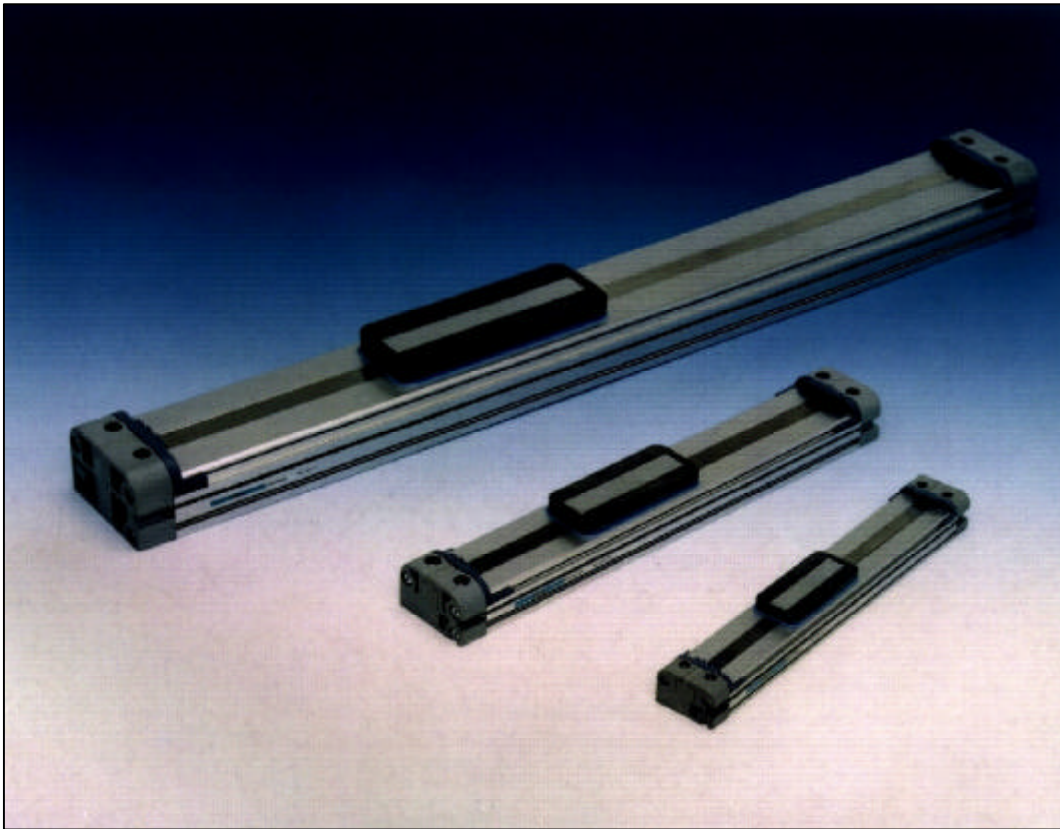


EcoRodless

ORV Series

Low profile rodless cylinder - ORV Series



Howa

Distributed in the United States by

FUMI
INTERNATIONAL

- **Low Profile**

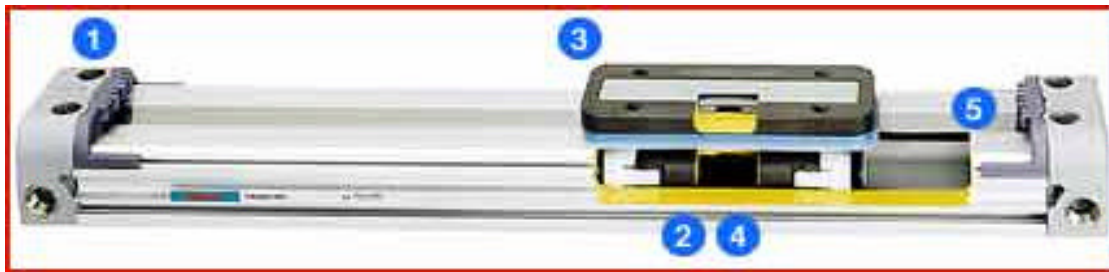
The EcoRodless boasts a 40% lower profile than other rodless cylinders, the ultimate advantage for versatile applications.

- **Slit Type Design**

The dynamic slit type seal allows the ORV Series to have an increased stroke length within a shorter barrel. This allows the EcoRodless to be installed in applications where no other rodless actuator can fit.

- **Economical Choice**

Cost-effective and efficient design for the OEM and MRO design engineer. Available in three stock sizes with labor saving mounting procedures.



- **Direct Mount 1**

End cap doubles as mounting bracket. Flat bottom design eliminates the need for barrel support.

- **Sensor Switch Capability 2**

The cylinder barrel, made from an anodized aluminum extrusion, has a sensor switch pocket molded into the barrel on both sides. This makes field installation simple and convenient no matter what the installed position. The piston doubles as a magnetic pick up.

- **Light Weight Design 3**

Reduce size and weight of the machine application. ORV Series operates under no load when Y and Z axis is centered and supported.

- **Flat Piston 4**

The very low barrel height of the ORV Series is a result of the unique piston design. A flat piston profile enhances the design concept of the slit type band cylinder.

- **Stainless Steel Band 5**

Quality materials guarantee longer life. A stainless steel band is used in the ORV Series to reduce the amount of air leakage. (Typically, a resinous band is used which is actually abrasive to the shielding around it.) Two seals, an inner and outer, help to produce a better recycle.

Specifications

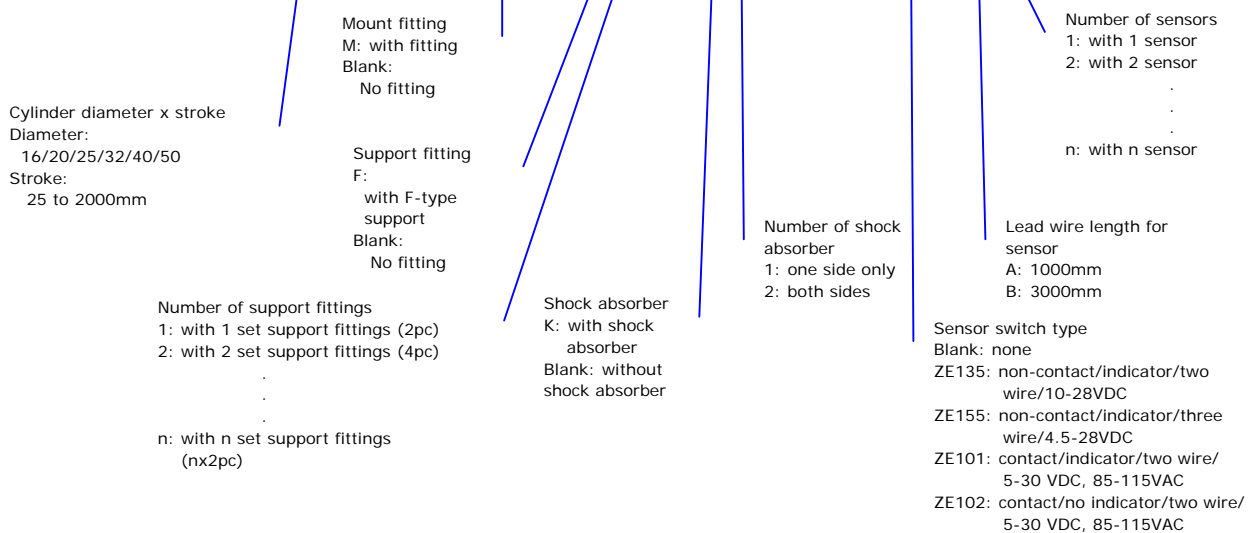
Model	ORV					
Cylinder diameter, mm	16	20	25	32	40	50
Fluid Used	Air (1)					
Operating Type	Double acting type					
Operating Pressure Range, MPa (kgf/cm ²)	0.15 to 0.8 (1.5 to 8)					
Pressure resistance, MPa (kgf/cm ²)	1.2 (12)					
Operating temperature range, deg-C	0 to 60					
Operating speed range, mm/s	Bumper: 80 to 500 Shock absorber: 80 to 800 (2)					
Cushion	Standard	Bumper				
	Option	Shock absorber				
Lubrication	Not required (3)					
Stroke adjusting range, mm (single side for the stroke specified)	0 to -20	0 to -20	0 to -20	0 to -30	0 to -30	0 to -30
	Shock absorber installed (option)					
Maximum stroke, mm	2000					
Stroke tolerance (2000 or less) (4)	+5	+6	+6	+6	+7	+6
	+1	+1	0	+1	+1	+2
Piping connection port	M5 x 0.8	Rc1/8	Rc1/8	Rc1/4	Rc1/4	Rc3/8

- (1) Use clean air with impurities such as moisture, dust, oxidized oil removed from compressed air.
- (2) For the relation of loaded mass and the piston speed, refer to the bumper capacity diagram and the shock absorber capacity diagram.
- (3) EcoRodless can be used without lubricating oil. However, if you use a lubricant, use a turbine oil class 1 (ISO VG32) or equivalent.
- (4) Since a stroke varies depending on the air pressure used, refer to a graph of bumper displacement.

