

SQUARE F CYLINDER®

GXA Series

Registration of Utility Model



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SQUARE F CYLINDER

GXA Series

High Accuracy Actuator integrating Ball-Spline!

Ball Spline



High-accuracy Ball Spline is adopted.

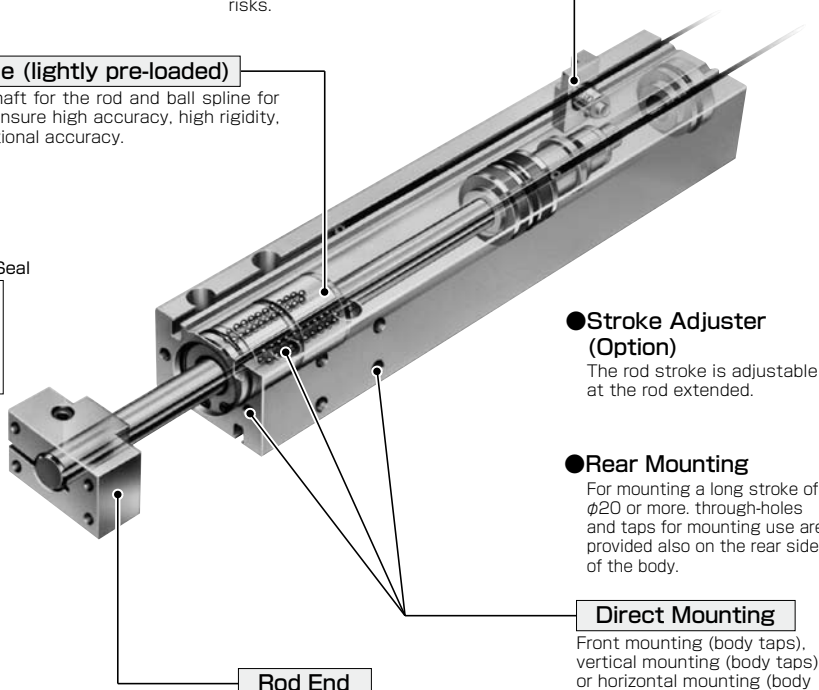
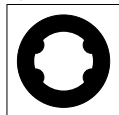
End Lock Mechanism

End Lock mechanism is available for your selection. Take advantage of this option to avoid dropping or any other risks.

Ball Spline (lightly pre-loaded)

The spline shaft for the rod and ball spline for the bearing ensure high accuracy, high rigidity, and non-rotational accuracy.

Special Rod Seal



●Stroke Adjuster (Option)

The rod stroke is adjustable at the rod extended.

●Rear Mounting

For mounting a long stroke of $\phi 20$ or more, through-holes and taps for mounting use are provided also on the rear side of the body.

Direct Mounting

Front mounting (body taps), vertical mounting (body taps), or horizontal mounting (body through-holes & taps) can be selected for your application.

Rod End

Three types of rod ends are available as options in a flange type, male thread or female thread.

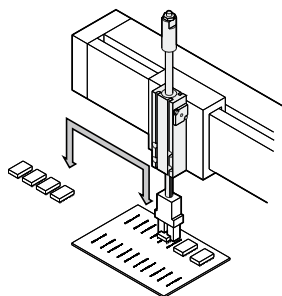
GXA

SQUARE F CYLINDER

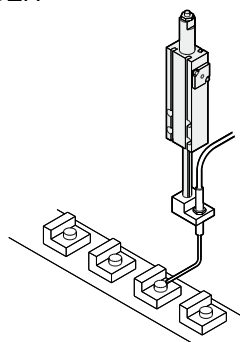
Summary of The SQUARE F CYLINDER

A transition from the air -cylinder -oriented design to the guideoriented design has resulted in the Square F series, that directly drives the high-accuracy ball spline itself. This structure enables superior compactness and accuracy of the ball spline. For use on the Z axis, the end lock mechanism can be set optionally $\phi 15$ to $\phi 30$). Also see the JKX series with round body.

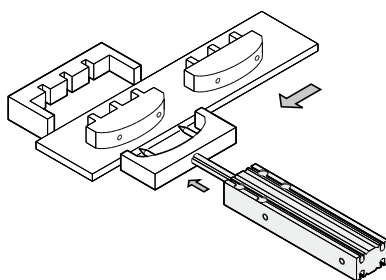
■ Application Examples : SQUARE F CYLINDER



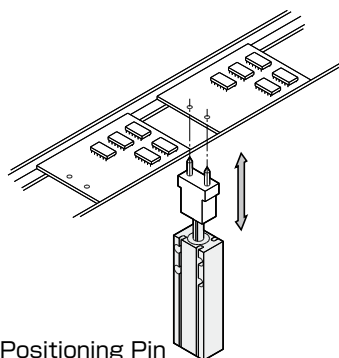
Pick and Place



Sensor Drive



Product Transfer

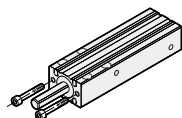


Positioning Pin

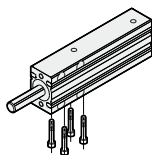
■ MAIN BODY INSTALLATION

(Bolt as shown in the figure are not supplied with products)

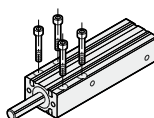
Front Mounting
(Body Tap)



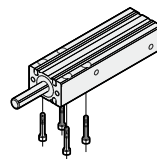
Side Mounting
(Body Tap)



Top Mounting
(Thru Hole used)



Bottom Mounting
(Body Tap)



Model Code Example

GXAHS-SD15-100-ZTZE-RB12LA

● Series Name

Support
System

SD Standard

● Magnet

No Code	None
S	with Magnet

A magnet is required when mounting switches.

Bore Size

10	φ10
15	φ15
20	φ20
25	φ25
30	φ30

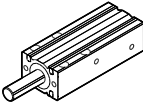
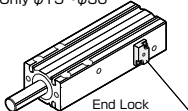
● Cable Length

No Code	1 m
LA	3 m

● Number of Switches

1	1
2	2

● End Lock Mechanism

No Code	None	H	with End Lock Mechanism
Only φ15~φ30			
			
		End Lock	

● Switch



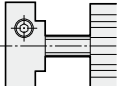
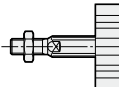
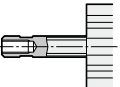
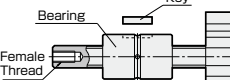
No Code	None			
RB1	Straight	DC12~24V	2 Wires Reed Switch	With Indicator Light
RC1	Angle			
RB2	Straight	DC12~24V	2 Wires Reed Switch	Without Indicator Light
RC2	Angle			
RB4	Straight	DC12~24V	2 Wires Solid State Switch	With Indicator Light
RC4	Angle			
RB5	Straight	DC5~24V	3 Wires Solid State Switch	With Indicator Light
RC5	Angle			

Direction of Cable Outlet

RB····Straight Outlet Cable RC····Angle Outlet Cable

For details  Page 1066, 1067

● Rod End Shape

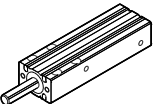
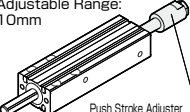
No Code	Standard	ZT	With Flange Rod End	<div>RB····Straight Outlet Cab</div> 	
					
WT	Male Thread Rod End	WS	Female Thread Rod End	FN	With Bearing for Floating Mechanism
				 <p>Female thread at the rod end and a key Provide (No two flats or the rod)</p>	

Two Flats will be any position on the rod circumference.

Intermediate Stroke

- 1-mm step intermediate strokes can be set by installing spacers in the standard stroke cylinder. The total length of the cylinder is the same as that of the longer size of standard strokes cylinder.
- For ordering intermediate strokes on the model with stroke adjuster (ZE), contact us.

● Stroke Adjuster

No Code	Without Stroke Adjuster
	
ZE	With Push Stroke Adjuster
Adjustable Range: 10mm	
	
Push Stroke Adjuster	

● Stroke

Bore Size	Standard Stroke												
	10	20	25	40	50	60	75	80	100	125	150	175	200
φ10	●	●		●		●		●	●	—	—	—	—
φ15		●		●		●		●	●	—	—	—	—
φ20			●		●		●		●	●	●	●	●
φ25			●		●		●		●	●	●	●	●
φ30			●		●		●		●	●	●	●	●

SPECIFICATIONS

Bore Size	φ10mm	φ15mm	φ20mm	φ25mm	φ30mm
Rod Size	φ 6mm	φ 8mm	φ10mm	φ13mm	φ16mm
Piping Size	M3×0.5	M5×0.8			Rc1/8
Guide Mechanism	Ball Spline				
Type of Operation	Double acting				
Fluid	Air				
Maximum Operating Pressure	0.7 MPa				
Minimum Operating Pressure	0.15MPa				
Proof Pressure	1.05MPa				
Operating Temperature	5~60℃				
Operating Speed	50~500mm/s				
Lubrication	Not required				
Cushioning	Rubber Cushion				
Stroke Adjust	10mm at the push side (option) ZE				
End Lock	End Lock Mechanism	None	With		
	Manual Release	—	Non-lock Type		
	Backlash	—	1.5mm or less		
	Maximum Holding Force	—	83N	147N	235N

1MPa=10.2kgf/cm²
1N=0.102kgf

GUIDE TYPE(BALL SPLINE)

Model	Type
GXA10	IKO LSAG6
GXA15	THK LT 8
GXA20	THK LT10
GXA25	THK LT13
GXA30	THK LT16

Pre-load:Zero or slightly pre-loaded

Mass

●Cylinder

Unit: g

Type	Model	Stroke												
		10	20	25	40	50	60	75	80	100	125	150	175	200
Standard Type	GXA10	75	85	—	105	—	125	—	145	165	—	—	—	—
	GXA15	—	165	—	190	—	215	—	240	265	—	—	—	—
	GXA20	—	—	290	—	345	—	400	—	455	510	565	620	675
	GXA25	—	—	455	—	530	—	605	—	680	755	830	905	980
	GXA30	—	—	780	—	895	—	1010	—	1125	1240	1355	1470	1585
Stroke Adjuster Type (ZE)	GXA10	100	110	—	130	—	150	—	170	190	—	—	—	—
	GXA15	—	185	—	215	—	245	—	275	305	—	—	—	—
	GXA20	—	—	385	—	455	—	525	—	595	665	735	805	875
	GXA25	—	—	585	—	685	—	785	—	885	985	1085	1185	1285
	GXA30	—	—	1020	—	1170	—	1320	—	1470	1620	1770	1920	2070

●Option

Unit: g






Model	With End Lock Mechanism (H)	With Floating Mechanism (FN)	With Flange Rod End (ZT)
GXA10	—	14	15
GXA15	40	28	17
GXA20	85	70	30
GXA25	130	120	50
GXA30	170	250	85

●Switch

Unit: g

Switch Type	Mass
RB1, RB2, RB4, RB5	15
RC1, RC2, RC4, RC5	
RB1LA, RB2LA, RB4LA, RB5LA	35
RC1LA, RC2LA, RC4LA, RC5LA	

OPTIONAL PARTS CODES





Name	Switch Fixture	Reed Switch(2 Wires, with Indicator Light)		Reed Switch(2 Wires, without Indicator Light)	
		Straight Outlet Cable	Angle Outlet Cable	Straight Outlet Cable	Angle Outlet Cable
<div>PARTS CODE</div> <div>Note</div> <div>PARTS CODE</div> <div>Note</div>	<div>BE(GXA)</div> <div>Screw, Nut</div>	<div>RB1 (GXA)</div> <div>Cable Length:1m</div>	<div>RC1 (GXA)</div> <div>Cable Length:1m</div>	<div>RB2(GXA)</div> <div>Cable Length:1m</div>	<div>RC2(GXA)</div> <div>Cable Length:1m</div>
		<div>RB1LA(GXA)</div> <div>Cable Length:3m</div>	<div>RC1LA(GXA)</div> <div>Cable Length:3m</div>	<div>RB2LA(GXA)</div> <div>Cable Length:3m</div>	<div>RC2LA(GXA)</div> <div>Cable Length:3m</div>
Content					

●RB,RC Switch

Conventional RG1,RG2 switches can be replaced to RB,RC switch

Comparison with old type

Old type	Equivalent Current Type
RG1	RB1, RC1
	RB2, RC2
RG2	RB4, RC4
	RB5, RC5

Solid State Switch(2 Wires, with Indicator Light)		Solid State Switch(3 Wires, with Indicator Light)	
Straight Outlet Cable	Angle Outlet Cable	Straight Outlet Cable	Angle Outlet Cable
<div>RB4(GXA)</div> <div>Cable Length:1m</div>	<div>RC4(GXA)</div> <div>Cable Length:1m</div>	<div>RB5(GXA)</div> <div>Cable Length:1m</div>	<div>RC5(GXA)</div> <div>Cable Length:1m</div>
<div>RB4LA(GXA)</div> <div>Cable Length:3m</div>	<div>RC4LA(GXA)</div> <div>Cable Length:3m</div>	<div>RB5LA(GXA)</div> <div>Cable Length:3m</div>	<div>RC5LA(GXA)</div> <div>Cable Length:3m</div>
			

Flange Rod End

<div>ZT(GXA□)</div> <div>Fill in □ as bore size.</div>


Repair Parts Kit

Standard	End Lock Type
<div>HQ(GXA□)</div> <div>Fill in □ as bore size.</div>	<div>HQ(GXAH□)</div> <div>Fill in □ as bore size.</div>
For details ☞ Page 953~955	For details ☞ Page 953~955

Note: There are no repair parts for stroke adjustment types.

