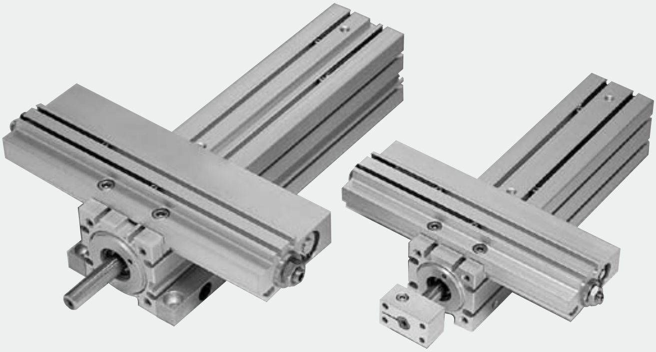
LINEAR TWIST

LINEAR TWIST®

CTW･CTX Series

Registration of Utility Model



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LINEAR TWIST

CTW･CTX Series

High-Accuracy Reciprocating and Rotary Motions can be Achieved with one Linear Twist.

Backlash ±0°

Ball Spline

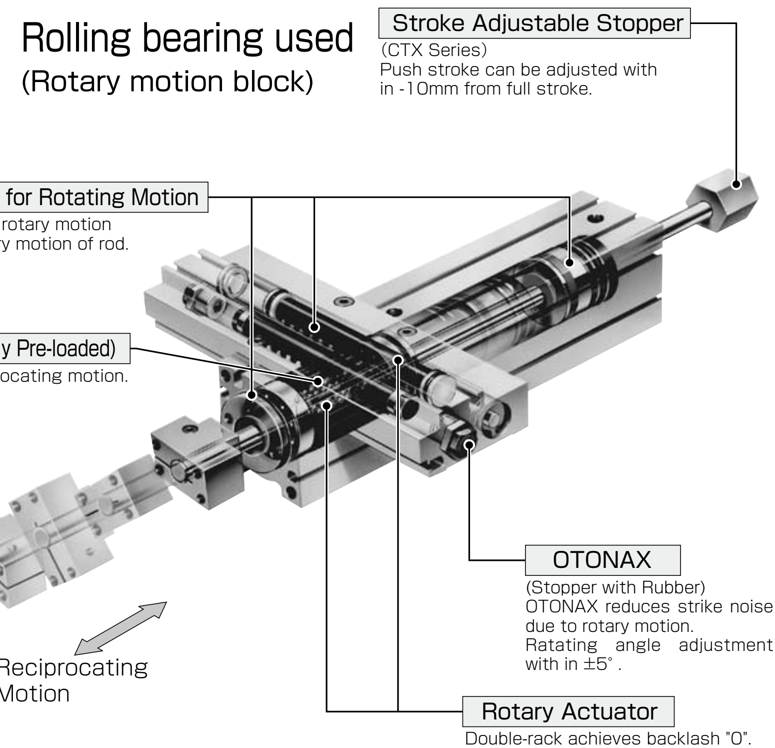
High-accuracy ball spline used

(Liner motion block)

Rolling Bearing

Rolling bearing used

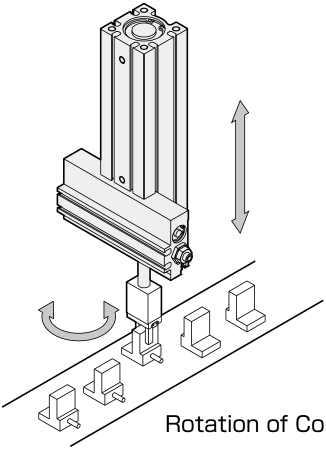
(Rotary motion block)



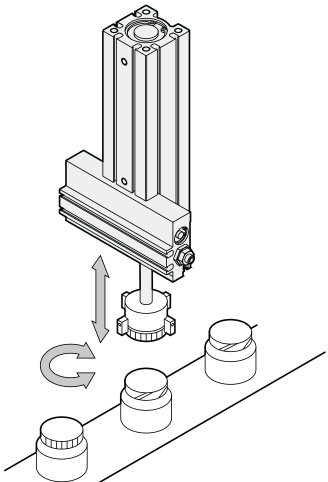
Summary of The LINEAR TWIST

The CTW /CTX Series are light-weight, compact actuators integrating high-accuracy reciprocating and rotary motion mechanism.
High-accuracy reciprocating and rotary motions can be achieved with one Linear Twist by combining the linear motion block using ball spline with the rotary motion block of excellent operating stability (rack & pinion).

■Application Examples : LINEAR TWIST



Rotation of Components

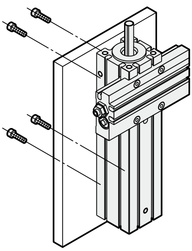


Open or Close the Cap

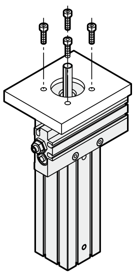
■MAIN BODY INSTALLATION

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

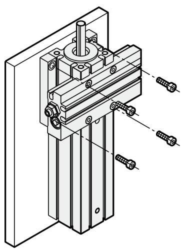
Bottom Mounting
(Body Tap)



Front Mounting
(Body Tap)



Bracket Mounting
(Thru Hole used)



Free Rotation Angle
CZL Series
1021 Page

Model Code Example

CTWS-SD25-50-VHZT-RB14LA

● Magnet

No Code	None
S	with Magnet

A magnet is required when mounting switches.

● Bore Size

25	ϕ25
32	ϕ32

● Rotation Angle

VQ	90°
VH	180°

● Cable Length

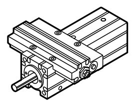
No Code	1m
LA	3m

● Number of Switches

1	1
2	2
3	3
4	4

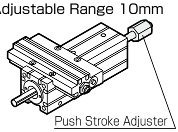
● Series Name

CTW	Standard



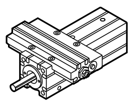
CTX	Stroke Adjustbale Type

Adjustable Range 10mm

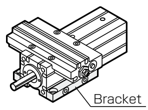


● Mounting

SD	Standard



LB	With Bracket



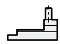
● Switch

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 ☞Page1066, 1067

Stroke ●

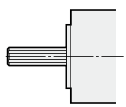
Bore Size	Standard Stroke(mm)			
	25	50	75	100
ϕ25	●	●	●	—
ϕ32	●	●	●	●

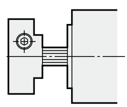
Intermediate Stroke

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 cylinder for standard strokes. For ordering intermediate strokes on the model with stroke adjuster (CTX). contact our company.

