CE RoHS

Feedback Stage NFS Series

High resolution feedback stage with 5-phase stepping motor, built-in glass scale, and CE/UKCA marking. The built-in optical glass scale provides high positional repeatability and high resolution.

- Ball screw drive allows longer travel than piezo stages, and a wide variety of travel and table sizes can be selected.
- A plugin for the "Autoconfig" function is equipped for user convenience.
- Controllers compatible with the Feedback Stage (NFS series) are available.

Guide

▶Use a controller (SHRC-203) compatible with Feedback Stage (NFS series).
▶Sample programs are available for download on our website.
- SG Sample 32/64 bit for Windows®
- LabVIEW

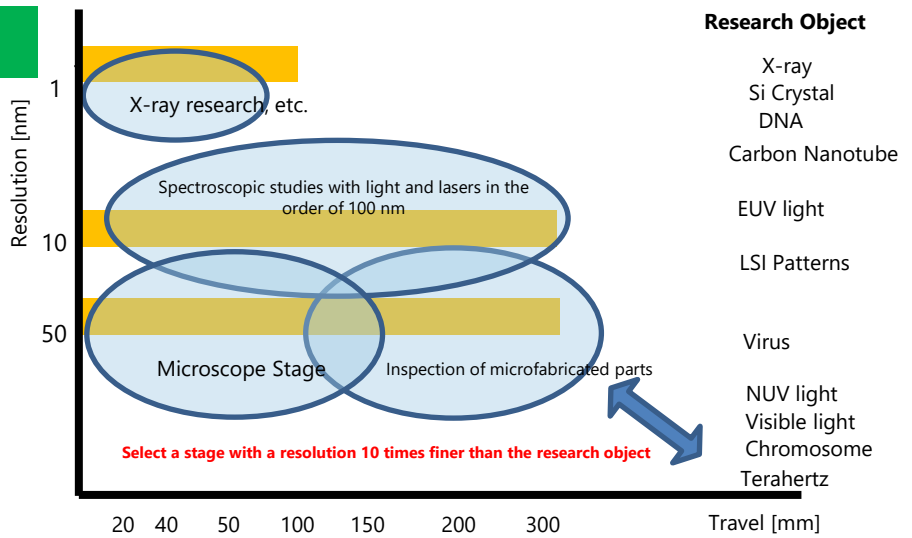
Attention

▶When operating, use in an environment with minimal temperature fluctuation. (Recommended: 23±1℃)
▶Use the product in an environment with as little vibration as possible. Or use it in an anti-vibration environment.
▶Use in an environment free of oil mist. Otherwise, the glass scale may become contaminated and scale errors may occur.
▶Contact our Sales if you intend to mount a workpiece larger than the size of the table surface.

Points for selecting the Travel *If you require a Travel other than those listed below, please contact our Sales.

Travel		
20mm	Stage Size **60×60mm**	Space-saving type, used when short travel is sufficient.
40mm	Stage Size **110×60mm**	This is the most stable type and is recommended if there is enough space for installation.
50mm	Stage Size **100×100mm、120×120mm**	For high resolution positioning over long distances.
100mm	Stage Size **175×100mm、175×120mm**	For high resolution positioning over long distances.
200mm	Stage Size **230×180mm**	For high resolution positioning over long distances. Lineup includes 10nm and 50nm resolution.
300mm	Stage Size **330×180mm**	For high resolution positioning over long distances. Lineup includes 10nm and 50nm resolution.

Feedback Stages (NFS Series)
Resolution and Travel Lineups



1nm Feedback Stage

NFS-UPX

Catalog Code W9315

Resolution 1nm

The 1 nm Feedback Stage is available in 6 different table sizes.

Travel [mm]			
20	40	50	100

Cable for NFS Feedback Stage(See cable page for details)	
Motor cable	**D15H12A-RC-3**
Scale cable	**DM15HD14A-RC-3**

Specifications

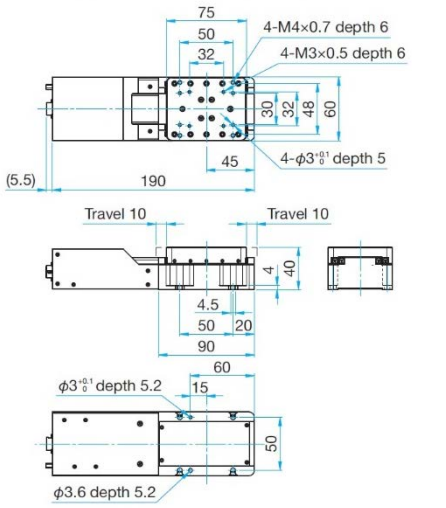
Part Number			NFS60-20UPX	NFS60-40UPX	NFS100-50UPX	NFS100-100UPX	NFS120-50UPX	NFS120-100UPX
Price [JP Yen]			700,000	750,000	800,000	900,000	800,000	900,000
Mechanical Specifications	Travel [mm]		20	40	50	100	50	100
	Stage Size [mm]		60×60	110×60	100×100	175×100	120×120	175×120
	Feed Screw		Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead
	Positioning Slide		Crossed roller	Crossed roller	Crossed roller	Crossed roller	Crossed roller	Crossed roller
	Stage Material		Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
	Finish		Black anodized	Black anodized	Black anodized	Black anodized	Black anodized	Black anodized
	Weight [kg]		0.5	1.0	2.7	3.7	3.0	4.0
Accuracy Specifications	Resolution *1	(Full)[μm/pulse]	1	1	2	2	2	2
		(Half)[μm/pulse]	0.5	0.5	1	1	1	1
	MAX Speed [mm/sec]		5	5	5	5	5	5
	Positioning Accuracy [μm]*2		1	1	1	2	1	2
	Positional Repeatability [μm]*2		0.4	0.4	0.4	0.4	0.4	0.4
	Micro-range Bi-directional Repeatability *3		±4nm	±4nm	±3nm	±3nm	±3nm	±3nm
	Least Increment Step Test (MIN)		3nm	3nm	3nm	3nm	3nm	3nm
	Load Capacity [N]		49 (5.0kgf)	49 (5.0kgf)	98 (10.0kgf)	98 (10.0kgf)	98 (10.0kgf)	98 (10.0kgf)
	Moment Stiffness	Pitch["/N・cm]	0.5	0.5	0.05	0.05	0.05	0.05
		Yaw["/N・cm]	0.5	0.5	0.05	0.05	0.05	0.05
		Roll["/N・cm]	0.5	0.5	0.05	0.05	0.05	0.05
	Lost Motion [μm]		0.4	0.4	0.4	0.4	0.4	0.4
	Backlash [μm]		1	1	1	1	1	1
	Parallelism[μm]		50	50	50	50	50	50
	Running Parallelism [μm]		10	10	10	10	10	10
	Pitch["]/Yaw["]		15/15	15/15	15/15	15/15	15/15	15/15
Motor	Type		5-phase stepping motor 0.35A/phase (Oriental Motor Co., Ltd.)		5-phase stepping motor 0.75A/phase (Oriental Motor Co., Ltd.)			
	Motor Part Number		PK523PMB-C5 (□28mm)		PK545NBW (□42mm)			
Encoder	Scale Resolution [nm]		1	1	1	1	1	1