THEORETICAL THRUST(Standard Type)

Unit: N

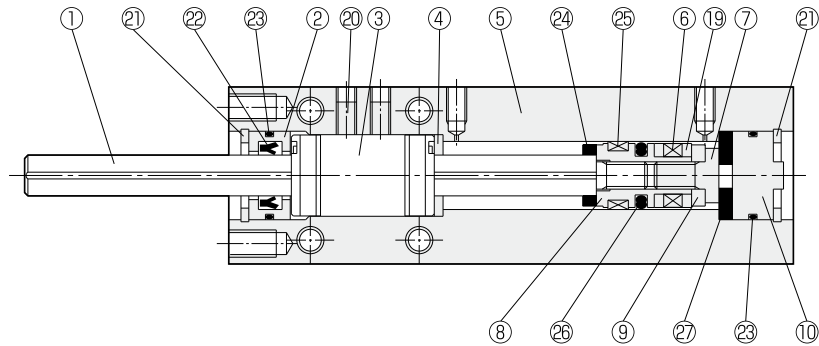
Bore Size (mm)	Working Direction	Operating Pressure MPa					
		0.2	0.3	0.4	0.5	0.6	0.7
φ10	Push	16	24	31	39	47	55
	Pull	12	18	24	30	35	41
φ15	Push	35	53	71	88	110	120
	Pull	30	45	59	74	89	100
φ20	Push	63	94	130	160	190	220
	Pull	47	71	94	120	140	170
φ25	Push	98	150	200	250	300	340
	Pull	76	110	150	190	230	260
φ30	Push	140	210	280	350	420	500
	Pull	100	150	200	250	300	350

1MPa=10.2kgf/cm²
1N=0.102kgf

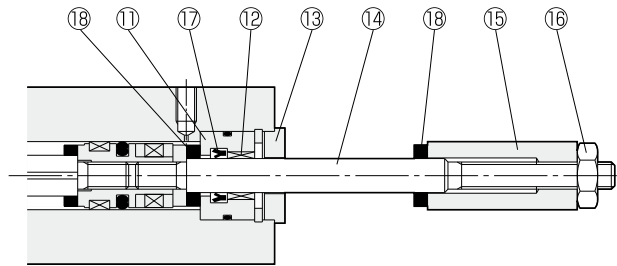
STRUCTURE AND PRINCIPAL COMPONENTS

GXA10

Standard Type



Stroke Adjuster Type (Disassembling is impossible.)



PRINCIPAL COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Spline Rod	High Carbon Chrome Bearing Steel	Hard Chromium Plated	8	Piston A	Stainless Steel		15	Stroke Adjust Stopper	Steel	Nickel Plating
2	Seal Holder	Aluminum Alloy		9	Piston B	Stainless Steel		16	Lock Nut	Steel	Nickel Plating
3	Ball Spline	Steel, Resin, etc		10	Head Cover	Aluminum Alloy		17	Rod Seal	NBR	
4	Bearing Stopper	Stainless Steel		11	Rod Cover	Aluminum Alloy		18	Cushion Rubber	Urethane	
5	Body	Aluminum Alloy		12	Bush	PTFE-Steel		19	Cushion Rubber	Urethane	
6	Magnet	Resin Bound Magnet	Only with Magnet	13	Stooer Receiver	Steel	Nickel Plating	20	Fixing Screw	Steel	Nickel Plating
7	Holder	Aluminum Alloy		14	Stroke Adjust Rod	Stainless Steel					

REPAIR PARTS FOR STANDARD TYPE

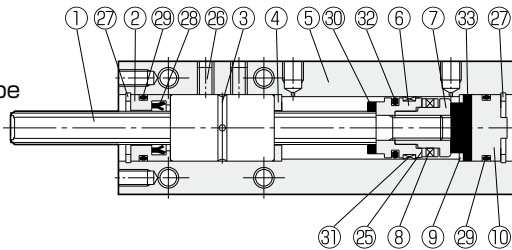
No.	Name	Material	Qty
21	Circlip	Steel	2
22	Spline Seal	Urethane	1
23	O-ring	NBR	2
24	Cushion Rubber	Urethane	1
25	Wear Ring	Synthetic Resin	1
26	Piston Seal	NBR	1
27	Cushion Rubber	Urethane	1

Note:
Stroke adjuster types cannot be disassembled.

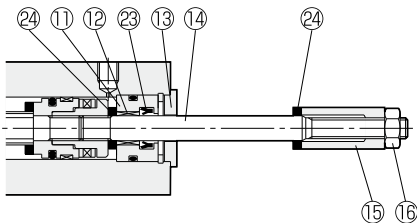
STRUCTURE AND PRINCIPAL COMPONENTS

GXA15

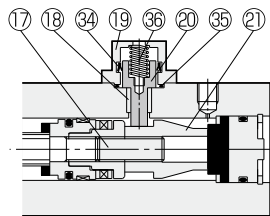
Standard Type



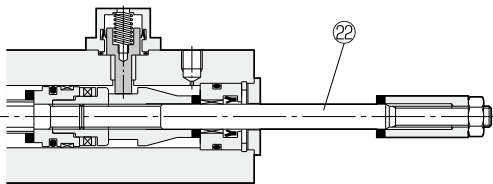
Stroke Adjuster Type (Disassembling is impossible.)



End Lock Type



Stroke Adjuster Type with End Lock Type



PRINCIPAL COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Spline Rod	High Carbon Chrome Bearing Steel	Hard Chromium Plated	10	Head Cover	Aluminum Alloy		19	End Lock Cover	Aluminum Alloy	Alumite Treatment
2	Seal Holder	Stainless Steel		11	Rod Cover	Aluminum Alloy		20	End Lock Pin	Steel (Heat Treatment)	Hard Chromium Plated
3	Ball Spline	Steel, Resin, etc.		12	Bush	PTFE-Steel		21	End Lock Collar	Steel (Heat Treatment)	Electroless Nickel Plating
4	Bearing Stopper	Steel	Electroless Nickel Plating	13	Stooer Receiver	Steel	Nickel Plating	22	Stroke Adjust Rod	Carbon Steel	Hard Chromium Plated
5	Body	Aluminum Alloy		14	Stroke Adjust Rod	Carbon Steel	Hard Chromium Plated	23	Rod Seal	NBR	
6	Piston A	Stainless Steel		15	Stroke Adjust Stopper	Steel	Nickel Plating	24	Cushion Rubber	Urethane	
7	Piston B	Stainless Steel		16	Lock Nut	Steel	Nickel Plating	25	Cushion Rubber	Urethane	
8	Magnet	Resin Bound Magnet	Only with Magnet	17	Fixing Screw	Steel		26	Fixing Screw	Steel	Nickel Plating
9	Cushion Presser	Stainless Steel		18	Bush	PTFE-Steel					

REPAIR PARTS FOR STANDARD TYPE

No.	Name	Material	Qty
27	Circlip	Steel	2
28	Spline Seal	Urethane	1
29	O-ring	NBR	2
30	Cushion Rubber	Urethane	1
31	Wear Ring	Synthetic Resin	1
32	Piston Seal	NBR	1
33	Cushion Rubber	Urethane	1

REPAIR PARTS FOR END LOCK TYPE

No.	Name	Material	Qty
34	Packing	NBR	1
35	O-ring	NBR	1
36	Spring	Stainless Steel	1

As the repair parts for the end lock type, the repair parts for the standard types with the parts shown above added are shipped.

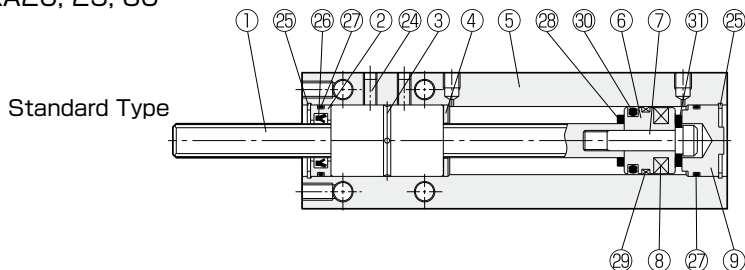
Note:

Stroke adjuster types cannot be disassembled.

The stroke adjustment type with an end lock allows replacement of the end lock only.
Use the repair parts for the end lock type.

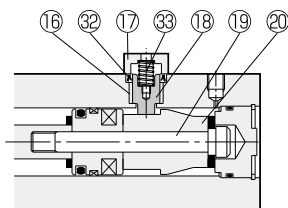
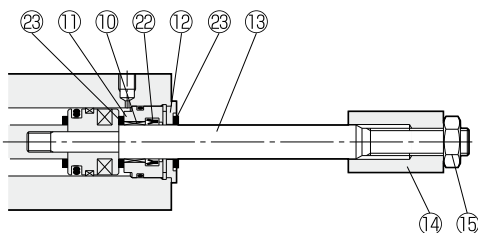
STRUCTURE AND PRINCIPAL COMPONENTS

GXA20, 25, 30

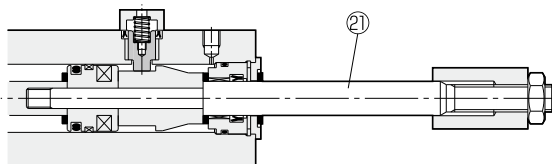


Stroke Adjuster Type (Disassembling is impossible.)

End Lock Type



Stroke Adjuster Type
with End Lock Type



PRINCIPAL COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Spline Rod		Hard Chromium Plated	9	Head Cover	Aluminum Alloy		17	End Lock Cover	Aluminum Alloy	White Alumite Treatment
2	Seal Holder	Aluminum Alloy		10	Bush	PTFE-Steel		18	End Lock Pin	Steel(Heat Treatment)	Hard Chromium Plated
3	Ball Spline	Steel, Resin, etc		11	Rod Cover	Aluminum Alloy		19	Piston Bolt	Stainless Steel	
4	Bearing Stopper	Stainless Steel		12	Stooper Receiver	Steel	Nickel Plating	20	End Lock Cover	Steel(Heat Treatment)	Electroless Nickel Plating
5	Body	Aluminum Alloy		13	Stroke Adjust Rod	Stainless Steel	Hard Chromium Plated	21	Stroke Adjust Rod	Stainless Steel	Hard Chromium Plated
6	Piston A	Aluminum Alloy		14	Stroke Adjust Stopper	Steel	Nickel Plating	22	Rod Seal	NBR	
7	Piston B	Stainless Steel		15	Lock Nut	Steel	Nickel Plating	23	Cushion Rubber	Urethane	
8	Magnet	Resin Bound Magnet	Only with Magnet	16	Bush	PTFE-Steel		24	Fixing Screw	Steel	Nickel Plating

REPAIR PARTS FOR STANDARD TYPE

No.	Name	Material	Qty
25	Circlip	Steel	2
26	Spline Seal	Urethane	1
27	O-ring	NBR	2
28	Cushion Rubber	Urethane	1
29	Wear Ring	Synthetic Resin	1
30	Piston Seal	NBR	1
31	Cushion Rubber	Urethane	1

REPAIR PARTS FOR END LOCK TYPE

No.	Name	Material	Qty
32	Packing	NBR	1
33	Spring	Stainless Steel	1

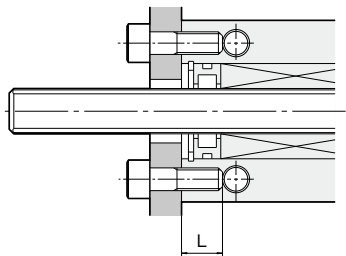
As the repair parts for the end lock type, the repair parts for the standard types with the parts shown above added are shipped.

Note:

Stroke adjuster types cannot be disassembled.

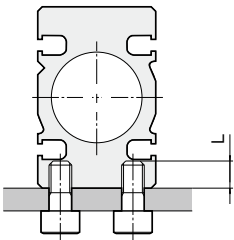
The stroke adjustment type with an end lock allows replacement of the end lock only.
Use the repair parts for the end lock type.

Front mounting(Body Tap)



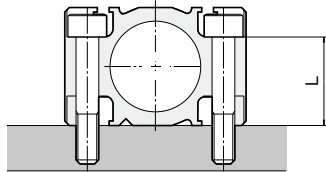
Model	Bolt Size	Screw Depth L (mm)	Fastening Torque N·m
GXA10	M4×0.7	7	2.5
GXA15	M4×0.7	7	2.5
GXA20	M5×0.8	9	5.1
GXA25	M5×0.8	9	5.1
GXA30	M6×1	9	8.6

Side mounting(Body Tap)



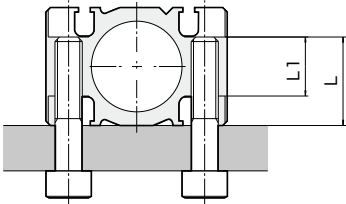
Model	Bolt Size	Screw Depth L (mm)	Fastening Torque N·m
GXA10	M4×0.7	3	2.5
GXA15	M4×0.7	3.5	2.5
GXA20	M5×0.8	6	5.1
GXA25	M5×0.8	6	5.1
GXA30	M6×1	8	8.6

Top mounting(Thru Hole used)



Model	Bolt Size	Thru Hole Length L (mm)	Fastening Torque N·m
GXA10	M3	11.5	1.1
GXA15	M4	13.5	2.5
GXA20	M5	19.5	5.1
GXA25	M5	24.5	5.1
GXA30	M6	29.5	8.6

Bottom mounting(Body Tap)



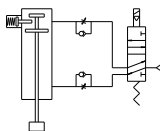
Model	Bolt Size	Screw Depth L1 (mm)	Screw Depth L (mm)	Fastening Torque N·m
GXA10	M4×0.7	5	11.5	2.5
GXA15	M5×0.8	7	13.5	5.1
GXA20	M6×1	13	19.5	8.6
GXA25	M6×1	18	24.5	8.6
GXA30	M8×1.25	23	29.5	22

PRECAUTION FOR USING END LOCK

⚠ Caution

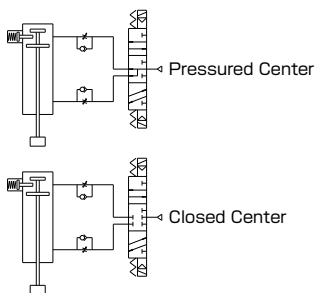
● Recommended Pneumatic Circuit

Use of two positions valves is recommended.



