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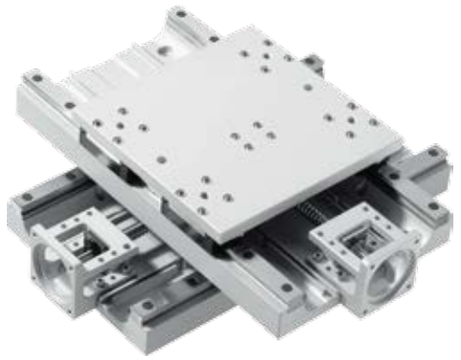
AC Design 04-27071159



XY TABLE-Linear Motion Stages

INDEX

This is a precision product. For operating properly, please be familiar with the following precautions before using it.

Unpacking Precautions

Before unpacking, please check the appearance for damage, loose screws or components. If there are concerns about structure and appearance, please take photographs as evidence and e-mail to the responsible unit.

When the packages arrive, please make sure that the specifications and contents are consistent with the order, and check whether any peripheral parts are missing.

For any questions, please contact the responsible unit.

Safety Precautions

Before placement and use, please make sure that there is sufficient working space around to prevent the possibility of falling and rolling.
→ CAUTION：A violation may result in personal injuries or product damage.

For safe installations and operations, please follow the electrical safety instructions. Do not use in any explosive, flammable, corrosive, humid environments or wet conditions nor near to such materials. Otherwise, there would be risks of fire and electric shocks.
→ CAUTION：A violation may result in serious personal injuries or product damage.

Please always check that whether the movement space of the motors and mechanisms is enough in operations, and avoid any body parts or clothing accessories being close of / entering into the working areas of the stages. It otherwise will cause dangers as rolling, pinching, and pulling.
→ CAUTION：A violation may result in personal injuries or product damage.

Please turn off the power before starting maintenance to prevent the danger as an electric shock.
→ CAUTION：A violation may result in serious personal injuries or product damage.

Installation Precautions

If any unusual situations arise in operations(such as unusual sounds and vibrations), please immediately stop the machine.
→ CAUTION：A violation may result in personal injuries or product damage.

For tightening screws, please use a torque wrench corresponds to specifications of the screws.
→ CAUTION：A violation may cause loosening.

Please do not allow the setting of machine speed to excess the maximum default speed, and avoid extreme changes of the setting and parameters.
→ CAUTION：A violation may result in personal injuries or product damage.

If any malfunctions or damage arise, please do not continue the use.
→ CAUTION：A violation may result in personal injuries or product damage.

Please make sure the wiring and connections of electric equipment are secured and the parameters are set correctly.
→ CAUTION：A violation may cause fire, electric shocks, personal injuries or product damage.

Environment Precaution

If any foreign objects such as dust or metal powder that enters into the screws or slide rails, it may reduce the product life and cause abnormal wears of products.
→ CAUTION：If any concerns exist, please implement the dust control measures.

Once the product is used as a mechanical processing standard, it may affect the life, performances and precision.
→ CAUTION：For this case, please have the installation be on a reliably rigid base.

The product is designed and planned to operate in the specified directions mentioned in the catalog. Please check with GMT if other directions will be applied.
→ CAUTION：If the product is used beyond the usage of horizontal directions, it will reduce the life and increase the probability of malfunctions.

Before installing our products, please make sure there are no unnecessary objects in the area, and use alcohol for cleaning to prevent for losing precision of the installation.
→ CAUTION：A violation may cause the product precision unable to match the specifications marked on the catalog.

Do not apply any inappropriate forces on or strike the product to prevent damage and the loss of precision and warranties.
→ CAUTION：A violation may cause the product precision unable to match the specifications marked on the catalog.

Please do not turn off the travel stroke limitation sensors during the operation, it otherwise will cause the deactivations of the sensors, and do not overuse the travel strokes while turning the knob on the back of the motors.
→ CAUTION：A violation may result in personal injuries or product damage.

Installation Precautions

While installing the peripheral mechanisms on the upper / lower board of the stage, please have the stage horizontally fixed and then make sure the flatness and the inclination angle of the mounting surface is within 0.01mm and 1° respectively to prevent for the arising of poor precision due to the deformations of the stage.

→ CAUTION：A violation may result in personal injuries or product damage.

Do not remove any parts of product arbitrarily to prevent the loss of precision and warranties. If a service is needed, please contact our salespersons.

→ CAUTION：A violation may cause damage on product and the precision unable to match the specifications marked on the catalog.

If any screw holes do not fit or need additional screw holes, please contact our salespersons and do not handle it by self to guarantee the precision and warranties.

→ CAUTION：A violation may cause damage on product and the precision unable to match the specifications marked on the catalog.

All of the accessories and parts of the product are not water-proof or dust-proof; please do not directly use in oil misty, dusty or humid environments.

→ CAUTION：A violation may cause damage on product and the precision unable to match the specifications marked on the catalog.

Installation Procedures：

1. Please make sure there is no flash, dust, or dent on the installation surface.
2. The screw holes should be aligned with the ones located on the installation surface.
3. Please adjust according to installation hole position(aiming screw hole).
4. It is suggested to use the screws according to the compliances of the standard specifications.
5. Use a torque wrench to tighten screws.

Precautions for Product Use Environments：

Transporting Temperature	-10℃ ~ 70℃
Transporting Humidity	below 90%RH(non-condensing)
Installation Temperature	0℃ ~ 40℃
Installation Humidity	below 20% ~ 80%RH(non-condensing)
Environmental Gases	It must not contain any corrosive, flammable gas, oil mist or dust indoors.

Model No. Introduction

GXY	25	-	20	20	J	W	P

Axis / Model No.		Table Width		X-Axis Stroke		Y-Axis Stroke		Belows	Surface Treatment		Accuracy Level	
GX	Single Axis	15	150 mm	05	50 mm	05	50 mm	Optional	W	Primary Anodized	P	Precise Level
GXY	Dual Axes	25	250 mm	10	100 mm	10	100 mm		B	Black Anodized	R	Regular Level
		40	400 mm	15	150 mm	15	150 mm					
				20	200 mm	20	200 mm					
				25	250 mm	25	250 mm					
				30	300 mm	30	300 mm					
				40	400 mm	40	400 mm					
				50	500 mm	50	500 mm					

Single Axis Specification Example

Model No.	Table Size (Width x Length)	Model No. + Belows	Table Size (Width x Length)	Stroke
GX15-05WP	150x160 mm	GX15-05JWP	150x188 mm	±25
GX15-10WP		GX15-10JWP		±50
GX15-15WP		GX15-15JWP		±75
GX15-20WP		GX15-20JWP		±100
GX15-25WP		GX15-25JWP		±125
GX15-30WP		GX15-30JWP		±150
GX25-20WP	250x260 mm	GX25-20JWP	250x300 mm	±100
GX25-25WP		GX25-25JWP		±125
GX25-30WP		GX25-30JWP		±150
GX25-40WP		GX25-40JWP		±200
GX25-50WP		GX25-50JWP		±250
GX40-40WP	400x420 mm	GX40-40JWP	400x470 mm	±200
GX40-50WP		GX40-50JWP		±250

Dual Axes Specification Example

Model No.	Table Size (Width x Length)	Model No. + Belows	Table Size (Width x Length)	Stroke	
				X-Axis	Y-Axis
GXY15-0505WP	150x160 mm	GXY15-0505JWP	150x188 mm	±25	±25
GXY15-0510WP		GXY15-0510JWP		±25	±50
GXY15-0515WP		GXY15-0515JWP		±25	±75
GXY15-1010WP		GXY15-1010JWP		±50	±50
GXY15-1015WP		GXY15-1015JWP		±50	±75
GXY15-1515WP		GXY15-1515JWP		±75	±75
GXY25-2020WP	250x260 mm	GXY25-2025JWP	250x300 mm	±100	±100
GXY25-2025WP		GXY25-2025JWP		±100	±125
GXY25-2030WP		GXY25-2030JWP		±100	±150
GXY25-2525WP		GXY25-2525JWP		±125	±125
GXY25-2530WP		GXY25-2530JWP		±125	±150
GXY25-3030WP		GXY25-3030JWP		±150	±150
GXY40-4040WP	400x420 mm	GXY40-4040JWP	400x470 mm	±200	±200
GXY40-4050WP		GXY40-4050JWP		±200	±250
GXY40-5050WP		GXY40-5050JWP		±250	±250

Product Characteristic

GMT XY Table Divided into :

◎Precision level(P)：Ball screw shaft is C5 level, Linear guide block is precise level P(Heavy preload).
Application：Measuring instrument, Measuring equipment, Coater.

◎Standard level(R)：Ball screw shaft is R level, Linear guide block is high level H(Light preload).
Application：Woodworking machine, Cutting machine, Laser Carving Machine, Image Comparator.

Perfect Durability

GMT linear guide base is made of high strength aluminum alloy, it has been stress eliminated and treated with deep cryogenic treatment under 196˚C(Please refer to P.45), and it has been highly increased to bear the maximum deforming strength. While it is applied to high precision slide table, the base structure is stable enough to against excess sensitivity of material heat expands cold contracts appearance cause by environment temperature change and also can keep a consistent movement of the slide table, and make guarantee it maintain high precision still after long period using.

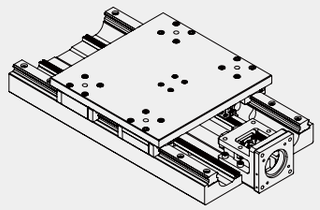
Variety of Product Assembly Dimensions

XY Table Precise Stage, the dimensions of satge is from 150mm~400mm, stroke is from 50mm~500mm, a variety of single axis or dual axes postioning stage can be provided due to modularization design.

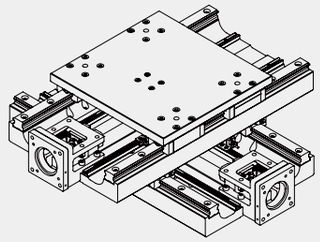
Motor Mount

Matched with all servo motors, easy insert installation without axis adjustment.
Motor, Coupling are options.

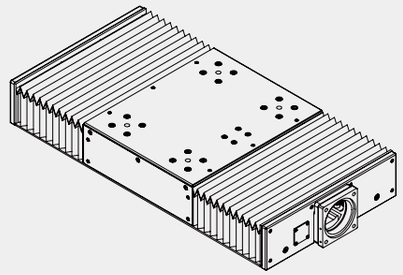
Single Axis Example : GX



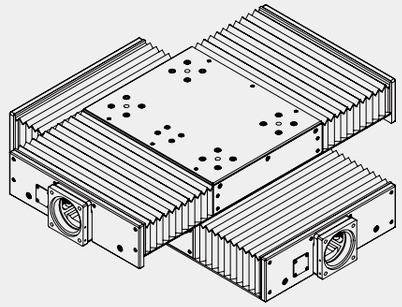
Dual Axes Example : GXY



Single Axis + Belows Example : GX-J



Dual Axes + Belows Example : GXY-J



Product Selection

Selection Steps

(1) Choose precise level(P) or regular level(R) by working environment and accuracy requirement.
(2) Select Single axis or Dule axes.
(3) Required table dimensions.
(4) Stroke options.
(5) Function options：with dust cover(J), No dust cover.
(6) Surface Treatment：Primary Anodized(W), Black Anodized(B).
(7) Coupling Options(Optional Accessary).
(8) Please advise us motor brand, model no. while you place an order.
(corresponding motor connecting plate)

Lubricant Use

◎General Environment：
Linear Guide：Lithium soap grease No.2 or viscosity 30~150cst of lubrication.
Ball Screw Shaft：Lithium soap lubricant or lubricant in viscosity 30~40cst.
◎Clean Room：The viscosity 30~40cst of lithium soap grease or lubrication.
Lubrication depends on individual request from clean room level.

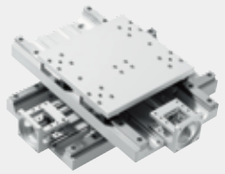
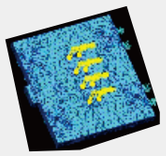
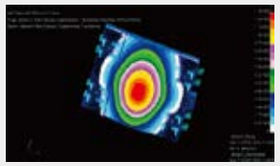
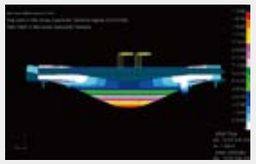
Limited Element Analysis

Points to Optimized Design Are as Belows：

(1) When material of producing parts is reduced, production and transportation cost are decreased at the same time.
(2) Due to material reduction, main unit weight of product is decreased greatly; Oppositely, energy loss dropped down as well, but system efficiency is raised. Meanwhile environment protection is also reached.
(3) Decrease stress, increase construction strength.
(4) Shape optimized design reduces material use, and improves the appearance of product, smooth and streamlined as well.
(5) Optimized design could save a lot of time in the design process by automatic analysis software execution and programmable parameter, without large amount of manpower to shorten the development duration.

Five Basic Steps in Optimized Design：

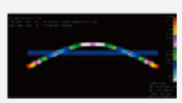
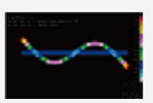
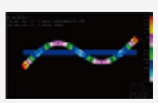
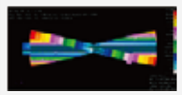
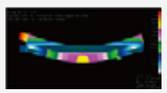
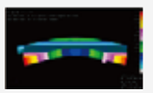
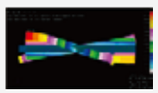
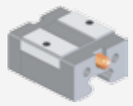
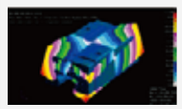
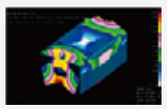
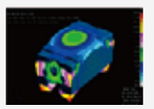
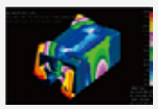
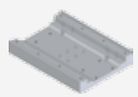
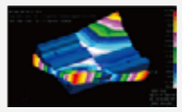
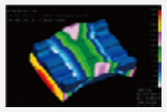
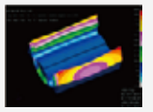
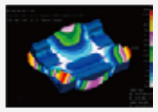
(1) Design Parameter Initialization：
Before use variable initialed into a design parameter, it needs to be appointed in the beginning before pre-work, so that it could avoid design parameter to be initialed again.
(2) Definition：
Main job of pre-work is simulate product limit element model that optimized analysis required. This is is exactly the same as regular analysis.
(3) Primary Analysis Execution：
Optimized resolution is the same as regular ANSYS steps, main resolution job, such as stress, strain and deformation etc....
(4) Get Feedback：
Post-production step is usually used to take required value(ex：stress, strain), and this step is mainly collected and stored with target function and limited condition to parameter type.
(5) Target Function Setting, Conditions Limitation and Loops of Optimized execution：
Final step is optimized resolution process, mainly control and design optimized resolution process, such as parameter design, limit of maximum and minimum, and declaration about target function and convergence criterion.