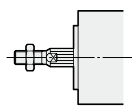
● Rod End Shape

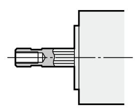
No Code	Standard	ZT	With Flange Rod End



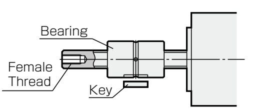


WT	Male Thread Rod End	WS	Female Thread Rod End





FN	With Bearing for Floating Mechanism



Female thread at the rod end and a key Provide (No two flats or the rod)

Switch Mountable Minimum Stroke and Minimum Rotation Angle

Number of Switches	Stroke	Rotation Angle
One Switch	5	20°
Two Switch	5	30°
Two Switches in a row	35	——

SPECIFICATIONS

Reciprocating Potion	Bore Size(mm)	φ25		φ32	
	Rod Size(mm)	φ 8		φ10	
	Piping Size	M5×0.8			
	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	50～300mm/s			
	Lubrication	Not required			
	Cushioning	Rubber Cushion			
	Stroke Adjust	Push Stroke Adjust 10mm (CTX Series)			
Rotating Potion	Driver	Double Acting Piston (Rack and Pinion Type)			
	Bore Size(mm)	φ12		φ16	
	Internal Volume	VQ	VH	VQ	VH
		2.3mℓ	4.6mℓ	5.5mℓ	11mℓ
	Piping Size	M5×0.8			
	Rotation Angle	90°、180°			
	Range of Adjustable Angle	±5°			
	Maximum Operating Pressure	0.7MPa			
	Minimum Operating Pressure	0.2MPa			
	Service Rotation Time	0.2～0.5s/90°			
	Minimum Drive Touque	0.62N·m		1.46N·m	
	Allowable Kinetic Energy	0.5×10^{-2}J		1.1×10^{-2}J	

For the effective torque ☞Page 1004

GUIDE TYPE(BALL SPLINE)

Model	Type
CTW(X)25	THK LT 8
CTW(X)32	THK LT10

Pre-load:Zero or slightly pre-loaded

Mass

●Cylinder

Unit: g

Model	Rotation Angle	Stroke 25	Stroke 50	Stroke 75	Stroke 100
CTW25	90°	760	840	920	—
	180°	850	930	1010	—
CTW32	90°	1490	1605	1720	1835
	180°	1680	1795	1910	2025
CTX25	90°	850	940	1030	—
	180°	940	1030	1120	—
CTX32	90°	1640	1770	1900	2030
	180°	1830	1960	2090	2220

●Option

Unit: g

Model	With Magnet (CTWS、CTXS)	With Bearing for Floating Mechanism (FN)	With Bracket (LB)	With Flange Rod End (ZT)
CTW(X)25	20	30	50	17
CTW(X)32	30	70	72	30

●Switch

Unit: g

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

METHOD TO CALCULATE THE MASS

Ex. CTWS−LB25−50−VQZT−RB14LA

Standard Mass··············840g
Magnet······················20g
Bracket·····················50g
Flange Rod End··············17g
Switch··············35×4=140g

840+20+50+17+140=1067g

OPTIONAL PARTS CODES

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

●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) Straight Outlet Cable	Solid State Switch(2 Wires, with Indicator Light) Angle Outlet Cable	Solid State Switch(3 Wires, with Indicator Light) Straight Outlet Cable	Solid State Switch(3 Wires, with Indicator Light) Angle Outlet Cable
RB4(CT) Cable Length:1m RB4LA(CT) Cable Length:3m	RC4(CT) Cable Length:1m RC4LA(CT) Cable Length:3m	RB5(CT) Cable Length:1m RB5LA(CT) Cable Length:3m	RC5(CT) Cable Length:1m RC5LA(CT) Cable Length:3m
 with fixture	 with fixture	 with fixture	 with fixture

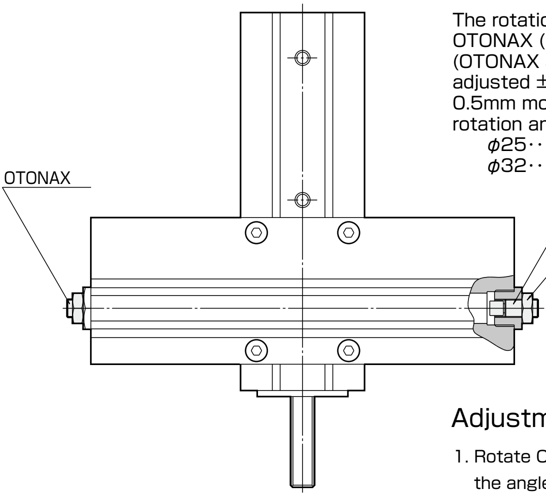
Bracket	Flange Rod End	Repair Parts Kit Standard	Repair Parts Kit Stroke Ajuster Type
LB(CT25) For CTW(X)25 LB(CT32) For CTW(X)32	ZT(CT25) For CTW(X)25 ZT(CT32) For CTW(X)32	HQ(CTW25) For CTW25 HQ(CTW32) For CTW32	HQ(CTX25) For CTX25 HQ(CTX32) For CTX32
 with fixing bolts		For details ☞Page 1000, 1001	For details ☞Page 1000, 1001

THEORETICAL THRUST

Unit: N

Series Name	Bore Size (mm)	Working Direction	Operating Pressure MPa					
			0.2	0.3	0.4	0.5	0.6	0.7
CTW	φ25	Push	96	140	190	240	290	340
		Pull	88	130	170	220	260	300
	φ32	Push	160	240	320	390	470	550
		Pull	140	210	280	360	430	500
CTX	φ25	Push·Pull	88	130	170	220	260	300
	φ32	Push·Pull	140	210	280	360	430	500

ADJUSTMENT OF ROTATION ANGLE



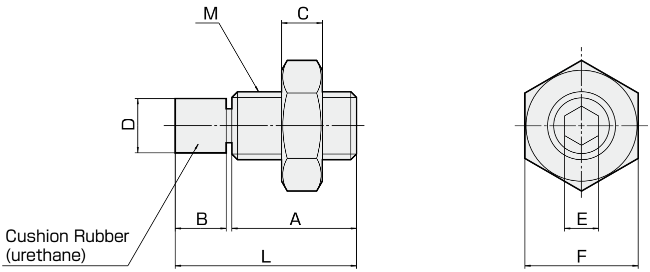
The rotation angle can be adjusted ±5° using OTONAX (stoppers with rubber) at both sides. (OTONAX at one side enables the angle to be adjusted ±2.5°.)
0.5mm movement of OTONAX corresponds with the rotation angle as bellow.

φ25··········About 2.3°
φ32··········About 1.7°

Adjustment Procedure

1. Rotate OTONAX using the hexagonal wrench to adjust the angle.
2. Tighten the nut to secure the position.

■OTONAX Outside Dimensions



Bore Size	Model	A	B	C	D	E	F	L	M
CTW(X)25	OTONAX−6S	11	4.5	3.6	φ4.8	3	10	16	M6x1
CTW(X)32	OTONAX−8S	15	5.5	5	φ6.5	4	13	21	M8x1.25

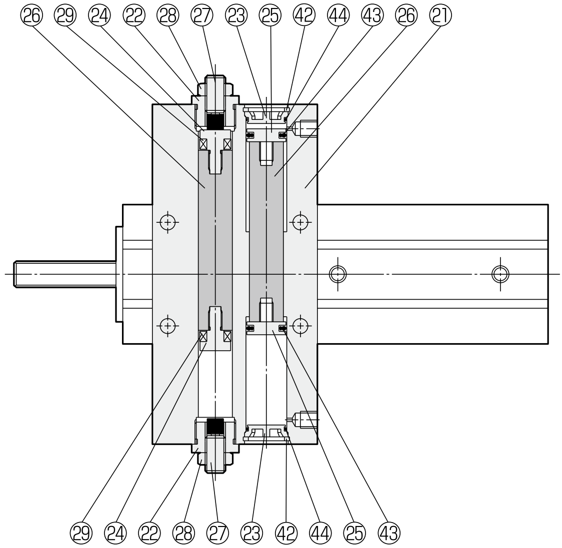
For OTONAX with other sizes ☞page 1053

■Change of Rotation Angle

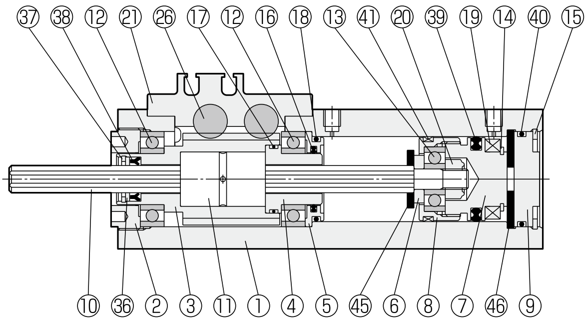
The rotation angle can be changed by replacing OTONAX at both sides with a medium-size OTONAX sold separately.