*1 Resolution is automatically set by "AutoConfig" when SHRC controller is connected.
*2 Values when the multi-point error compensation function is enabled.
*3 Micro-range Bi-directional Repeatability is a test to measure repetitive positioning accuracy (ISO) in a micro range.
Measurement step for 1 nm feedback stage (NFS-UPX series): 5 nm

Outline Drawing

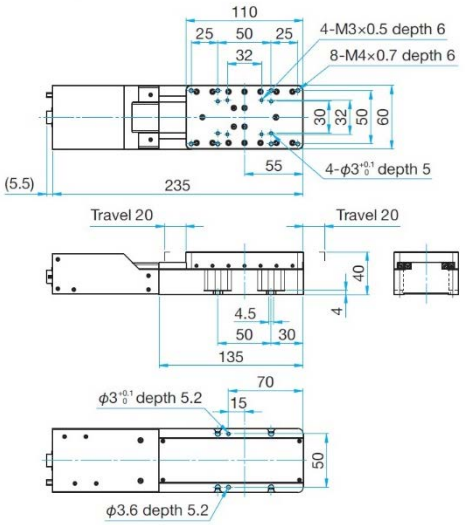
NFS60-20UPX

Hexagonal socket head cap screw M4×10…4 screws



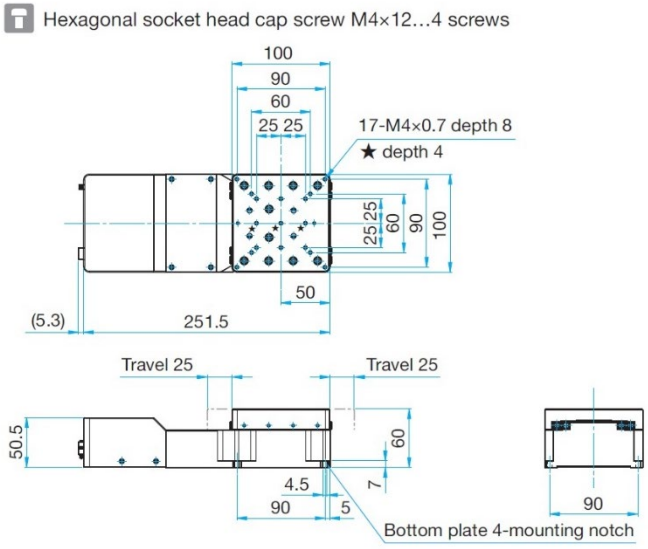
NFS60-40UPX

Hexagonal socket head cap screw M4×10…4 screws



NFS100-50UPX

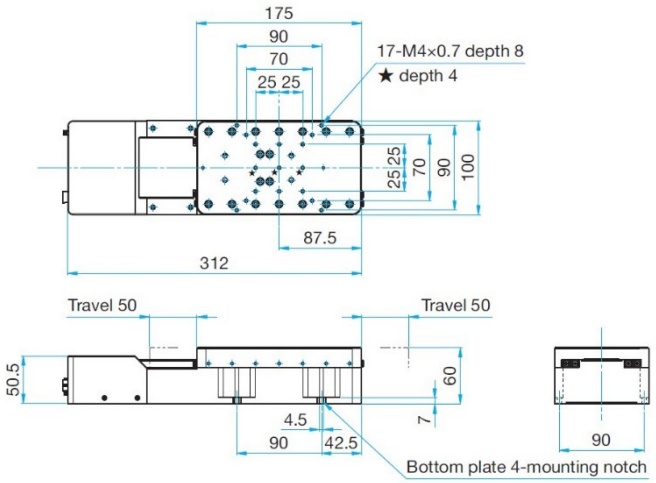
Hexagonal socket head cap screw M4×12…4 screws



Outline Drawing

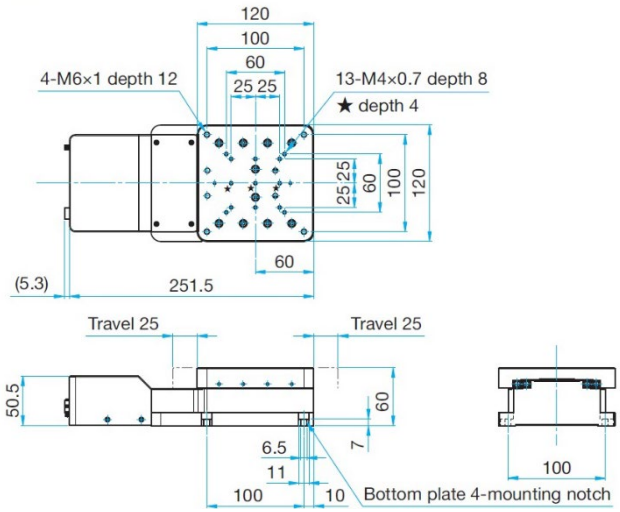
NFS100-100UPX

Hexagonal socket head cap screw M4×12…4 screws



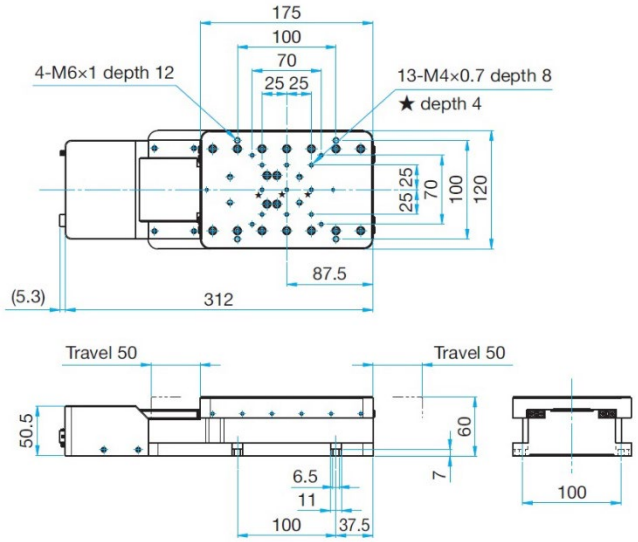
NFS120-50UPX

Hexagonal socket head cap screw M6×14…4 screws



NFS120-100UPX

Hexagonal socket head cap screw M6×14…4 screws



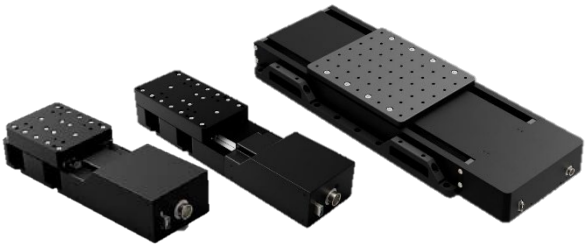
10nm Feedback Stage

NFS-PX

Catalog Code W9316

Resolution 10nm

The 10 nm Feedback Stage is available in 8 different table sizes.



