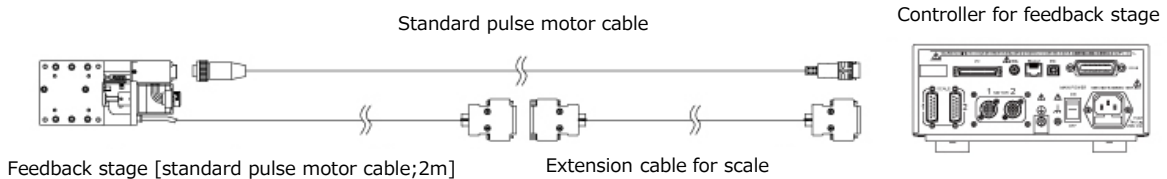


■ Extend cable configuration

[To extend the cable longer than 2m]

It consists of standard pulse motor cable (5m), scale cable (2m) directly connected with stage and extension cable (3m) for scale.

Standard pulse motor cable and extension cable for scale are required other than stage and controller.



■ Standard pulse motor cable

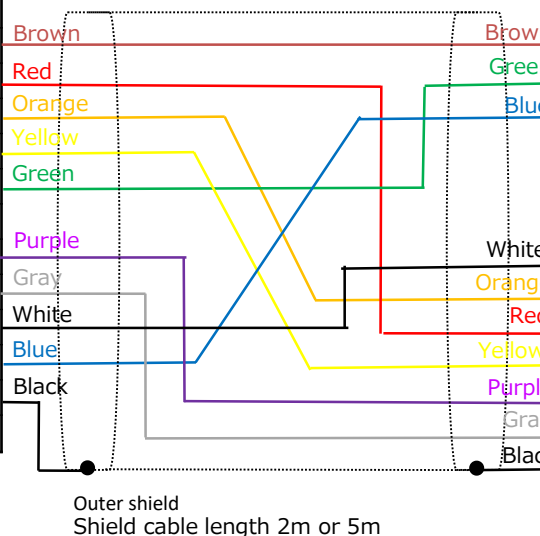
Specifications		
Part Number	PM-CA-2	PM-CA-5
JP Price [¥]	6,500	9,500
Cable length [m]	2	5
Controller	FC-411、FC-511、FC-611、FC-911	
Stage	FS-1020***、FS-1050***、FS-1100***、FS-3150***	

Controller side (12pin)
RP17-13P-12PC(Hirose Electric Co., Ltd.)

Pin Number	
1	Motor lead
2	Motor lead
3	Motor lead
4	Motor lead
5	Motor lead
6	N.C
7	+Vs
8	GND
9	LS1(CCW)
10	LS2(CW)
11	F.G
12	N.C

Stage side (12pin)
HR10A-10TP-12PC
(Hirose Electric Co., Ltd.)

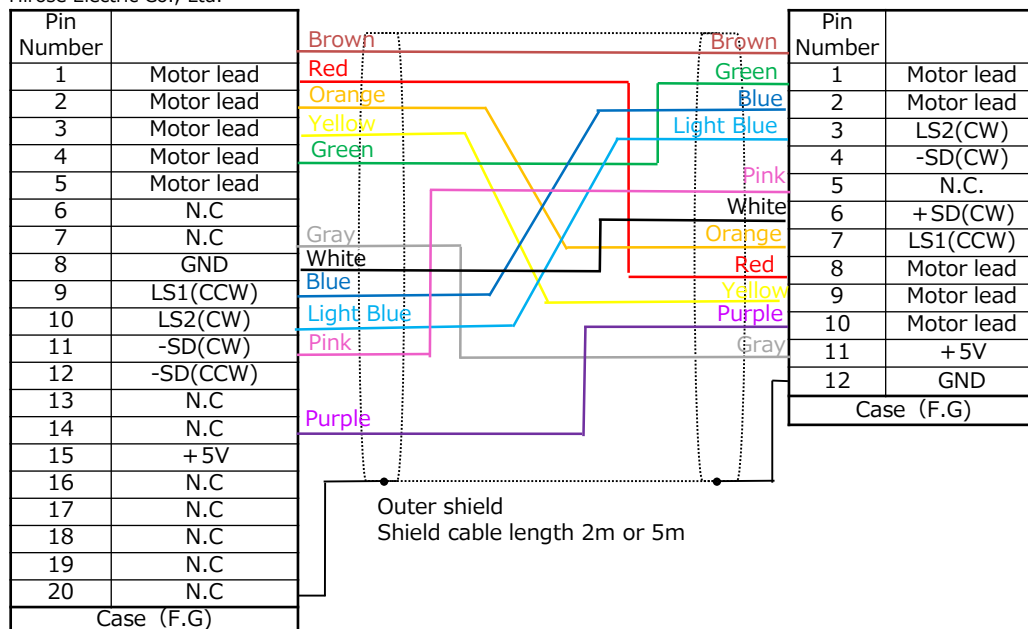
Pin Number	
1	Motor lead
2	Motor lead
3	LS2(CW)
4	N.C
5	N.C
6	N.C
7	LS1(CCW)
8	Motor lead
9	Motor lead
10	Motor lead
11	+Vs
12	GND