Bore Size	OTONAX model for change	Rotation Angle Range before change	Rotation Angle Range after change
CTW(X)25	OTONAX−6M	85°～ 95°	0°～ 95°
		175°～185°	83°～185°
CTW(X)32	OTONAX−8M	85°～ 95°	17°～ 95°
		175°～185°	107°～185°

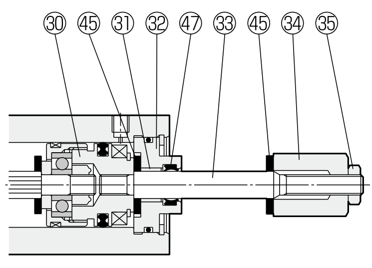
STRUCTURE AND PRINCIPAL COMPONENTS



CTW Serise



CTX Serise



PRINCIPAL COMPONENTS

No.	Name	Material	Remarks	No.	Name	Material	Remarks
1	Body	Aluminum Alloy	Alumite Treatment	19	Magnet	Resin Bound Magnet	
2	End Cover	Aluminum Alloy		20	U-nut	Steel	Nickel Plating
3	Pinion Bearing Holder	Steel	Nitriding	21	Rotary Actuator Body	Aluminum Alloy	Alumite Treatment
4	Bearing Spacer	Stainless Steel		22	Front Cover	Stainless Steel	
5	Inner Spacer	Aluminum Alloy		23	Rear Cover	Synthetic Resin	
6	Piston Spacer	Steel	Electroless Nickel Plating	24	Stopper Receiver	Stainless Steel	
7	Piston Cover	Stainless Steel		25	Piston	Synthetic Resin	
8	Piston	Stainless Steel		26	Rack	Stainless Steel	Nitriding
9	Head Cover	Aluminum Alloy		27	OTONAX	Stainless Steel	
10	Spline Rod	High Carbon Chrome Bearing Steel	Hard Chromium Plated	28	Lock Nut	Steel	Nickel Plating
11	Ball Spline	Steel, Resin,etc		29	Magnet	Resin Bound Magnet	
12	Rolling Bearing	Steel		30	Piston Cover	Stainless Steel	
13	Rolling Bearing	Steel		31	Bush	PTFE, Steel	
14	Snap Ring	Steel		32	Head Cover	Stainless Steel	
15	Circlip	Steel	Nickel Plating	33	Stroke Adjustmnet Rod	Stainless Steel	
16	Rotating Seal	NBR		34	Stroke Adjustmnet Stopper	Steel	Nickel Plating
17	O-ring	NBR		35	Lock Nut	Steel	Nickel Plating
18	O-ring	NBR					

REPAIR PARTS

CTW

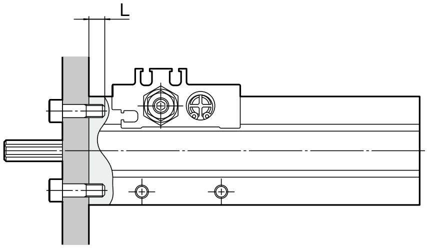
No.	Name	Material	Qty	Remarks
36	Rod Seal Holder	Aluminum Alloy	1	
37	Circlip	Steel	1	Nickel Plating
38	Spline Seal	Urethane Rubber	1	
39	Piston Seal	NBR	1	
40	O-ring	NBR	1	
41	Wear Ring	Synthetic Resin	1	
42	Circlip	Steel	2	Nickel Plating
43	Piston Seal	NBR	2	
44	O-ring	NBR	2	
45	Cushion Rubber	Urethane Rubber	1	
46	Rear Cushion Rubber	Urethane Rubber	1	

CTX

No.	Name	Material	Qty	Remarks
36	Rod Seal Holder	Aluminum Alloy	1	
37	Circlip	Steel	1	Nickel Plating
38	Spline Seal	Urethane Rubber	1	
39	Piston Seal	NBR	1	
40	O-ring	NBR	1	
41	Wear Ring	Synthetic Resin	1	
42	Circlip	Steel	2	Nickel Plating
43	Piston Seal	NBR	2	
44	O-ring	NBR	2	
45	Cushion Rubber	Urethane Rubber	3	
47	Rod Seal	NBR	1	

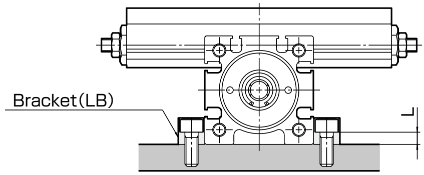
BODY INSTALLATION

Front mounting(Body Tap)



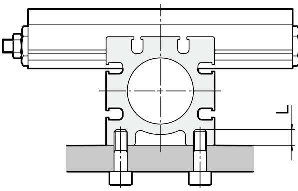
Model	Bolt Size	Screw Depth L(㎜)	Fastening Torque N·m
CTW(X)25	M5×0.8	6	5.1
CTW(X)32	M6×1	8	8.6

Bracket mounting(Thru Hole used)



Model	Bolt Size	Thru Hole Length L(㎜)	Fastening Torque N·m
CTW(X)25	M5	4.6	5.1
CTW(X)32	M6	5.6	8.6

Bottom mounting(Body Tap)



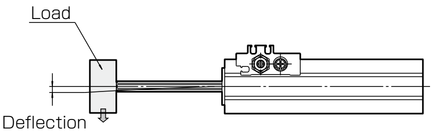
Model	Bolt Size	Screw Depth L(㎜)	Fastening Torque N·m
CTW(X)25	M5×0.8	6	5.1
CTW(X)32	M6×1	7	8.6

MATTERS TO BE NOTED FOR DESGINING

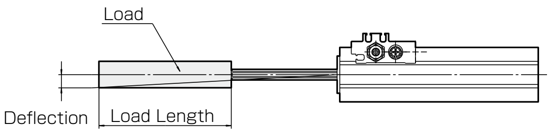
⚠Caution

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 1026 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.