● Do Not Use The Following Circuits

Do not use three positions valves as shown below. Locking is achieved, air is exhausted in the part locking mechanism is located.



● Actuation

Before operating actuator supply air to the air inlet part without locking mechanism. For the subsequent reciprocating motion, repeat air supply-exhaust as usual for both of the parts. For air supply to the locking part, the back pressure must be applied to the opposite part.

(Please refer to Recommended Pneumatic Circuit)

⚠ Warning

If air is supplied to the locking port when the port without locking mechanism is exhausted, an excessive force will be applied so that the locking mechanism may be damaged. Also it is dangerous because the rod will jump out.

● Minimum Actuating Pressure

For the operation, apply a pressure of 0.15MPa or more. Pressure lower than that level may be insufficient to release the lock.

● Locking

When the piston rod reaches the return end of the stroke, and air in locking mechanism is exhausted completely, then the lock pin comes out to lock the piston rod by the force of the spring.

In this state, the piston rod will not drop even though air is exhausted from the actuator.

Do not supply the air to the locking part in this state. Please note that the locking will take time if the exhaust speed is too low.

● Locking Release

Before releasing the lock, always supply air to the part that has no locking mechanism.

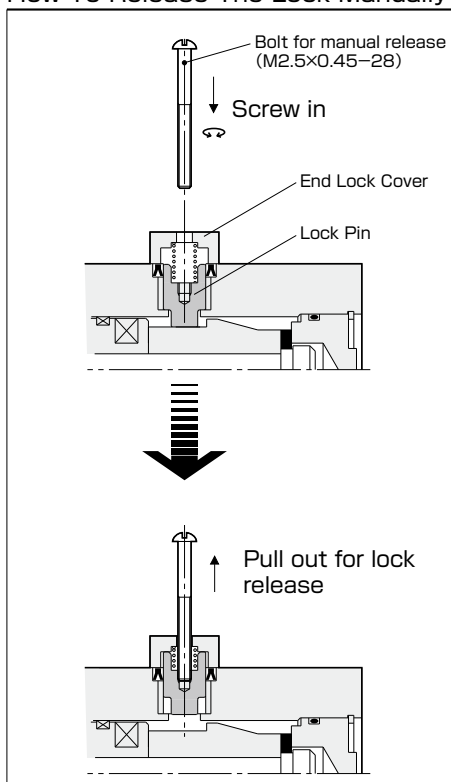
● Manual Release of Lock

While the lock will be released automatically by the normal operation, it can also be released manually.

Insert a bolt from the upper hole of the end-lock cover, then screw it into the lock pin and pull it out. Then the lock will be released. The locked state will be returned by releasing the bolt. The bolt for the manual release (M2.5X0.45X28) is attached to the shipment.

For an ordinary operation, remove the bolt.

How To Release The Lock Manually



⚠ Warning

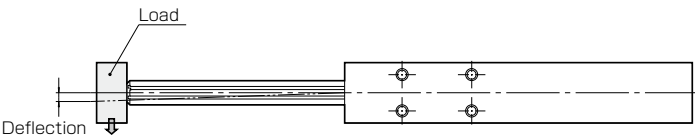
Before releasing the lock, always supply the air to the part that has no locking mechanism. For a manual release, if the lock is released forcibly when a load is applied to the rod, the lock mechanism may be damaged or the rod may drop suddenly. Even if no load is applied, take every possible care for the release.

MATTERS TO BE NOTED FOR DESGINING

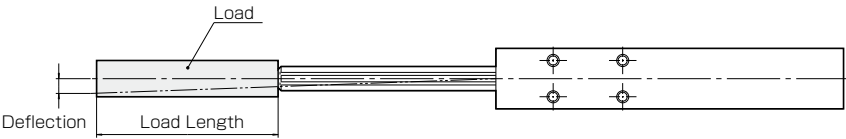
⚠ Caution

Rod End Deflection in case of Horizontal Use

Deflection is generated due to the load mounted at the rod end.
See the graphs on pages 960, 961 for allowable load mass and deflection.



When the load length is long, the deflection at the load end is larger than that at the rod end.



In this case, read the deflection from the graph taking the length of the load length plus cylinder stroke as cylinder stroke.

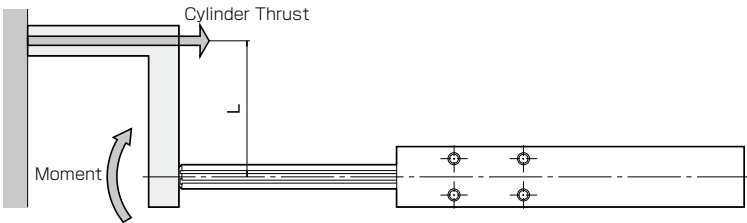
Example: Cylinder Stroke.....100mm
Load Length.....50mm
Assuming 100+50=150mm as cylinder stroke,
read the deflection at the point (100+50)mm of cylinder stroke from the graph.

Allowable Load Mass of Vertical Use

Relation between load mass and cylinder speed of vertical use see the graphs on page 984.

Moment Generated by Cylinder Thrust in case of Offset Contact

When a load/work is put into contact at an offset point from the rod as shown, a large moment is generated due to cylinder thrust.
Check the table of allowable moment in page 953.



Moment=Cylinder thrust x L(offset distance)

When an external force (lateral load) acts on the rod

In case where an external force (lateral load) acts temporarily on the rod end when the cylinder stopped, read deflection from the broken lines on the graphs

Rod Deflection

In case where a load is light, but the stroke is long, or a load at the rod end is large, the rod deflection may sometimes become unexpectedly large.

Select a model referring to the graphs of deflection.

Rod Vibration

In case where stroke is long, or load mass at the rod end is large, rod vibration may be generated at the cylinder push end.

Then, decrease the speed or select a model with a size larger dia. rod.

Also, when the rigidity of the base for mounting the cylinder is not sufficient, enhance the rigidity of the base.

Rolling Feel in Bearing

The bearing (ball spline) of this product is slightly preloaded. Accordingly, when the rod is moved by hand, rolling of balls inside the bearing may cause slight feel of operation discontinuity or difference in the rolling resistance between products. This is due to preload of the bearing and does not affect the performance.

Stroke Adjustment of Push-out Adjustment Types (ZE)

When adjusting the stroke, loosen the lock nut and turn the stopper for stroke adjustment.

When loosening the lock nut, set a spanner on the across flats of both the lock nut and the stopper for stroke adjustment.

Turning the stopper for stroke adjustment without loosening the lock nut causes the torque to be applied to the push-out adjustment rod as well, which may cause loosening of the connection between the rod and the piston, leading to failure.

After stroke adjustment, lock by setting a spanner on the across flats of both the lock nut and the stopper for stroke adjustment.

Use a spanner of an appropriate size.

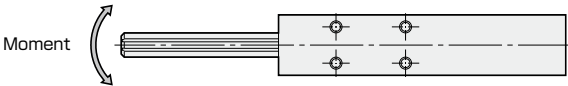
Use of a monkey or pipe wrench may hinder correct adjustment, causing failure.

Mounting of Load

When mounting a load by using a male or female thread at the rod end, set a spanner on the across flats of the rod to prevent the tightening torque from being applied to the bearing.

ALLOWABLE MOMENT

In case where a moment load is applied to the rod end



In case where the cylinder is operated under constant moment

Model	Allowable Moment N·m
GXA10	0.19
GXA15	0.40
GXA20	1.2
GXA25	1.5
GXA30	4.7


In case where a moment is applied temporarily while the cylinder stopped

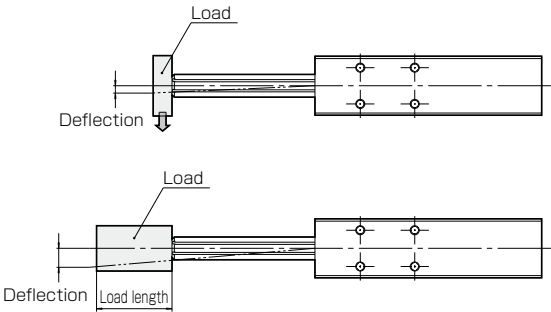
Model	Allowable Moment N·m
GXA10	0.35
GXA15	1.2
GXA20	3.1
GXA25	3.9
GXA30	14

1N·m=0.102kgf·m

ALLOWABLE LOAD MASS, ALLOWABLE LATERAL LOAD AND ROD DEFLECTION

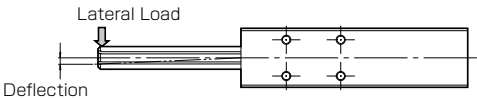
●Load Mass and Rod Deflection

In case of horizontal usage of the cylinder, deflection is generated in the rod due to the load mounted at the rod end. The relation between allowable load mass and deflection is shown in the graphs below. Applied load mass shall be within the range indicated by each solid line correspondent to each stroke length. (Please refer  page 958)

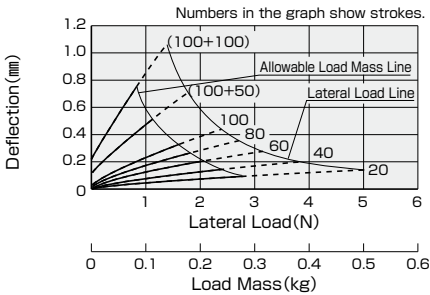


●Lateral Load Rod Deflection

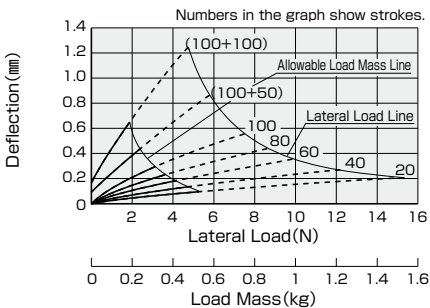
Under the condition that the cylinder is stopped the relation between deflection due to an external force (lateral load) acting temporarily on the rod and allowable load mass is shown in the graphs below. Applied lateral load shall be smaller than the value indicated by each broken line correspondent to each stroke length. If an external force acts on constantly, see the values of allowable load mass in the graphs.



GXA10



GXA15



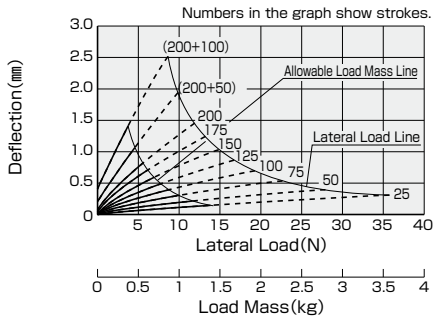
Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
20	0.30	5.0
40	0.25	3.9
60	0.21	3.2
80	0.18	2.7
100	0.16	2.4
(100+50)	0.12	1.8
(100+100)	0.09	1.4

Quotation () indicates (Stroke + Load Length)

Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
20	0.55	15
40	0.48	12
60	0.41	10
80	0.36	8.6
100	0.32	7.5
(100+50)	0.24	5.9
(100+100)	0.19	4.7

Quotation () indicates (Stroke + Load Length)

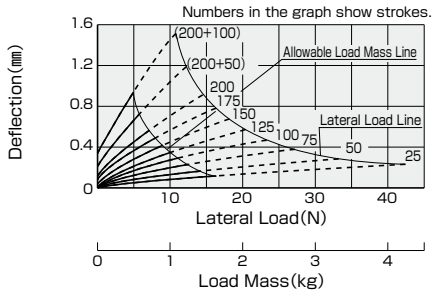
GXA20



Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
25	1.4	36
50	1.2	28
75	1.0	23
100	0.90	19
125	0.80	17
150	0.72	15
175	0.65	13
200	0.60	12
(200+50)	0.48	10
(200+100)	0.40	8.7

Quotation () indicates (Stroke + Load Length)

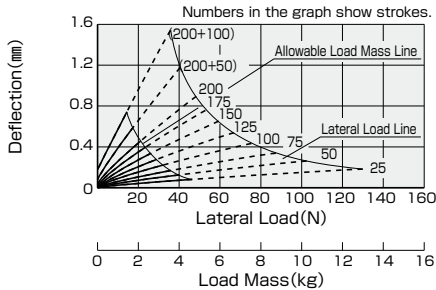
GXA25



Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
25	1.8	43
50	1.5	34
75	1.3	28
100	1.1	23
125	1.0	20
150	0.90	18
175	0.82	16
200	0.75	15
(200+50)	0.60	12
(200+100)	0.51	11

Quotation () indicates (Stroke + Load Length)

GXA30



Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
25	4.8	130
50	4.1	110
75	3.6	88
100	3.2	76
125	2.9	66
150	2.6	59
175	2.4	53
200	2.2	48
(200+50)	1.8	41
(200+100)	1.5	36

Quotation () indicates (Stroke + Load Length)

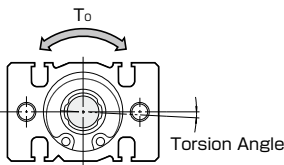
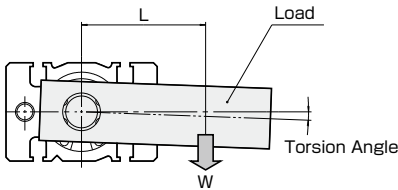
ALLOWABLE TORQUE AND TORSION ANGLE OF ROD

Torsion angle at the rod end when the rod is pushed out

- In case where the cylinder is operated under constant torque (dynamic allowable torque)
- when a torque is applied temporarily while the cylinder stopped (static allowable torque)

A torsional moment (torque) is generated when a load in eccentric condition is mounted at the rod end as shown below.
When the cylinder is operated in this condition, the torque shall be smaller than the value indicated by each solid line in the graphs below.