Part Numbering System

Example of a complete Part Number and Description to be ordered.

ORV 16 x 500 - M - F1 - K2 - ZE135 A 2

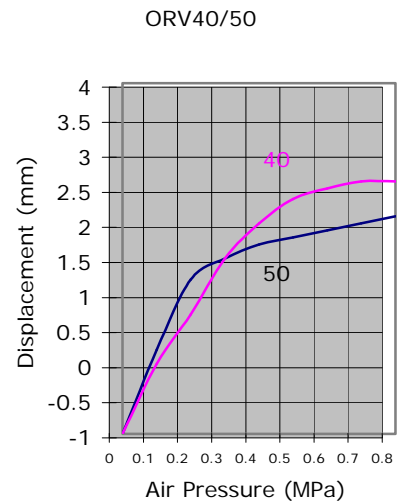
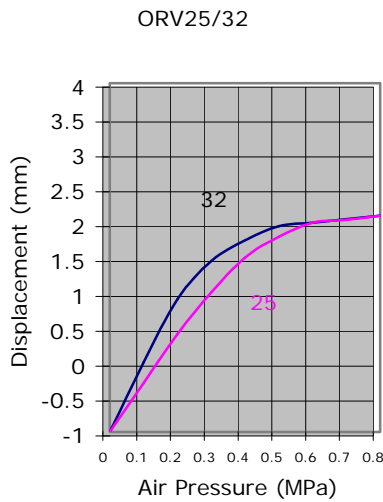
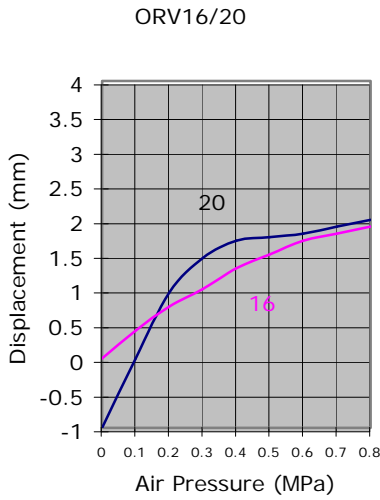


* For optional parts and spare parts, refer to relating sections in this catalog.

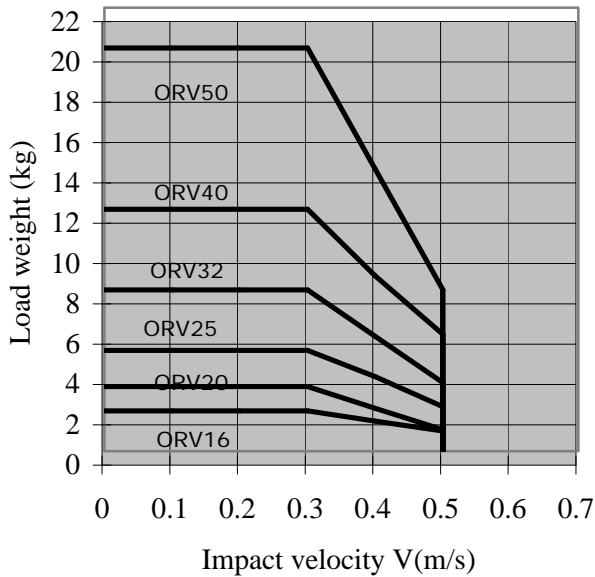
Bumper Performance Data

The displacement of the internal bumpers (standard) mounted on both ends of the piston vary depending on the air pressure used as shown in the following graph.

An external shock absorber (option) should be specified when an accurate stop position is necessary.



Bumper capacity



If application exceeds capacity shown on graph, a shock absorber should be specified.

Load weight : refers to total mass in motion

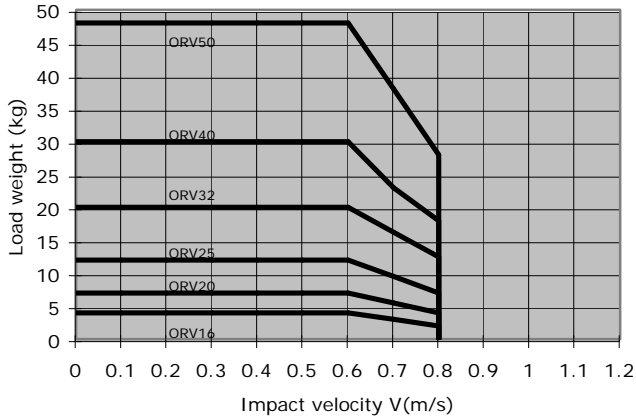
Impact velocity : measured speed just prior to contacting the bumper

(This is not equal to the average speed: cylinder stroke / turnaround time)

Graph based on horizontal air cylinder mount, using 0.5MPa pressure.

Shock Absorber Performance Data

Shock absorbers should be used within range shown below.



Load weight :
refers to total mass in motion

Impact velocity :
measured speed just prior
to contacting the shock-absorber

Graph based on horizontal
air cylinder mount,
using 0.5MPa pressure.

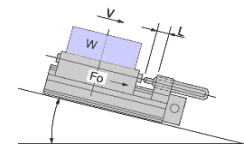
Cylinder Type	ORV16	ORV20	ORV25	ORV32	ORV40	ORV50
Shock absorber type	KSHGV 10x10	KSHGV 12x10	KSHGV 14x12	KSHGV 18x15	KSHGV 20x16	KSHGV 22x25
Energy absorbing capacity J (kgf m)	3 (0.3)	6 (0.6)	8 (0.8)	20 (2.0)	25 (2.5)	50 (5.0)
Stroke mm	10					
Max impact speed mm/s	800					
Max cycle time cycle/min	30					
Spring force (at compression) N (kgf)	5 (0.5)	9 (0.9)	9 (0.9)	15 (1.5)	18 (1.8)	26 (2.6)

Shock Absorber Impact Energy Calculation

Horizontal Impact

$$E = E1 + E2$$

$$= W \cdot V^2 / 2 + F_o \cdot L$$



* 1: For tilted impact,
change E3 to E'3 = $W \cdot g \cdot L \sin$

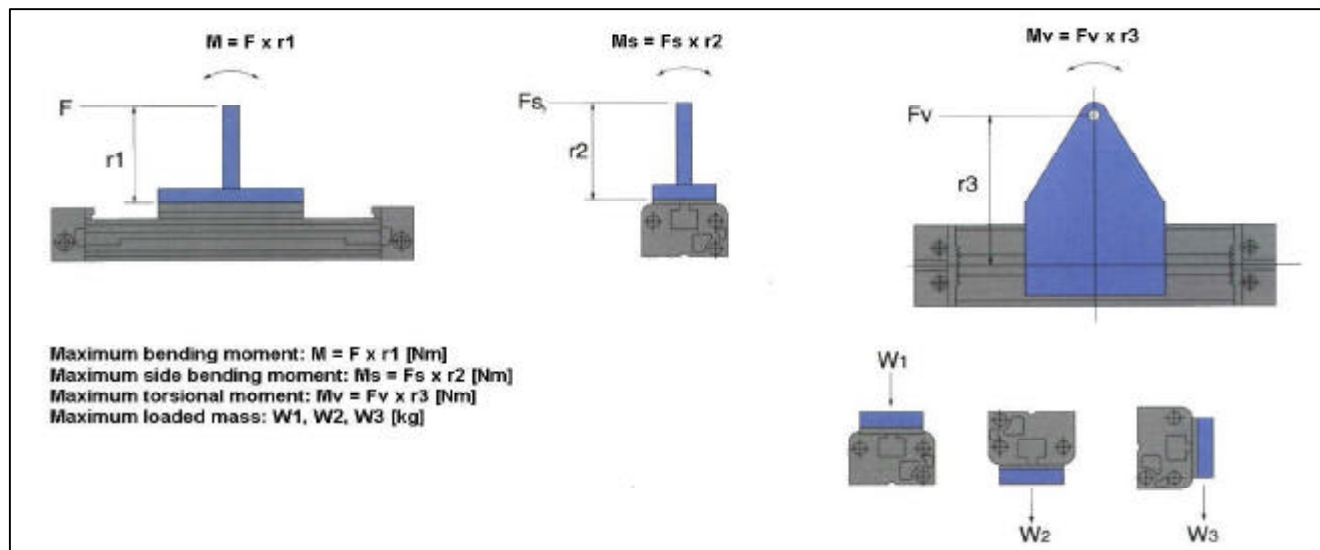
*2: For downward movement, a
heavier load can be moved by setting
less air pressure than for upward movement

Vertical Impact *1

Down *2	Up
$E = E1 + E2 + E3$ $= W \cdot V^2 / 2 + F_o \cdot L + W \cdot g \cdot L$	$E = E1 + E2 - E3$ $= W \cdot V^2 / 2 + F_o \cdot L - W \cdot g \cdot L$