Travel [mm]					
20	40	50	100	200	300

Cable for NFS Feedback Stage(See cable page for details)	
Motor cable	**D15H12A-RC-3**
Scale cable	**DM15HD14A-RC-3**

Specifications

Part Number			NFS60-20PX	NFS60-40PX	NFS100-50PX	NFS100-100PX
Price [JP Yen]			350,000	430,000	450,000	550,000
Mechanical Specifications	Travel [mm]		20	40	50	100
	Stage Size [mm]		60×60	110×60	100×100	175×100
	Feed Screw		Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead
	Positioning Slide		Crossed roller	Crossed roller	Crossed roller	Crossed roller
	Stage Material		Aluminum	Aluminum	Aluminum	Aluminum
	Finish		Black anodized	Black anodized	Black anodized	Black anodized
	Weight [kg]		0.5	1.0	2.7	3.7
Accuracy Specifications	Resolution*1	(Full)[μm/pulse]	2	2	2	2
		(Half)[μm/pulse]	1	1	1	1
	MAX Speed [mm/sec]		10	10	10	10
	Positioning Accuracy [μm]*2		1	1	1	2
	Positional Repeatability [μm]*2		0.5	0.5	0.5	0.5
	Micro-range Bi-directional Repeatability *3		±20nm	±20nm	±20nm	±20nm
	Least Increment Step Test (MIN)		30nm	30nm	30nm	30nm
	Load Capacity [N]		49 (5.0kgf)	49 (5.0kgf)	98 (10.0kgf)	98 (10.0kgf)
	Moment Stiffness	Pitch["/N・cm]	0.5	0.5	0.05	0.05
		Yaw["/N・cm]	0.5	0.5	0.05	0.05
		Roll["/N・cm]	0.5	0.5	0.05	0.05
	Lost Motion [μm]		0.5	0.5	0.5	0.5
	Backlash [μm]		1	1	1	1
	Parallelism[μm]		50	50	50	50
	Running Parallelism [μm]		10	10	10	10
	Pitch["]/Yaw["]		15/15	15/15	15/15	15/15
Motor	Type		5-phase stepping motor 0.35A/phase (Oriental Motor Co., Ltd.)		5-phase stepping motor 0.75A/phase (Oriental Motor Co., Ltd.)	
	Motor Part Number		PK523PB-C7 (□28mm)		PK545NBW (□42mm)	
Encoder	Scale Resolution [nm]		10	10	10	10

*1 Resolution is automatically set by "AutoConfig" when SHRC controller is connected.
*2 Values when the multi-point error compensation function is enabled.
*3 Micro-range Bi-directional Repeatability is a test to measure repetitive positioning accuracy (ISO) in a micro range.
Measurement step for 10 nm feedback stage (NFS-PX series): 50 nm

Resolution 10nm

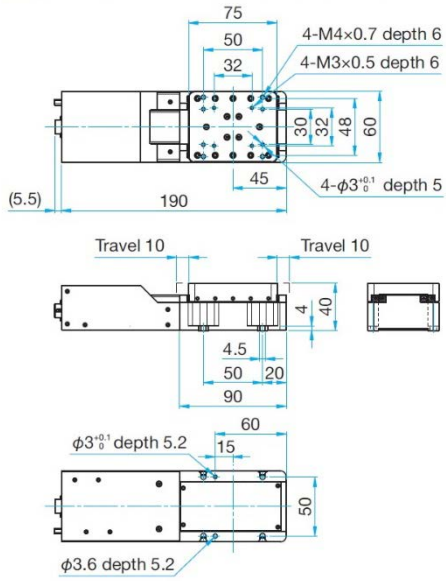
Specifications						
Part Number			**NFS120-50PX**	**NFS120-100PX**	**NFS180-200PX**	**NFS180-300PX**
Price [JP Yen]			**450,000**	**550,000**	**770,000**	**820,000**
Mechanical Specifications	Travel [mm]		50	100	200	300
	Stage Size [mm]		120×120	175×120	230×180	330×180
	Feed Screw		Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ10mm, 2mm lead	Ball screw diameter φ10mm, 2mm lead
	Positioning Slide		Crossed roller	Crossed roller	LM guide	LM guide
	Stage Material		Aluminum	Aluminum	Aluminum	Aluminum
	Finish		Black anodized	Black anodized	Black anodized	Black anodized
	Weight [kg]		3.0	4.0	13.2	17
Accuracy Specifications	Resolution *1	(Full)[μm/pulse]	2	2	4	4
		(Half)[μm/pulse]	1	1	2	2
	MAX Speed [mm/sec]		10	10	20	20
	Positioning Accuracy [μm]*2		1	2	2	2
	Positional Repeatability [μm]*2		0.5	0.5	0.6	0.6
	Micro-range Bi-directional Repeatability *3		±20nm	±20nm	±20nm	±20nm
	Least Increment Step Test (MIN)		30nm	30nm	30nm	30nm
	Load Capacity [N]		98 (10.0kgf)	98 (10.0kgf)	196 (20.0kgf)	196 (20.0kgf)
	Moment Stiffness	Pitch["/N・cm]	0.05	0.05	0.02	0.02
		Yaw["/N・cm]	0.05	0.05	0.02	0.02
		Roll["/N・cm]	0.05	0.05	0.02	0.02
	Lost Motion [μm]		0.5	0.5	0.6	0.6
	Backlash [μm]		1	1	1	1
	Parallelism[μm]		50	50	100	100
	Running Parallelism [μm]		10	10	20	20
	Pitch["]/Yaw["]		15/15	15/15	20/20	20/20
Motor	Type		5-phase stepping motor 0.75A/phase (Oriental Motor Co., Ltd.)			
	Motor Part Number		PK545NBW (□42mm)			
Encoder	Scale Resolution [nm]		10	10	10	10

*1 Resolution is automatically set by "AutoConfig" when SHRC controller is connected.
*2 Values when the multi-point error compensation function is enabled.
*3 Micro-range Bi-directional Repeatability is a test to measure repetitive positioning accuracy (ISO) in a micro range.
Measurement step for 10 nm feedback stage (NFS-PX series): 50 nm