Motorized X & XY-Axis Linear ➊ Motion Stage <Linear Ball Guiding>
Limited Element Analysis
GMT GLOBAL INC.
Product Introduction

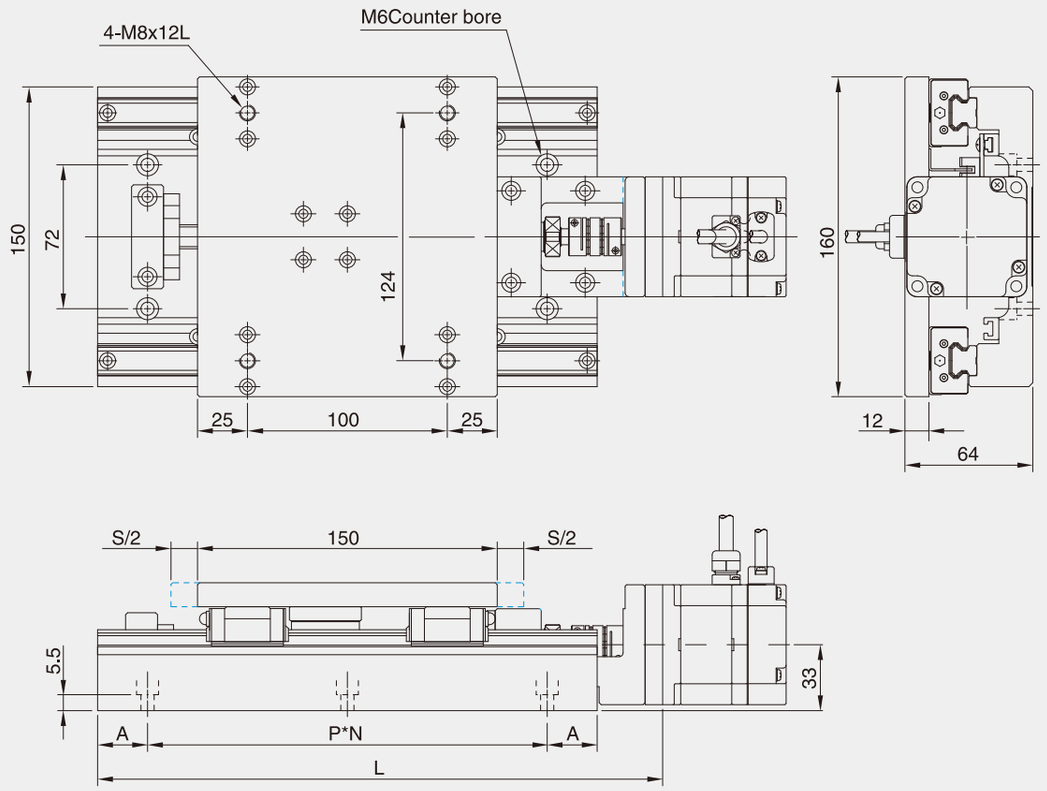
Product Analysis Items：

(1) The table of slide base deforming analysis.
(2) The max load capacity of dual axes table moving to end of X and Y-axis.(main unit load)
(3) The max load capacity of dual axes table moving to end of X and Y-axis.(side load)
(4) The max load capacity of X and Y-axis linear guide and table.
(5) Heating deformation analysis of linear guide and slide base.
(6) Modal analysis of linear guide, table, slide block and slide base.
(7) Cocmoc and nastran individualized structure verification.

		Mode 1	Mode 2	Mode 3	Mode 4
Linear Guide	Resonance Frequency (Hz)	7(bending)	9(torsion)	20(bending)	24(torsion)
	Shape				
Table	Resonance Frequency (Hz)	24(torsion)	35(bending)	46(bending)	62(torsion)
	Shape				
Slide Block	Resonance Frequency (Hz)	271(torsion)	453(bending)	506(bending)	578(torsion)
	Shape				
Slide Base	Resonance Frequency (Hz)	17(torsion)	23(bending)	40(bending)	41(torsion)
	Shape				

GMT XY Table make use of limited element analysis to have optimized design of structure and shape.

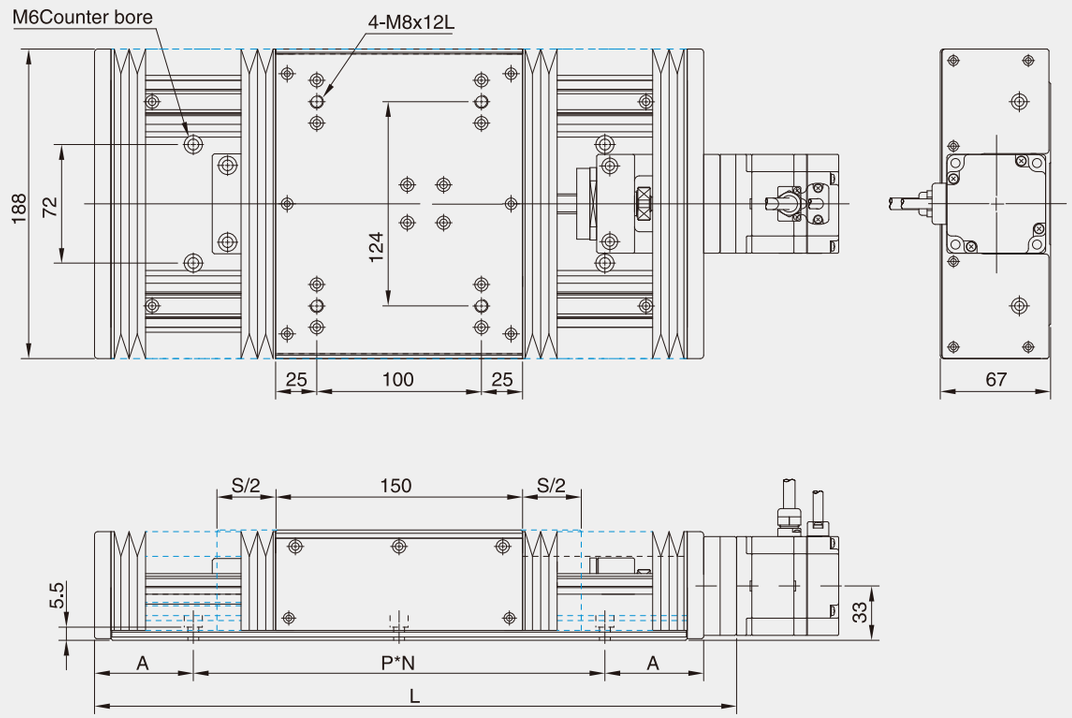
GX15-□□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX15-05WP	GX15-05BP	±25	0.005	0.015	±0.002	40	P	Ø12	5	C5	37.5	125x1	234	3.7
GX15-10WP	GX15-10BP	±50	0.005	0.015							62.5	125x1	284	4.1
GX15-15WP	GX15-15BP	±75	0.01	0.02							25	125x2	334	4.6
GX15-20WP	GX15-20BP	±100	0.01	0.02							50	125x2	384	5.1
GX15-25WP	GX15-25BP	±125	0.02	0.03							75	125x2	434	5.6
GX15-30WP	GX15-30BP	±150	0.02	0.03							37.5	125x3	484	5.9

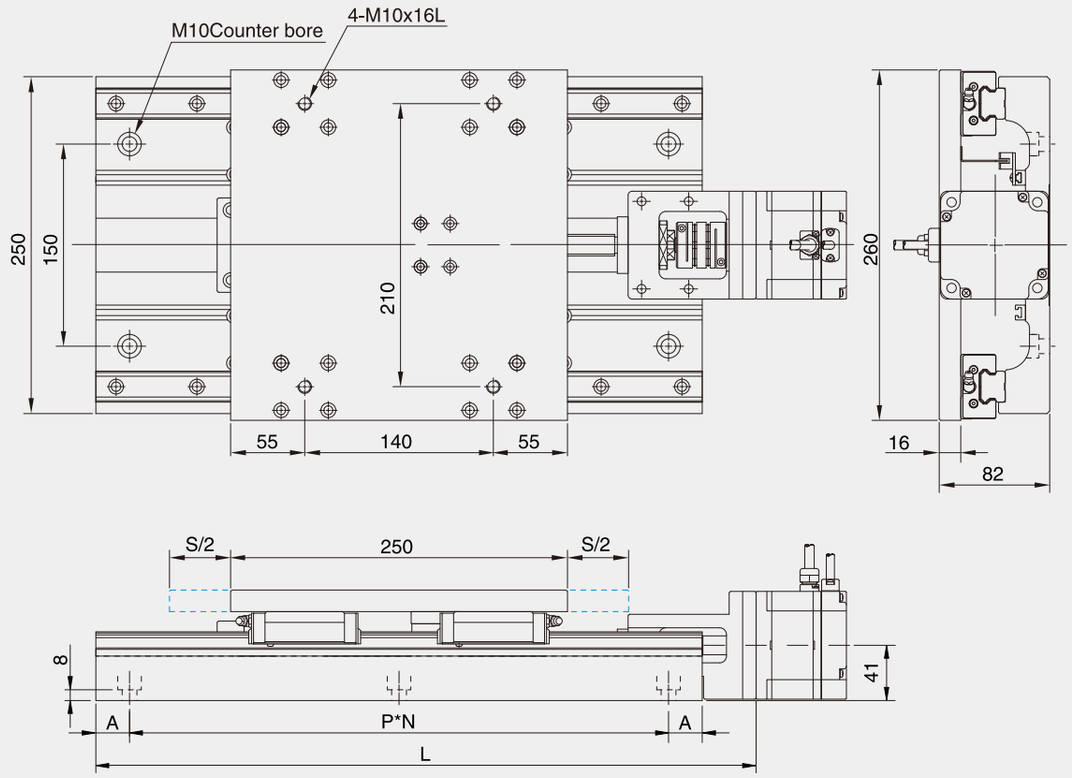
GX15-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX15-05JWP	GX15-05JBP	±25	0.005	0.015	±0.002	40	P	Ø12	5	C5	20	125x2	310	5.9
GX15-10JWP	GX15-10JBP	±50	0.005	0.015							60	125x2	390	6.7
GX15-15JWP	GX15-15JBP	±75	0.01	0.02							32.5	125x3	460	7.4
GX15-20JWP	GX15-20JBP	±100	0.01	0.02							77.5	125x3	550	8.3
GX15-25JWP	GX15-25JBP	±125	0.02	0.03							50	125x4	620	8.9
GX15-30JWP	GX15-30JBP	±150	0.02	0.03							22.5	125x5	690	9.5

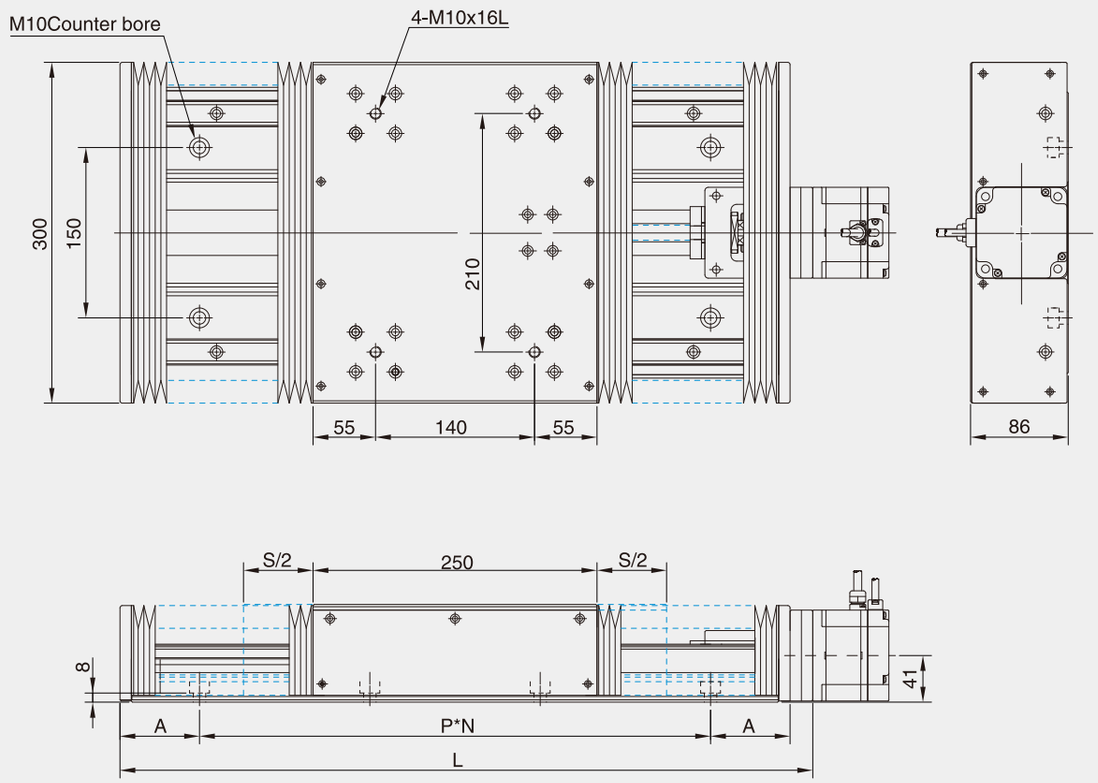
GX25-□□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX25-20WP	GX25-20BP	±100	0.015	0.025	±0.003	70	P	Ø16	5	C5	75	150x2	490	12.4
GX25-25WP	GX25-25BP	±125	0.015	0.025							25	150x3	540	13.1
GX25-30WP	GX25-30BP	±150	0.025	0.035							50	150x3	590	14.5
GX25-40WP	GX25-40BP	±200	0.025	0.035							25	150x4	690	16.4
GX25-50WP	GX25-50BP	±250	0.025	0.05							75	150x4	790	18.2

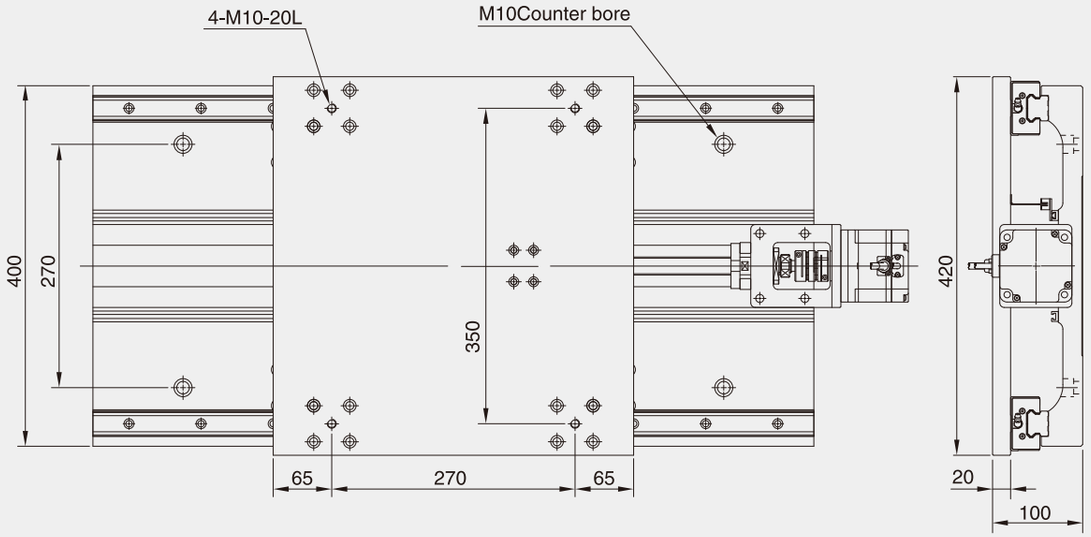
GX25-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX25-20JWP	GX25-20JBP	±100	0.015	0.025	±0.003	70	P	Ø16	5	C5	70	150x3	610	18.6
GX25-25JWP	GX25-25JBP	±125	0.015	0.025							25	150x4	670	19.2
GX25-30JWP	GX25-30JBP	±150	0.025	0.035							60	150x4	740	21
GX25-40JWP	GX25-40JBP	±200	0.025	0.035							50	150x5	870	23.5
GX25-50JWP	GX25-50JBP	±250	0.035	0.05							35	150x6	990	25