<p>E: Total impact energy ... [J]</p> <p>E1: Kinetic energy ... $W \cdot V^2 / 2$ [J]</p> <p>E2: Additional energy by cylinder thrust ... $F_o \cdot L$ [J]</p> <p>E3: Additional energy by loaded mass ... $W \cdot g \cdot L$ [J]</p> <p>W: Loaded mass [kg]</p>	<p>V: Impact velocity [m/s]</p> <p>g: Gravitational acceleration, 9.8 [m/s²]</p> <p>Fo: Cylinder thrust ... $= D^2 \cdot 3.14 \cdot P / 4$ [N]</p> <p>(D: inner diameter [mm], P: used air pressure [MPa])</p> <p>L: Absorbing stroke of the shock absorber [m]</p>
---	---

Load Performance Data



Note: Loads above, as well as inertia forces generated by acceleration and deceleration must be considered, and kept within the values below

Cylinder Type		ORV16	ORV20	ORV25	ORV32	ORV40	ORV50	
M	N•m (kgfm)	3.2 (0.32)	6.3 (0.63)	12 (1.2)	30 (0.3)	60 (6.0)	100 (10.0)	
Ms	N•m (kgfm)	0.5 (0.05)	1.2 (0.12)	1.6 (0.16)	3.2 (0.32)	6.3 (0.63)	10 (1.0)	
Mv	N•m (kgfm)	0.5 (0.05)	1.2 (0.12)	1.6 (0.16)	3.2 (0.32)	6.3 (0.63)	10 (1.0)	
With Bumper	W1	kg	2	3.2	5	8	12	20
	W2	kg						
	W3	kg						
With Shock Absorber	W1	kg	4	7	12	20	30	48
	W2	kg						
	W3	kg						

Bolt Tightening Torque

For Shock Absorber Hexagon Nut

Type	for ORV16 KSHGV10x10	for ORV20 KSHGV12x10	for ORV25 KSHGV14x12	for ORV32 KSHGV18x15	for ORV40 KSHGV20x16	for ORV50 KSHGV22x25
Tightening torque N•m (kgf•cm)	8 (80)	8 (80)	10 (100)	24 (240)	30 (300)	78 (780)

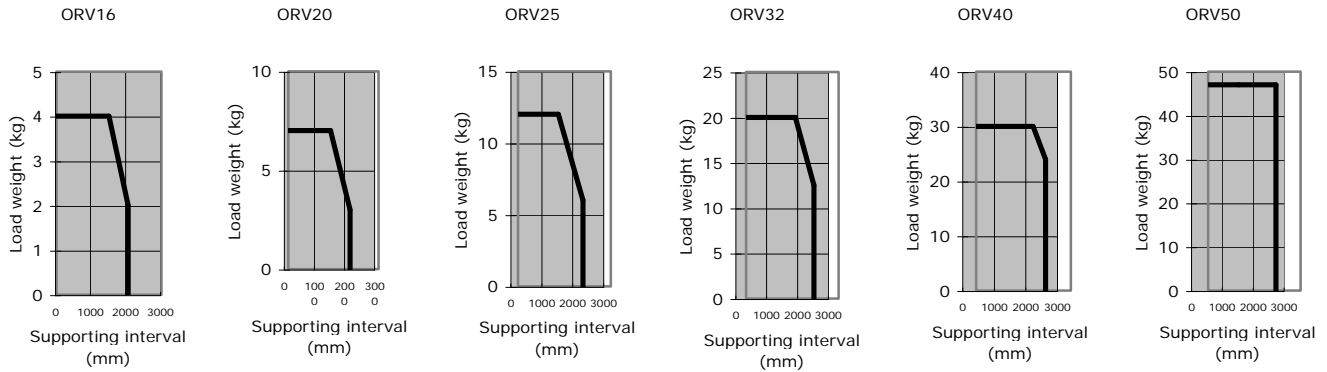
For ORV Carriage

Type	ORV16	ORV20	ORV25	ORV32	ORV40	ORV50
Tightening torque N•m (kgf•cm)	1.2 (12)	2.8 (28)	6 (60)	10 (100)	10 (100)	20 (200)
Hex Wrench Size mm	2.5	3	4	5	5	6

Notes:

- 1 Tighten the bolts mounting the shock absorber according to the chart above
- 2 Use the shock absorber within the capacity range. Absorbing energy of the shock absorber at low speeds differs from the energy in high speeds.
- 3 Max impact velocity of the shock absorber is 800mm/s. This is not equivalent to the average speed: it is the instantaneous speed at impact.
- 4 Protect the shock absorber from water, oil, and dust.
- 5 Do not loosen the screws on the back side of the shock absorber unit. The oil sealed inside will flow out, and the shock absorber will not function properly.

Supporting Intervals



Type	Support interval : L (mm)
ORV16	stroke + 62
ORV20	stroke + 82
ORV25	stroke + 94

Type	Support interval : L (mm)
ORV32	stroke + 138
ORV40	stroke + 170
ORV50	stroke + 194

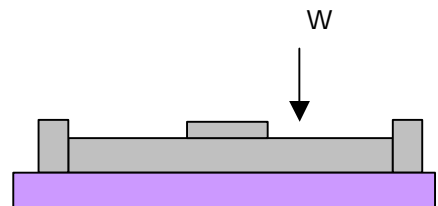
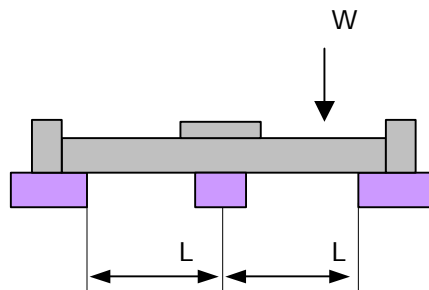
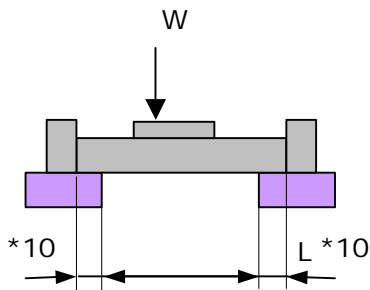
The cylinder will require intermediate supports depending on the load weight and supporting interval. An F-type support can be used for intermediate support.

Supporting Intervals

End Cap Support

3 Position Support

Barrel Bottom Support



When supporting the barrel along the length of the cylinder, intermediate supports are not necessary.

* When supporting by end caps or by 3 position support, support the barrel with at least 10mm of surface.

Standard Stroke Lengths

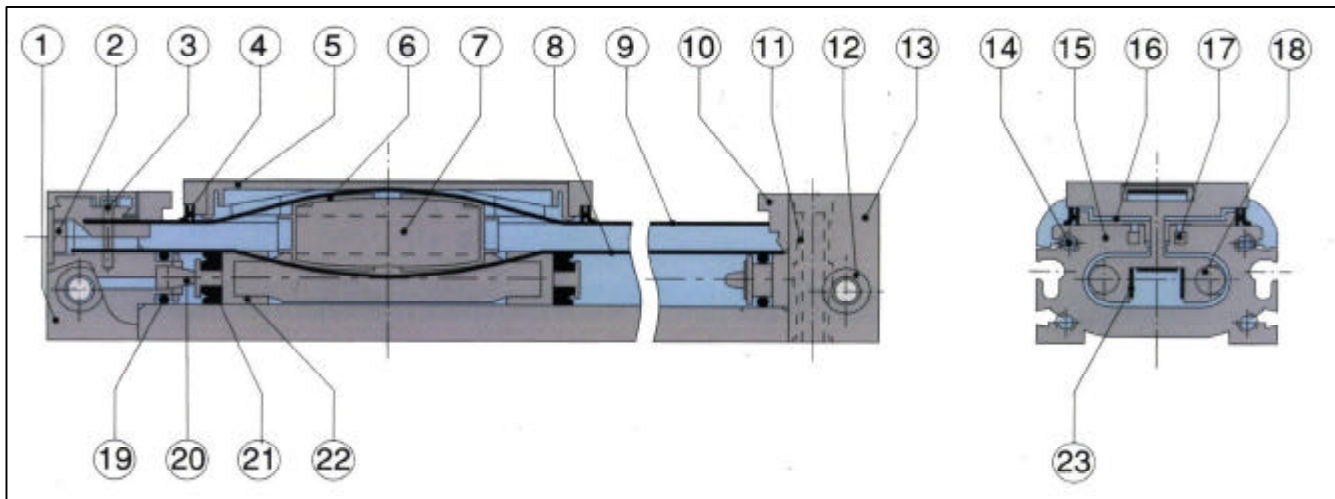
Type	Standard Strokes (mm)	Max (mm)
ORV16	25,50,75,100,125,150,175,200,250,300,350,400,450,500,600,700,800	2000
ORV20	50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 700, 800	
ORV25	50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 700, 800	
ORV32	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200	
ORV40	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200	
ORV50	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200	

Non-standard strokes (in 1mm pitch) are available.