When a torque (T_0) is applied temporarily to the rod from outside while the cylinder stopped, the torque shall be smaller than the value indicated by each broken line in the graphs below.



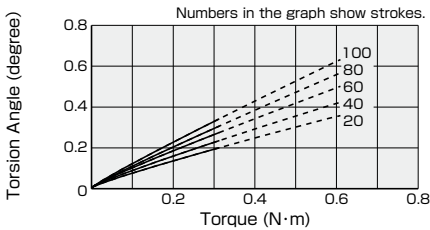
$T=L \times W$

T: Torsional moment

L: Distance between the rod center and the center of gravity of a load

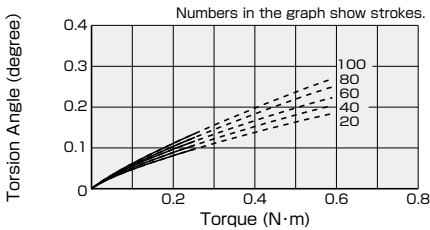
W: Load mass

GXA10



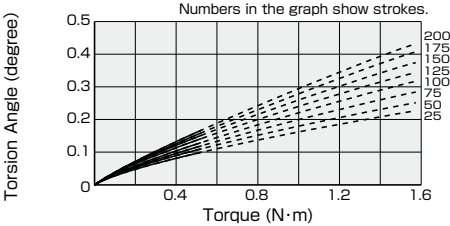
Dynamic Allowable Torque	Static Allowable Torque
0.31N·m	0.61N·m

GXA15



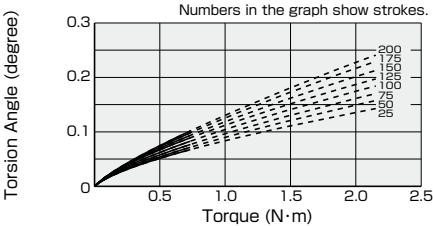
Dynamic Allowable Torque	Static Allowable Torque
0.25N·m	0.59N·m

GXA20



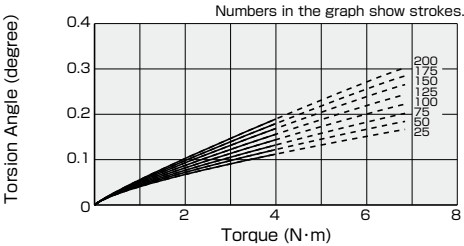
Dynamic Allowable Torque	Static Allowable Torque
0.50N·m	1.6N·m

GXA25



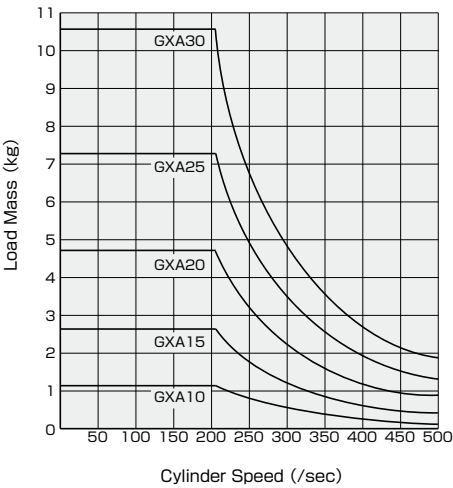
Dynamic Allowable Torque	Static Allowable Torque
0.75N·m	2.2N·m

GXA30



Dynamic Allowable Torque	Static Allowable Torque
4.0N·m	6.9N·m

RELATION BETWEEN LOAD MASS AND CYLINDER SPEED(Vertecal installation) —

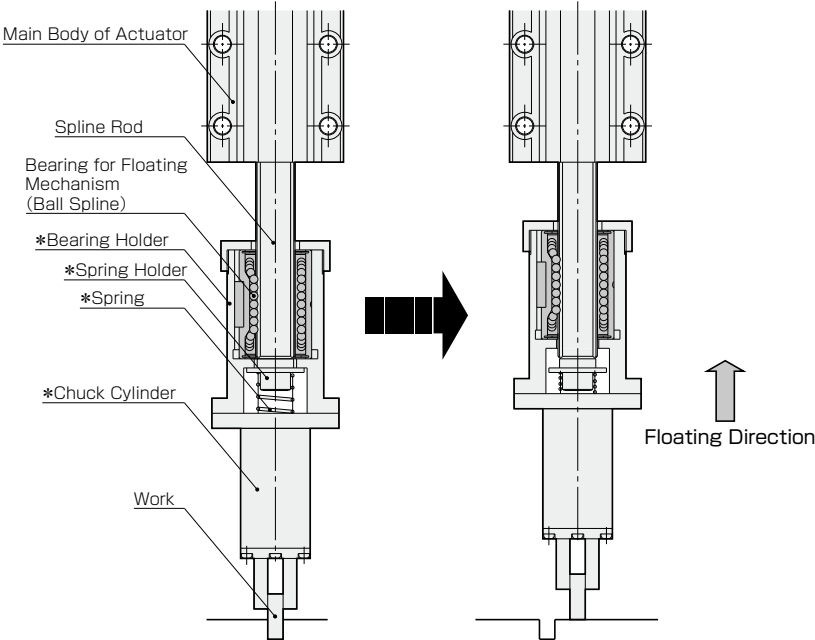


Warning
Be sure to use the unit within the range specified by the line. otherwise the cylinder may be damaged.

BEARING FOR FLOATING MECHANISM(Option Code FN) —

Construction and Application Example

GXA
SQUARE F CYLINDER



●As for the parts (parts made * in the figure above) other than the bearing for floating mechanism, it is required to design and produce the construction and parts fitting with the machine at your side.

●Prevention of damage when work installation fails

In case where work installation fails due to incomplete location, defective parts, etc. and the work is bumped, the floating mechanism will prevent the work from damage by absorbing the shock.

●Softening of impact force at work installation

In case where an impact force due to actuator velocity may cause breakage of work or defective assembling at work installation, the floating mechanism will prevent the work from such damage by softening the impact force and help to achieve smooth work installation and press fit.

●Work installation at different levels

In case where works are installed at the positions of different levels, only one actuator can perform the operation by setting floating stroke by level difference in advance.

●The bearing for floating mechanism incorporates the high precision and high rigidity ball spline.

■MATERS TO BE NOTED FOR DESIGNING

⚠Caution

①Specific resistance of Bearing

The bearing for floating mechanism has the specific resistance respectively. Pay attention to the setting load value of the spring.

(The spring force shall be determined from a viewpoint of the mechanism as a whole.)

Unit: N

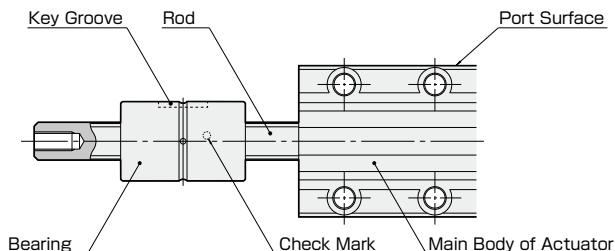
Model	Speck Resistance
GXA10	2.5
GXA15	3
GXA20	3.5
GXA25	4
GXA30	5

②Direction of Bearing key groove and check mark

*The check mark means the digit indicated in the optional place on the outside of the bearing.
The digit are optional and mean nothing.

●GXA15~30

When the bearing is mounted to the rod, insert straight so that the key groove of the bearing locates at the air inlet port side of actuator and check mark at the body side of actuator. If it is inserted forcibly, the balls inside the bearing may come off.



●GXA10

The bearing has no specific directionality. Insert it smoothly.

③Position of the key groove for bearing

The key groove and the rod spline grooves for the bearing, which is for floating mechanism, in the Square F cylinder (GXA series) are located in an arbitrary area that ranges approximately ± 3 degrees against the center line. Pay full attention to the design of bearing holders.

④Combination of the bearing and the rod

The bearing for floating mechanism and the rod are combinedly supplied. If other bearing, which is ordered additionally, attached to other actuator (including the part of the same specification), or purchased from somewhere afterward, is mounted to the rod, this may cause malfunction or poor accuracy. Be sure to use the bearing attached to the actuator.
The check mark (See clause 2 of this note.) on the bearing has nothing to do with the combination with the rod. Even if the ckeck mark on the bearing is the same. the combination of the bearing and the rod is another matter.

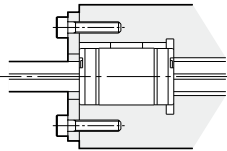
⑤Tolerance of the housing inside dia. for the bearing

Generally, the tolerance between the bearing for floating mechanism and the housing shall be by transition fit (J6). In case where accuracy is not so required, it shall be by loose fit (H7).

Tolerance of housing inside dia.	General service conditions	J6
	A accuracy is not required	H7

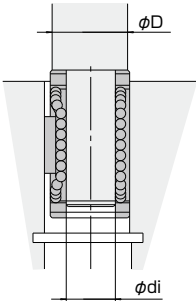
⑥Mounting of the bearing

The figure below shows a mounting example of the bearing for floatig mechanism.
Fixing strength in the axial direction is not so required, but onlydriving fit is not enough to hold and another measures shall be taken.



⑦Insertion of the bearing

When the bearing for floating mechanism is inserted, use a jig and not to tilt the cylinder to be parallel against the rod and insert carefully.



The black parts on the sides of the bearing used for GXA10 are resin-based parts. Handle with care.

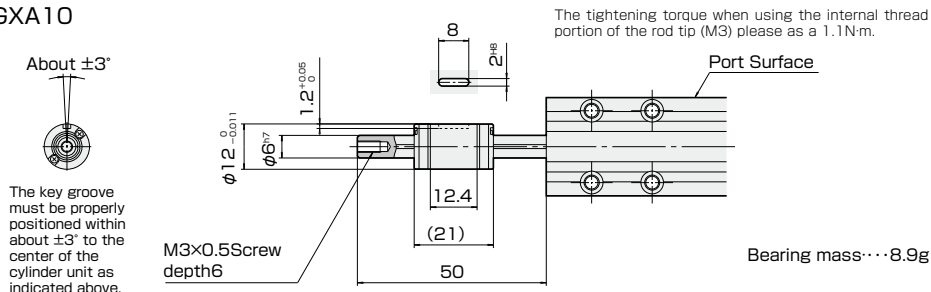
Model	di	D
GXA10	ϕ 5.0	ϕ 11.5
GXA15	ϕ 7.0	ϕ 15.5
GXA20	ϕ 8.5	ϕ 20.5
GXA25	ϕ 11.5	ϕ 25.5
GXA30	ϕ 14.5	ϕ 30.5

⑧Actual stroke of the actuator

The length of actuator stroke minus floating stroke is the stroke by which the work actually shifts. Be careful to select stroke.

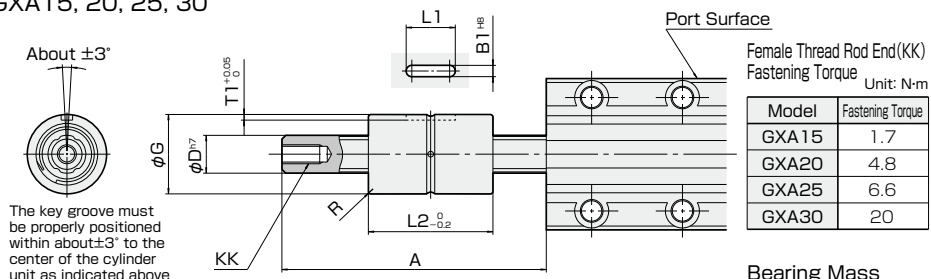
DIMENSIONS OF ROD END WITH BEARING FOR FLOATING MECHANISM(Option Code FN) —

GXA10

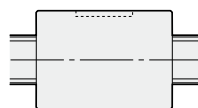


Note 1: Bearing outside dimension $\phi 12_{+0.011}^{-0.006}$ is the diameter of the part where the length is 12.4mm in the figure.
 Note 2: The rod protrudes longer than that of the standard type. Check the total length of the cylinder.
 Note 3: A bolt and washer to prevent the bearing from dropping are attached to the female thread (M3X0.5 in the figure) for shipment. Remove the bolt and washer before using the cylinder. (the bolt and washer are not adhered.)

GXA15, 20, 25, 30



Note 1: Bearing outside dimension $\phi 12_{+0.011}^{-0.006}$ is the diameter of the part where the length is 12.4mm in the figure.
 Note 2: The rod protrudes longer than that of the standard type. Check the total length of the cylinder.
 Note 3: A bolt and washer to prevent the bearing from dropping are attached to the female thread (M3X0.5 in the figure) for shipment. Remove the bolt and washer before using the cylinder. (the bolt and washer are not adhered.)



External view of the GXA25 bearing

Female Thread Rod End(KK)
Fastening Torque Unit: N·m

Model	Fastening Torque
GXA15	1.7
GXA20	4.8
GXA25	6.6
GXA30	20

Bearing Mass Unit: g

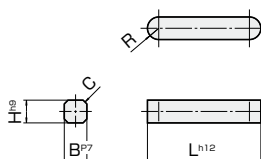
Model	Mass
GXA15	18
GXA20	50
GXA25	79
GXA30	165

Unit: mm

Model	A	B1	D	G	KK	L1	L2	R	T1
GXA15	55	2.5	$\phi 8$	$\phi 16_{+0.011}^{-0.006}$	M4X0.7 depth8	10.5	25	0.5	1.2
GXA20	70	3	$\phi 10$	$\phi 21_{+0.013}^{-0.006}$	M5X0.8 depth10	13	33	0.5	1.5
GXA25	75	3	$\phi 13$	$\phi 26_{+0.013}^{-0.006}$	M6X1 depth12	15	36	0.5	1.5
GXA30	95	3.5	$\phi 16$	$\phi 31_{+0.013}^{-0.006}$	M8X1.25depth13	17.5	50	0.5	2

Note 1: The rod protrudes longer than that of the standard type (A in the figure). Check the total length of the cylinder.
 Note 2: For GXA30, the shape of the rod spline grooves is different from the shape illustrated above.
 For the dimensions of the entire unit, see pages Outline Dimensions.
 Note 3: A bolt and washer to prevent the bearing from dropping are attached to the female thread (KK in the figure) for shipment. Remove the bolt and washer before using the cylinder. (The bolt and washer are not adhered.)