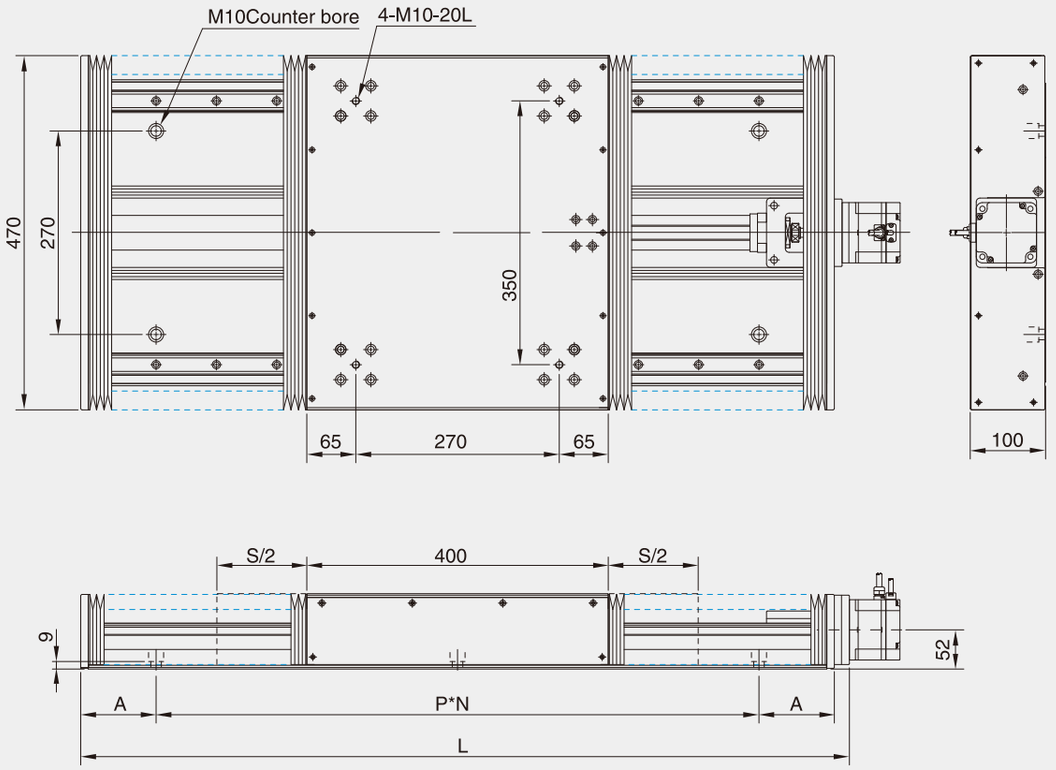
GX40-□□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX40-40WP	GX40-40BP	±200	0.05	0.08	±0.005	80	P	Ø20	5	C5	100	200x3	840	38.6
GX40-50WP	GX40-50BP	±250	0.05	0.08							50	200x4	940	42.1

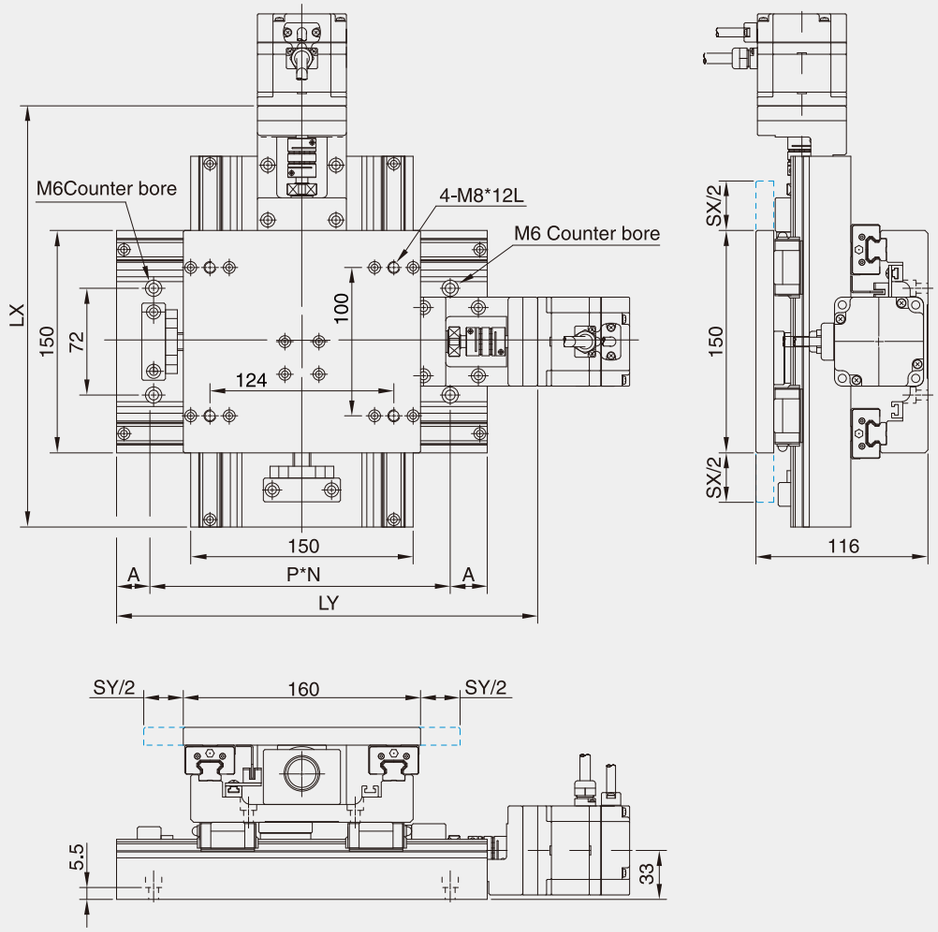
GX40-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX40-40JWP	GX40-40JBP	±200	0.05	0.08	±0.005	80	P	Ø20	5	C5	100	200x4	1020	50.5
GX40-50JWP	GX40-50JBP	±250	0.05	0.08							60	200x5	1140	5.31

GXY15-□□P series

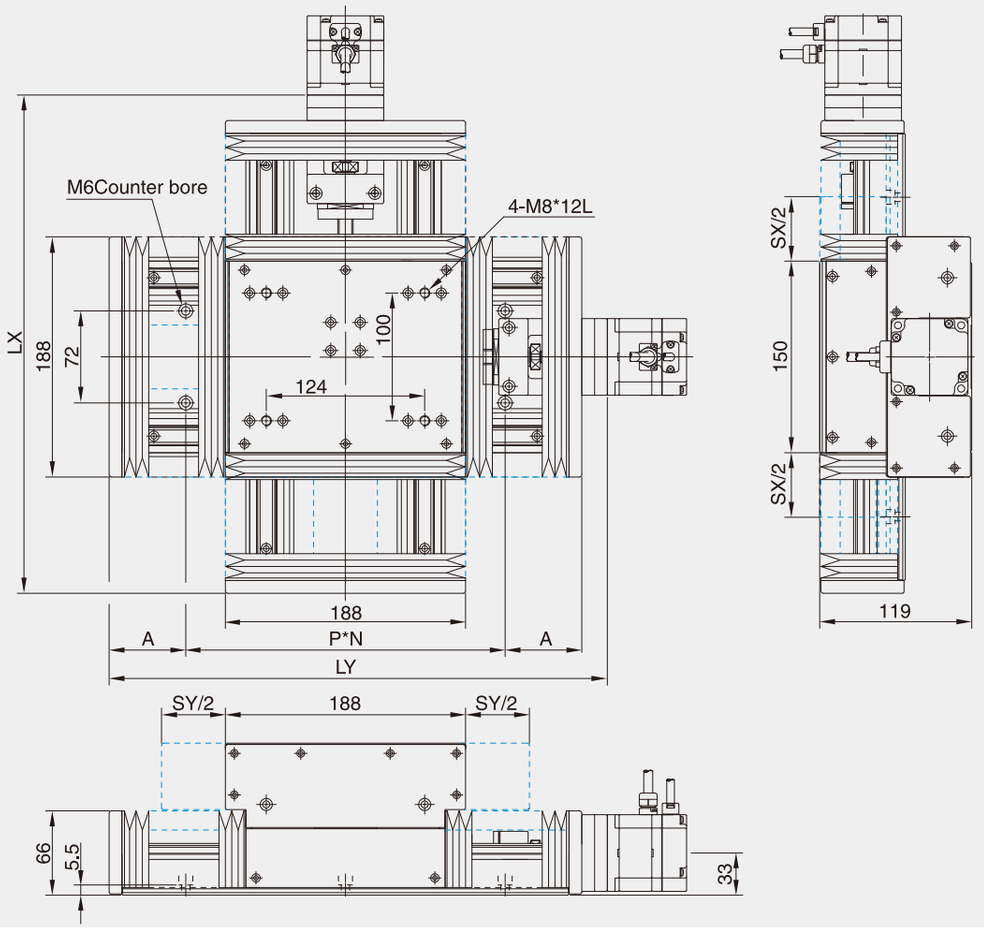


Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY15-0505WP	GXY15-0505BP	±25	±25	0.005	0.025	±0.002	30	P	Ø12	5	C5	37.5	125x1	234	234	6.7
GXY15-0510WP	GXY15-0510BP	±25	±50	0.008	0.03							62.5	125x1	234	284	7.1
GXY15-0515WP	GXY15-0515BP	±25	±75	0.012	0.04							25	125x2	234	334	7.6
GXY15-1010WP	GXY15-1010BP	±50	±50	0.015	0.05							62.5	125x1	284	284	7.6
GXY15-1015WP	GXY15-1015BP	±50	±75	0.018	0.08							25	125x2	284	334	8
GXY15-1515WP	GXY15-1515BP	±75	±75	0.02	0.1							25	125x2	334	334	8.5

Motorized X & XY-Axis Linear Motion Stage <Linear Ball Guiding>
GMT GLOBAL INC.
Precision Level | XY-Axis | GXY15 + Belows
Product Specification

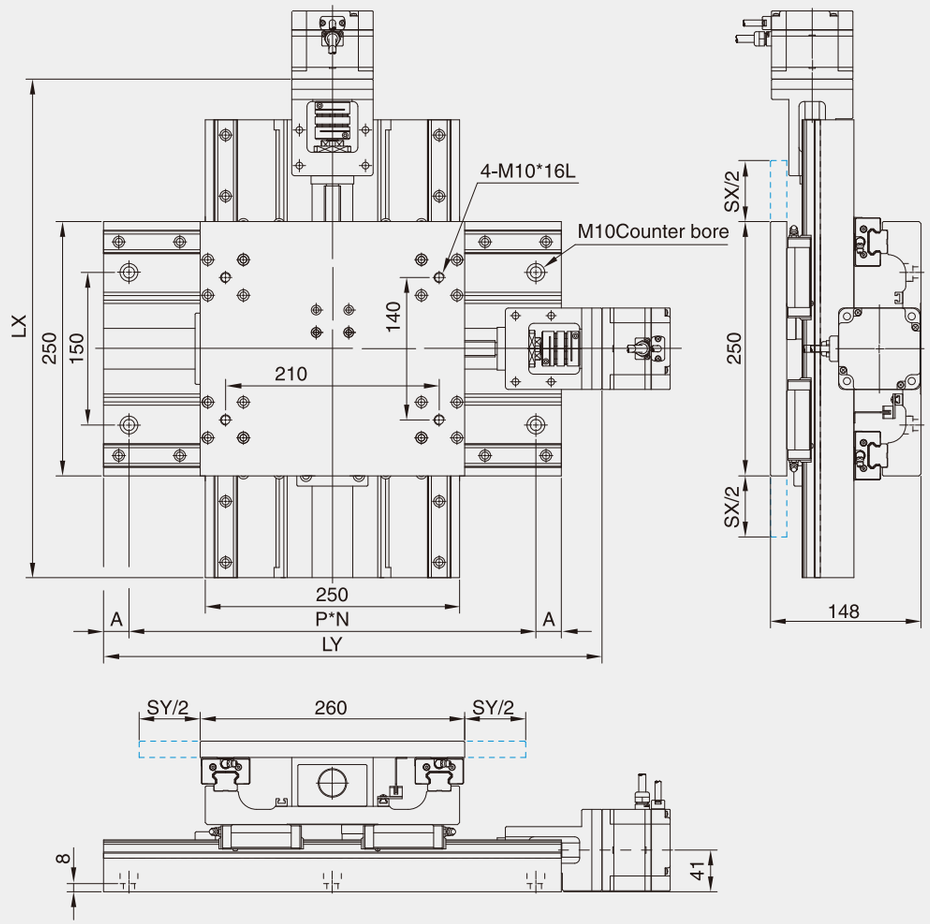
GXY15-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY15-0505JWP	GXY15-0505JBP	±25	±25	0.005	0.025	±0.002	30	P	Ø12	5	C5	20	125x2	310	310	10.7
GXY15-0510JWP	GXY15-0510JBP	±25	±50	0.008	0.03							60	125x2	310	390	11.3
GXY15-0515JWP	GXY15-0515JBP	±25	±75	0.012	0.04							32.5	125x3	310	460	12.2
GXY15-1010JWP	GXY15-1010JBP	±50	±50	0.015	0.05							60	125x2	390	390	11.9
GXY15-1015JWP	GXY15-1015JBP	±50	±75	0.018	0.08							32.5	125x3	390	460	12.7
GXY15-1515JWP	GXY15-1515JBP	±75	±75	0.02	0.1							32.5	125x3	460	460	13.4

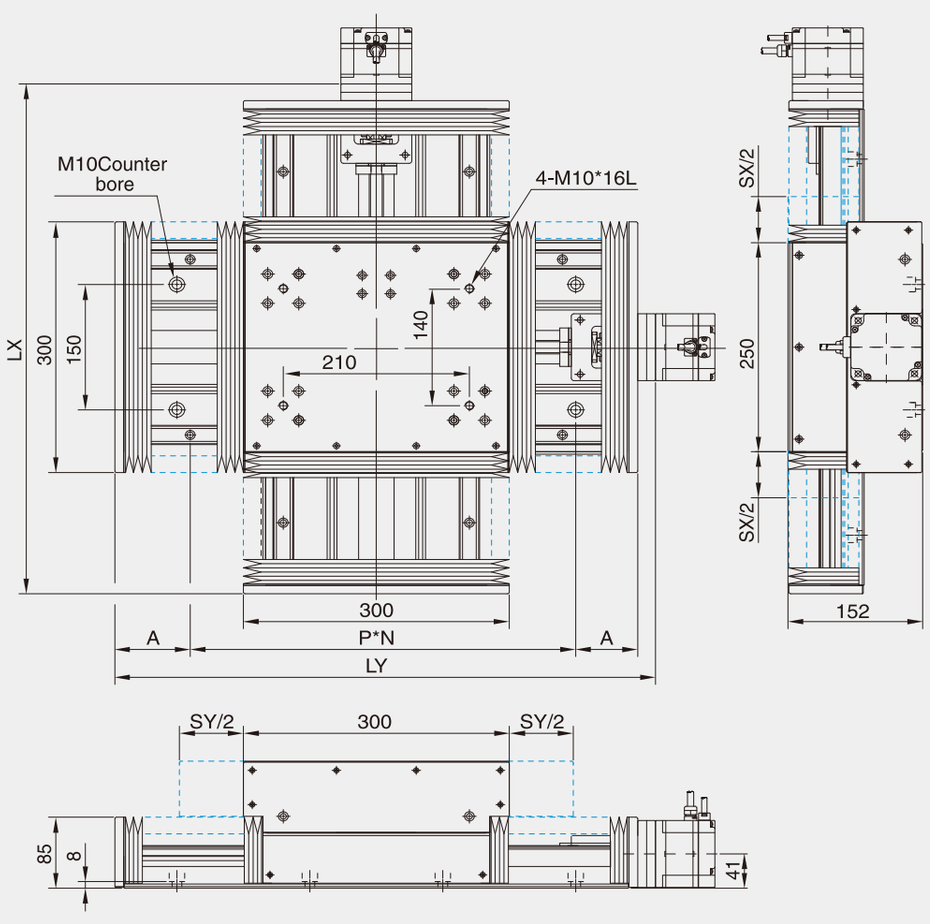
GXY25-□□P series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY25-2020WP	GXY25-2020BP	±100	±100	0.02	0.08	±0.003	55	P	Ø16	5	C5	75	150x2	490	490	22.8
GXY25-2025WP	GXY25-2025BP	±100	±125	0.02	0.08							25	150x3	490	540	23.1
GXY25-2030WP	GXY25-2030BP	±100	±150	0.025	0.09							50	150x3	490	590	24.5
GXY25-2525WP	GXY25-2525BP	±125	±125	0.025	0.09							25	150x3	540	540	23.4
GXY25-2530WP	GXY25-2530BP	±125	±150	0.03	0.1							50	150x3	540	590	24.8
GXY25-3030WP	GXY25-3030BP	±150	±150	0.03	0.1							50	150x3	590	590	26.2