Outline Drawing

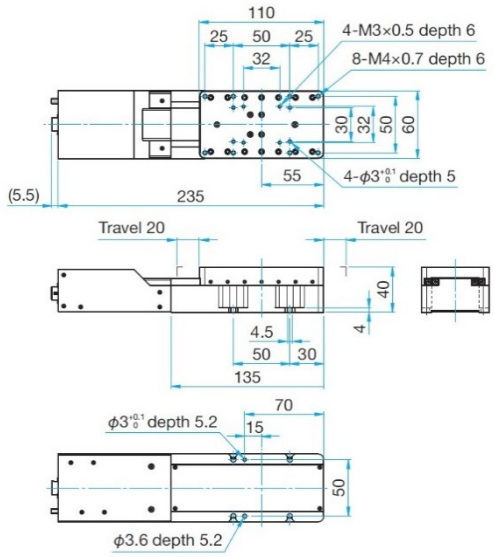
NFS60-20PX

Hexagonal socket head cap screw M4×10…4 screws



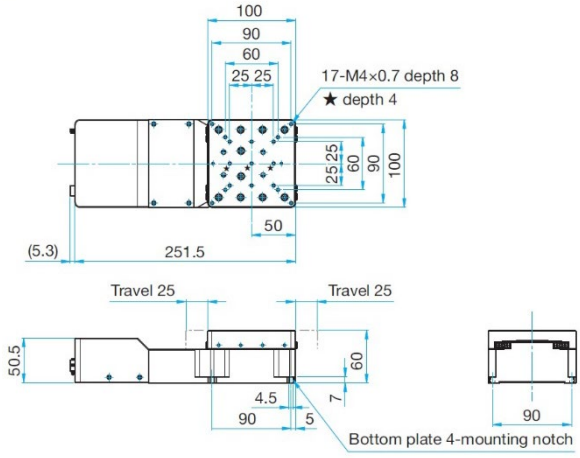
NFS60-40PX

Hexagonal socket head cap screw M4×10…4 screws



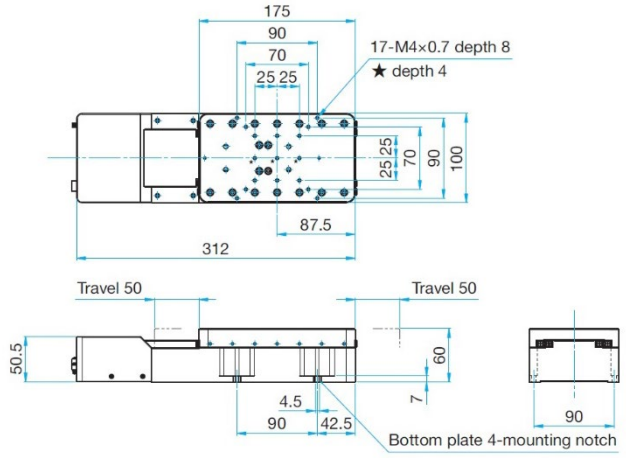
NFS100-50PX

Hexagonal socket head cap screw M4×12…4 screws



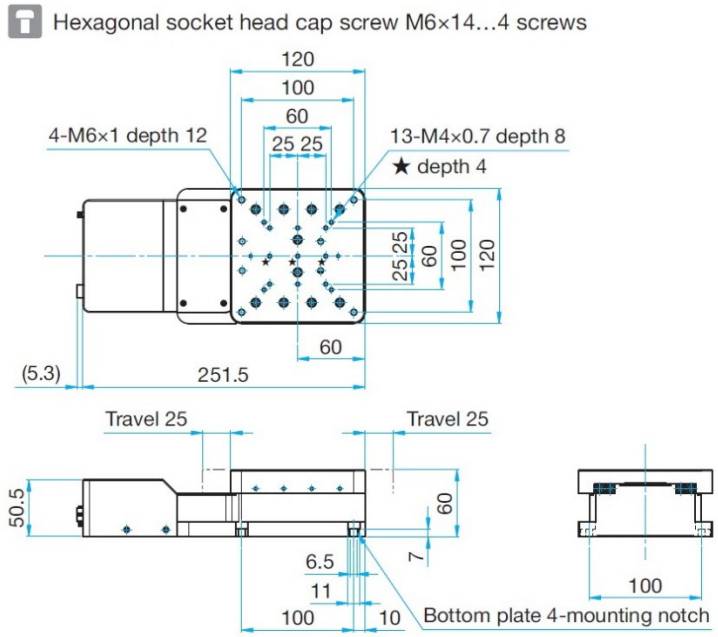
NFS100-100PX

Hexagonal socket head cap screw M4×12…4 screws

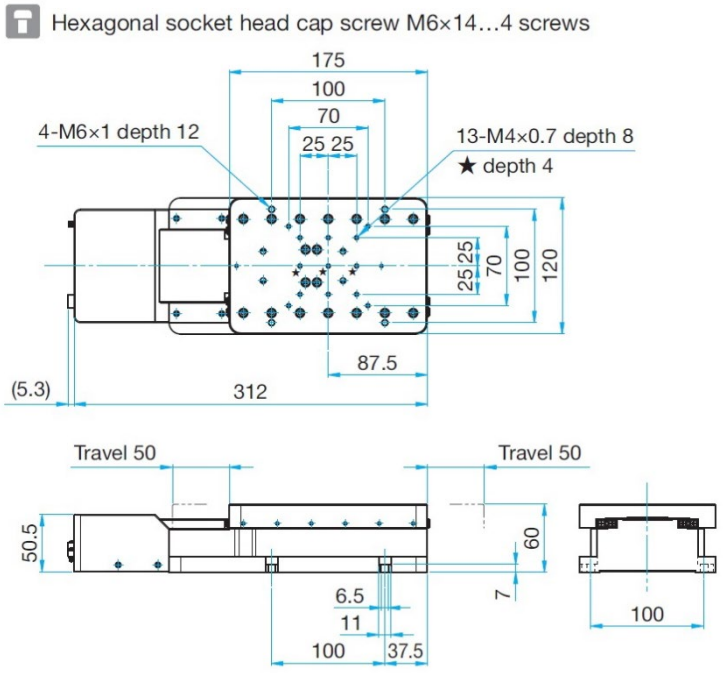


Outline Drawing

NFS120-50PX

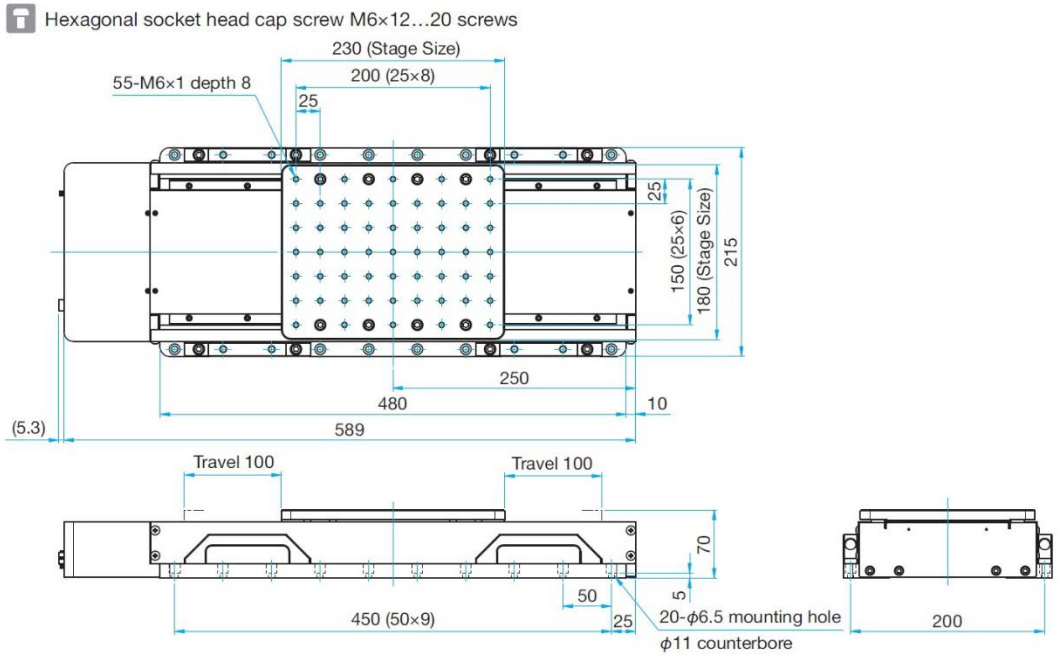


NFS120-100PX

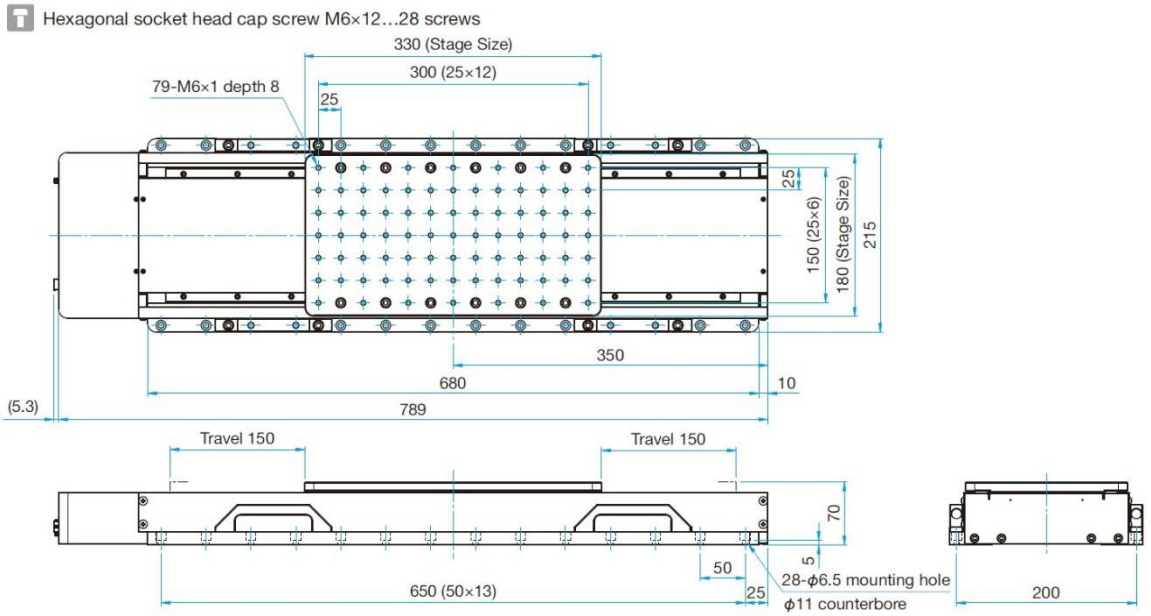


Outline Drawing

NFS180-200PX



NFS180-300PX

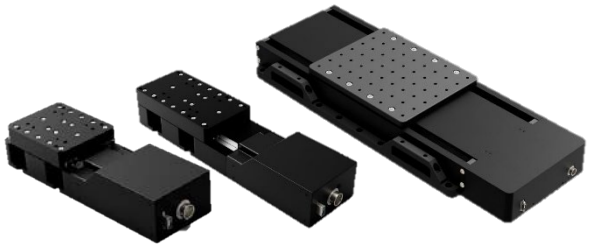


50nm Feedback Stage NFS-X

Catalog Code W9317

Resolution 50nm

The 50 nm Feedback Stage is available in 8 different table sizes.



Travel [mm]					
20	40	50	100	200	300

Cable for NFS Feedback Stage(See cable page for details)	
Motor cable	**D15H12A-RC-3**
Scale cable	**DM15HD14A-RC-3**

Specifications

Part Number			NFS60-20X	NFS60-40X	NFS100-50X	NFS100-100X
Price [JP Yen]			320,000	380,000	400,000	485,000
Mechanical Specifications	Travel [mm]		20	40	50	100
	Stage Size [mm]		60×60	110×60	100×100	175×100
	Feed Screw		Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ4mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead
	Positioning Slide		Crossed roller	Crossed roller	Crossed roller	Crossed roller