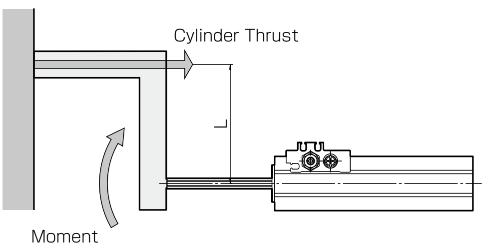
Example: Cylinder Stroke･･･････････75㎜

Load Length････････････････････50㎜

Assuming 75+50=125mm as cylinder stroke,
read the deflection at the point (75+50)mm of cylinder stroke from the graph.

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.



Moment=Cylinder thrust x L(offset distance)

MATTERS TO BE NOTED FOR DESGINING

⚠Caution

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.

Rod End Runout and Repeatability (Reference Value)

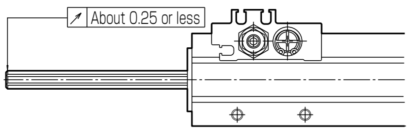
For oscillation with the rod at the full stroke position (fully projected), the circumferential runout of the rod end around the oscillation center axis is approximately 0.25 mm maximum.
The repeatability of oscillation is approximately 0.01 mm maximum.

Rolling Feel in Bearing

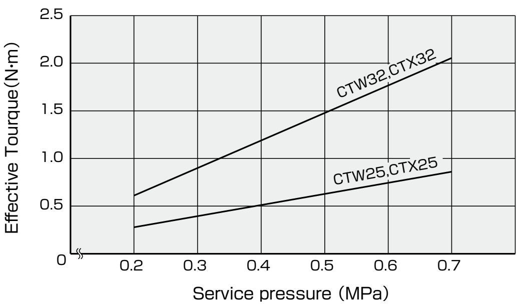
The bearing (ball spline) of this product is slightly preloaded. Accordingly, when the rod is moved by hand, rolling of balls inside the bearing may cause slight feel of operation discontinuity or difference in the rolling resistance between products. This is due to preload of the bearing and does not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

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.

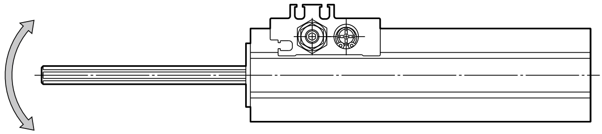


EFFECTIVE TOURQUE



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
CTW(X)25	0.4
CTW(X)32	1.2

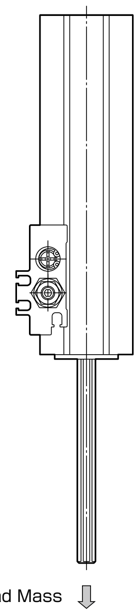
In case where a moment is applied temporarily while the cylinder stopped

Model	Allowable Moment N·m
CTW(X)25	1.2
CTW(X)32	3.1

ALLOWABLE LOAD MASS (When the vertical up-and-down direction use)

Model	Allowable Load Mass kg
CTW(X)25	1.5
CTW(X)32	2

Allowable Load Mass, Allowable Lateral Load and Rod Deflection ☞page 1008



CALCULATION OF KINETIC ENERGY

Be sure to use in conditions in which the kinetic energy calculated does not exceed the allowable kinetic energy.

■Kinetic Energy Calculation Formula

$$E = \frac{1}{2} I \omega^2$$

E : Kinetic Energy J
I : Inertial Moment. kg・m²
ω : Angular Speed rad/s

Allowable Kinetic Energy

Model	Allowable Kinetic Energy
CTW25	0.5×10^{-2} J
CTW32	1.1×10^{-2} J

The inertial moment calculation formula depends on the shape of the article to be oscillated. See the following page.

■Calculation Example 1

●Calculate the inertial moment.

Based on the shape, use calculation formula No. 7 in the table on the following page.

$$I = W\cdot\frac{d^2}{8} = 0.4\times\frac{0.05^2}{8} = 0.000125\ (kg\cdot m^2)$$

●Calculate the angular speed.

The oscillation should cover 90° in 0.2 seconds.

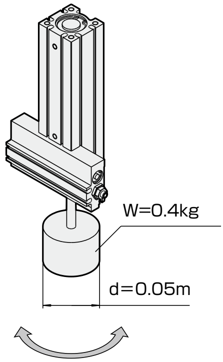
Accordingly, 90° = 0.5 π (rad) from 360° = 2 π (rad)

$$\omega = \frac{0.5\pi}{0.2} = \frac{0.5\times3.14}{0.2} = 7.85\ (rad/s)$$

●The kinetic energy is:

$$E = \frac{1}{2} I \omega^2 = \frac{1}{2}\times0.000125\times7.85^2 = 0.39\times10^{-2}\ (J)$$

Based on this result, either CTW(X)25 or 32 can be used.



Oscillation of 90° in 0.2 Seconds

■Calculation Example 2

Use formula No. 11 in the table on the next page. This formula is an addition of the inertial moments of the arm and the end.

●Calculate the inertial moment.

Calculate the inertial moment of the arm in formula No. 11.

$$I_1 = W_1\cdot\frac{\ell_1^2}{3} = 0.1\times\frac{0.06^2}{3} = 0.00012\ (kg\cdot m^2)$$

Based on the end shape, use calculation formula No. 5 in the table on the following page for the turning radius K^2.

$$I_2 = W_2\cdot K^2 + W_2\cdot \ell_2^2 = W_2\cdot\frac{a^2+b^2}{12} + W_2\cdot\ell_2^2$$

$$= 0.2\times\frac{0.03^2+0.02^2}{12} + 0.2\times0.07^2$$

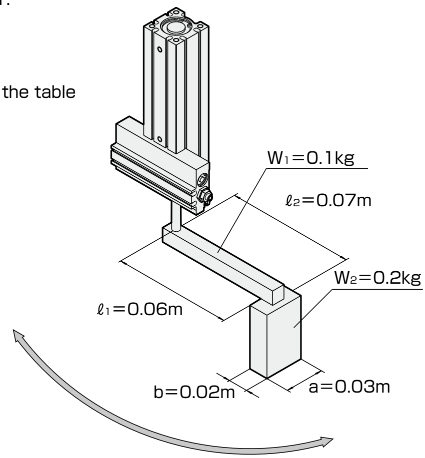
$$= 0.0009866\ (kg\cdot m^2)$$

●Calculate the angular speed.

The oscillation should cover 120° in 0.5 seconds.

Accordingly, 120° = 0.67 π (rad) from 360° = 2 π (rad)

$$\omega = \frac{0.67\pi}{0.5} = \frac{0.67\times3.14}{0.5} = 4.21\ (rad/s)$$



Oscillation of 120° in 0.5 Seconds

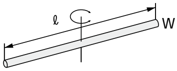
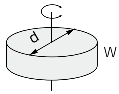
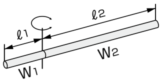
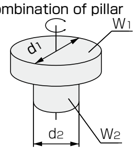
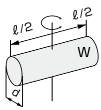
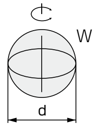
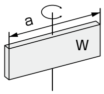
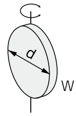
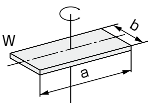
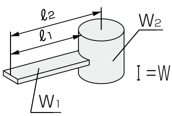
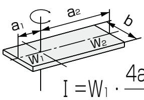
●The kinetic energy is:

$$E = \frac{1}{2}(I_1 + I_2)\ \omega^2 = \frac{1}{2}\times(0.00012+0.0009866)\times4.21^2 = 0.98\times10^{-2}\ (J)$$

Based on this result, CTW(X)32 can be used.