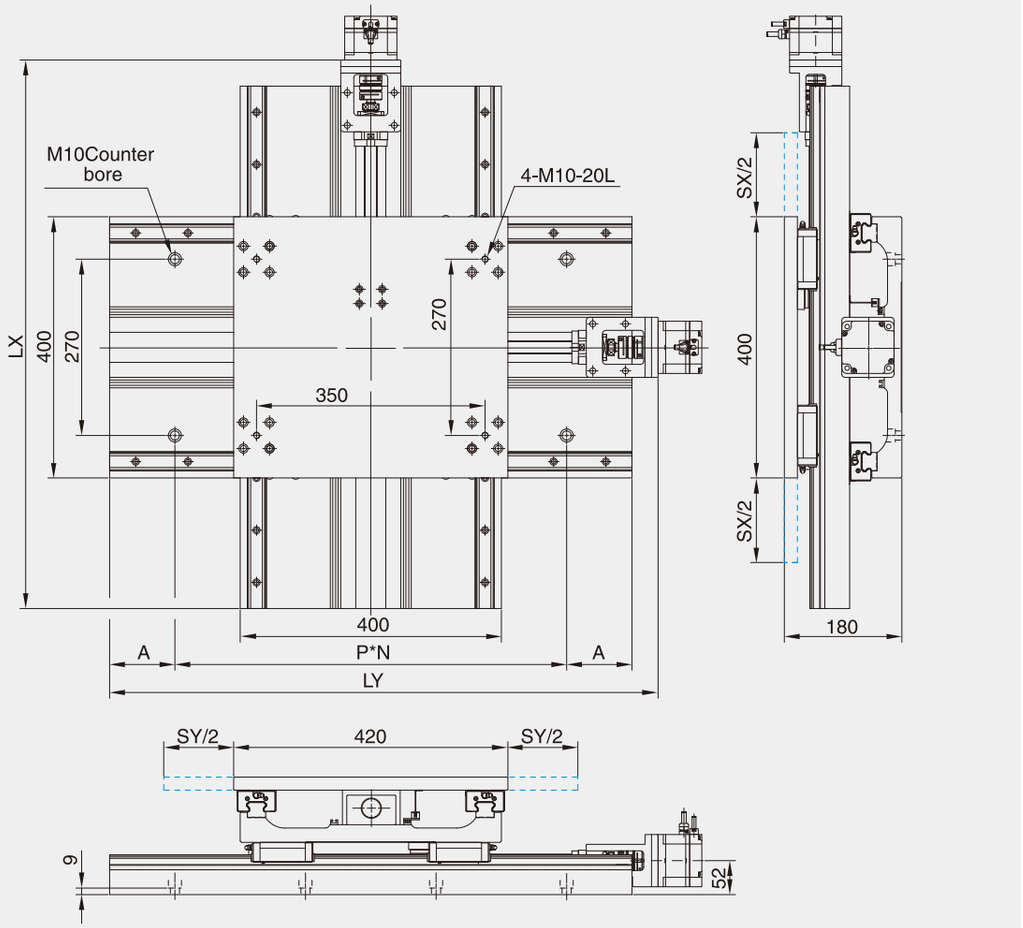
GXY25-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY25-2020JWP	GXY25-2020JBP	±100	±100	0.02	0.08	±0.003	55	P	Ø16	5	C5	70	150x3	610	610	32.7
GXY25-2025JWP	GXY25-2025JBP	±100	±125	0.02	0.08							25	150x4	610	670	33.4
GXY25-2030JWP	GXY25-2030JBP	±100	±150	0.025	0.09							60	150x4	610	740	35.3
GXY25-2525JWP	GXY25-2525JBP	±125	±125	0.025	0.09							25	150x4	670	670	34
GXY25-2530JWP	GXY25-2530JBP	±125	±150	0.03	0.1							60	150x4	670	740	35.9
GXY25-3030JWP	GXY25-3030JBP	±150	±150	0.03	0.1							60	150x4	740	740	37.4

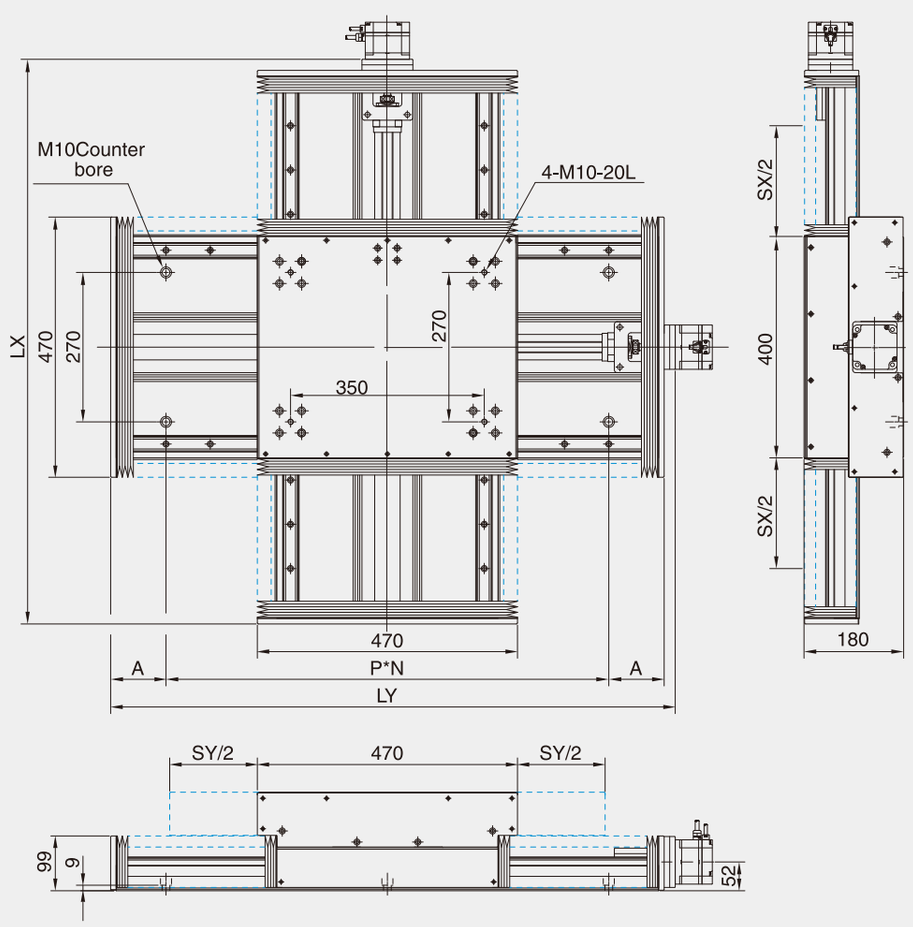
GXY40-□□P series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY40-4040WP	GXY40-4040BP	±200	±200	0.04	0.12	±0.005	60	P	Ø20	5	C5	100	200x3	840	840	68.3
GXY40-4050WP	GXY40-4050BP	±200	±250	0.04	0.13							50	200x4	840	940	71.7
GXY40-5050WP	GXY40-5050BP	±250	±250	0.05	0.15							50	200x4	940	940	75.1

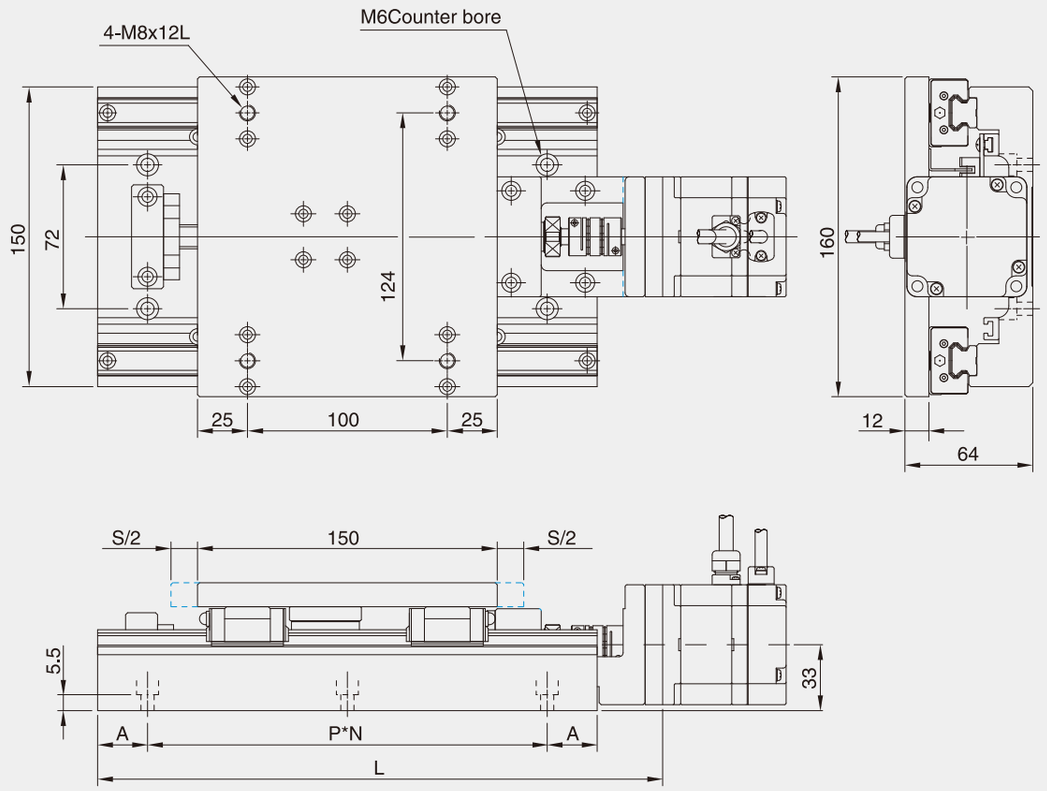
GXY40-□J□P series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY40-4040JWP	GXY40-4040JBP	±200	±200	0.04	0.12	±0.005	60	P	Ø20	5	C5	100	200x4	1020	1020	90.2
GXY40-4050JWP	GXY40-4050JBP	±200	±250	0.04	0.13							60	200x5	1020	1140	93
GXY40-5050JWP	GXY40-5050JBP	±250	±250	0.05	0.15							60	200x5	1140	1140	95.7

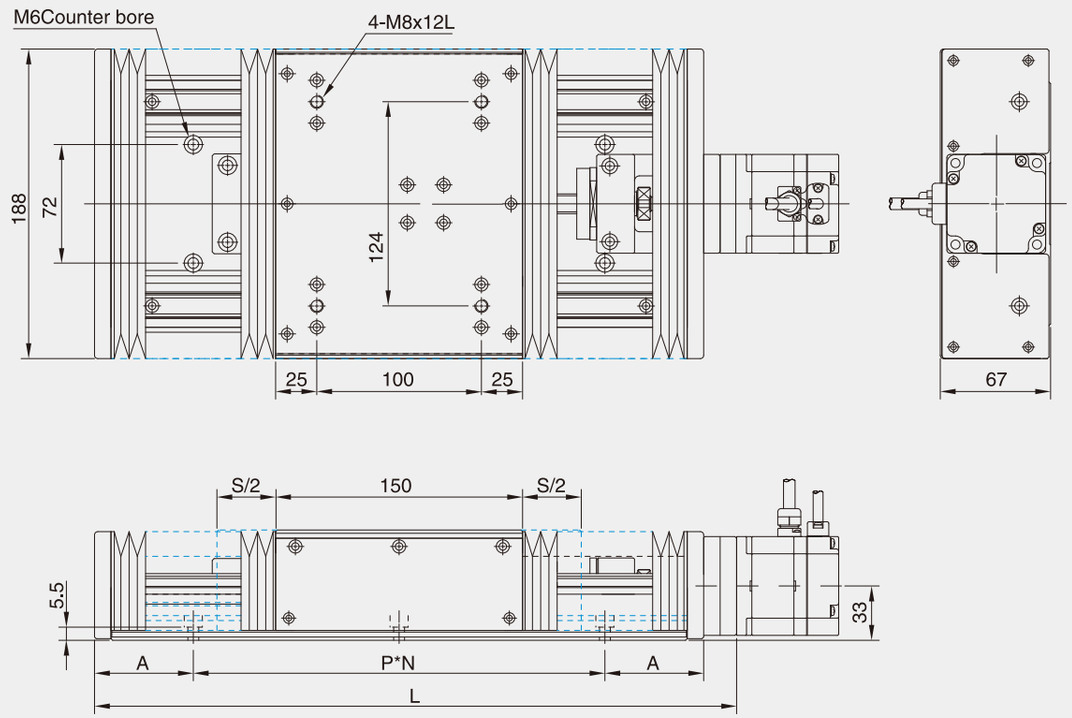
GX15-□□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX15-05WR	GX15-05BR	±25	0.015	0.045	±0.006	40	H	Ø12	5	R	37.5	125x1	234	3.7
GX15-10WR	GX15-10BR	±50	0.015	0.045							62.5	125x1	284	4.1
GX15-15WR	GX15-15BR	±75	0.03	0.06							25	125x2	334	4.6
GX15-20WR	GX15-20BR	±100	0.03	0.06							50	125x2	384	5.1
GX15-25WR	GX15-25BR	±125	0.06	0.09							75	125x2	434	5.6
GX15-30WR	GX15-30BR	±150	0.06	0.09							37.5	125x3	484	5.9