Weight of Cylinder and Components

Type	at zero stroke	per 1mm stroke	F-support	M-mount	Shock absorber		
					One side	2 sides	Plate
					kg		
ORV16	0.2	0.0012	0.008	0.019	0.62	0.124	0.077
ORV20	0.34	0.0016	0.016	0.03	0.105	0.21	0.14
ORV25	0.51	0.002	0.028	0.038	0.18	0.36	0.2
ORV32	1.15	0.0034	0.036	0.095	0.31	0.62	0.47
ORV40	1.9	0.005	0.062	0.13	0.48	0.96	0.68
ORV50	3.48	0.0076	0.062	0.23	0.75	1.5	1.07

Standard Stroke Lengths

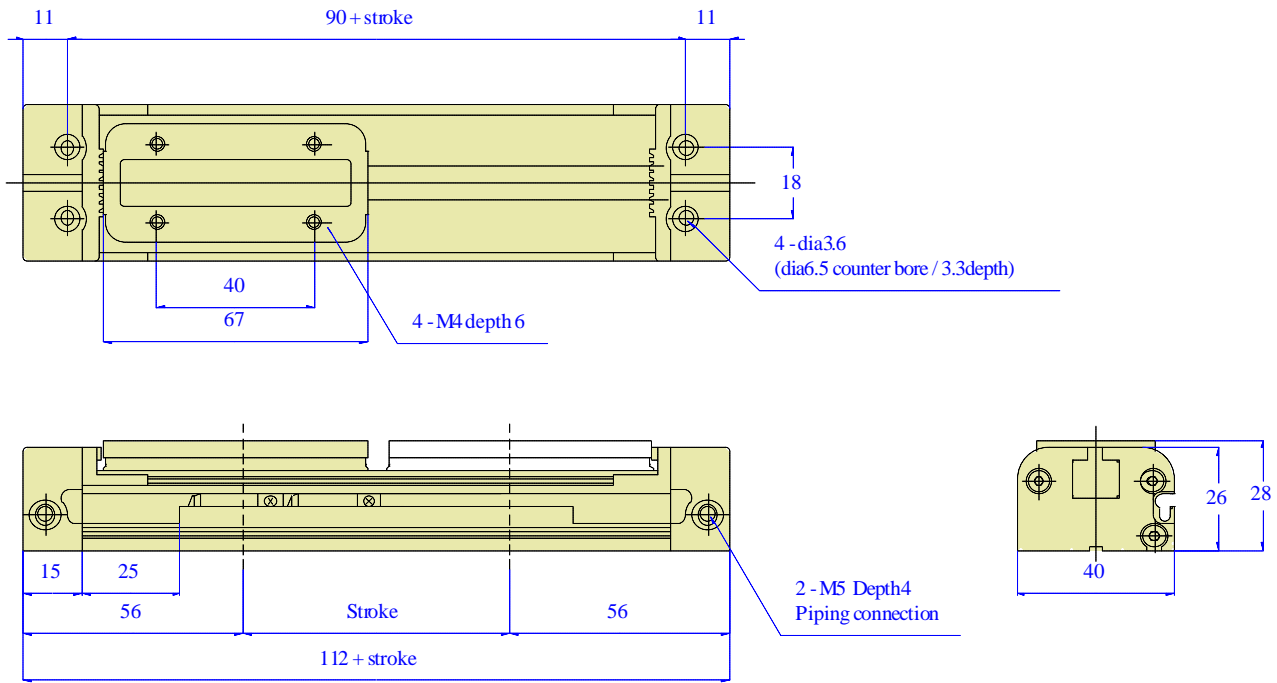


No	Item	Material	Quantity	Remarks
1	End cap R	PBT	1	
2	Cap cover	PP	2	
3	Band fixing pin	Stainless steel	2	Parallel pin
4	Scraper*	Nylon	1	
5	Mount Cover*	PBT	1	
6	Band guide*	Special resin	2	
7	Piston yoke	Aluminum alloy	1	Alumite coating
8	Inner seal band	Stainless chrome	1	
9	Outer seal band	Stainless chrome	1	
10	Mount bumper	Urethane rubber	2	
11	Thread insert B	Brass	4	
12	Thread insert A	Brass	2	
13	End cap L	PBT	1	
14	Button bolt with hex hole	Alloy steel	6	Zinc chromate coating
15	Cylinder barrel	Aluminum alloy	1	Alumite coating
16	Shim	Polyester	-	
17	Magnet strip	Rubber magnet	2	
18	Magnet	Magnet	2	Alumite coating
19	Cylinder gasket*	NBR	2	
20	Piston bumper	NBR	2	
21	Piston packing*	NBR	2	
22	Piston	Polyacetal	2	
23	Inner band guide	Hard vinyl chloride	2	

* Items can be purchased as seal repair kit

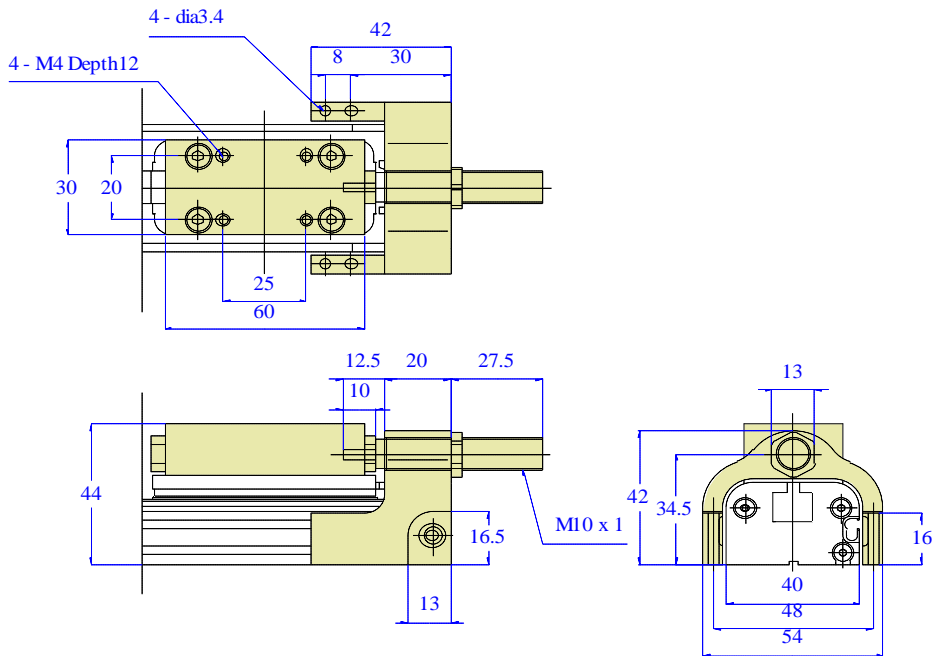
ORV16 Dimensions

units:mm

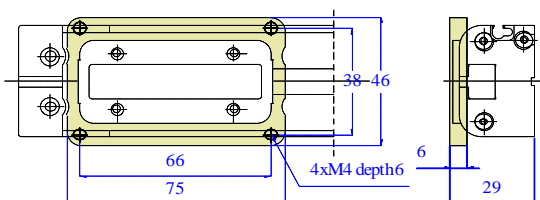


ORV16 Shock Absorber Dimensions

units:mm

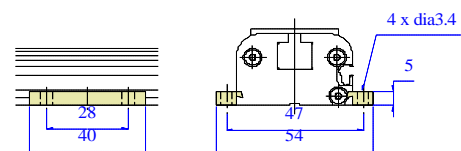


ORV16 M-mount units:mm



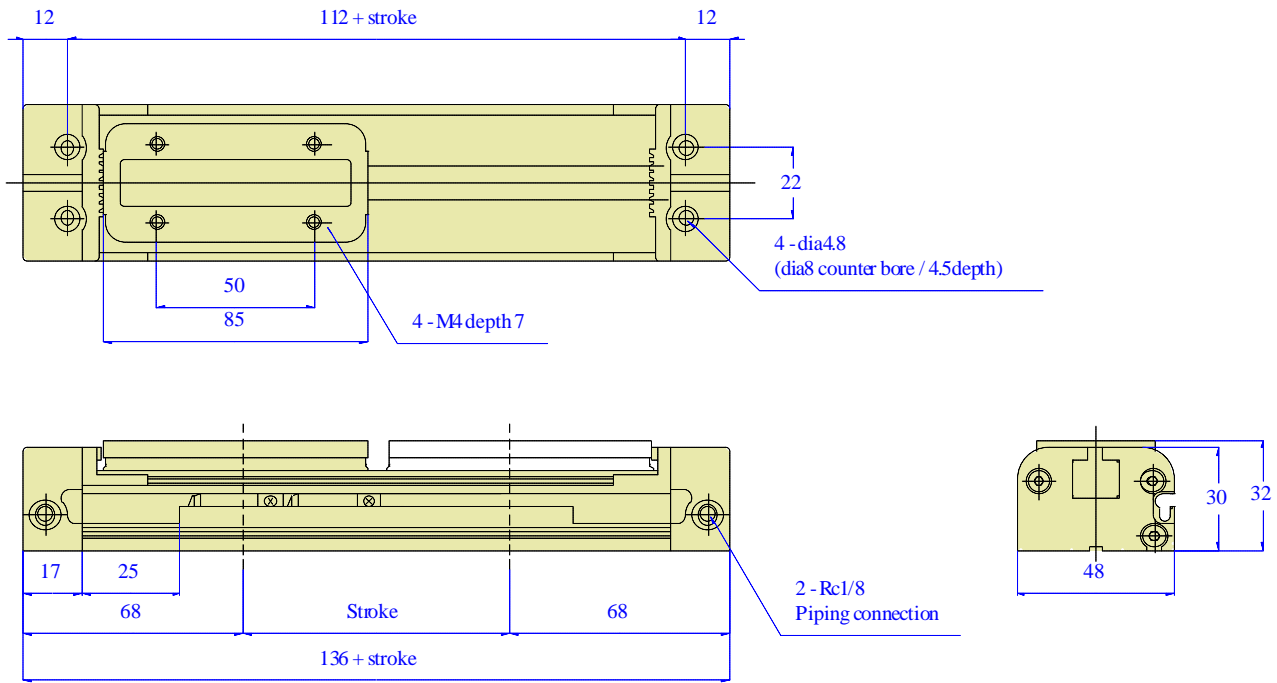
NOTE Remove the shock absorber mount when using M type mount