CALCULATION OF INERTIA MOMENT

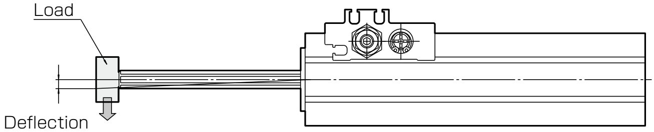
I : Moment of Inertia W : Mass

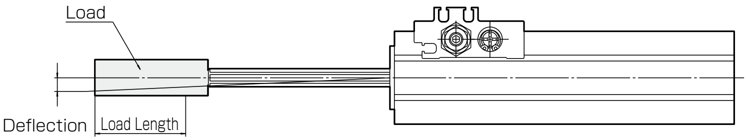
No.	Shape	Inertia moment	Rotational Radius	No.	Shape	Inertia moment	Rotational Radius
1	Thin bar 	$I=W\cdot\frac{\ell^2}{12}$	$K^2=\frac{\ell^2}{12}$	7	Pillar (including a thin disk) 	$I=W\cdot\frac{d^2}{8}$	$K^2=\frac{d^2}{8}$
2	Thin bar 	$I=W_1\cdot\frac{\ell_1^2}{3}+W_2\cdot\frac{\ell_2^2}{3}$	$K^2=\frac{\ell_1^2}{3}+\frac{\ell_2^2}{3}$	8	Combination of pillar 	$I=W_1\cdot\frac{d_1^2}{8}+W_2\cdot\frac{d_2^2}{8}$	$K^2=\frac{d_1^2}{8}+\frac{d_2^2}{8}$
3	Thick bar 	$I=W\left(\frac{\ell^2}{12}+\frac{d^2}{16}\right)$	$K^2=\frac{\ell^2}{12}+\frac{d^2}{16}$	9	Sphere 	$I=W\cdot\frac{d^2}{10}$	$K^2=\frac{d^2}{10}$
4	Thin rectangle board (cubic-rectangle) 	$I=W\cdot\frac{a^2}{12}$	$K^2=\frac{a^2}{12}$	10	Thin disk 	$I=W\cdot\frac{d^2}{16}$	$K^2=\frac{d^2}{16}$
5	Rectangle board (cubic-rectangle) 	$I=W\cdot\frac{a^2+b^2}{12}$	$K^2=\frac{a^2+b^2}{12}$	11	Concentrated load at the top of a bar  $I=W_1\cdot\frac{\ell_1^2}{3}+W_2\cdot K^2+W_2\cdot\ell_2^2$		Calculation using the shape of W2
6	Rectangle board (cubic-rectangle)  $I=W_1\cdot\frac{4a_1^2+b^2}{12}+W_2\cdot\frac{4a_2^2+b^2}{12}$		$K^2=\frac{4a_1^2+b^2}{12}+\frac{4a_2^2+b^2}{12}$				

ALLOWABLE LOAD MASS, ALLOWABLE LATERAL LOAD AND ROD DEFLECTION

●Load mass and rod deflection

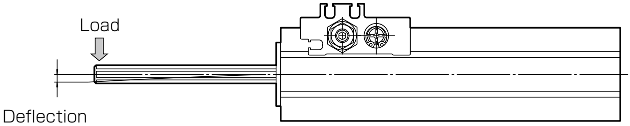
In case of horizontal usage of the cylinder, deflection is generated in the rod due to a load mounted at the rod end. The relation between allowable load mass and deflection is shown in the graphs below.
Applied load mass shall be within the range indicated by each solid line correspondent to each stroke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



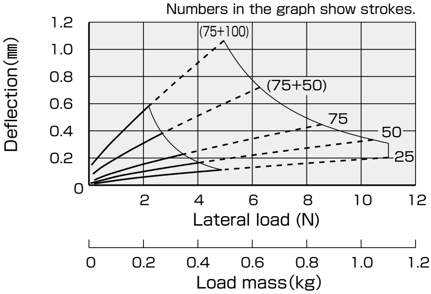


●Lateral load and rod deflection

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.



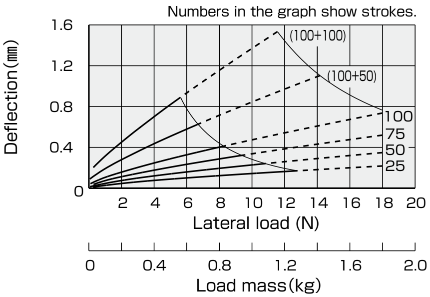
CTW(X)25



Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
25	0.50	11
50	0.41	10.4
75	0.35	8.6
(75+50)	0.27	6.3
(75+100)	0.22	5.0

Quotation ( ) indicates (Stroke + Load Length)

CTW(X)32



Stroke (mm)	Allowable Load Mass (kg)	Allowable Lateral Load (N)
25	1.3	18
50	1.1	18
75	0.96	18
100	0.85	18
(100+50)	0.68	14.2
(100+100)	0.57	11.6

Quotation ( ) indicates (Stroke + Load Length)

BEARING FOR FLOATING MECHANISM (Option Code FN)

●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

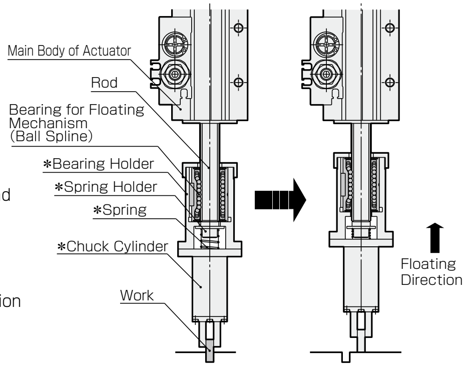
In case where an impact force due to actuator velocity may cause breakage of work or defective assembling at work installation, the floating mechanism will prevent the work from such damage by softening the impact force and help to achieve smooth work installation and press fit.

●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.

●Construction and application example



●As for the parts (parts marked * 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.

■MATTERS TO BE NOTED FOR DESIGNING

⚠ Caution

①Specific resistnace of Bearing

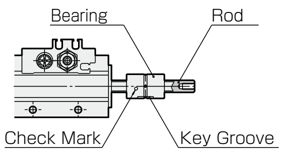
The bearing for floating mechanism has the specific resistance respectively. Pay attention to the setting load value of the spring.
(The spring force shall be determined from a viewpoint of the mechanism as a whole.)

Unit: N

Model	Specific Resistance
CTW25	3
CTW32	3.5

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



③Tolerance 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).

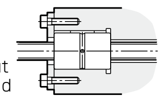
Tolerance of Housing Inside Dia.	General Service Conditions	J6
	Accuracy is not required	H7

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 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 rod. Even if the check mark on the bearing is the same, the combination of the bearing and the rod is another matter.

⑤Mounting of the bearing

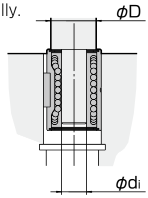
The right figure shows a mounting example of the bearing for floating mechanism. Fixing strength in the axial direction is not so required, but only driving fit is not enought to hold and another measures shall be taken.