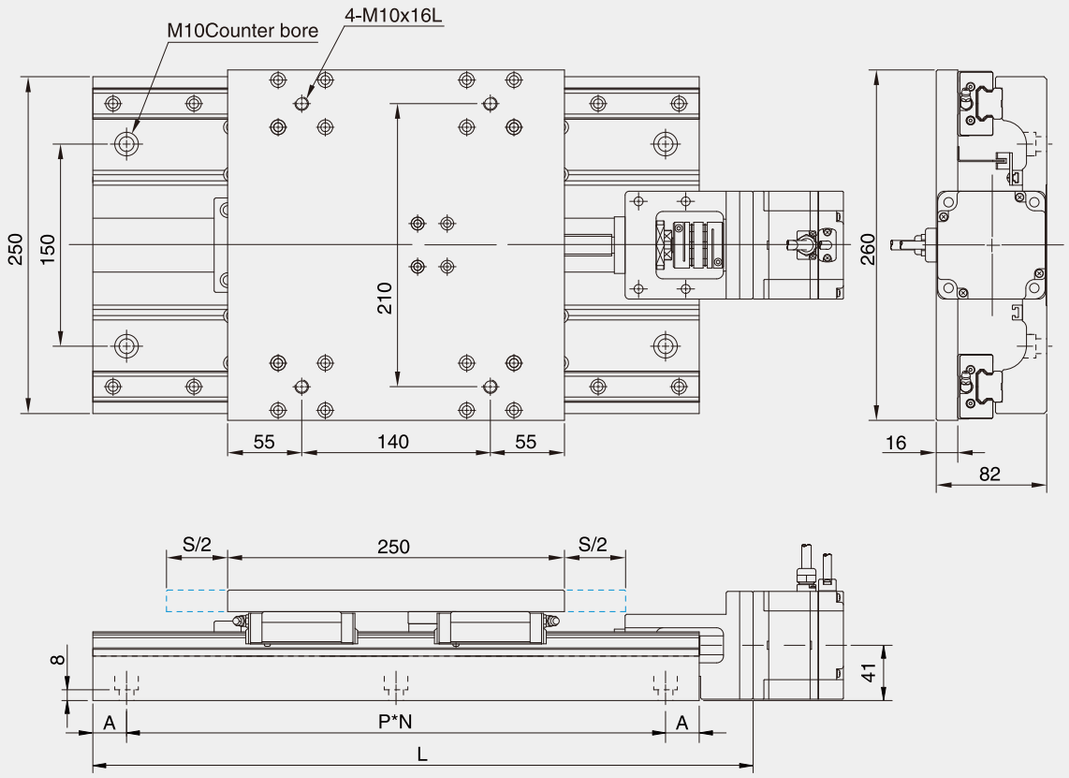
GX15-□J□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX15-05JWR	GX15-05JBR	±25	0.015	0.045	±0.006	40	H	Ø12	5	R	20	125x2	310	5.9
GX15-10JWR	GX15-10JBR	±50	0.015	0.045							60	125x2	390	6.7
GX15-15JWR	GX15-15JBR	±75	0.03	0.06							32.5	125x3	460	7.4
GX15-20JWR	GX15-20JBR	±100	0.03	0.06							77.5	125x3	550	8.3
GX15-25JWR	GX15-25JBR	±125	0.06	0.09							50	125x4	620	8.9
GX15-30JWR	GX15-30JBR	±150	0.06	0.09							22.5	125x5	690	9.5

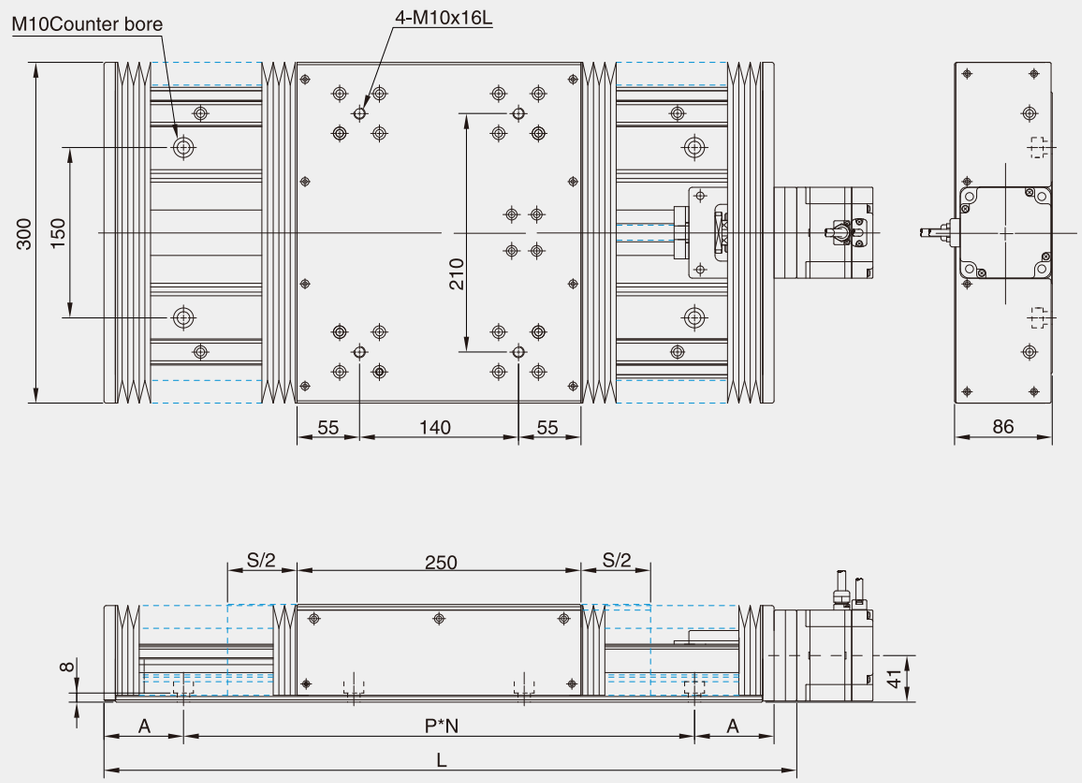
GX25-□□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX25-20WR	GX25-20BR	±100	0.045	0.05	±0.006	70	H	Ø16	5	R	75	150x2	490	12.4
GX25-25WR	GX25-25BR	±125	0.045	0.05							25	150x3	540	13.1
GX25-30WR	GX25-30BR	±150	0.075	0.07							50	150x3	590	14.5
GX25-40WR	GX25-40BR	±200	0.075	0.07							25	150x4	690	16.4
GX25-50WR	GX25-50BR	±250	0.105	0.1							75	150x4	790	18.2

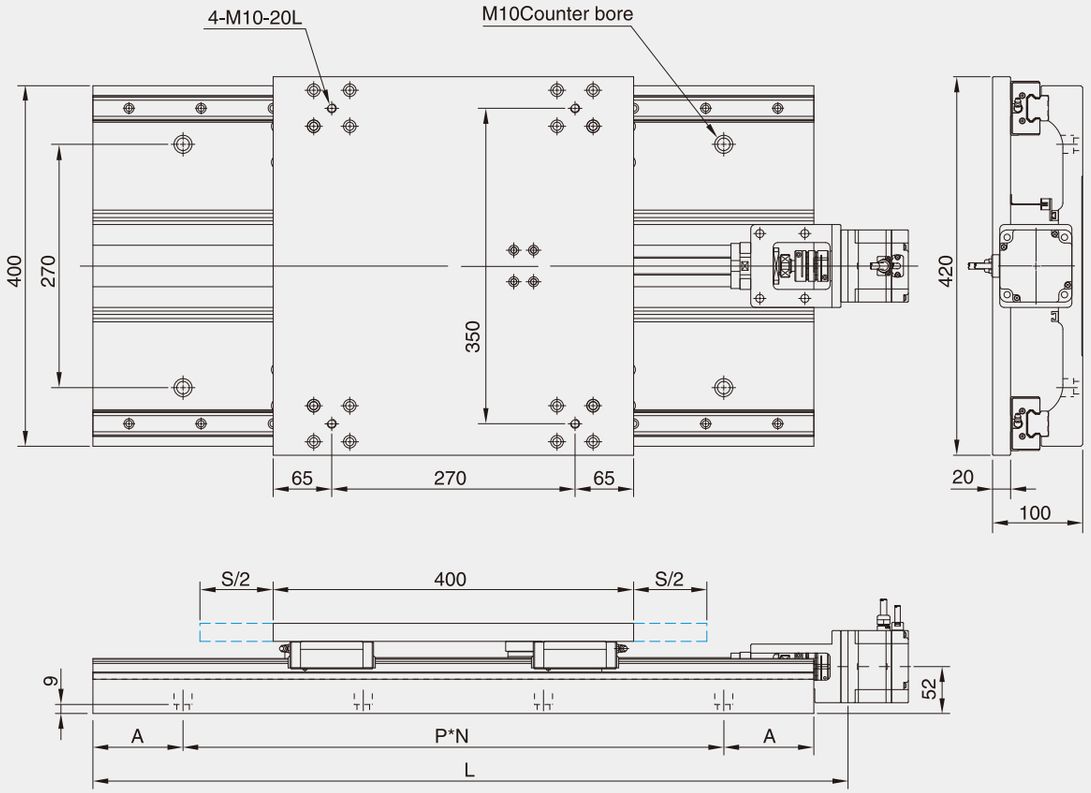
GX25-□J□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX25-20JWR	GX25-20JBR	±100	0.045	0.05	±0.006	70	H	Ø16	5	R	70	150x3	610	18.6
GX25-25JWR	GX25-25JBR	±125	0.045	0.05							25	150x4	670	19.2
GX25-30JWR	GX25-30JBR	±150	0.075	0.07							60	150x4	740	21
GX25-40JWR	GX25-40JBR	±200	0.075	0.07							50	150x5	870	23.5
GX25-50JWR	GX25-50JBR	±250	0.105	0.1							35	150x6	990	25

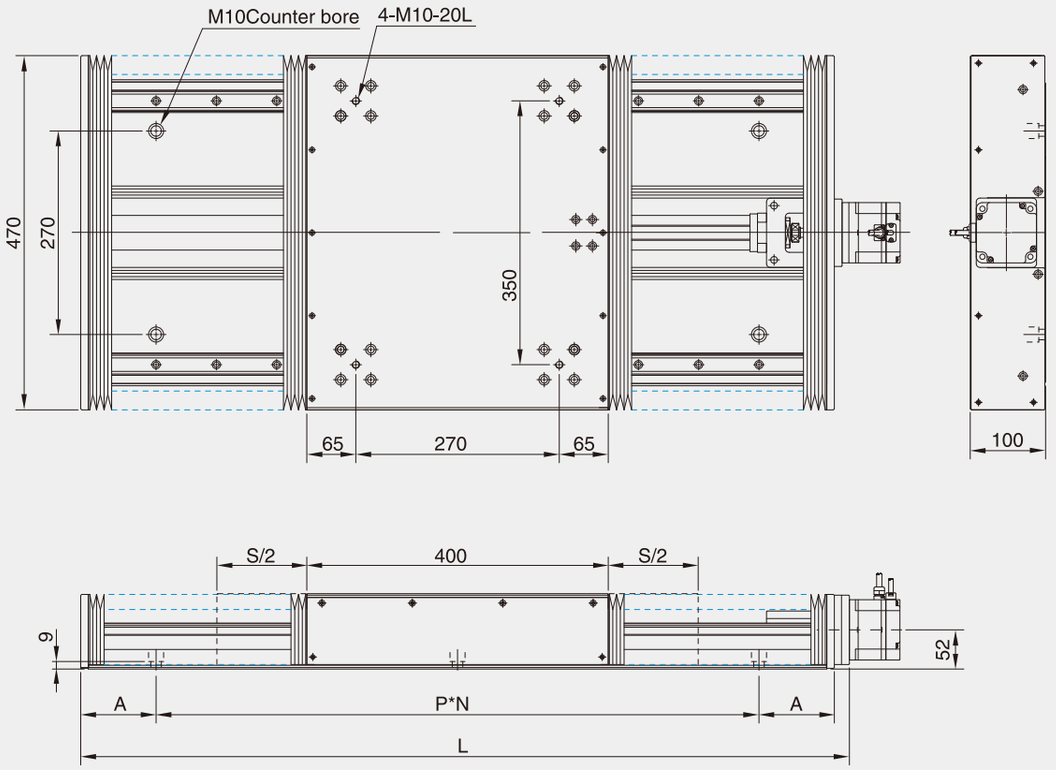
GX40-□□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX40-40WR	GX40-40BR	±200	0.15	0.13	±0.015	80	H	Ø20	5	R	100	200x3	840	38.6
GX40-50WR	GX40-50BR	±250	0.15	0.13							50	200x4	940	42.1

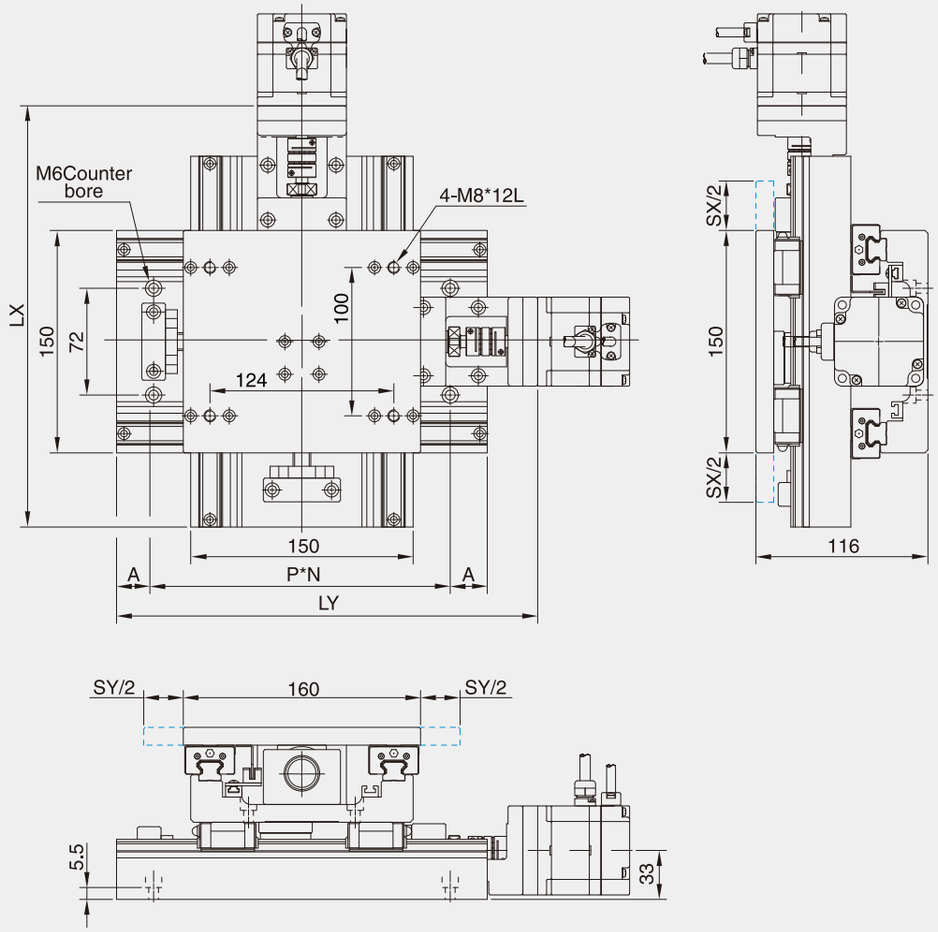
GX40-□J□R series



Unit : mm

Model No.		X-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)	Main Unit Weight (Kg)
Primary Anodized	Black Anodized	S						Dia.	Lead	Accuracy	A	PxN		
GX40-40JWR	GX40-40JBR	±200	0.11	0.13	±0.015	80	H	Ø20	5	R	100	200x4	1020	50.5
GX40-50JWR	GX40-50JBR	±250	0.11	0.13							60	200x5	1140	5.31