	Stage Material		Aluminum	Aluminum	Aluminum	Aluminum
	Finish		Black anodized	Black anodized	Black anodized	Black anodized
	Weight [kg]		0.5	1.0	2.7	3.7
Accuracy Specifications	Resolution *1	(Full)[μm/pulse]	2	2	2	2
		(Half)[μm/pulse]	1	1	1	1
	MAX Speed [mm/sec]		10	10	10	10
	Positioning Accuracy [μm]*2		1	1	1	2
	Positional Repeatability [μm]*2		0.5	0.5	0.5	0.5
	Micro-range Bi-directional Repeatability *3		±100nm	±100nm	±100nm	±100nm
	Least Increment Step Test (MIN)		150nm	150nm	150nm	150nm
	Load Capacity [N]		49（5.0kgf）	49（5.0kgf）	98（10.0kgf）	98（10.0kgf）
	Moment Stiffness	Pitch["/N･cm]	0.5	0.5	0.05	0.05
		Yaw["/N･cm]	0.5	0.5	0.05	0.05
		Roll["/N･cm]	0.5	0.5	0.05	0.05
	Lost Motion [μm]		0.5	0.5	0.5	0.5
	Backlash [μm]		1	1	1	1
	Parallelism[μm]		50	50	50	50
	Running Parallelism [μm]		10	10	10	10
	Pitch["]/Yaw["]		15/15	15/15	15/15	15/15
Motor	Type		5-phase stepping motor 0.35A/phase (Oriental Motor Co., Ltd.)		5-phase stepping motor 0.75A/phase (Oriental Motor Co., Ltd.)	
	Motor Part Number		PK523PB-C7 (□28mm)		PK545NBW (□42mm)	
Encoder	Scale Resolution [nm]		50	50	50	50

*1 Resolution is automatically set by “AutoConfig” when SHRC controller is connected.
*2 Values when the multi-point error compensation function is enabled.
*3 Micro-range Bi-directional Repeatability is a test to measure repetitive positioning accuracy (ISO) in a microrange.
Measurement step for 50 nm feedback stage (NFS-X series): 100 nm