⑥Insertion of the bearing

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

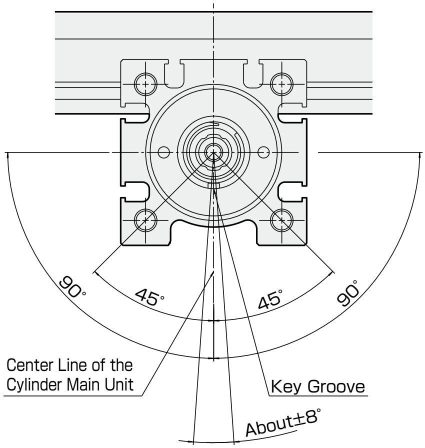
Model	d_i	D
CTW(X)25	ϕ 7.0	ϕ15.5
CTW(X)32	ϕ 8.5	ϕ20.5



⑦Actual 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 FIOATING MECHANISM(Option code FN)



When the rotation angle is divided into two sections with the center line of the cylinder main unit, the key groove must be properly positioned within about ±8° to the center of the cylinder main unit. Carefully design the bearing holder.

Female Thread Rod End(KK) Fastening Torque

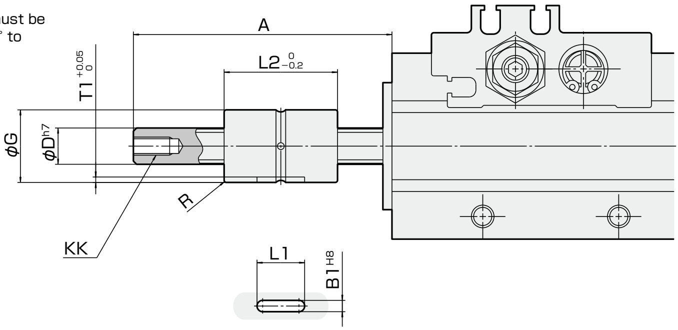
Unit: N·m

Model	Fastening Torque
CTW(X)25	1.7
CTW(X)32	4.8

Bearing Mass

Unit: g

Model	Mass
CTW(X)25	18
CTW(X)32	50

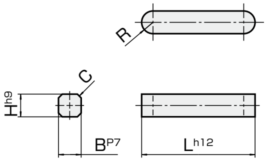


Unit: mm

Model	A	B1	D	G	KK	L1	L2	R	T1
CTW(X)25	55	2.5	ϕ 8	$\phi 16^{\ 0}_{-0.011}$	M4x0.7 depth8	10.5	25	0.5	1.2
CTW(X)32	65	3	ϕ10	$\phi 21^{\ 0}_{-0.013}$	M5x0.8 depth10	13	33	0.5	1.5

Note 1: The rod protrudes longer than that of the standard type (A in the figure). Check the total length of the cylinder.
For the details of the other dimensions, see pages 1012 to 1015.
Note 2: 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.)



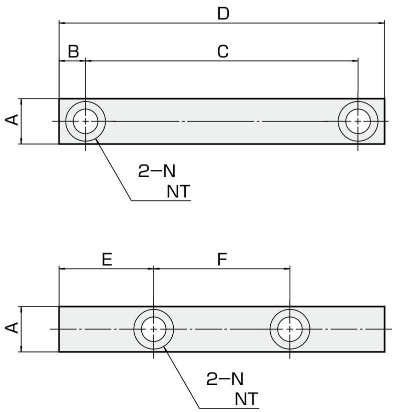
Unit: mm

Model	B	C	H	L	R
CTW(X)25	2.5	0.5	2.5	10.5	1.25
CTW(X)32	3	0.5	3	13	1.5

OPTIONAL DIMENSIONS

Bracket

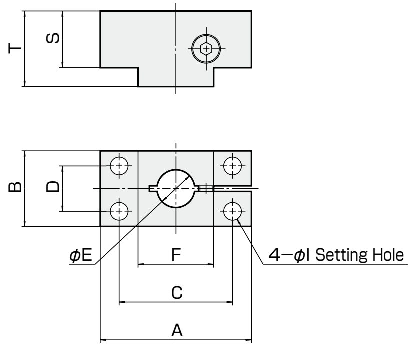
Option Code LB



Option Code	A	B	C	D	E	F	N	NT
LB(CT25)	10	6	58	70	20	30	ϕ5.5thru	ϕ9 counterbore depth5.4
LB(CT32)	12	7	72	86	25	36	ϕ6.5thru	ϕ10.5 counterbore depth6.4

Frange Rod End

Option Code ZT

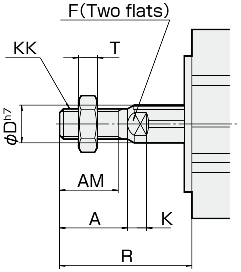


For ZT(CT25), note that the outside dimensions (A in the figure) and work setting hole dimensions (C in the figure) have been changed corresponding to prior flange rod end ZS(CT25). ZT(CT32) is compartible with the prior type.

Option Code	A	B	C	D	E	F	I	S	T
ZT(CT25)	33	17	26	10	ϕ 8	19	ϕ3.6	11.3	15
ZT(CT32)	40	20	30	12	ϕ10	20	ϕ4.7	15	20

Male Thread Rod End

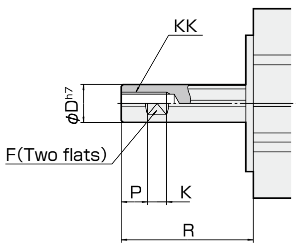
Option Code WT



Model	A	AM	D	F	R	K	KK	T
CTW(X)25	14	12	8	7	32	4.5	M6×1	3.6
CTW(X)32	18	15.5	10	8	35	5	M8×1.25	5

Female Thread Rod End

Option Code WS



Model	D	F	R	K	KK	P
CTW(X)25	8	7	32	4.5	M5×0.8 depth10	7
CTW(X)32	10	8	35	5	M6×1 depth12	7