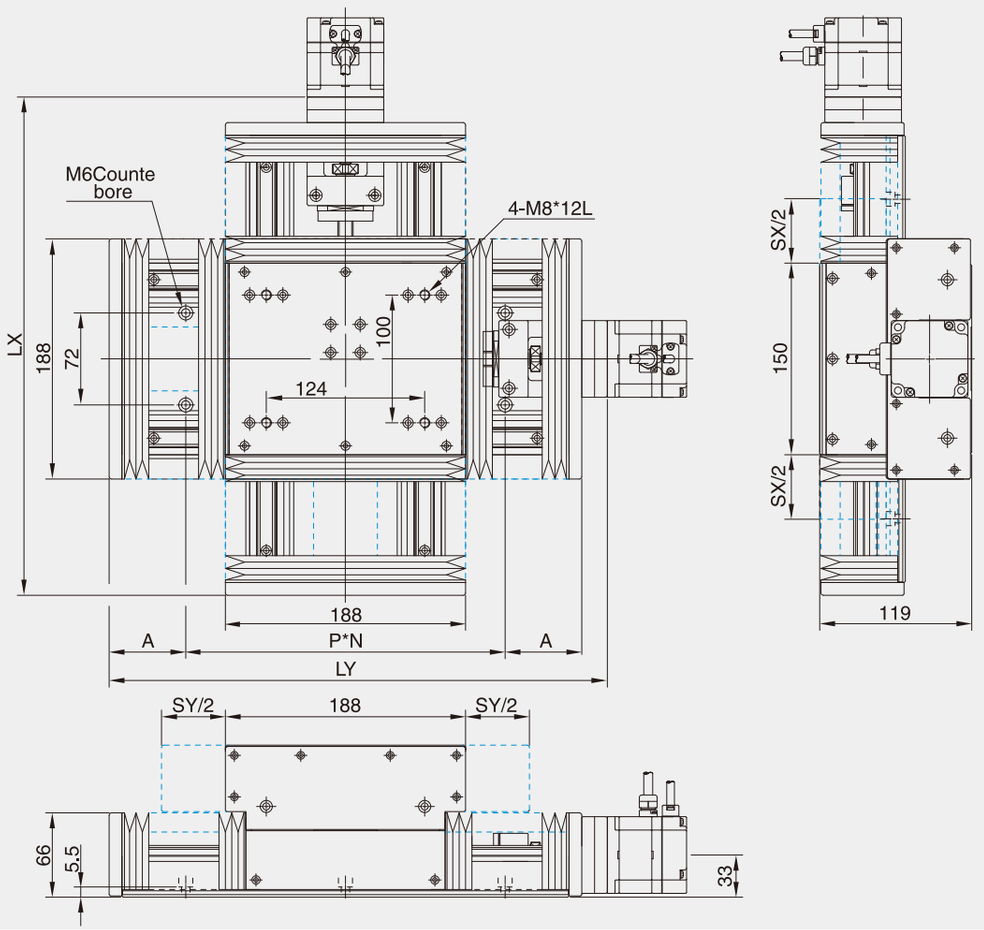
GXY15-□□R series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY15-0505WR	GXY15-0505BR	±25	±25	0.015	0.05	±0.006	30	H	Ø12	5	R	37.5	125x1	234	234	6.7
GXY15-0510WR	GXY15-0510BR	±25	±50	0.024	0.06							62.5	125x1	234	284	7.1
GXY15-0515WR	GXY15-0515BR	±25	±75	0.036	0.08							25	125x2	234	334	7.6
GXY15-1010WR	GXY15-1010BR	±50	±50	0.045	0.11							62.5	125x1	284	284	7.6
GXY15-1015WR	GXY15-1015BR	±50	±75	0.054	0.15							25	125x2	284	334	8
GXY15-1515WR	GXY15-1515BR	±75	±75	0.06	0.2							25	125x2	334	334	8.5

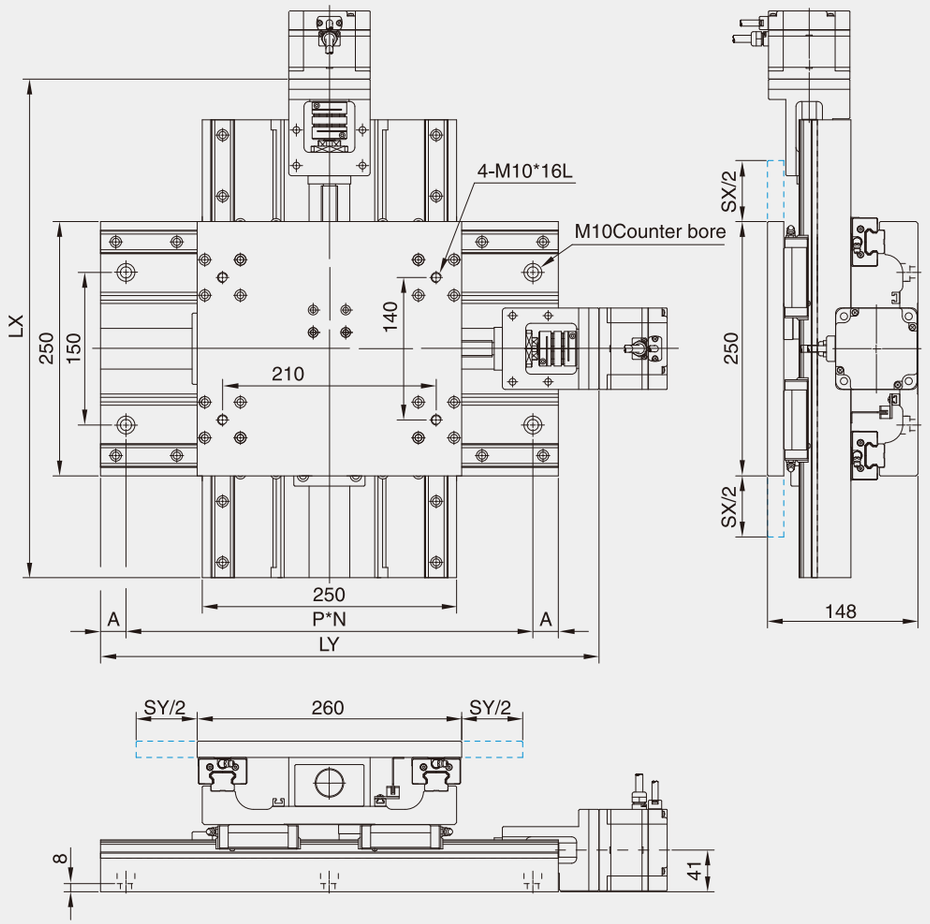
GXY15-□J□R series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY15-0505JWR	GXY15-0505JBR	±25	±25	0.015	0.05	±0.006	30	H	Ø12	5	R	20	125x2	310	310	10.7
GXY15-0510JWR	GXY15-0510JBR	±25	±50	0.024	0.06							60	125x2	310	390	11.3
GXY15-0515JWR	GXY15-0515JBR	±25	±75	0.036	0.08							32.5	125x3	310	460	12.2
GXY15-1010JWR	GXY15-1010JBR	±50	±50	0.045	0.11							77.5	125x2	390	390	11.9
GXY15-1015JWR	GXY15-1015JBR	±50	±75	0.054	0.15							50	125x3	390	460	12.7
GXY15-1515JWR	GXY15-1515JBR	±75	±75	0.06	0.2							22.5	125x3	460	460	13.4

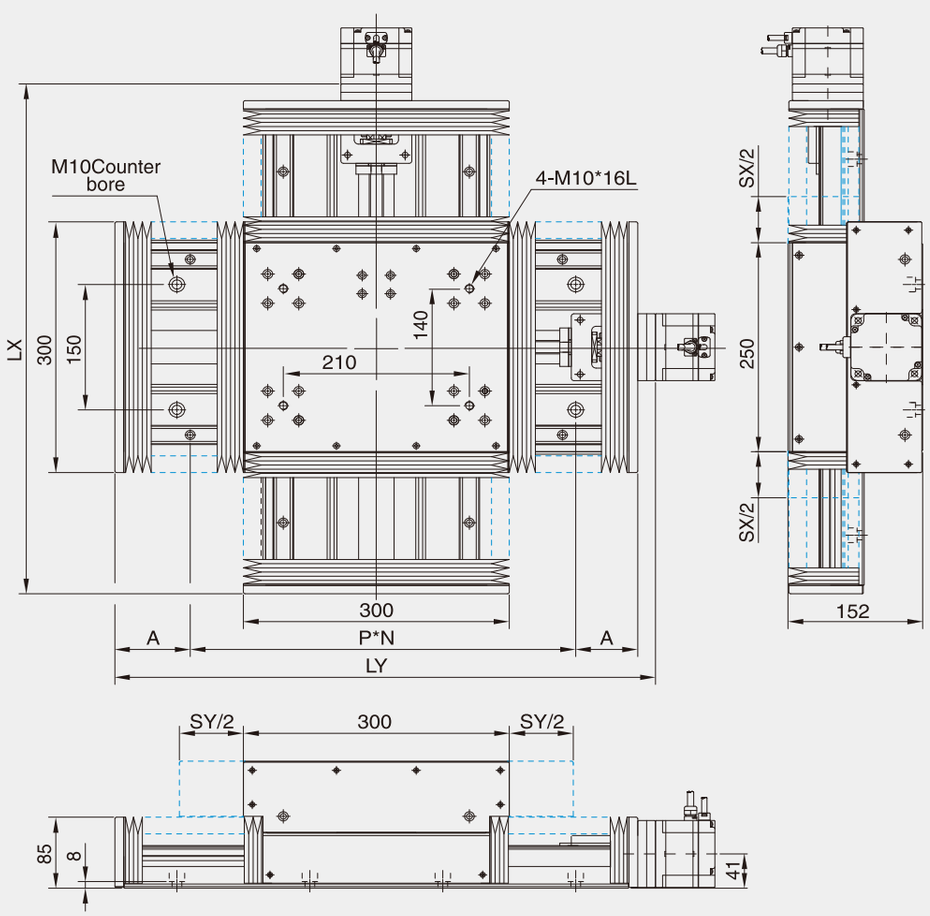
GXY25-□□R series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY25-2020WR	GXY25-2020BR	±100	±100	0.06	0.1	±0.009	55	H	Ø16	5	R	75	150x2	490	490	22.8
GXY25-2025WR	GXY25-2025BR	±100	±125	0.06	0.1							25	150x3	490	540	23.1
GXY25-2030WR	GXY25-2030BR	±100	±150	0.075	0.13							50	150x3	490	590	24.5
GXY25-2525WR	GXY25-2525BR	±125	±125	0.075	0.13							25	150x3	540	540	23.4
GXY25-2530WR	GXY25-2530BR	±125	±150	0.09	0.18							50	150x3	540	590	24.8
GXY25-3030WR	GXY25-3030BR	±150	±150	0.09	0.18							50	150x3	590	590	26.2

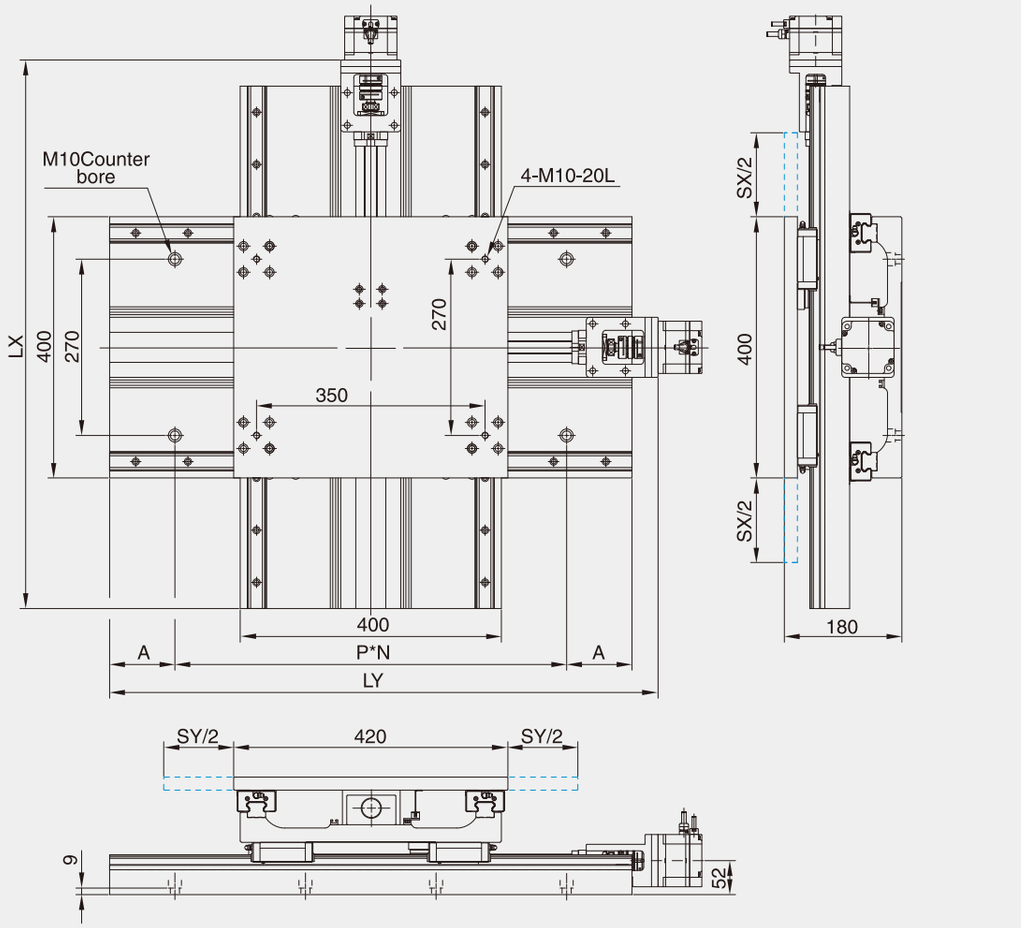
GXY25-□J□R series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY25-2020JWR	GXY25-2020JBR	±100	±100	0.06	0.1	±0.009	55	H	Ø16	5	R	70	150x3	610	610	32.7
GXY25-2025JWR	GXY25-2025JBR	±100	±125	0.06	0.1							25	150x4	610	670	33.4
GXY25-2030JWR	GXY25-2030JBR	±100	±150	0.075	0.13							60	150x4	610	740	35.3
GXY25-2525JWR	GXY25-2525JBR	±125	±125	0.075	0.13							25	150x4	670	670	34
GXY25-2530JWR	GXY25-2530JBR	±125	±150	0.09	0.18							60	150x4	670	740	35.9
GXY25-3030JWR	GXY25-3030JBR	±150	±150	0.09	0.18							60	150x4	740	740	37.4

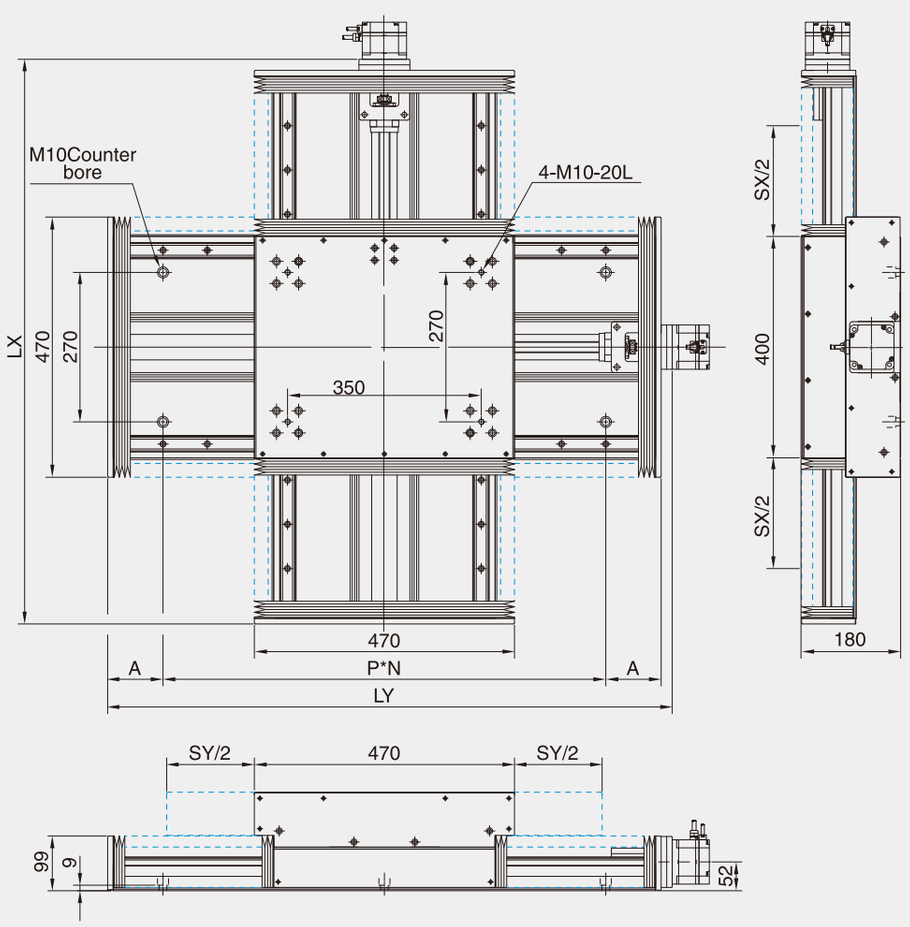
GXY40-□□R series



Unit : mm

Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY40-4040WR	GXY40-4040BR	±200	±200	0.12	0.15	±0.015	60	H	Ø20	5	R	100	200x3	840	840	68.3
GXY40-4050WR	GXY40-4050BR	±200	±250	0.12	0.17							50	200x4	840	940	71.7
GXY40-5050WR	GXY40-5050BR	±250	±250	0.15	0.2							50	200x4	940	940	75.1