ORV16 F-support units:mm



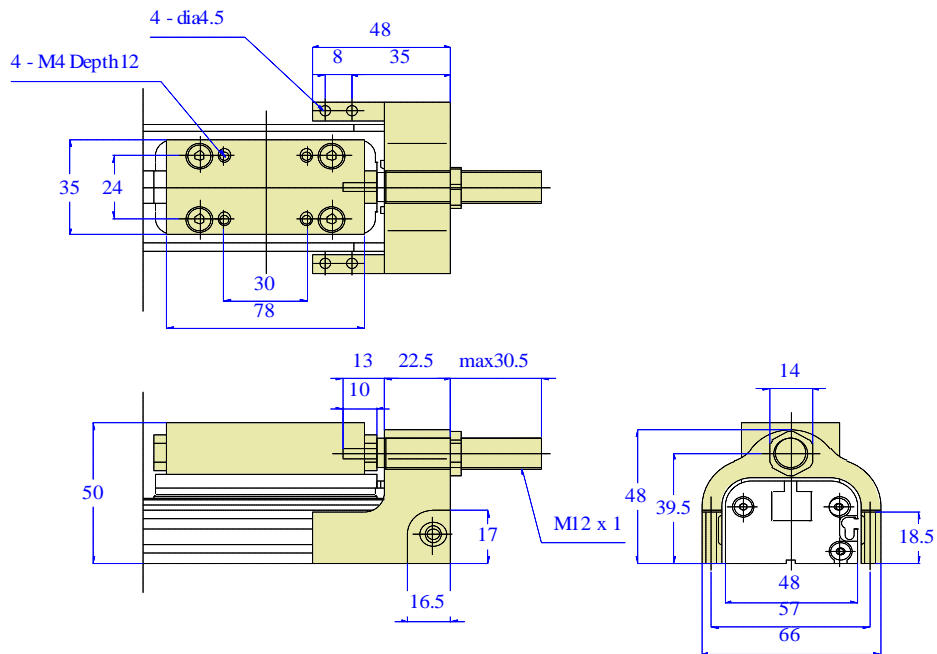
ORV20 Dimensions

units:mm



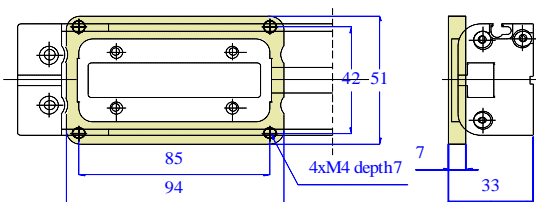
ORV20 Shock Absorber Dimensions

units:mm



ORV20 M-mount

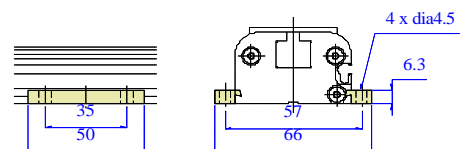
units:mm



NOTE: Remove the shock absorber mount when using M type mount

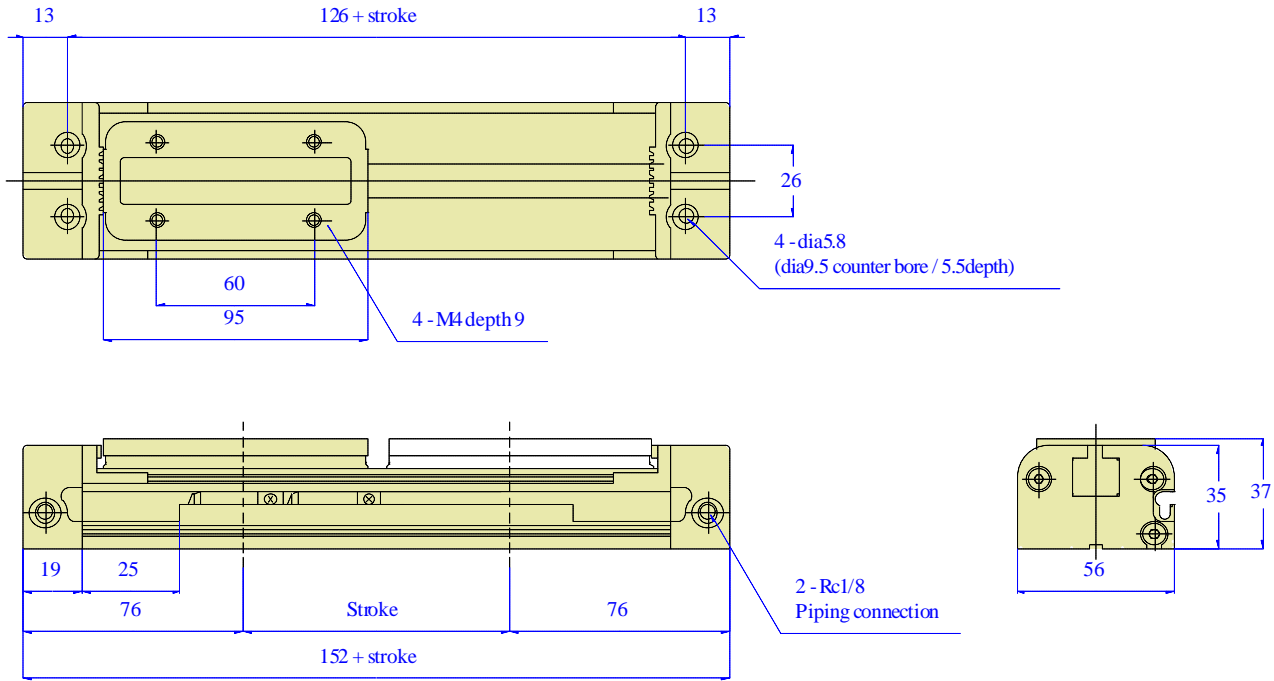
ORV20 F-support

units:mm



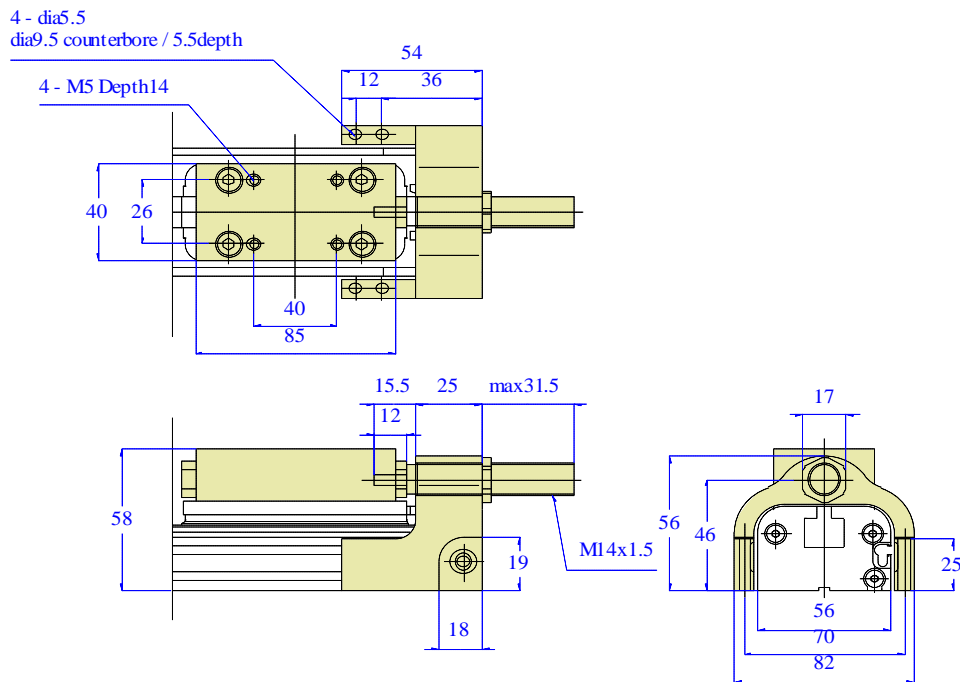
ORV25 Dimensions

units:mm



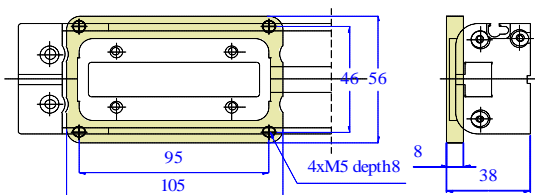
ORV25 Shock Absorber Dimensions

units:mm



ORV25 M-mount

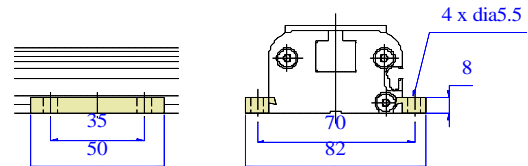
units:mm



NOTE Remove the shock absorber mount when using M type mount

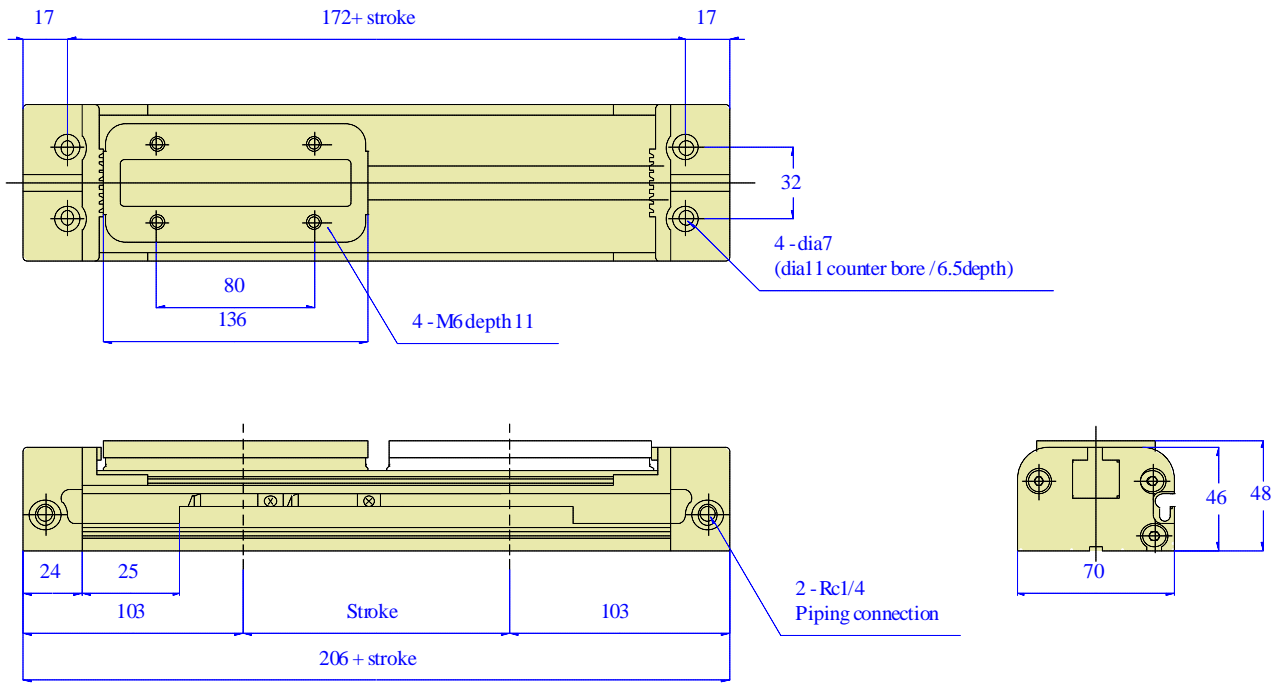
ORV25 F-support

units:mm



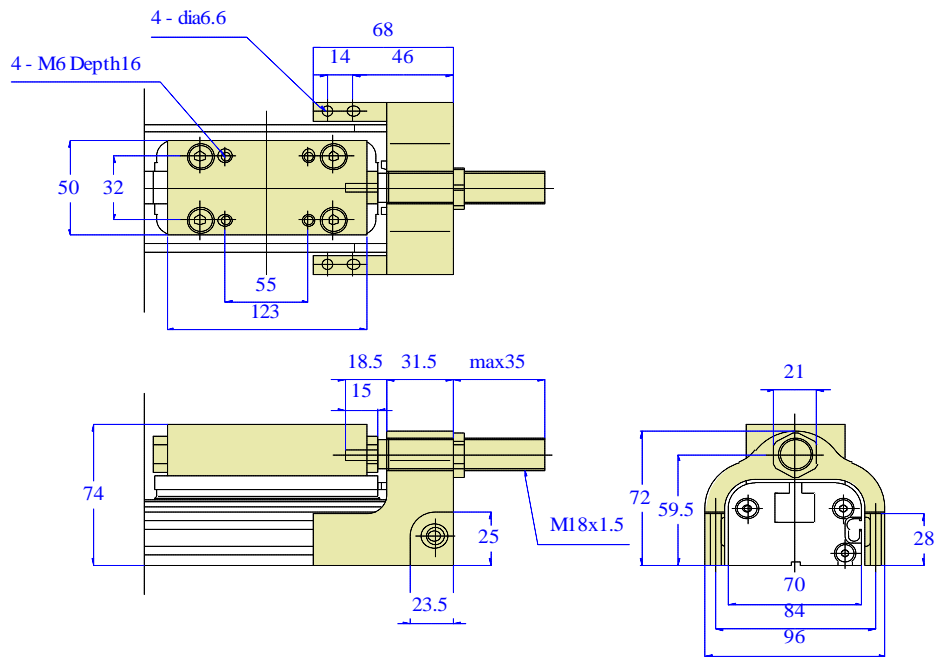
ORV32 Dimensions

units:mm



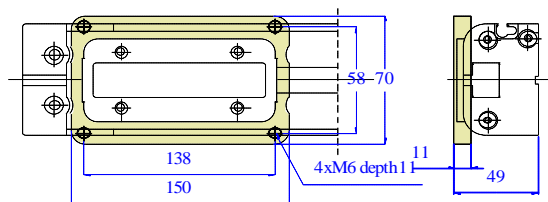
ORV32 Shock Absorber Dimensions

units:mm



ORV32 M-mount

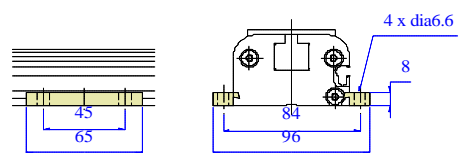
units:mm



NOTE Remove the shock absorber mount when using M type mount

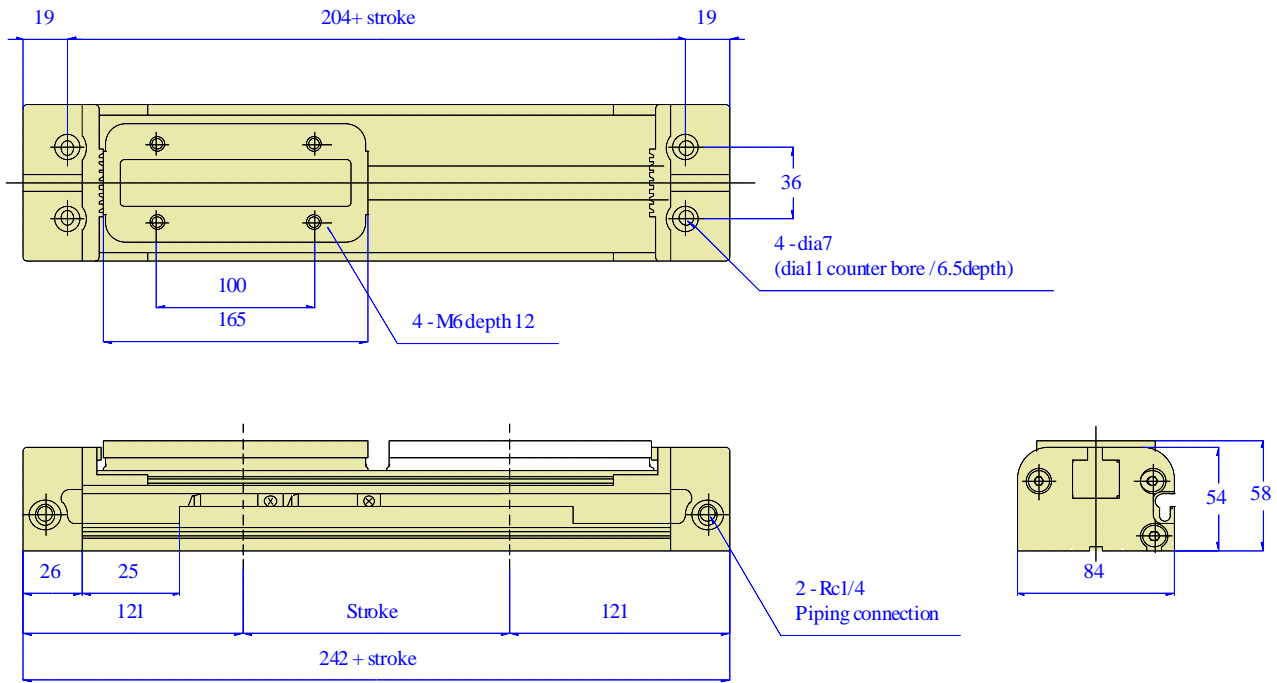
ORV32 F-support

units:mm



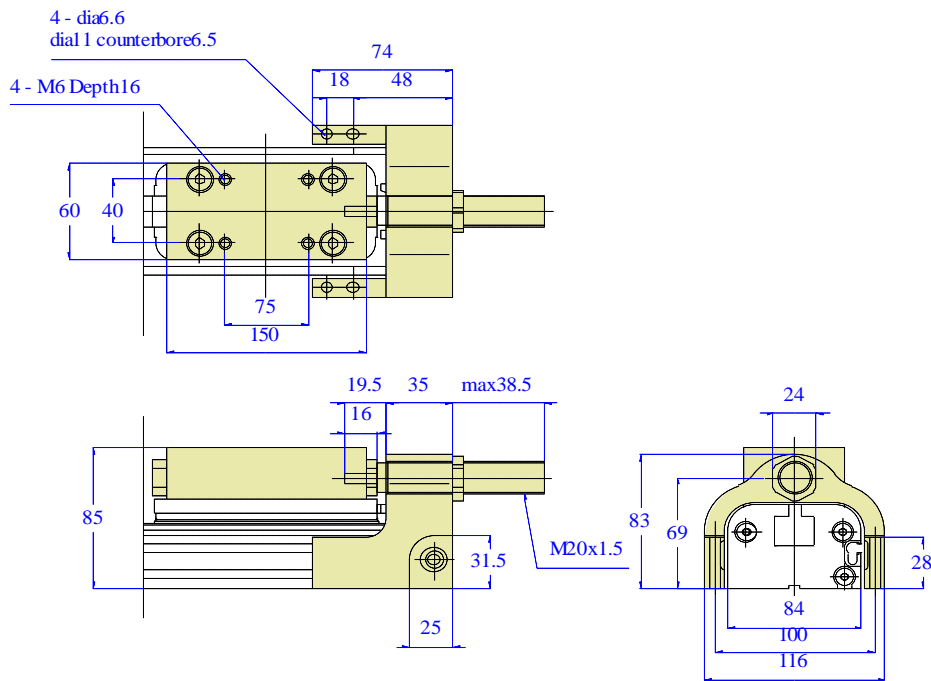
ORV40 Dimensions

units:mm



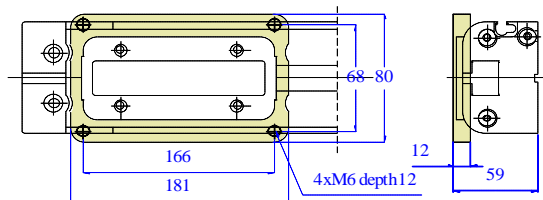
ORV40 Shock Absorber Dimensions

units:mm



ORV40 M-mount

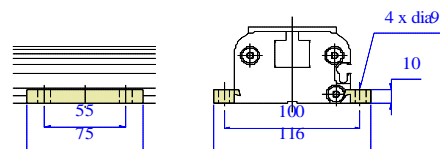
units:mm



NOTE: Remove the shock absorber mount when using M type mount

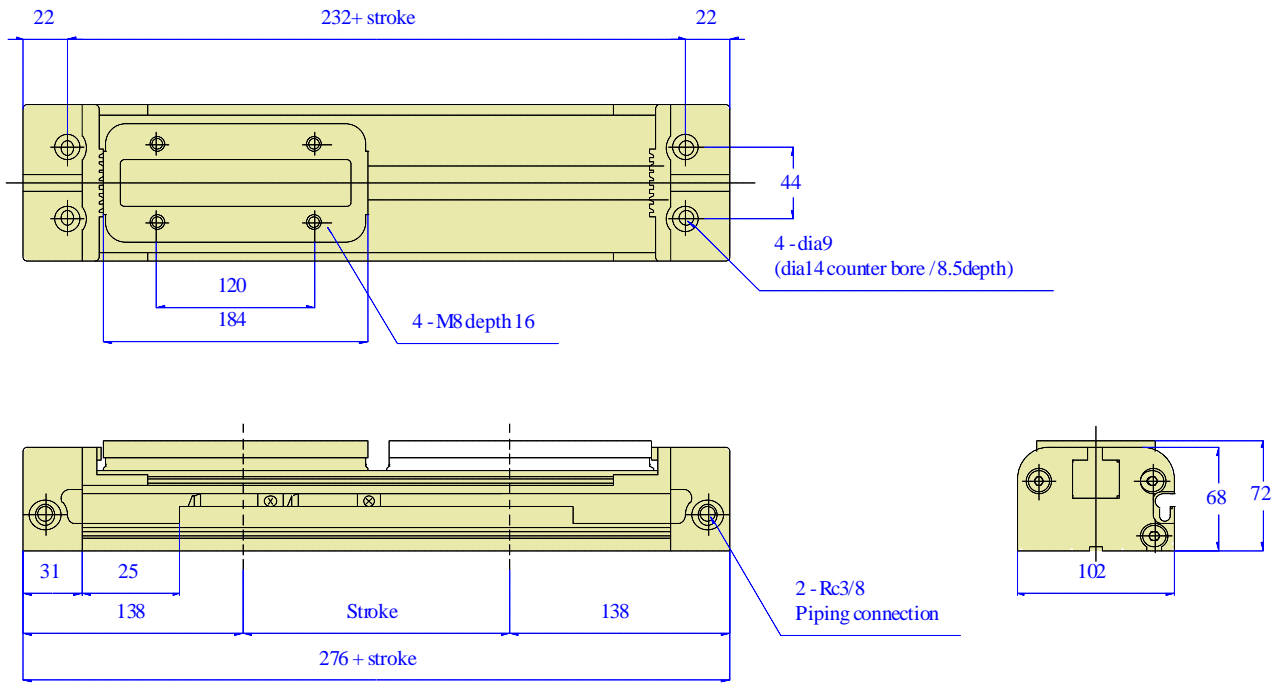
ORV40 F-support

units:mm