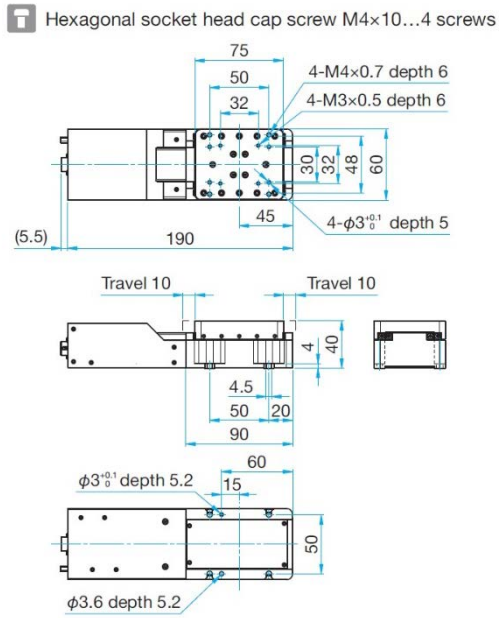
Resolution 50nm

Specifications						
Part Number			**NFS120-50X**	**NFS120-100X**	**NFS180-200X**	**NFS180-300X**
Price [JP Yen]			**400,000**	**485,000**	**700,000**	**750,000**
Mechanical Specifications	Travel [mm]		50	100	200	300
	Stage Size [mm]		120×120	175×120	230×180	330×180
	Feed Screw		Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ8mm, 1mm lead	Ball screw diameter φ10mm, 2mm lead	Ball screw diameter φ10mm, 2mm lead
	Positioning Slide		Crossed roller	Crossed roller	LM guide	LM guide
	Stage Material		Aluminum	Aluminum	Aluminum	Aluminum
	Finish		Black anodized	Black anodized	Black anodized	Black anodized
	Weight [kg]		3.0	4.0	13.2	17
Accuracy Specifications	Resolution*1	(Full)[μm/pulse]	2	2	4	4
		(Half)[μm/pulse]	1	1	2	2
	MAX Speed [mm/sec]		10	10	20	20
	Positioning Accuracy [μm]*2		1	2	2	2
	Positional Repeatability [μm]*2		0.5	0.5	0.6	0.6
	Micro-range Bi-directional Repeatability *3		±100nm	±100nm	±100nm	±100nm
	Least Increment Step Test (MIN)		150nm	150nm	150nm	150nm
	Load Capacity [N]		98 (10.0kgf)	98 (10.0kgf)	196 (20.0kgf)	196 (20.0kgf)
	Moment Stiffness	Pitch["/N・cm]	0.05	0.05	0.02	0.02
		Yaw["/N・cm]	0.05	0.05	0.02	0.02
		Roll["/N・cm]	0.05	0.05	0.02	0.02
	Lost Motion [μm]		0.5	0.5	0.6	0.6
	Backlash [μm]		1	1	1	1
	Parallelism[μm]		50	50	100	100
	Running Parallelism [μm]		10	10	20	20
	Pitch["]/Yaw["]		15/15	15/15	20/20	20/20
Motor	Type		5-phase stepping motor 0.75A/phase (Oriental Motor Co., Ltd.)			
	Motor Part Number		PK545NBW (□42mm)			
Encoder	Scale Resolution [nm]		50	50	50	50

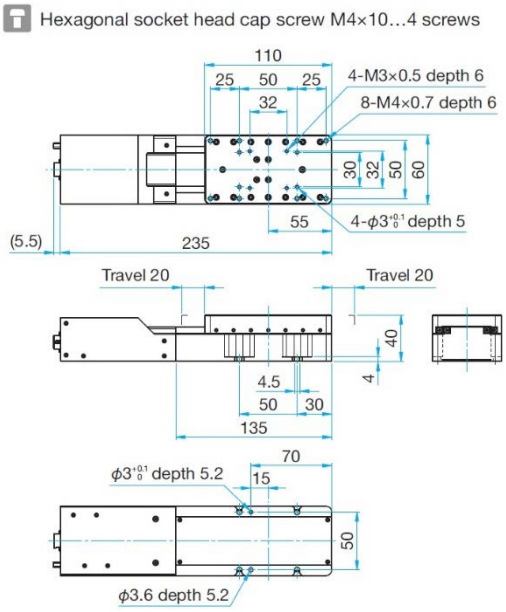
*1 Resolution is automatically set by “AutoConfig” when SHRC controller is connected.
*2 Values when the multi-point error compensation function is enabled.
*3 Micro-range Bi-directional Repeatability is a test to measure repetitive positioning accuracy (ISO) in a microrange.
Measurement step for 50 nm feedback stage (NFS-X series): 100 nm