■Dimensions of Key (A Key is attached to the product)



Unit: mm

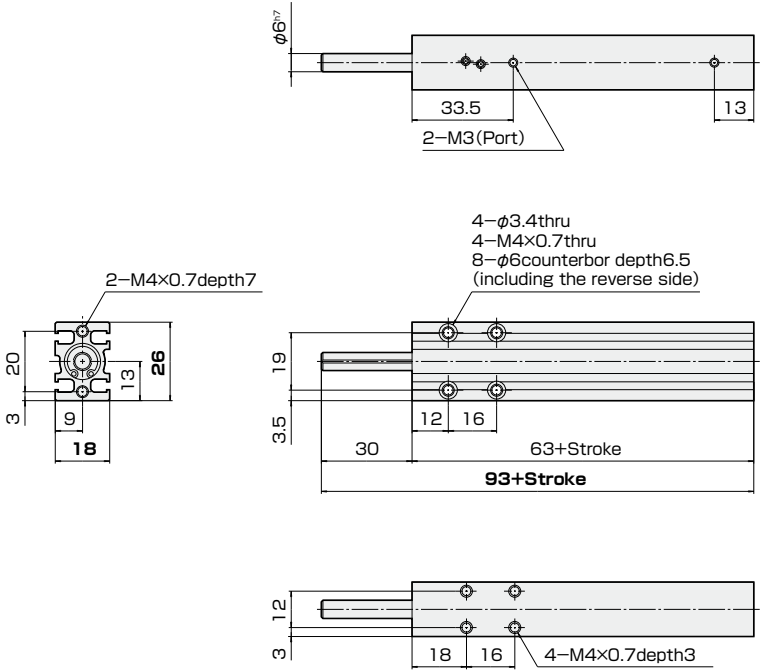
Model	B	C	H	L	R
GXA10	2	0.16	2	7.8	1
GXA15	2.5	0.5	2.5	10.5	1.25
GXA20	3	0.5	3	13	1.5
GXA25	3	0.5	3	15	1.5
GXA30	3.5	0.5	3.5	17.5	1.75

DIMENSIONS(mm) GXA10 STANDARD TYPE

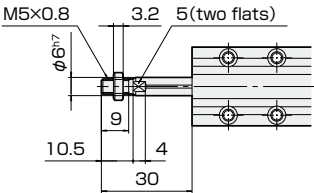
GXA(S)–SD10–(Stroke)



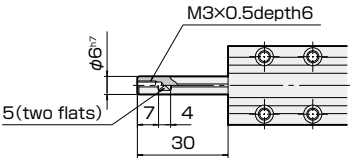
Standard Stroke page 950



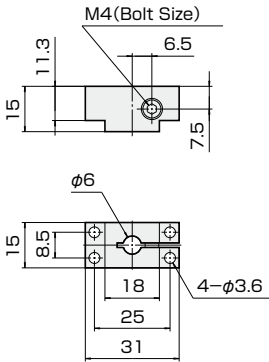
Male Thread Rod End (WT)



Female Thread Rod End (WS)



Flange Rod End (ZT)



A X G

SQUARE FL CYLINDER

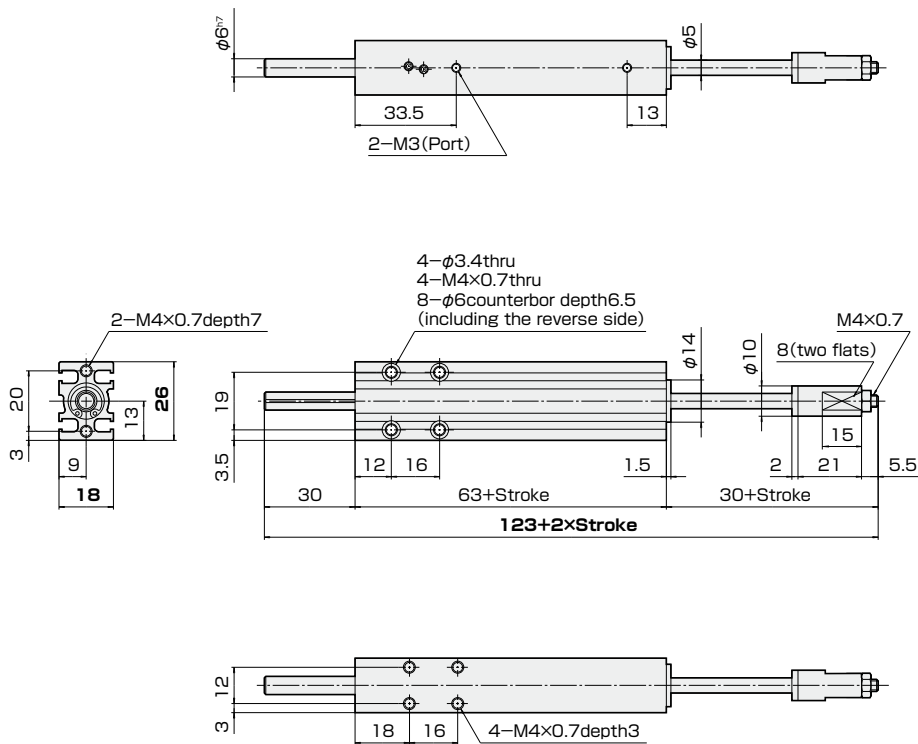
DIMENSIONS(mm) GXA10 STROKE ADJUSTER TYPE

GXA(S)–SD10–(Stroke)–ZE

Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



GXA

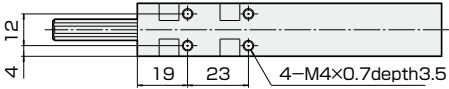
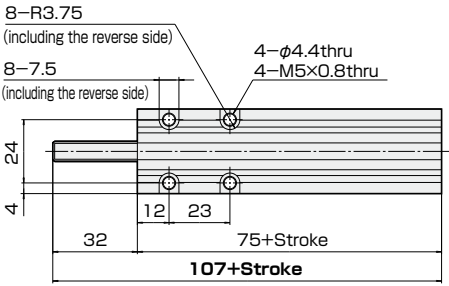
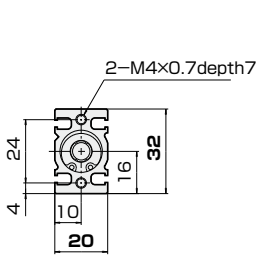
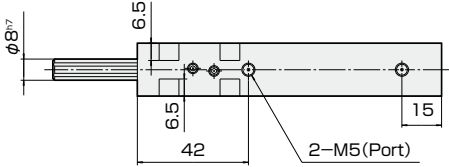
SQUARE F CYLINDER

DIMENSIONS(mm) GXA15 STANDARD TYPE

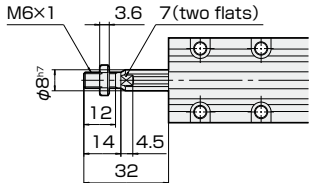
GXA(S)–SD15–(Stroke)



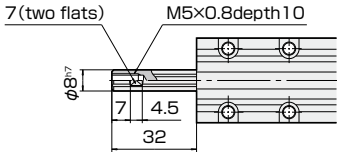
Standard Stroke page 950



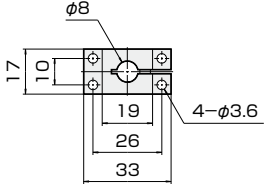
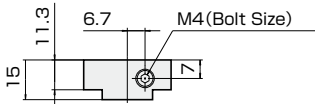
Male Thread Rod End(WT)



Female Thread Rod End(WS)



Flange Rod End(ZT)



AXG


SQUARE FL CYLINDER

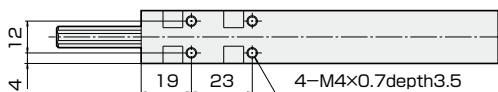
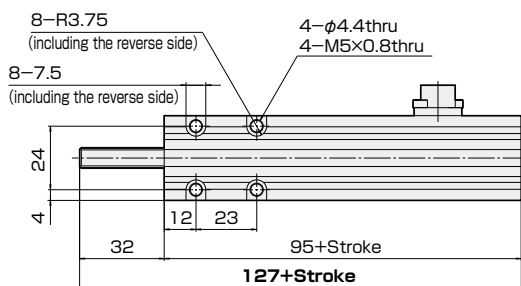
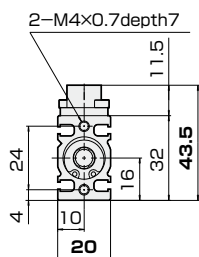
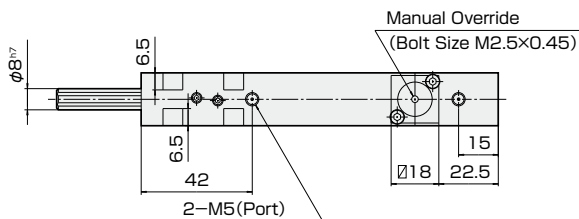
DIMENSIONS(mm) GXAH15 END LOCK TYPE



GXAH(S)–SD15–(Stroke)

With End Lock
Mechanism

Bore Size

Standard Stroke  page 950



- Female Thread Rod End(WS), Male Thread Rod End(WT), Flange Rod End(ZT)  page 970
- Safe Note for End Lock System  page 957

GXA

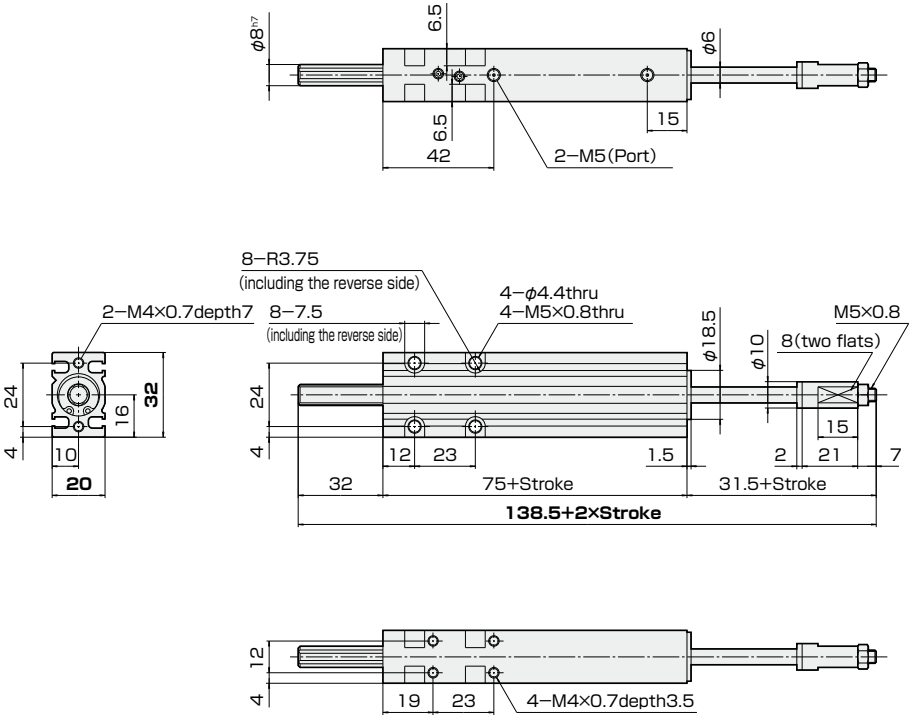
SQUARE F CYLINDER

DIMENSIONS(mm) **GXA15 STROKE ADJUSTER TYPE**

GXA(S)–SD15–(Stroke)–ZE

Bore Size
with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



● Female Thread Rod End (WS), Male Thread Rod End (WT), Flange Rod End (ZT)  page 970


DIMENSIONS(mm) GXAH15 STROKE ADJUSTER AND END LOCK TYPE

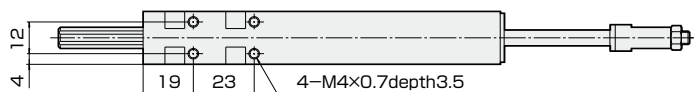
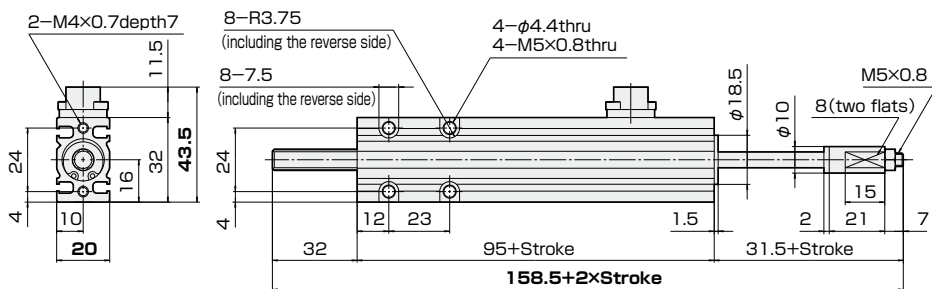
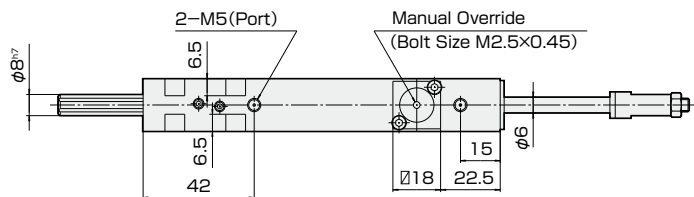
GXAH(S)–SD15–(Stroke)–ZE