GXY40-□J□R series



Unit : mm

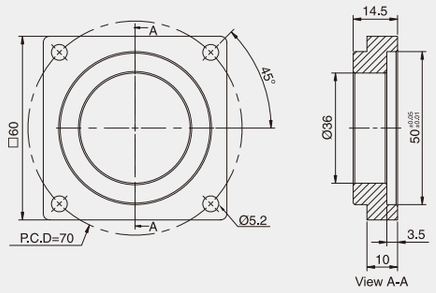
Model No.		X-Axis Stroke	Y-Axis Stroke	Straightness	Positioning Precision	Repeatability Precision	Load Capacity (Kgf)	Linear Rail Accuracy	Screw Shaft			Mounting Dimensions		Length (L)		Main Unit Weight (Kg)
Primary Anodized	Black Anodized	SX	SY						Dia.	Lead	Accuracy	A	PxN	LX	LY	
GXY40-4040JWR	GXY40-4040JBR	±200	±200	0.12	0.15	±0.015	60	P	Ø20	5	C5	100	200x4	1020	1020	90.2
GXY40-4050JWR	GXY40-4050JBR	±200	±250	0.12	0.17							60	200x5	1020	1140	93
GXY40-5050JWR	GXY40-5050JBR	±250	±250	0.15	0.2							60	200x5	1140	1140	95.7

Connection Comparision List for Servo Motor

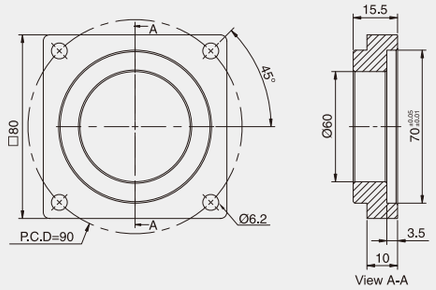
Model No.	Motor Connecting Plate Size	Brand	
		MITSUBISHI	YASKAWA
GX15-05-90	□60	HC-KFS23(200W)	SGMAH-02(200W)
		HC-KFS43(400W)	SGMAH-04(400W)
		HC-MFS23(200W)	
		HC-MFS43(400W)	
GX25-20-90	□80	HC-KFS73(750W)	
		HC-MFS73(750W)	SGMAH-08(750W)
GX40-40-90	□80	HC-KFS73(750W)	
		HC-MFS73(750W)	SGMAH-08(750W)

Motor Connecting Plate Size

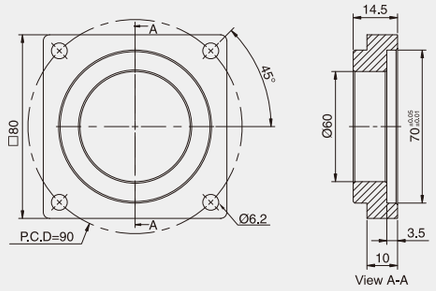
◎GX-15-05-90



◎GX-25-20-90

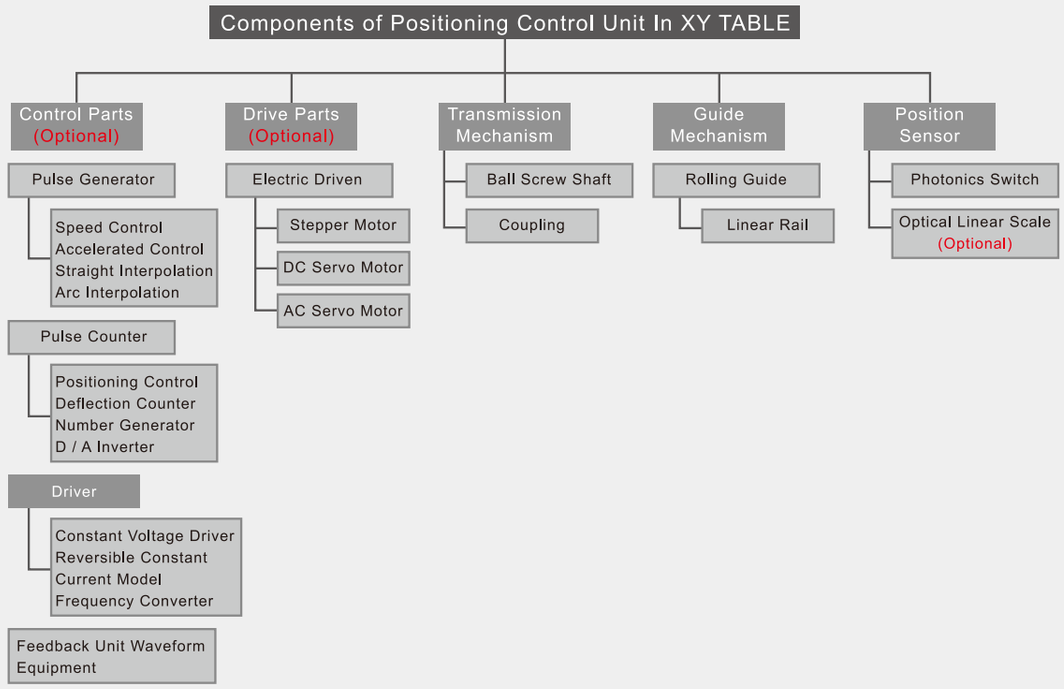


◎GX-40-40-90

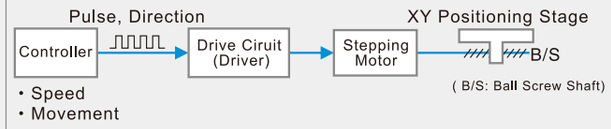
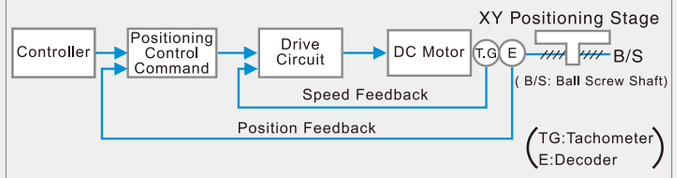
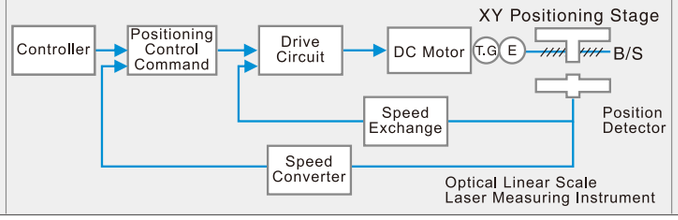


◎ Above model no. applied to motor are for refereene. Please recheck with manufacturer before purchasing.
◎ Motor could be matched with those out of above list. Please confirm installation dimensions.

Positioning Control



Control Mode Comparision

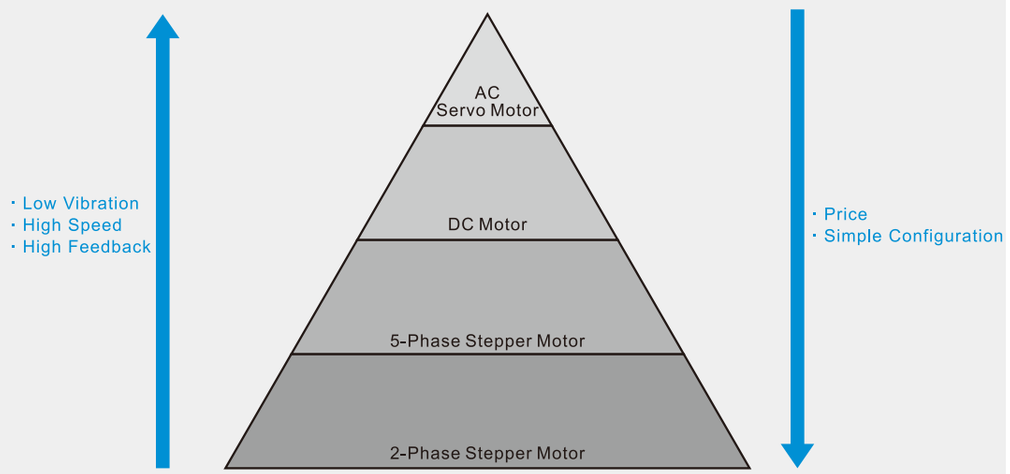
Mode	Component	Advantage	Defect
Open Loop		• Simple Configuration • Low price	• Slip With Ease (It can be effected easier due to condition changing.) • Unusable En Max. Capacity • Positioning Sccuracy Decided By Table Quality
Semi-Closed Loop		• High Speed Feedback • Usable in max. Capacity	• Higher Price • Carbon Brush Life in Motor • Positioning Accuracy Decided by Table Quality
Closed Loop		• Precise Positioning	• Highest Price • Complicated Configuration In Servo System, Not Easy to Adjust

Motor Introduction

◎Stepper motor and DC motor are usually used as power source to drive the positioning stage. Each one has its feature for selection up on application needs.

◎AC servo motor is the same as brushless type of DC servo motor and its character is similar as DC servo motor.

Motor	Advantages	Defect
2-Phase Stepper Motor	• Cheaper drive circuit • Simple configuration • Resolution (mm) : 1/200, 1/400, 1/800	• Unbalance torque is bigger, needs anti-vibration (especially in low rpm) • Drive in mid, high speed, need proper speed adjustment (Torque decrease while high speed running -> slip out) • Motor overheating
5-Phase Stepper Motor and DC Motor	Compare to 2-Phase Motor • Rotate smoother • Low vibration • High resolution : 1/500, 1/1000 • 1/1500, 1/10000 • High speed feedback • Low damping character	• Torque decrease while high speed running -> slip out • Motor overheating
DC Servo Motor AC Servo Motor	• Low vibration • High speed feedback • Position confirm by encoder, no worry about slip out. • Usable in max. capacity (Max. torque = couple time to rated toque) • High resolution (resoluted by encoder and multiple circuit to 1/1000, 1/2000...)	• Higher price in motor driven circuit • There are carbon brush life and abrasion pollution concern if motor is carbon brush type. • Motor overheating needs to be noticed in high speed adjustment and high frequency heavyloading.



Resolution

Resolution(the minimum unit) means table movementin each pulse signal(mm/pulse). In other word, the acquired value is lead of ball screw sahft divided by divisible value of motor running one time. (Please note no gear in such situation)

$$\text{Resolution} = \frac{\text{Ball screw shaft lead}}{\text{Divisible vaule of motor running one time}} \qquad (\text{Ex})\ \frac{5\text{ mm}}{1000\text{ p}} = 0.005\text{ mm/pulse}$$

For stepper motor, divisible value of motor running one time is decided by motor basic divisible value and excitation mode of driver.
2-phase stepper motor - divisible value ... 200, 400, 800
5-phase stepper motor - divisible value ... 500, 1000, 5000, 10000

In semi-closed loop mode (DC motor, AC servo motor) is decided by division value of encoder and multiple of electricity (1 time, 2 times, 4 times). 2000 pulses and 4000 pulses are also as option to use when encoder is 1000 pulses.

In closed-loop mode control, resolution is no reference to ball screw shaft lead but decided by optical linear scale graduation pitch(normal pitch are 10um, 20um) and divisible circuit of electricity.

In general, they are 5um/p, 1um/p and high resolution is 0.1um/p.

Speed

Stage top feed rate V(mm/s) is decided by the max tolerate N(rpm)of drive motor and ball screw shaft lead (mm/rev).

stage speed $V = \ell \times \frac{N}{60}$ (mm/rev)

(EX) ℓ = 10(mm/rev), and applied N=3,000 rpm motor. Table speed $V = 10 \times \frac{3000}{60}$ 5000(mm/rev)

Comparing to load torque of table, motor output must to have full surplus torque.
Please pay more attention that input torque sharp down especially it is over 1500rpm while stepper motor is used in high speed rotation.

Using DC motor or AC servo motor, the max RPM would be affected by motor function. The limit is from wave number of encoder as positioning deviation counter performance sometimes.

(EX) The max wave number of deviation counter = 100(kpps), Ball screw shaft leadℓ = 10(mm/rev), encoder divisible value P = 1000

1. Using resolution 0.01 mm/ p, top wave number of deviation counter f = 500 / 0.01 = 50(kpps)<100(kpps)
   Follow up above rule speed would be reached 500(mm/sec), whiel N - 3000rpm.
2. 4 times to decoder, equal to 4000 p/rev, resolution turned into 10/4000 = 0.0025(mm/p)
   Stage speed V = 100,000x 0.0025 x 250(mm/sec)
   Motor RPM N = 250 / 10 x 60 = 1500(rpm)

Motor Models	Division	Max. Wave No.	Ball Screw Shaft Lead(mm/rev)											
			2		4		5		8		10		12	
	pulse /rev	kpps	Resolution (μm)	Top speed (mm/s)	Resolution (μm)	Top speed (mm/s)	Resolution (μm)	Top speed (mm/s)	Resolution (μm)	Top speed (mm/s)	Resolution (μm)	Top speed (mm/s)	Resolution (μm)	Top speed (mm/s)
2-Phase Stepper Motor	200	6	10	60	20	120	25	150	40	200	50	300	100	600
	400	12	5		10		12.5		20		25		50	
	800	24	2.5		5		6.25		10		12.5		25	
5-Phase Stepper Motor DC Motor	500	20	4	80	8	160	10	200	16	320	20	400	40	800
	1000	40	2		4		5		8		10		20	
	5000	200	0.4		0.8		1		1.6		2		4	
	10000	400	0.2		0.4		0.5		0.8		1		2	
DC Servo Motor (AC Servo Motor)	800	40	2.5	100	5	200	6.25	250	10	400	12.5	500	25	1000
	1000	50	2		4		5		8		10		20	
	2000	100	1		2		2.5		4		5		10	
	4000	200	0.5		1		1.25		2		2.5		5	

Closed Loop Control with Optical Linear Scale	Max. Wave No.	Resolution	Top Speed (nothing to guide lead of ball screw shaft)	
	300kpps	0.1 μm	30 mm/s	Special control system required to raise speed
		0.5 μm	150 mm/s	
		1.0 μm	300 mm/s	

Life Calculation of Linear Guide

Linear Guide Selection

Linear guide selection is according to using condition and selection model to make load capacity and life checking computations. Due to checking computations result, linear guide model can be judged suitable or not.

Checking computation of load capacity is to get static safety factor by basic rated static load(Co), and also ensure static load limit; checking computation of life is to calculate rated life by basic rated dynamic load.

Life of linear guide means grand distance accumulated of circulatory stress effect brought from balls or rolling plane till peeling off from metal surface caused by rolling fatigue of material.