Outline Drawing

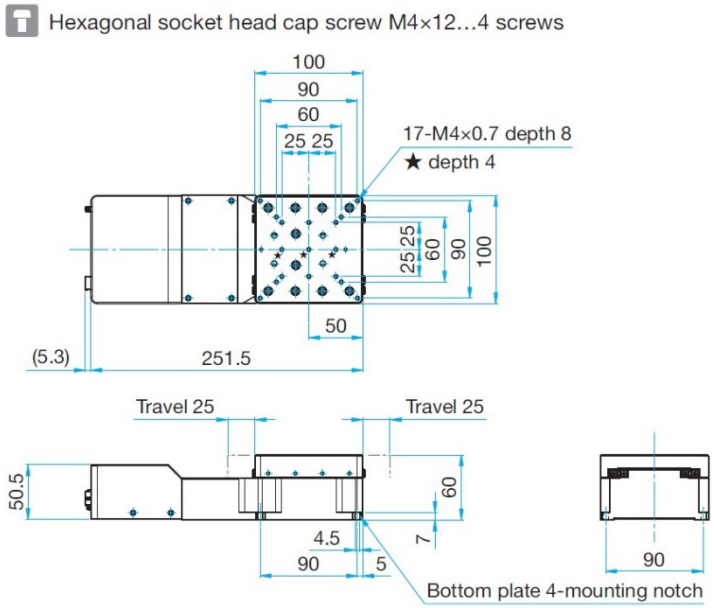
NFS60-20X



NFS60-40X



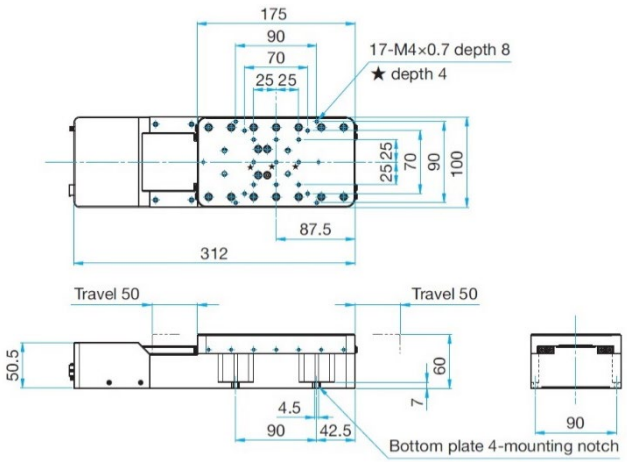
NFS100-50X



Outline Drawing

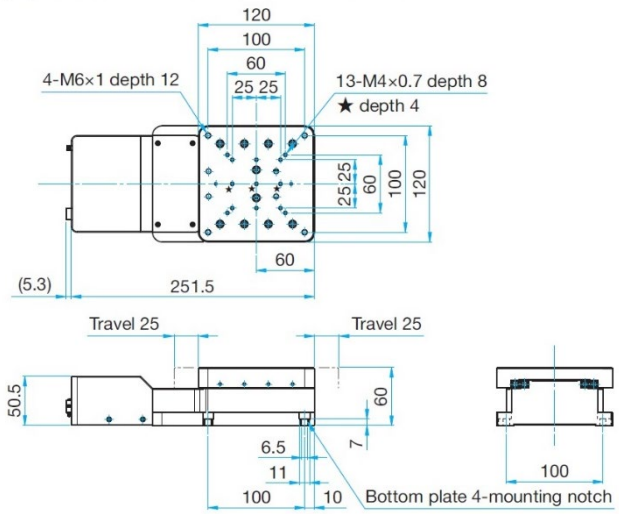
NFS100-100X

Hexagonal socket head cap screw M4×12…4 screws



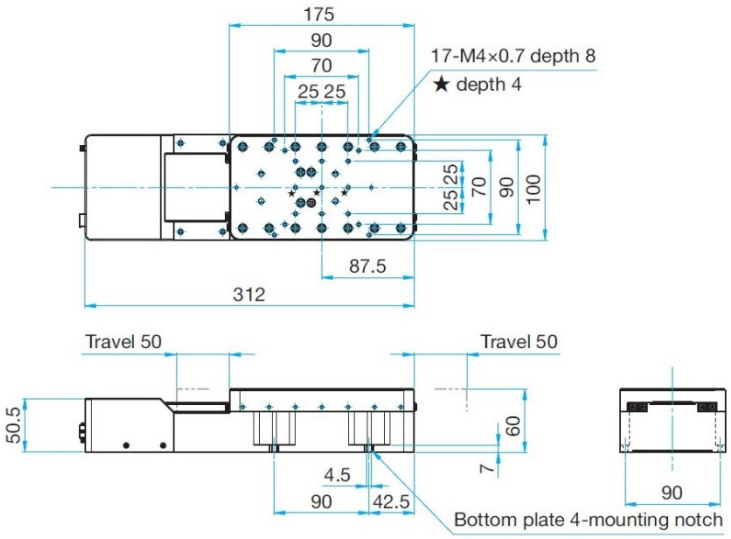
NFS120-50X

Hexagonal socket head cap screw M6×14…4 screws



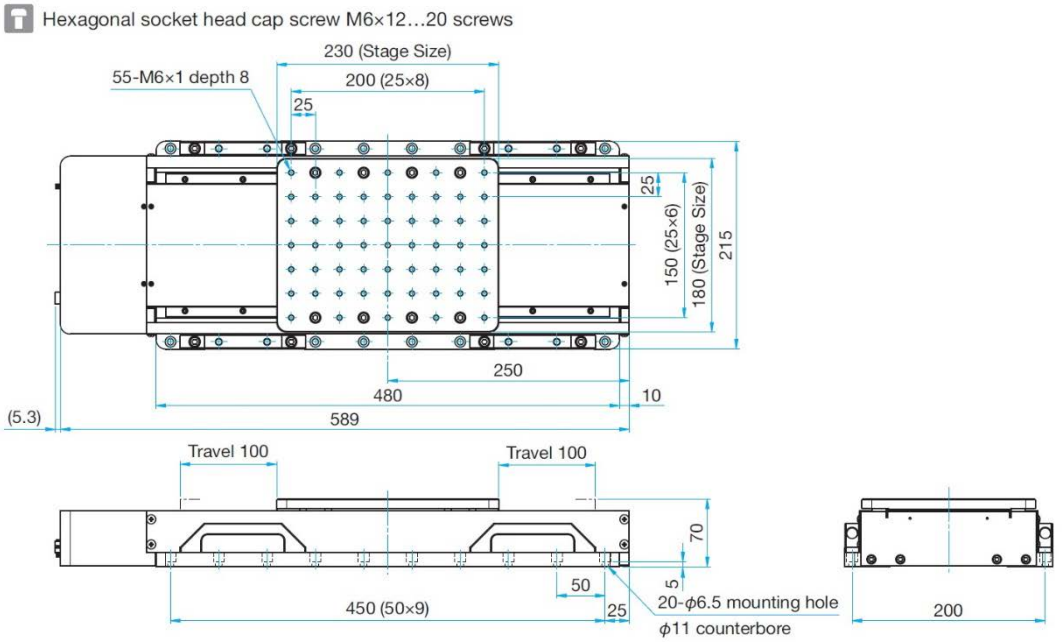
NFS120-100X

Hexagonal socket head cap screw M4×12…4 screws

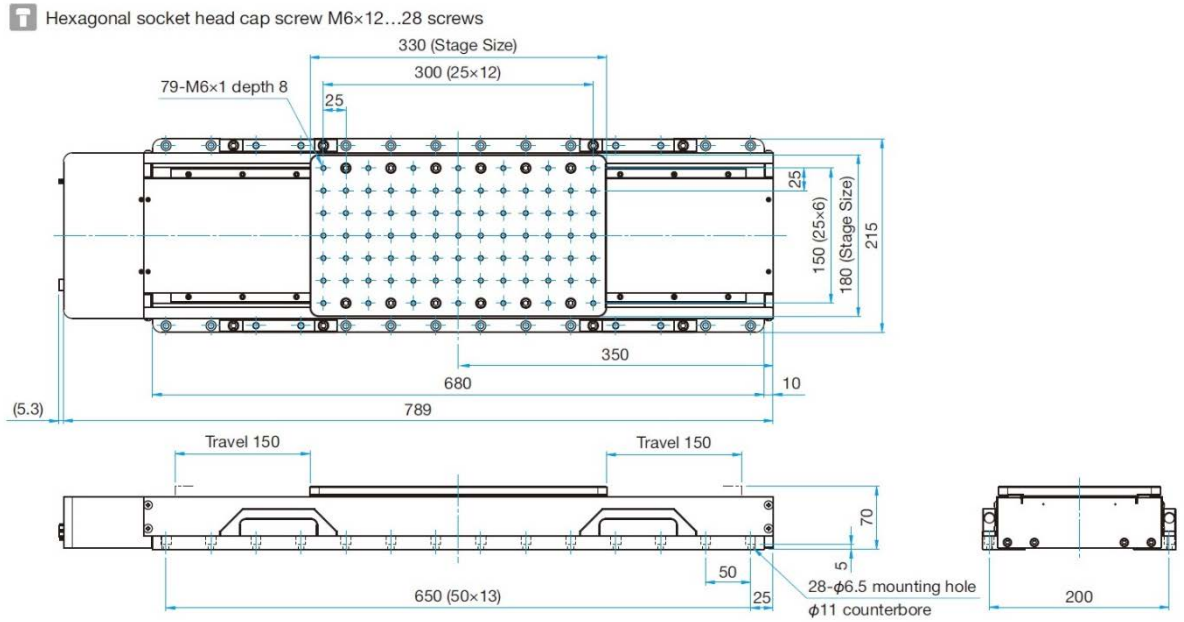


Outline Drawing

NFS180-200X



NFS180-300X



Cable for NFS Feedback Stage

RoHS Catalog Code W9318

Various cables for use with the NFS Feedback Stage are available.
D15H12A-RC-3 is a Motor Cable to connect NFS series and 3 Axis Stage Controller (SHRC-203).
DM15HD14A-RC-3 is a Scale Cable to connect NFS series and 3 Axis Stage Controller (SHRC-203).

Wiring Diagram

D15H12A-RC-3

Controller side(15pin)
Connector : 17JE-23150-02(D1)
Hood : 17JE-15H-1A4-CF
(Plug type)
DDK Ltd.