With End Lock
Mechanism

Bore Size



with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



GXA


SQUARE F CYLINDER

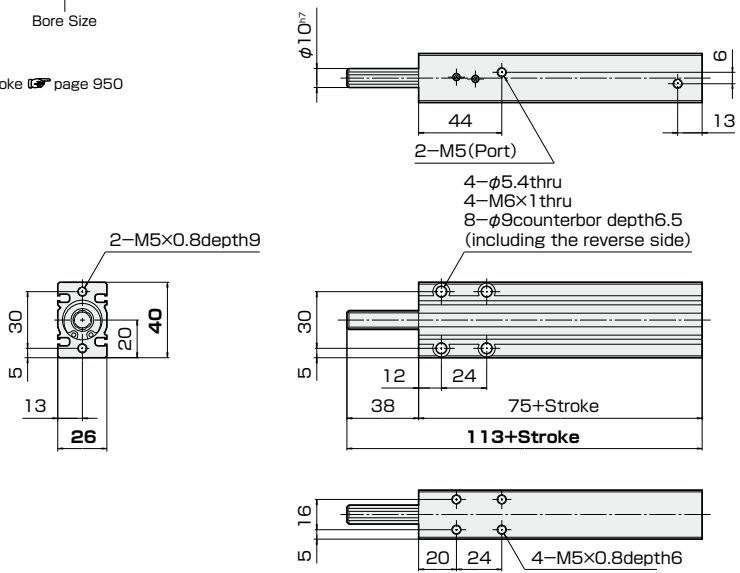
- Female Thread Rod End(WS), Male Thread Rod End(WT), Flange Rod End(ZT)  page 970
- Safe Note for End Lock System  page 957

DIMENSIONS(mm) GXA20 STANDARD TYPE

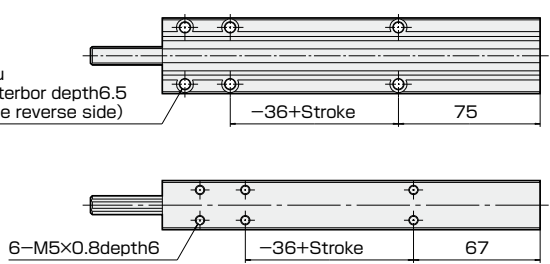
GXA(S)–SD20–(Stroke)

Bore Size

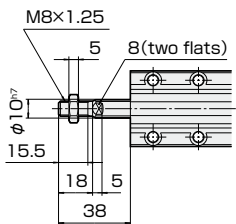
Standard Stroke  page 950



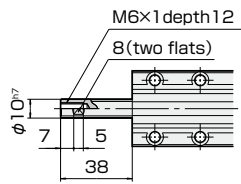
In case of 125~200 Stroke



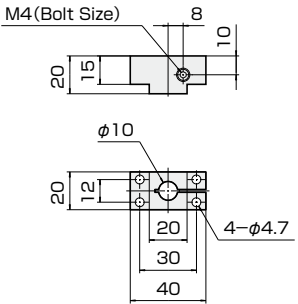
Male Thread Rod End (WT)



Female Thread Rod End (WS)



Flange Rod End (ZT)



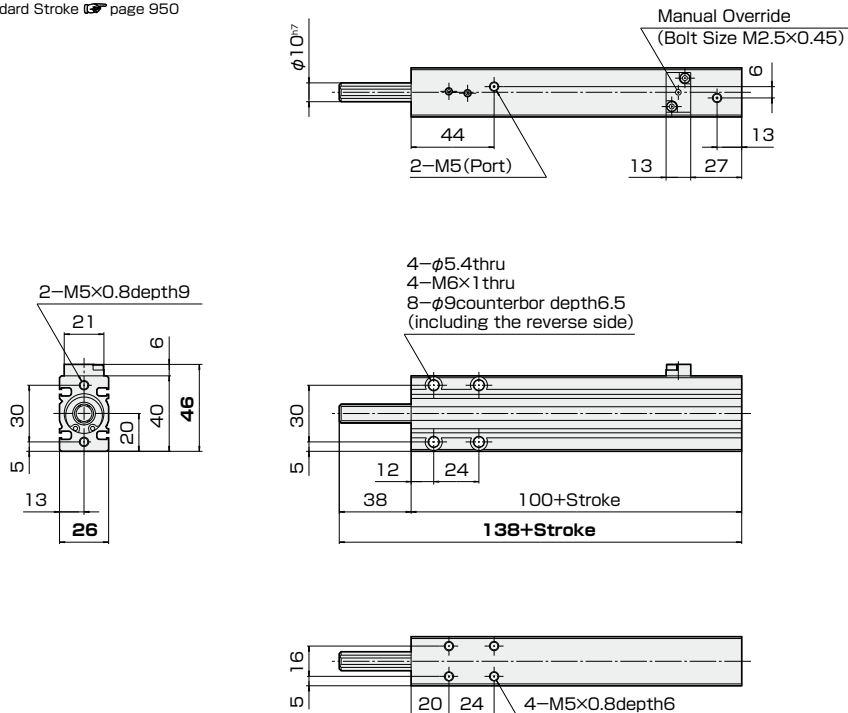
DIMENSIONS(mm) GXA H20 END LOCK TYPE

GXAH(S)–SD20–(Stroke)

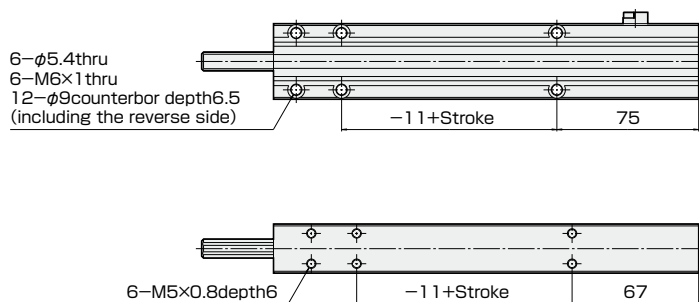
With End Lock
Mechanism



Bore Size

Standard Stroke  page 950



In case of 100~200 Stroke



- Female Thread Rod End (WS), Male Thread Rod End (WT), Flange Rod End (ZT)  page 974
- Safe Note for End Lock System  page 957

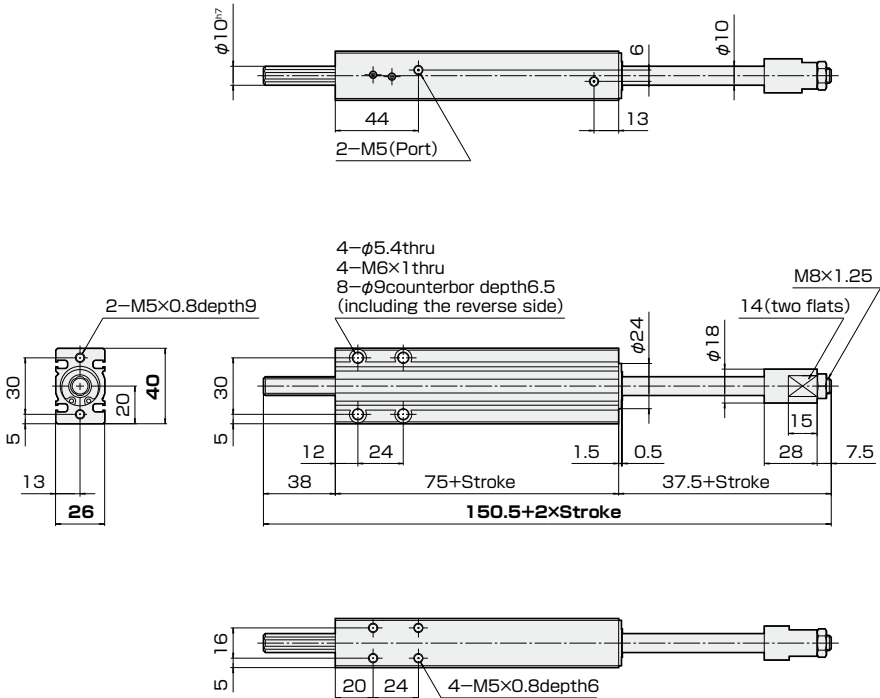
DIMENSIONS(mm) GXA20 STROKE ADJUSTER TYPE

GXA(S)–SD20–(Stroke)–ZE

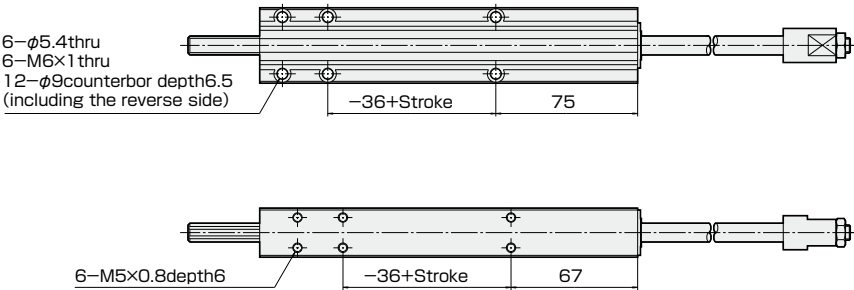
Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



In case of 125~200 Stroke




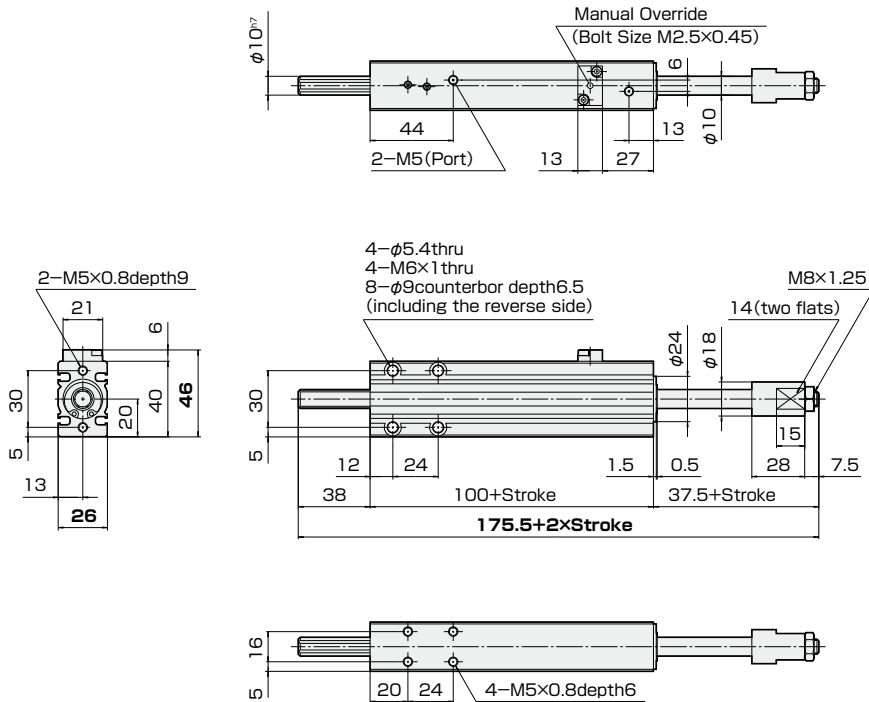
DIMENSIONS(mm) GXA20 STROKE ADJUSTER AND END LOCK TYPE

GXAH(S)-SD20-(Stroke)-ZE

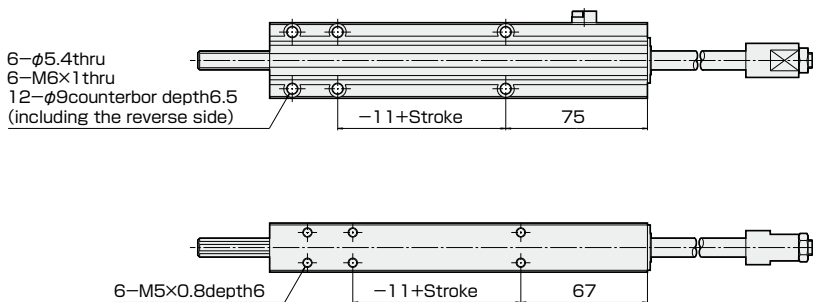
With End Lock Mechanism



Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950

In case of 100~200 Stroke

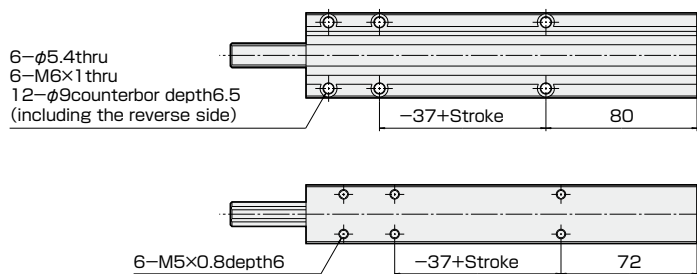
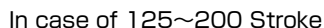


● Female Thread Rod End (WS), Male Thread Rod End (WT), Flange Rod End (ZT)  page 974
● Safe Note for End Lock System  page 957

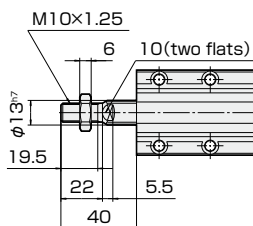
SQUARE F CYLINDER

Bore Size

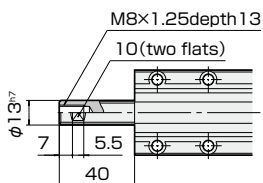
Technical drawing of a 100mm diameter cast iron flange with 4 holes. Dimensions include 31mm hole diameter, 45mm outer diameter, 22.5mm hole spacing, 35mm hole depth, 5mm hole diameter, 1.55mm hole diameter, and 2-M5x0.8 depth 9. The drawing is labeled '100' and '4'.