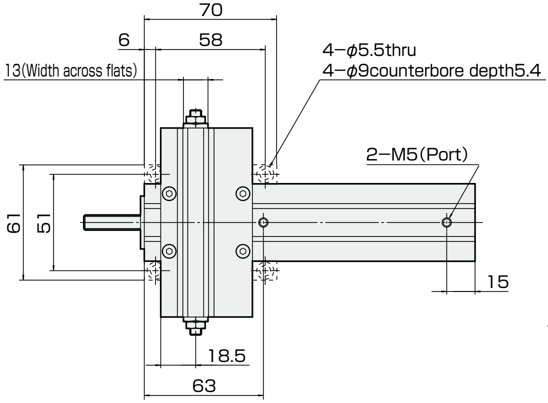
DIMENSIONS (mm)　CTW25 STANDARD TYPE

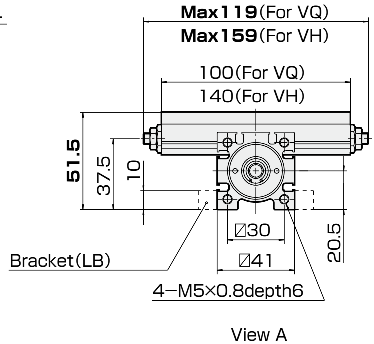
CTW(S)−SD25−(Stroke)−VQ / VH

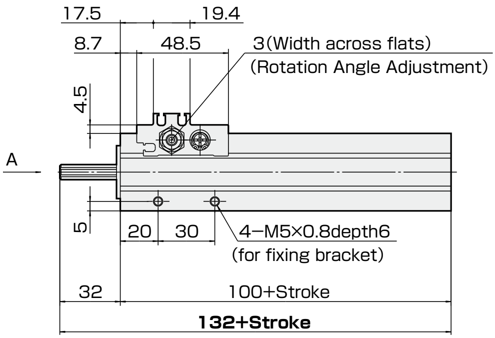
Bore Size: 25

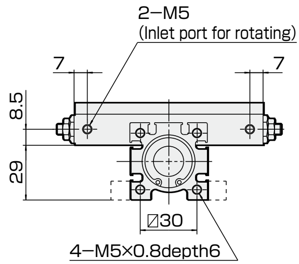
Rotation Angle: VQ……90°±5°, VH……180°±5°

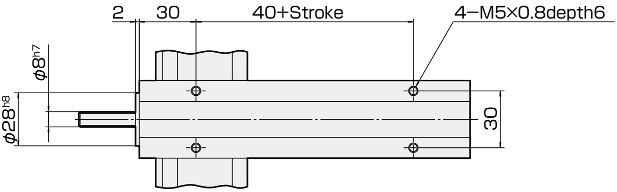
Standard Stroke ☞ page 996











For the female thread rod end (WS), male thread rod end (WT), flange rod end (ZT), and bracket (LB), With bearing for floating mechanism ☞page1010, 1011

C T W (X)

LINEAR TWIST

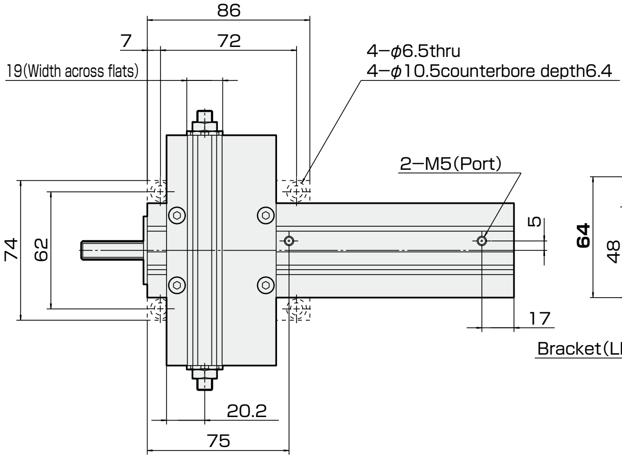
DIMENSIONS(mm)　CTW32　STANDARD TYPE

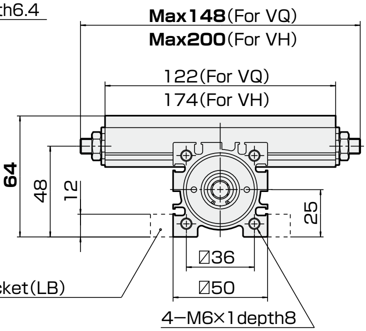
CTW(S)−SD32−(Stroke)− VQ / VH

Bore Size

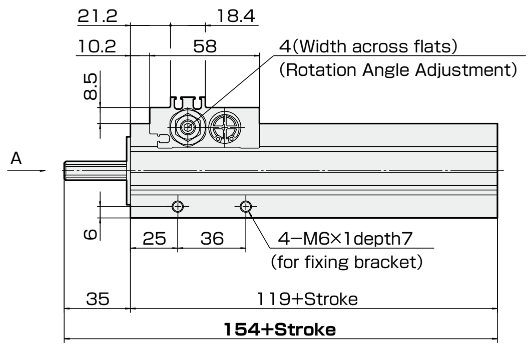
Rotation Angle VQ······90°±5°
VH······180°±5°

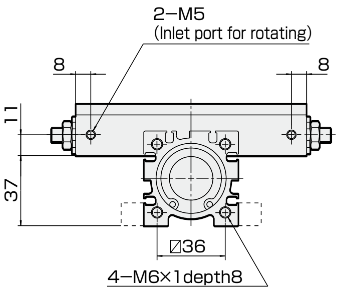
Standard Stroke ☞ page 996

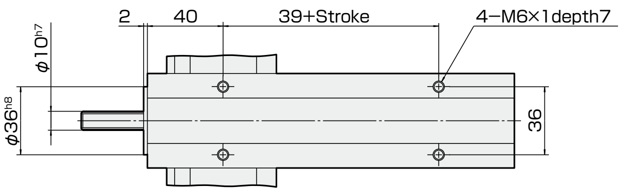




View A







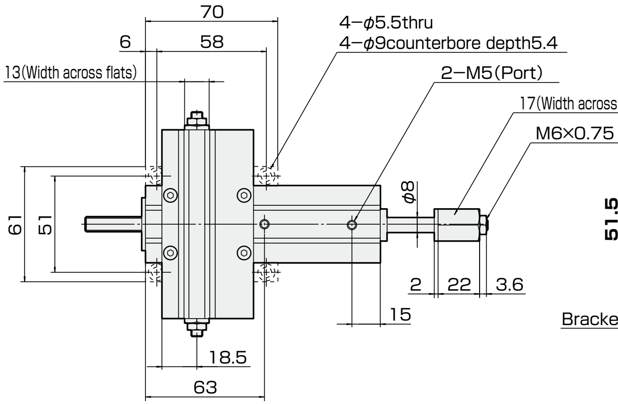
For the female thread rod end (WS), male thread rod end (WT), flange rod end (ZT), and bracket (LB), With bearing for floating mechanism ☞page1010, 1011

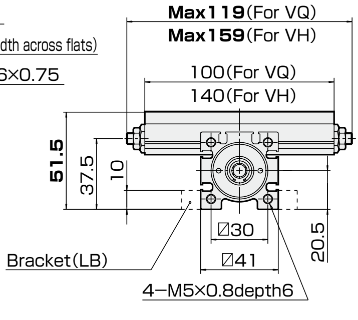
DIMENSIONS(mm) CTX25 STROKE ADJUSTER TYPE

CTX(S)−SD25−(Stroke)−VQ/VH

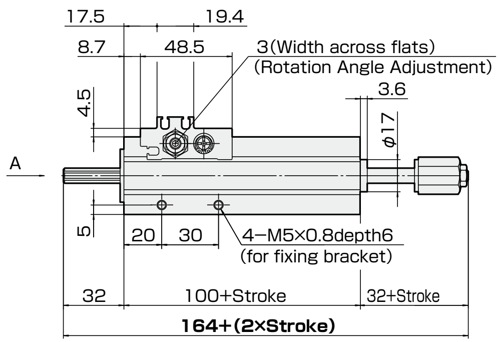
- CTX(S): with Stroke Adjuster, Push Stroke Adjustable Range: 10mm
- 25: Bore Size
- VQ/VH: Rotation Angle VQ······90°±5°, VH······180°±5°