■ Cable for pulse motor (for the stage with slow down sensor)

Controller side (D-sub 20pin)
HR10A-13P-20PC (73)
Hirose Electric Co., Ltd.

Stage side (D-sub 12pin)
HR10A-10TP-12PC
Hirose Electric Co., Ltd.

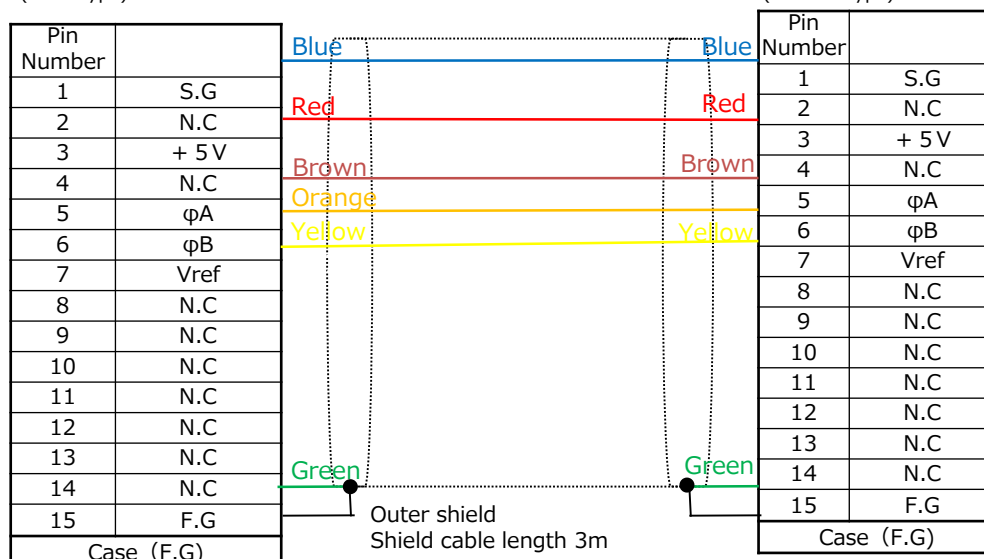


Specifications		
Part Number	PM4N-CA-2SD	PM4N-CA-5SD
JP Price [¥]	12,000	16,500
Cable length [m]	2	5
Controller	FC-414, FC-514	
Stage	FS-3200**, FS-3300, FS-3400	

■ Extension cable for scale

Controller side (D-sub 15pin)
17JE-23150-02(D1)
(Male Type) DDK Ltd.

Stage side (D-sub 15pin)
17JE-13150-02(D1)
(Female Type) DDK Ltd.



Specification	
Part number	PS-EX-3
JP Price [¥]	10,500
Cable length [m]	3
Stage controller	FC-911, FC-611, FC-511, FC-514, FC-411, FC-414
Feedback stage	Scale cable