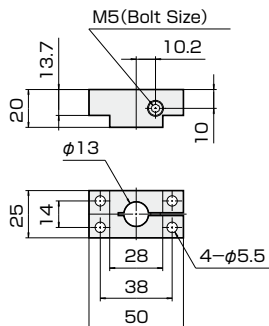
Male Thread Rod End(WT)



Female Thread Rod End(WS)



Flange Rod End(ZT)




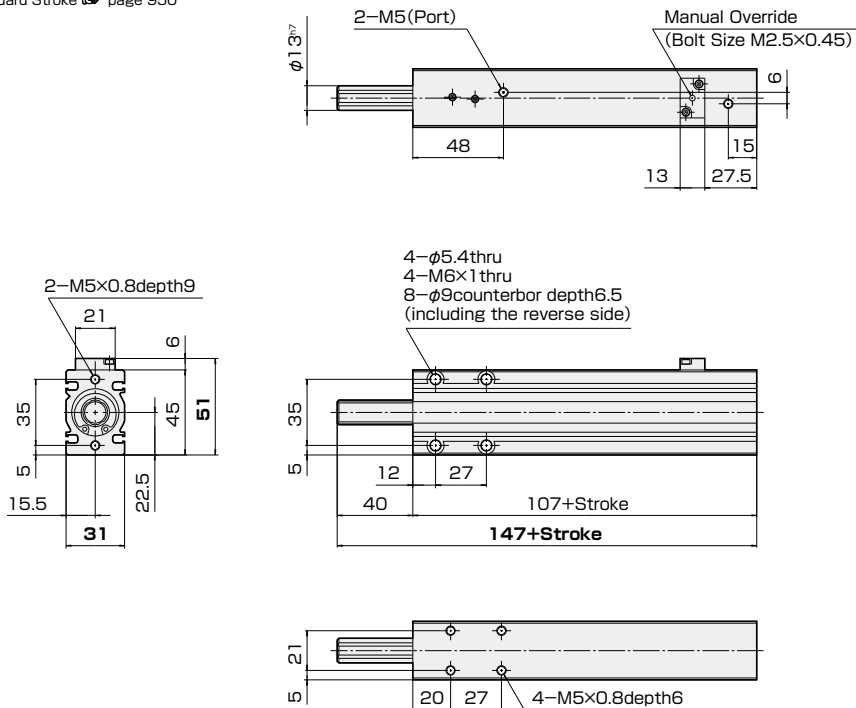
DIMENSIONS(mm) GXA H25 END LOCK TYPE

GXAH(S)–SD25–(Stroke)

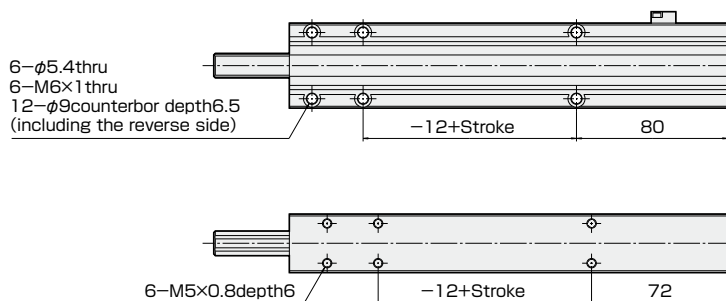
With End Lock
Mechanism


Bore Size

Standard Stroke  page 950



In case of 100~200 Stroke




- Female Thread Rod End (WS), Male Thread Rod End (WT), Flange Rod End (ZT)  page 97 8
- Safe Note for End Lock System  page 957

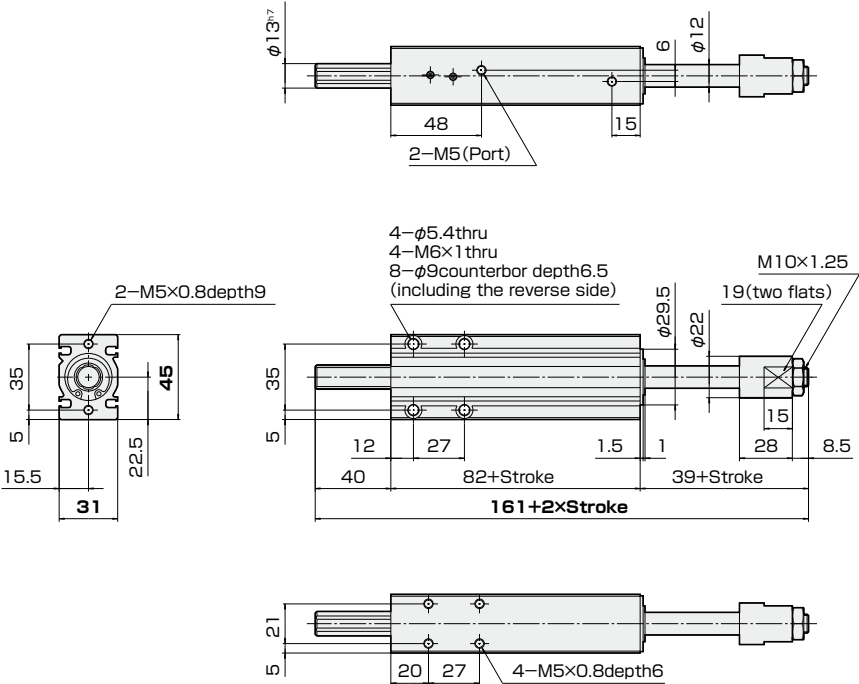
DIMENSIONS(mm) GXA25 STROKE ADJUSTER TYPE

GXA(S)–SD25–(Stroke)–ZE

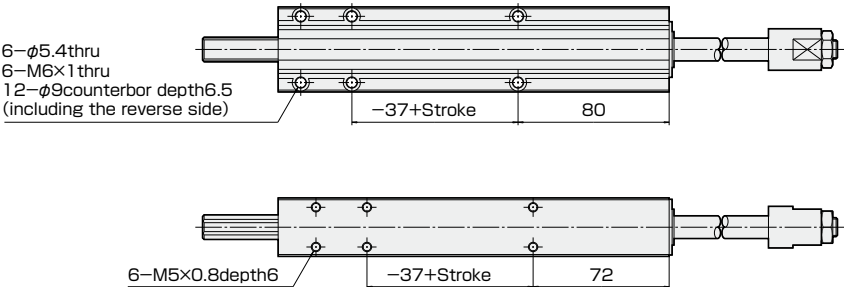
Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



In case of 125~200 Stroke



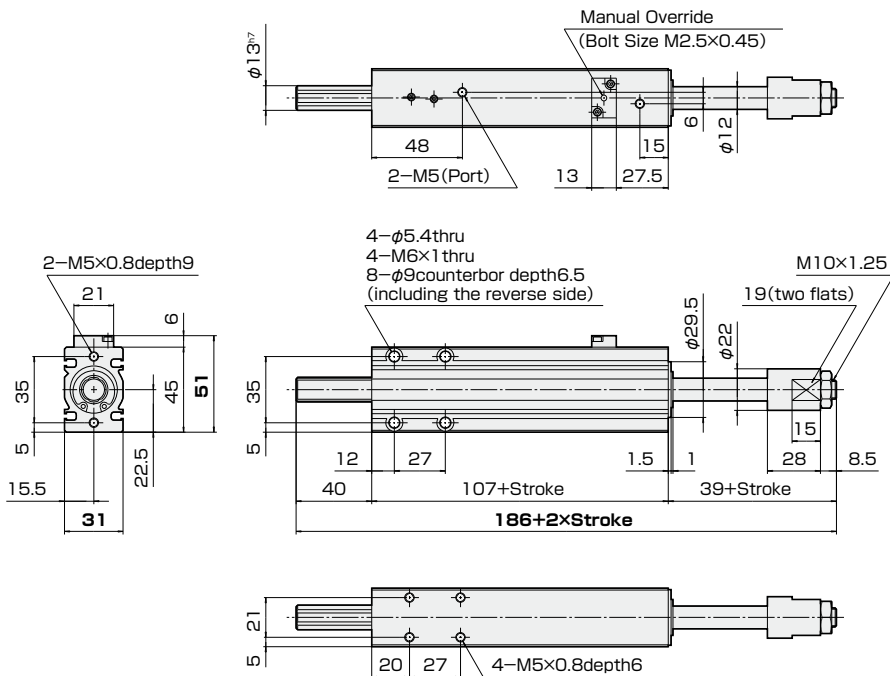
DIMENSIONS(mm) GXAH25 STROKE ADJUSTER AND END LOCK TYPE

GXAHS-SD25-(Stroke)-ZE

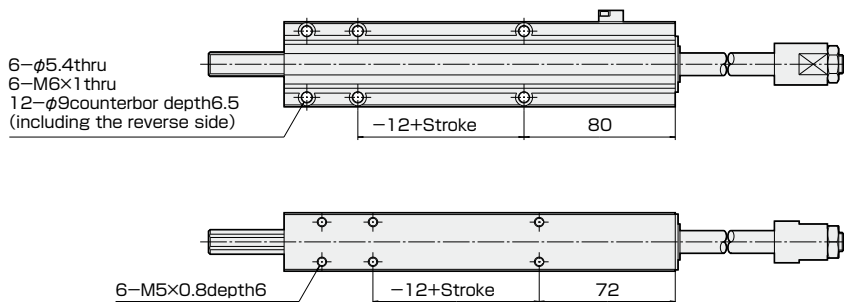
With End Lock Mechanism



Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke page 950

In case of 100~200 Stroke



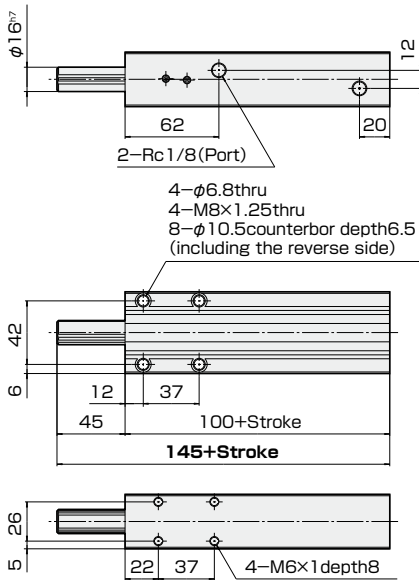
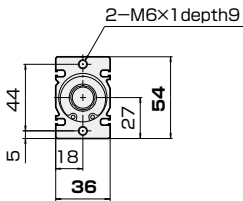
- Female Thread Rod End(WS), Male Thread Rod End(WT), Flange Rod End(ZT)  page 978
●Safe Note for End Lock System  page 957

DIMENSIONS(mm) GXA30 STANDARD TYPE

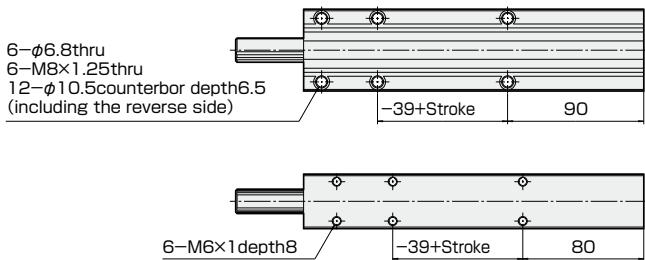
GXA(S)–SD30–(Stroke)



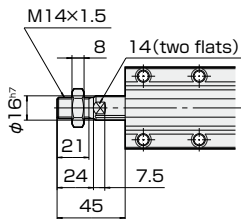
Standard Stroke page 950



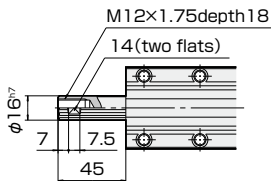
In case of 125~200 Stroke



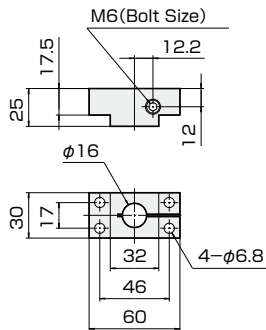
Male Thread Rod End(WT)



Female Thread Rod End(WS)



Flange Rod End(ZT)



GXA
SQUARE FL CYLINDER

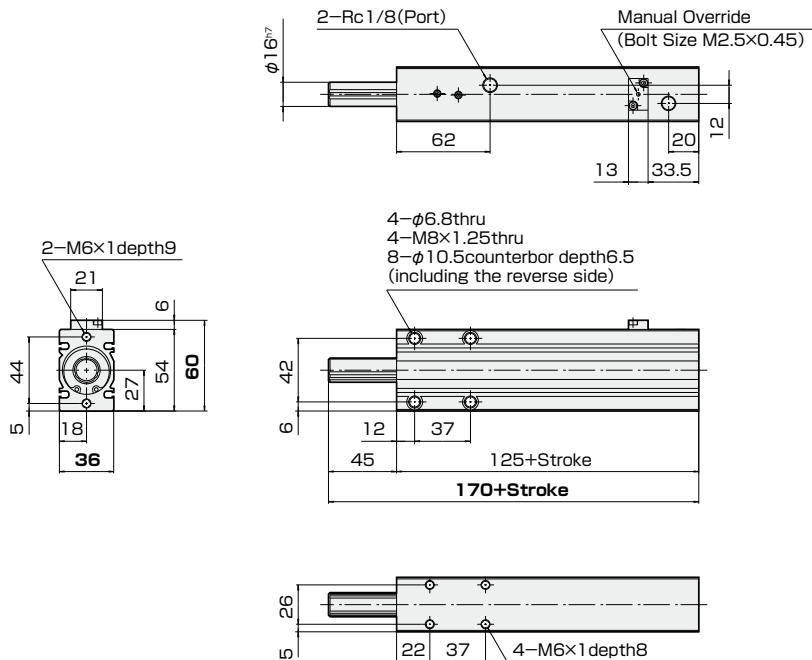
DIMENSIONS(mm) GXA H30 END LOCK TYPE

GXAH(S)–SD30–(Stroke)