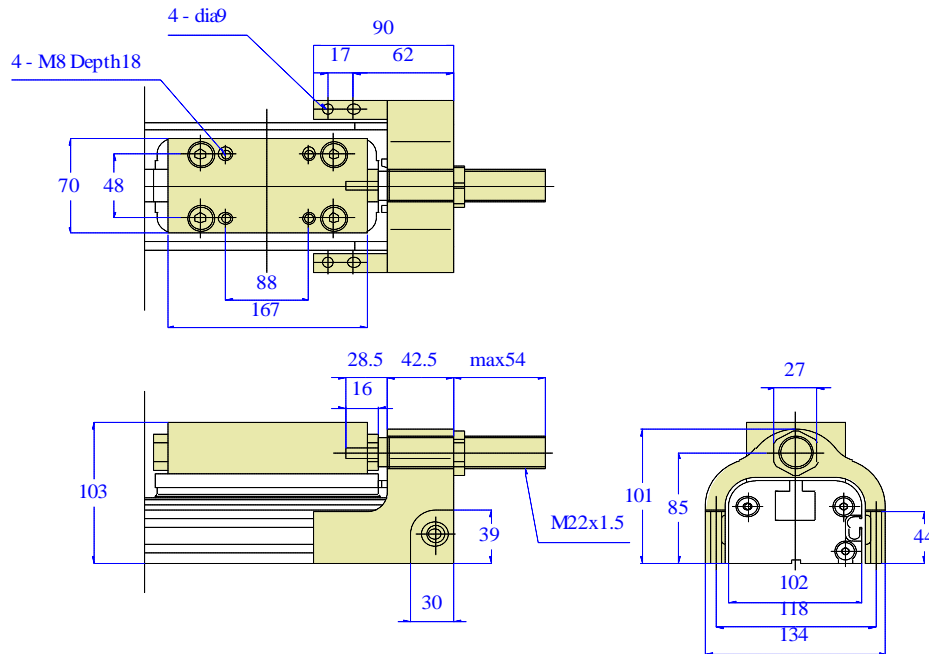
ORV50 Dimensions

units:mm



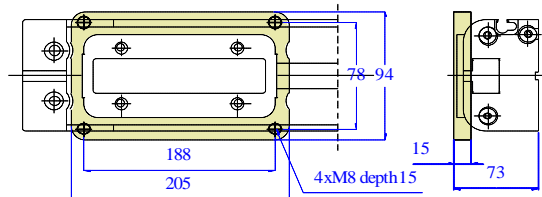
ORV50 Shock Absorber Dimensions

units:mm



ORV50 M-mount

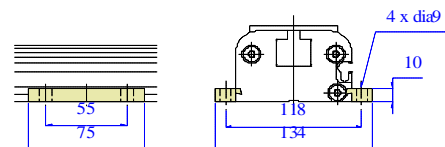
units:mm



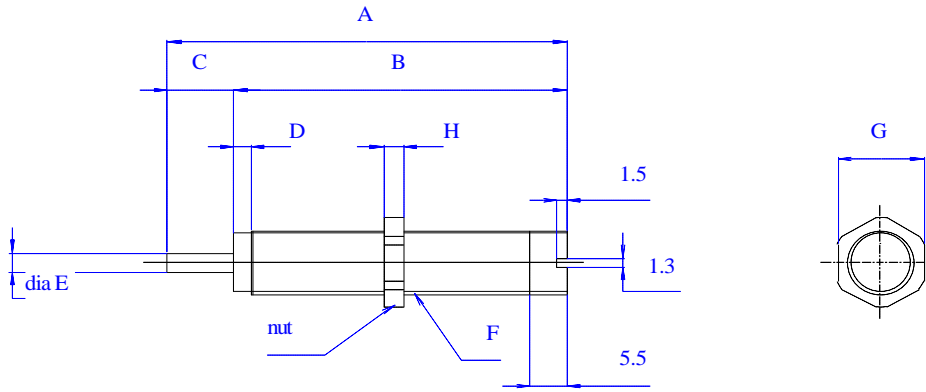
NOTE Remove the shock absorber mount when using M type mount

ORV50 F-support

units:mm



Shock Absorber Dimensions and Part Number



units: mm

Type	A	B	C	D	E	F	G	H
ORV16 KSHGV10x10	60	50	10	3.5	3	M10x1	13	3
ORV20 KSHGV12x10	66	56	10	3.5	3.5	M12x1	14	4
ORV25 KSHGV14x12	72	60	12	4.5	3.5	M14x1.5	17	6
ORV32 KSHGV18x15	85	70	15	4.5	5	M18x1.5	21	8
ORV40 KSHGV20x16	93	77	16	4.5	6	M20x1.5	24	8
ORV50 KSHGV22x25	125	100	25	4.5	6	M22x1.5	27	9

Optional Equipment

M-type Mounting

M-ORV XXX

Shock absorber holder

C-ORV XXX

F type support (2pc)

F-ORV XXX

Shock absorber plate (with bolt)

T-ORV XXX

Shock absorber unit (with plate, holder, absorber)

K-ORV XXX

XXX: Cylinder bore

Spare Parts

Seal kit

MK1-ORV XXX

Seal band kit (inner/outer seal, fixing pin)

MK2-ORV XXX - stroke

End cap assembly of right side

MK3-ORV XXX

End cap assembly of left side

MK4-ORV XXX

Piston assembly

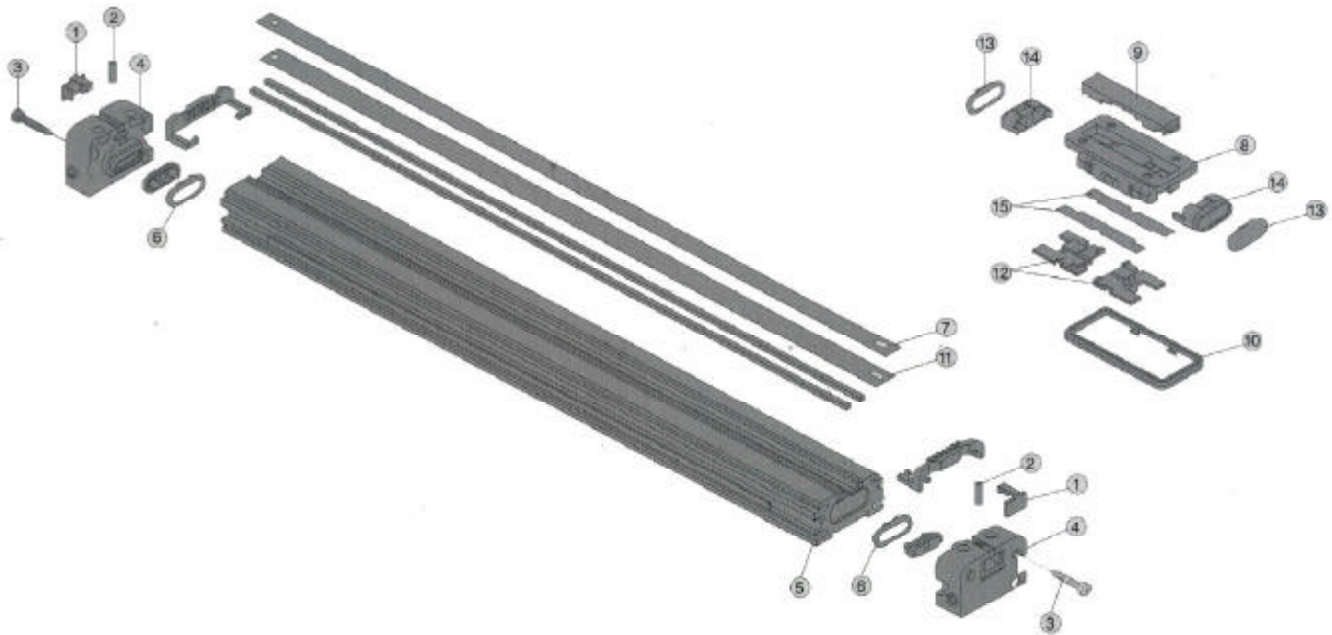
MK5-ORV XXX

XXX: Cylinder bore

Proximity Sensors

Please see separate catalog on sensors for details.

Assembly and Disassembly



Assembly

Note: Any damage to the inner seal band, piston packing, and cylinder gasket will lead to air leakage.

1. Assemble the band guide(12), shim(15), and scraper(10) with the piston yoke(8).