Basic Rated Static Load (Co)

The contact areas between balls and rolling plane would appear permanent deformation on partial areas while against overload or shock during linear guide operating in static or low speed. In case permanent deformation out of limitation would affect smoothness of linear guide motion.

Basic rated static load(Co)is the same as allowed static load limit where the max. stress occurring in contact surface have permanent deformation between balls and rolling plane sum reached to 0.0001 times to the ball diameter in the same direction and equivalence static load.

Allowed Static Torque (Mo)

Allowed static torque(Mo)is the same as static applied moment limit where the max. stress occurring in contact surface have permanent deformation between balls and rolling plane sum reached to 0.0001 times to the ball diameter in the same direction and equivalence static torque. According to distributing stress in linear guide internal, applied moment on linear guide, the max stress occurred from balls on two ends of guides. In linear guide, torque is defined as MP, MY and MR 3 directions moment.

Static Safety Factor (f_s)

While linear guide is applied to vibration, shock or intense operation stop enviornment, due to intertia force or outer torque effects, hard load would be occurred. Under this load situation, static safety factor is considered necessarily.

Static safety factor(fs)is shown as mutiples to load which basic rated statice load(Co)on linear guide. All baseline value of static safety factors in various application follow those formulas as below：

$$f_s = \frac{Co}{P} \text{ or } f_s = \frac{Mo}{M}$$

f_s : Static safety factor

Co : Basic rated static Load (N)

Mo : Allowed static torque(N·m)

P : Load caculation (N)

M : Torque caculation (N·m)

Machine	Load Condition	Lower Limit of f_s
General Machine	Regular load	1.0 ~ 1.3
	Vibration, shock	2.0 ~ 3.0
Machine Tool	Regular load	1.0 ~ 1.5
	Vibration, shock	2.5 ~ 7.0

Motorized X & XY-Axis Linear ➲ Motion Stage <Linear Ball Guiding>
Life Calculation of Linear Guide
GMT GLOBAL INC.
Technical Information

Basic Dynamic Load (C)

There are a little differences in life of linear guides even if same batch of production operating in the same condition. Therefore, to ensure life of linear guide, defined rated life(L)is used to basic rated dynamic load calculation, means total distance of same batch of linear guide in same specification running in the same condition, 90% of appearance without peeling off caused by surface fatigue. Basic rated dynamic load(C), stands for load of same batch of linear guide in same specification operating in the same condition have rated life 50km, ball direction and size are fixed load.

Life Calculation (L)

Rated life of linear guide depends on actual load. To use basic rated dynamic load(C)and work load(P)in optional specification to calculate usage life. Usage life of linear guide change by running situation, rolling plane hardness and surrounding temperature, its formula as below :

$$L = \left(\frac{f_H \times f_r}{f_W} \times \frac{C}{P}\right)^3 \times 50$$

L：Rated life(km)

C：Basic dynamic load(N)

P：Work load(N)

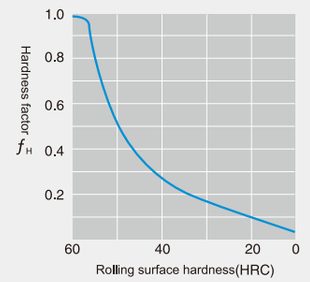
f_H：Hardness factor

f_r：Temperature factor

f_W：Load factor

Hardness Factor (f_H)

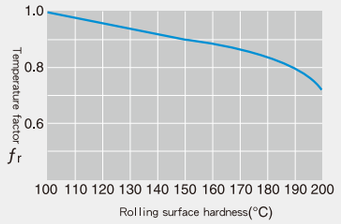
Hardness of rolling plane on linear guide must be HRC58~64. Load capacity of linear rail guide would be decreased if hardness is lower than HRC58~64. Basic rated dynamic and static load shall multiply relative hardness fH individually as chart. Linear guide standard hardness is required over HRC58 before shipment, so Fh=1.0.



Iemperature Factor (f_r)

Life of linear guide would be affected by high temperature, especially environment using temperature is over 100. Basic rated dynamic and static laod shall multiply reative temperature factor fr individually, as chart.

Accessories are made of plastic or rubber. Recommended environment temperature is under 100˚C.



Load Factor (f_W)

Load of linear guide could be taken calculation, but calculated value is less than load in actual operation with vibration and shock situation. Considering different operating conditions and using speed, it's recommended to take experienced load factor divided by basic dynamic load(C)as chart below.

Operating Conditions	Using Speed	f_W
Smooth without shock	V≦15 m/min	1.0 ~ 1.2
Regular shock with vibration	15≦V≦60 m/min	1.2 ~ 1.5
Medium shock with vibration	60≦V≦120 m/min	1.5 ~ 2.0
Hard shock with vibration	V≦120 m/min	2.0 ~ 3.5

Calculation of Life Hours (L)

Rated life(L)can be calculated by above formula and get life time(Ln)based on linear guide use certain stroke length and repeat frequency as formula below .

$$L_h = \frac{Lx10^3}{2xlsxn_1x60}$$

L_h : Rated life time(hr)
L : Rated life(km)

ls : Stroke length(m)
n_1 : Repeat frequency per 1 min

Life Calculation of Ball Screw Shaft

Life of Ball Screw Shaft

Even if in correct usage, it would be unusable due to degeneration after a period.
Period from beginning to disablement is called life of ball screw shaft, generally 2 kinds divided :
1. Fatigue life : The peeling off appearance is occured .
2. Accuracy life : Accuracy degradation caused by abrasion.

※Fatigue life of ball screw shaft and rolling bearing both could be calculated by basic rated load.

Basic Dynamic Load (C)

Dynamic load means same batch of ball screw shaft operating under the same conditions for a million times, and 90% of them without peeling off from ball screw shafts. The axial load is called basic dynamic load(C).
In selection of ball screw shaft, shorter or longer life are inappropriate. Fatigue life goals to variety purposed of ball screw shaft shown for reference as list below :

(1) Machine tool - 20000(hours)
(2) Industry machine - 10000(hours)
(3) Automatic control equipment - 15000(hours)
(4) Measuring instrument - 15000(hours)

Life Calculation

Fatigue life could be shown as 3 ways :

(1)Fatigue life, shown in total rotated numbers $L = (\frac{Ca}{Fax f_w}) \times 10^6$

(2)Fatigue life, shown in total operating time $Lt = \frac{L}{60xn}$

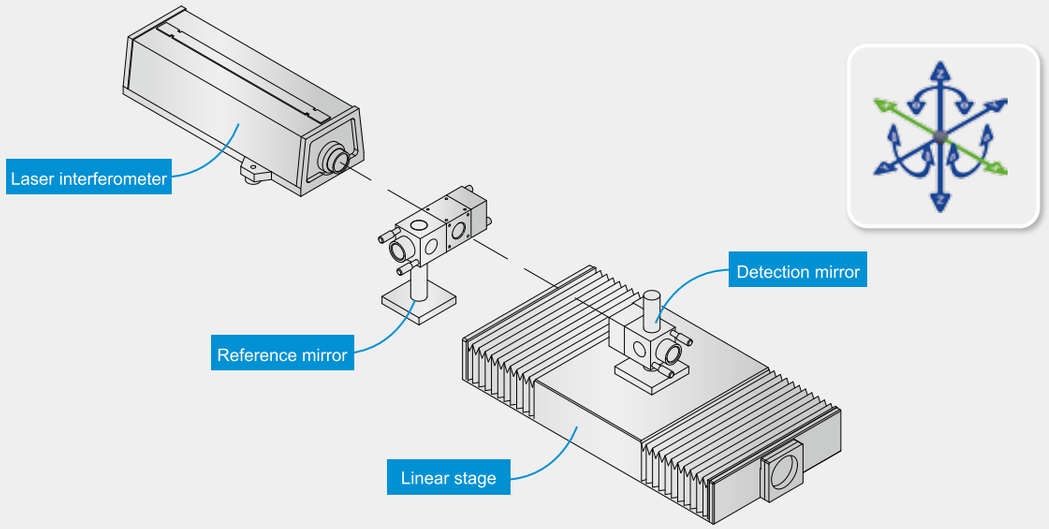
(3)Fatigue life, shown in total stroke $Ls = \frac{L}{60xn}$

L : Fatigue life, shown in total rotated numbers
Lt : Fatigue life, shown in total running time
Ls : Fatigue life, shown in total stroke
Ca : Basic dynamic rated load

Fa : Axial load
n : The Max. RPM of Motor
l : Lead
f_W : Load factor

Vibration & Shock	Speed(V)	Load Factor(f_W)
Light	V < 15 m/min	1.0 ~ 1.2
Medium	15 < V<60 m/min	1.2 ~ 1.5
Hard	V > 60 m/min	1.5 ~ 3.0

Testing Method



Testing equipment：a laser interferometer or Zeiss coordinate measuring machine.
The foundation of the stage should be fixed during the operation, while only the upper stage is working at the same time.

Laser

Positioning Precision (Unit : μm)

Within a predetermined stroke, set a laser interferometer or CMM for the measurement and start working a homing linear stage to an unspecified point in a fixed direction. As the motion is done, record the difference has occurred between the actual and target movement values. The difference is referred to as a positioning precision.

Laser

Repeatability Positioning Precision (Unit : ±μm)

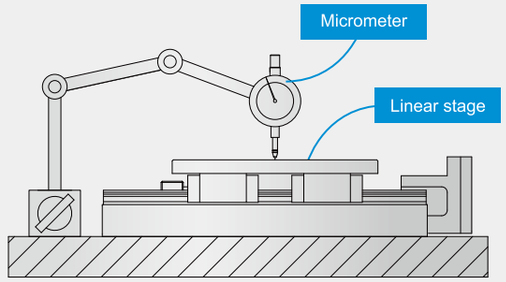
At the first half of the test of repeatability precision, the positioning test should have been repeated for seven times. Then record the maximum difference and the path including it to be used to perform the next step.
With half value of the difference, test for the other differences at midpoint/both ends of the previous path and thence record the maximum again, which is referred to as a repeatability positioning precision.

Laser

Missed Step(The losses of distance since a reverse rotation) (Unit : μm)

Within a predetermined stroke, set a laser interferometer or CMM for the measurement and start working a homing linear stage to an unspecified point by giving a command of positive direction, once the movement is completed, record the difference between the actual and target values. Simultaneously, give a same value of movement command of negative direction with which the stage will be moved back, then record another difference as the motion completed, and continue to do the next repetition.
After the seven repetitions are done, an average value of all the differences recorded is finally referred to as a missed step.

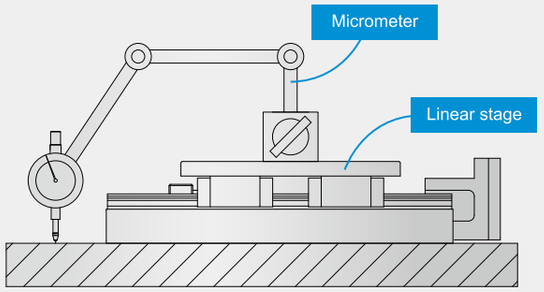
Motorized X & XY-Axis Linear ▶ Motion Stage <Linear Ball Guiding>
Testing Method
GMT GLOBAL INC.
Technical Information



Testing equipment：a micrometer or Zeiss coordinate measuring machines.
The foundation of the stage should be fixed during the operation, while only the meter is moving at the same time.

Parallelism (Unit : μm)

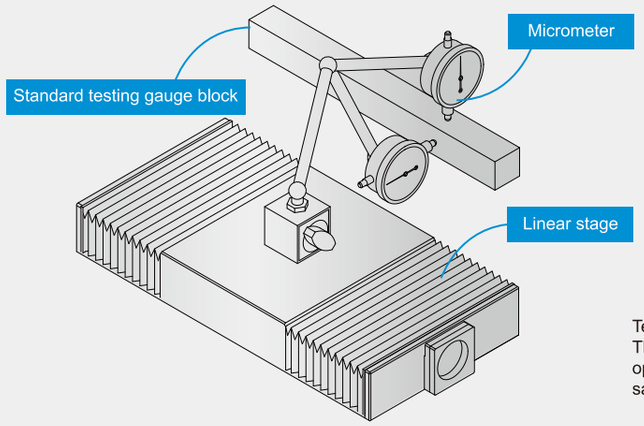
Place a homing stage onto granite workbench and set a micrometer to measure the maximum level difference at middle area of the stage(or use Zeiss coordinate measuring machines), and referred to as a parallelism.



Testing equipment：a micrometer.
The foundation of the stage should be fixed during the operation, while only the upper stage is working at the same time.

Dynamic Parallelism (Unit : μm)

Place the micrometer onto the stage surface to measure the maximum level difference by measuring on the granite workbench while the stage is working, then referred to as a dynamic parallelism.



Testing equipment：a micrometer.
The foundation of the stage should be fixed during the operation, while only the upper stage is working at the same time.

Dynamic Straightness (Unit : μm)

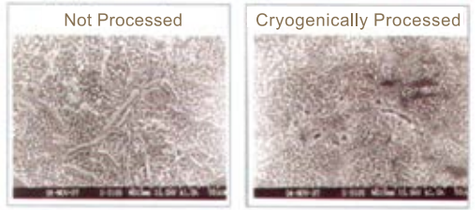
Within a predetermined stroke, from the starting position of the stage, start working the stage in a specific direction and use standard gauge block to as a basis to measure the differences between the actual and target values of the horizontal and vertical straightness. The maximum difference is referred to as a dynamic straightness.

Advantage Cryogenic Treatment

Cryogenic process is to place the part in the medium with temperature under 196˚C, followed step by step progress of new technic to improve material character. Found by relevant search, cryogenic process is not only obviously increase on strength and life of black(colour)metal, plastic and china…etc, but also improve the structure evenly.
Increase of dimension stability brings huge economic benefit and promising application in aviation, aerospace, optics, creatures, chemistry, machinery, electronic and light industry.

◎Purpose of Cryogenic Process：

EX： Comparison of metallographic analysis



Metallographic analysis before cryogenic process

Metallographic analysis after cryogenic process

◎Benefic Analysis of Aluminum Alloy After Cryogenic Process：

Improvement during process or in the end of process：
(1) Deformation of microstructure stress caused by designed material shape.
(2) Effectively controlling aging deformation.
(3) After mechanical testing, mechanism strength has been obviously improved, and perfectly perform the desinged mechanism.
Practical application：After dissolving aluminum alloy(Duralumin), have it with cryogenic process and unfrozen immediately.
It could not only speed up aging, but reduce most of residual stress at same time to improve mechanical character.
Found by another info, aluminum alloy casting with cryogenic process has improvement of processed ability.

Material	Parts	Hardness	Wear-Resistant	Cutting Life	Dimension Stability	Others
SKH	Drill, Cutting Tools, Cutter	+	+	+	+	Tempering 1 time
SKD11	Punching Die, Punch, Shearing Blade, breaking knife	+	+	+	+	Avoid broken by grinding
SKD61	Aluminum extrusion die	+	+			
SUJ	Slide Rail, Roller	+	+		+	
Penetration Components	Shaft, Gear, Bushing, Cam	+	+		+	Avoid broken by grinding
SUS	Austenitic(300) Martensitic(420J2, 440) Precipitation(630, 631)	+ + +	+ + +	 +	+ + +	Improvement of corronsion resistant Improvement of corronsion resistant Improvement of erosion resistance
18Ni 280Grade	18%Ni type 25%Ni type	+ +	+ +		+ +	Speed up time effective Speed up time effective
Sintered Alloy	Cutting tools, Roll, Automobile parts		+	+	+	Remove residual stress
Cu Alloy	TIP, NOZZLE		+		+	
AL Alloy	Automatic Machinery Components, precision processing, Mould Manufacturing, electponic and Precise instrument, SMT, PC board soldering device		+		+	Improvement of machinability

GMT GLOBAL INC.