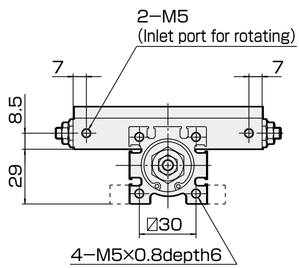
Standard Stroke ☞page 996

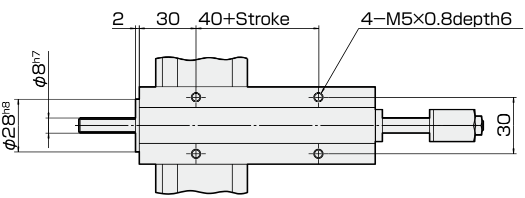




View A







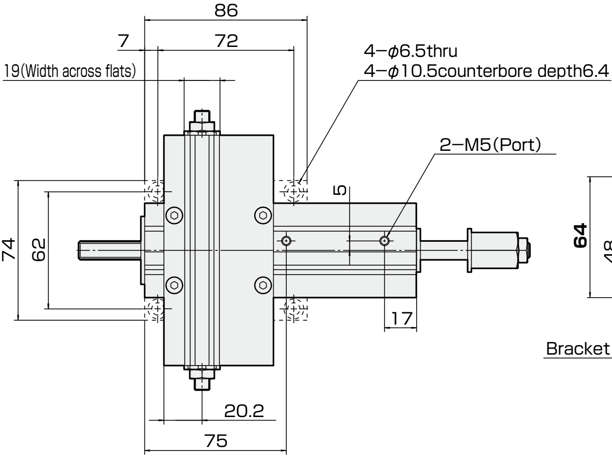
For the female thread rod end (WS), male thread rod end (WT), flange rod end (ZT), and bracket (LB), With bearing for floating mechanism ☞page1010, 1011

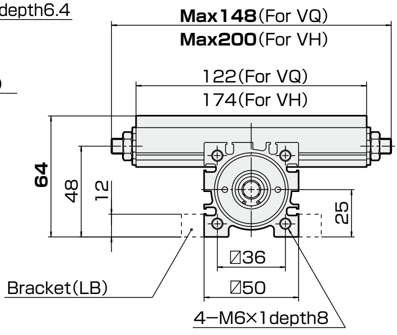
DIMENSIONS(mm) CTX32 STROKE ADJUSTER TYPE

CTX(S)−SD32−(Stroke)− VQ / VH

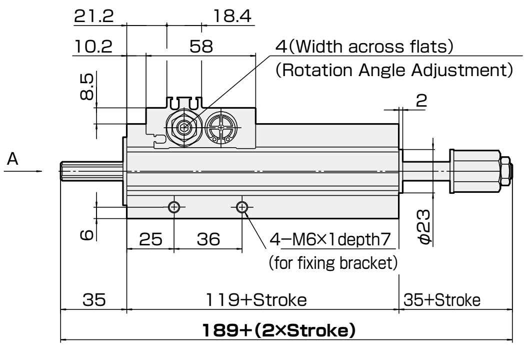
Standard Stroke ☞ page 996

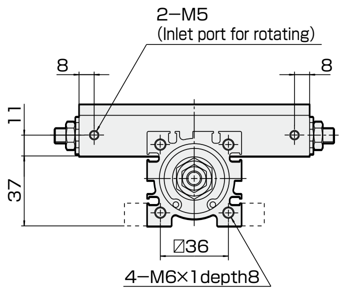
- (S): with Stroke Adjuster, Push Stroke Adjustable Range: 10mm
- 32: Bore Size
- VQ / VH: Rotation Angle VQ……90°±5°, VH……180°±5°

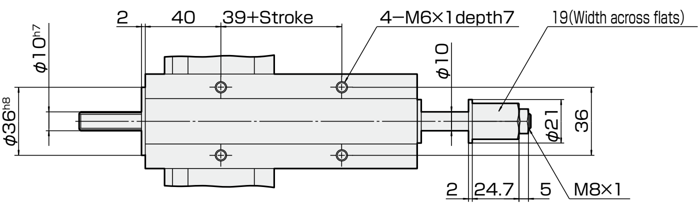




View A



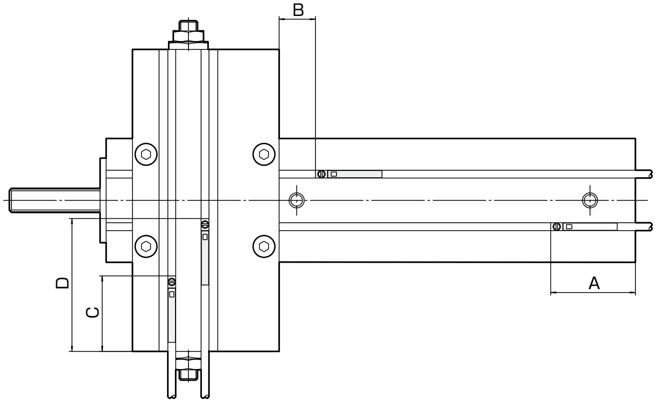




For the female thread rod end (WS), male thread rod end (WT), flange rod end (ZT), and bracket (LB), With bearing for floating mechanism ☞page1010, 1011

INSTALLATION OF SWITCH

■Switch Setting Position



RB(RC)1, 2 Switch

Model	Switch Setting Position (㎜)				
	A	B	C	D 90°	D 180°
CTW(X)25	28	12	25	44	64
CTW(X)32	30	14	28	60	82

RB(RC)4, 5 Switch

Model	Switch Setting Position (㎜)				
	A	B	C	D 90°	D 180°
CTW(X)25	26	14	23	42	62
CTW(X)32	28	16	26	58	80

Hysteresis, On Hold Distance

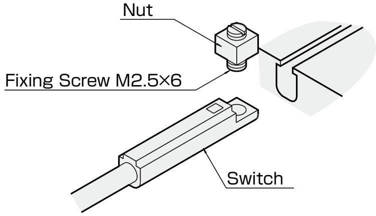
Unit: ㎜

Model	Switch Position	RB(RC)1, 2 On hold distance(ℓ)	RB(RC)1, 2 Hysteresis(c)	RB(RC)4, 5 On hold distance(ℓ)	RB(RC)4, 5 Hysteresis(c)
CTW(X)25	Liner Motion Block	10	1	4	1
	Rotary Motion Block	12		4	
CTW(X)32	Liner Motion Block	11		4	
	Rotary Motion Block	14		4.5	

Explanation of hysteresis and on hold distance ☞ Page 1064

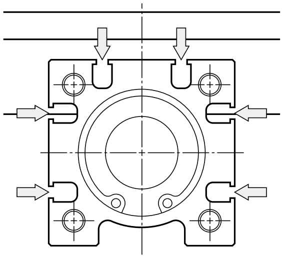
■Installation of Switch

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 torgue of fixing screw must be 0.1 N·m.

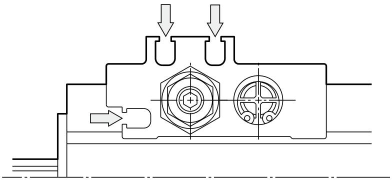


■Switch Installation Position

Liner Motion Block(Six Positions)



Rotary Motion Block(Three Positions)



■MEMO■

■MEMO■

■MEMO■