2. Assemble the piston(14) with the piston yoke(8) while facing the groove for the inner seal band(11) upward.
3. Assemble the piston packing(13) with the piston(14) facing out with profile of the packing upward (toward the inner seal). Put grease on the packing.
4. Assemble the inner seal band(11) with the piston yoke(8) and the band guide(12) by inserting the chamfered side of the inner seal band must be facing toward inside of into them.
5. Assemble the outer seal band(7) with the piston yoke(8) and the band guide(12) inserting into them so that each hole of the outer seal band overlaps to the same shape hole of the inner seal band, round to round, oval to oval.
6. Apply grease to underside of band guide(12) and the groove on the underside of the scraper(10).
7. Insert the piston yoke(8) inside the cylinder barrel(5). Position the inner seal band(11) inside the cylinder barrel and the outer seal band(7) to be outside of the barrel. When inserting the piston yoke into the cylinder barrel, lightly hold up the band guide(12) so that the piston yoke slides onto the edges of the barrel.
8. Assemble the end cap(4) with the cylinder gasket(6) profile facing the center. Apply grease to cylinder gasket.
9. Align the holes of the inner seal band(11) and one of the outer seal band(7). Adjust the bands so that the lengths exceeding over the cylinder barrel on the left is equal to the right.
10. Insert the end cap(4) into the cylinder barrel(5) and loosely tighten the three end cap bolts(3).

Disassembly

1. Remove the cap cover(1) with a small (-)screwdriver.
2. Pull out fixing pins(2) using needle nose pliers.
3. Remove the three end cap bolts(3).
4. Remove the end cap(4).
5. Remove the cylinder gasket(6).
6. Repeat steps 1-5 for other end.
7. Remove the outer seal band(7) from the piston yoke(8), mount cover(9), and scraper(10).
8. Remove the piston yoke(8) by sliding it out. The inner seal band should come out also.
9. Remove the inner seal band(11) from the piston yoke(8) and the band guide(12).
10. Remove the piston packing(13) from the piston(14).
11. Remove the piston(14) by opening the clips.
12. Remove the band guide(12), shim(15), and scraper(10).
13. Remove the mount cover(9) by opening the clips using a (-) screwdriver.



For North American Inquiries please contact our USA headquarters:

Izumi International, Inc.
1 Pelham Davis Circle
Greenville SC 29615
Telephone: 864-288-8001
Fax: 864-288-7272
mailto: us-sales@izumiinternational.com
www.izumiinternational.com

For all inquiries regarding products or services outside of North America please contact our office in Japan.

The Japanese office employs English speaking representatives that will be glad to assist you.

Izumi International Co., LTD.
3-20-10 Toyosaki, Kita-Ku
Osaka 531-0072, Japan
Telephone: 06-6375-4116
Fax: 06-6375-4117 (country code 81)
mailto: jp-sales@izumiinternational.com
www.izumiinternational.com