PinNo	Signal Name
1	Motor Blue
2	Motor Red
3	Motor Orange
4	Motor Green
5	Motor Black
6	GND
7	ORG
8	Vs (+24V)
9	ACONF
10	NC
11	LS (+) CW side lim
12	LS (–) CCW side lim
13	GND
14	NEAR
15	+24V
CASE	

1 Blue
1 White
2 Yellow
2 Brown
3 Green
3 Black
4 Red
4 Gray
5 Purple
5 Orange
6 Blue
6 Brown

Stage side(12pin)
Connector : HR10A-10P-12SC(73)
(Socket type)
Hirose Electric Co., Ltd.

PinNo	Signal Name
1	Motor Blue
2	Motor Red
3	Motor Orange
4	Motor Green
5	Motor Black
6	GND
7	ORG
8	Vs (+24V)
9	ACONF
10	LS (+) CW side lim
11	LS (–) CCW side lim
12	NEAR
CASE	

DM15HD14A-RC-3

Controller side(15pin)
Connector : D02-M15PG-N-F0
Hood : DE-C8-J9-F4-1R
(Plug type)
Japan Aviation Electronics Industry, Ltd.

PinNo	Signal Name
1	GND
2	GND
3	+5V
4	+5V
5	N.C
6	N.C
7	N.C
8	N.C
9	Alarm–
10	A+
11	A–
12	B+
13	B–
14	N.C
15	FG
CASE	

1 Blue
2 Yellow
1 White
2 Brown
3 Green
4 Red
4 Gray
5 Purple
5 Orange
3 Black

Stage side(14pin)
Connector : HDR-E14FSG1+
Hood : HDR-E14LPHP+
(Socket type)
HTK Ltd.

PinNo	Signal Name
1	GND
2	GND
3	+5V
4	+5V
5	N.C
6	N.C
7	N.C
8	N.C
9	Alarm–
10	A+
11	A–
12	B+
13	B–
14	FG
CASE	

Specifications		
Part Number	**D15H12A-RC-3**	**DM15HD14A-RC-3**
Price [JP Yen]	**16,500**	**19,000**
Product Name	Motor Cable	Scale Cable
Cable Length [m]	3	3

3 Axis Stage Controller

SHRC-203

Catalog Code W9314

Controller capable of controlling a wide range of high-resolution stages from an open-loop Motorized Stage with 5-phase stepping motor to a 1 nm Feedback Stage.

- Stage controller with built-in driver for 5-phase stepping motors, capable of 3-axis full closed-loop to open-loop control independently for each axis.
- External control via USB/GP-IB/Ethernet interface, manual operation via front panel or handy terminal (JS-301, JB-401, JD-101, MD-400), and automatic control via internal program (8 banks) are available.
- Full closed loop control is available when used with Precision Motorized Stages with Built-in Compact Scale.

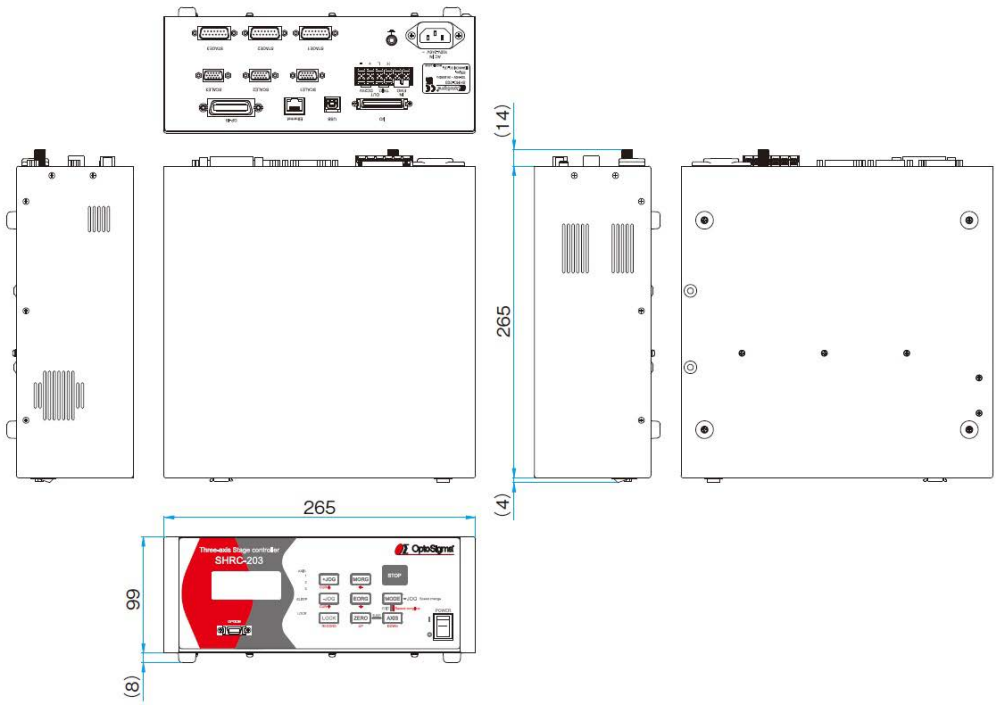
Guide

▶ Sample programs are available for download on our website.
- SG Sample 32/64 bit for Windows®
- LabVIEW

Part Number	SHRC-203
Product Name	3 Axis Stage Controller
Price [JP Yen]	398,000

Outline Drawing

SHRC-203



Specifications	
General Specifications	
Power Voltage	AC100～240V ± 10% 50/60Hz
Power Consumption	2A
Operating Temperature	5～40℃
Storage Temperature	-20～60℃
Ambient Humidity	20～80%RH (without condensation)
Weight	4.6kg
External Dimensions (W × H × D)	265 × 99 × 265mm

Performance Specifications	
Coordinate Indication Range	± 999,999,999
Max. Travel to Set	-2147483648～＋2147483647 phase
Max. Driving Speed	1,000,000pps
Min. Driving Speed	1pps
Acceleration/Deceleration Time	1～1,000ms
Micro-step (Max. Division)	8,000
Driving Current	0.3～1.4A/phase

Control Command	
Controller Function	○
Number of Control Axes	3 axes
Stored Program Control	○
Feedback Control	GS
Circular Interpolation Control	○
Linear Interpolation Control	○
Machine Origin Return	○
Theoretical Origin Setting	○
Relative Position Drive	○
Absolute Position Drive	○
Jog Operation	○
Position Appointment	-
Deceleration stop	○
Emergency Stop	○
Speed Setting	○
Driver Function	Micro-step
Motor Free/Hold	○

Interface	
GP-IB	○
RS232C	-
USB	○
Ethernet	○

I/O Specification	
Origin Sensor	○
Proximity Sensor	○
CW (+) Limit	○
CCW(−) Limit	○
General Purpose Input	6 point
General Purpose Output	6 point
Control Input	18 point
Control Output	5 point
Trigger Output	○

Optional	
CJ-200A	-
JS-301	○
JB-401	○
JD-101	○
SJT-02	-
MD-400	○