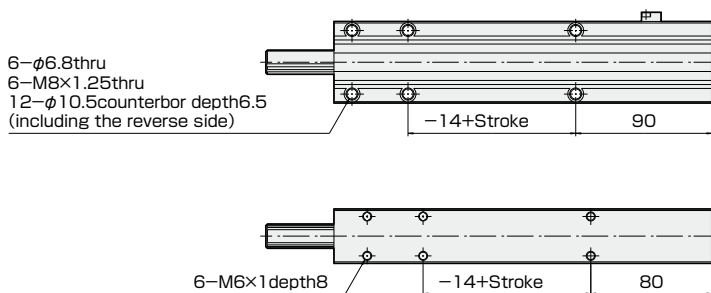
With End Lock
Mechanism



Bore Size

Standard Stroke  page 950



In case of 100~200 Stroke



- Female Thread Rod End (WS), Male Thread Rod End (WT), Flange Rod End (ZT)  page 982
- Safe Note for End Lock System  page 957

GXA

SQUARE F CYLINDER

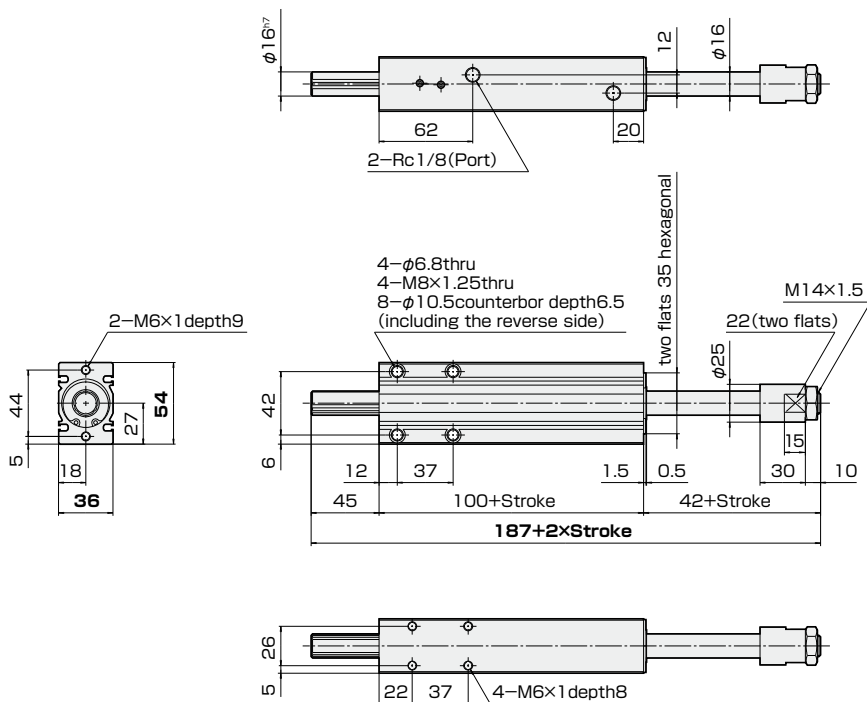
DIMENSIONS(mm) GXA30 STROKE ADJUSTER TYPE

GXA(S)–SD30–(Stroke)–ZE

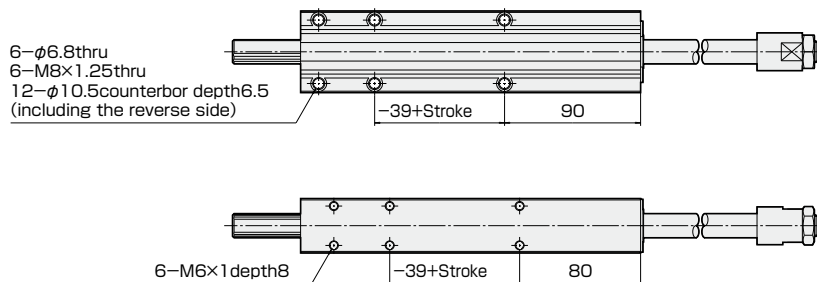
Bore Size

with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



In case of 125~200 Stroke



●Female Thread Rod End(WS), Male Thread Rod End(WT), Flange Rod End(ZT)  page 982

DIMENSIONS(mm) GXAH30 STROKE ADJUSTER AND END LOCK TYPE

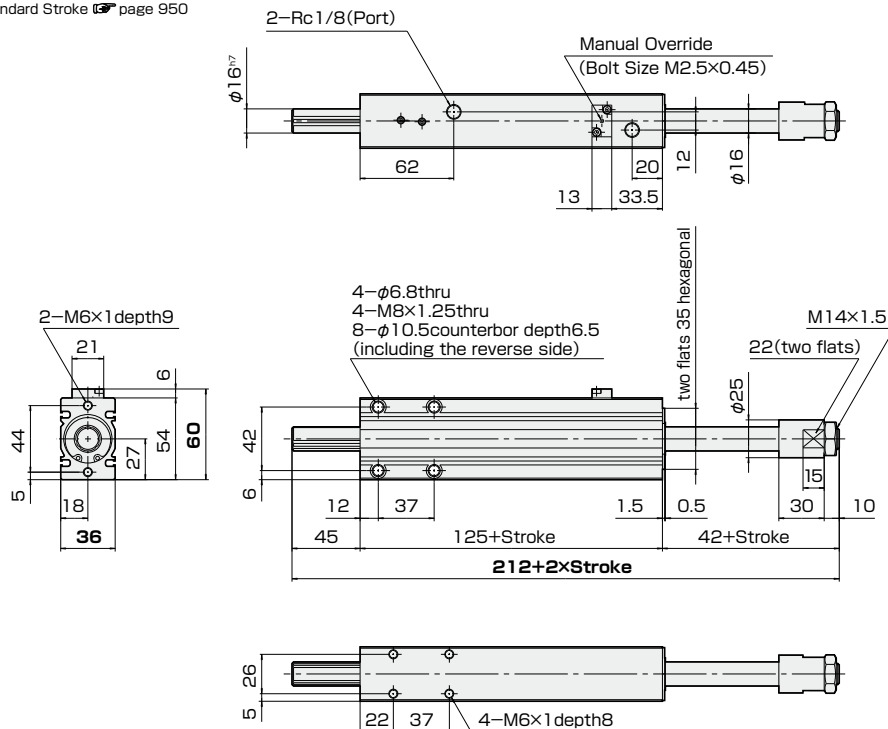
GXAH(S)-SD30-(Stroke)-ZE

With End Lock
Mechanism

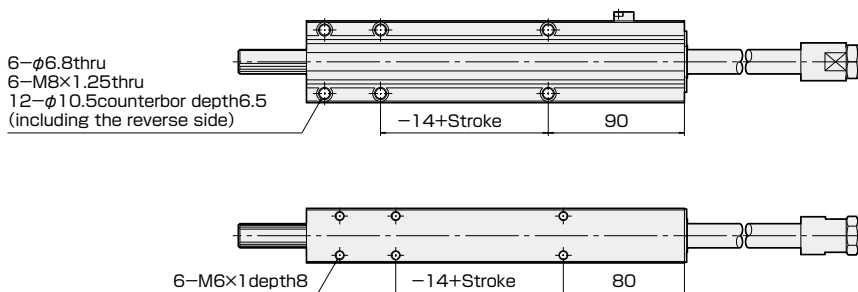
Bore Size



with Stroke Adjuster
Push Stroke Adjustable Range: 10mm

Standard Stroke  page 950



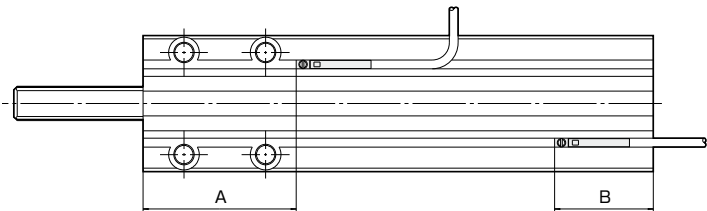
In case of 100~200 Stroke



- Female Thread Rod End(WS), Male Thread Rod End(WT), Flange Rod End(ZT)  page 982
- Safe Note for End Lock System  page 957

INSTALLATION OF SWITCH

■Switch Setting Position



RB(RC) 1, 2 Switch

Model	Switch Setting Position (mm)	
	A	B
GXA10	33	29
GXA15	42	33(53)
GXA20	43	31(56)
GXA25	48	33(58)
GXA30	56	43(68)

Dimension quotation () is in case of End Lock Type.


RB(RC)4, 5 Switch

Model	Switch Setting Position (mm)	
	A	B
GXA10	35	27
GXA15	44	31(51)
GXA20	45	29(54)
GXA25	50	31(56)
GXA30	58	41(66)

Dimension quotation () is in case of End Lock Type.

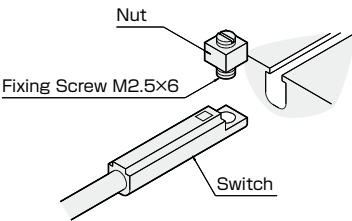
Hysteresis, On Hold Distance Unit: mm

Model	RB(RC) 1, 2		RB(RC)4, 5	
	On Hold Distance(l)	Hysteresis(C)	On Hold Distance(l)	Hysteresis(c)
GXA10	9	1	4	1
GXA15	8		4	
GXA20	10		4	
GXA25	11		5	
GXA30	13		5	

Explanation of hysteresis and on hold distance  Page 1064

■Installation of Switch

Assemble the fixing screw with a nut to the switch.
Insert the switch into the groove.
After setting the position, fasten the screw by a screwdriver.
Fastening torque of fixing screw must be 0.1 N·m.



CUSTOM MADE

To each order, we will create a drawing of the product to be delivered based on the reference drawing shown below.
Contact us for the prices, how to order, time to delivery and detailed specification.

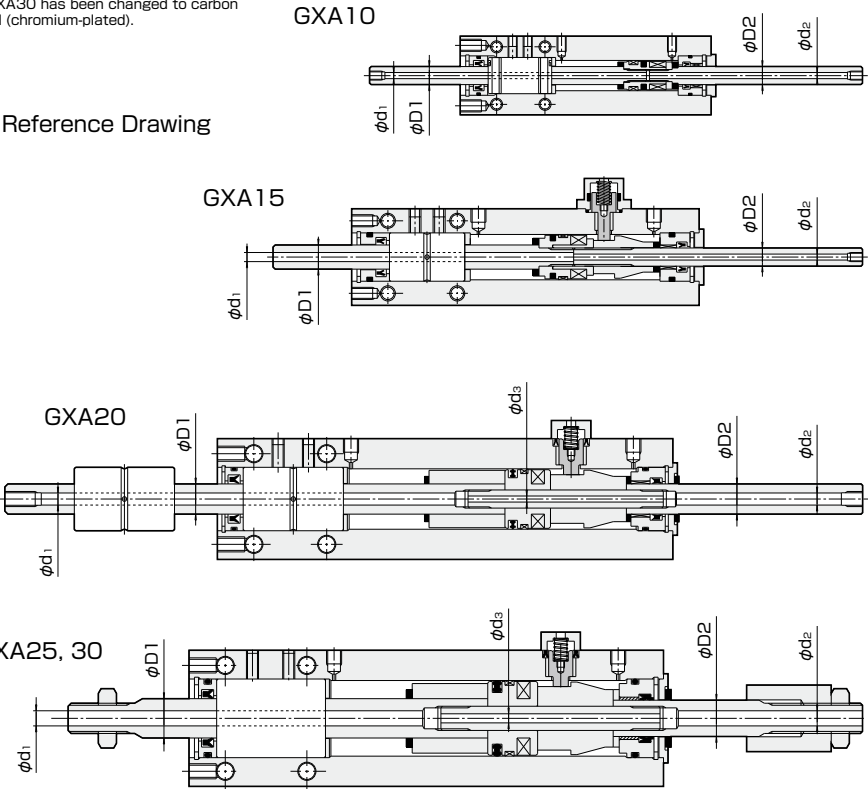
Hollow Rod Model.....Type with the hollow rods on both ends.
Optional.....With End Lock Mechanism
With Stroke Adjustment Mechanism
With Bearing for Floating Mechanism
Rod End with Male/Female Thread

Application.....For Vacuum Suction, etc.

The rod and hollow diameters for respective models are as shown in the table below. (Unchangeable)

Model	Spline Rod Diameter (D1)	Stroke Adjustment Rod Diameter (D2)	Spline Rod Hollow Diameter (d1)	Stroke Adjustment Rod Hollow Diameter (d2)	Piston Shaft Hollow Diameter (d3)
GXA10	φ 6	φ 6	φ2	φ2	—
GXA15	φ 8	φ 6	φ3	φ2	—
GXA20	φ10	φ10	φ4	φ4	φ2
GXA25	φ13	φ12	φ5	φ3	φ3
GXA30	φ16	φ16	φ7	φ5	φ4

Note: The material of the stroke adjustment rod of GXA30 has been changed to carbon steel (chromium-plated).



Note: GXA 20 to 30 have a body with the overall length longer than that of the standard models.
Note: With GXA30, a stroke of up to 175 mm is supported.

■ MEMO ■

■ MEMO ■

■ MEMO ■

■ MEMO ■

■ MEMO ■