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SMC

FIA-GL98-0083

ROD-LESS CYLINDER (MAGNET TYPE)

CY1S (SLIDER TYPE) SERIES

INSTRUCTION MANUAL

SMC CORPORATION

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1.How to install.

1 - 1.Surface to be installed:

Surface to be installed is desired with high flattness but, when sufficient flattness is unobtainable, install -ation should be performed to enable the :SLIDE BLOCK travel under minimum operating pressure by shim adjust- ing or other means.

1 - 2.Installation procedure.

Mounting of main body should be done with PLATE parts at both ends. Installation with SLIDE BLOCK should not be made. Mounting with SLIDE BLOCK causes excessive lat -teral loads to bearing portion and thus may result in malfunction.

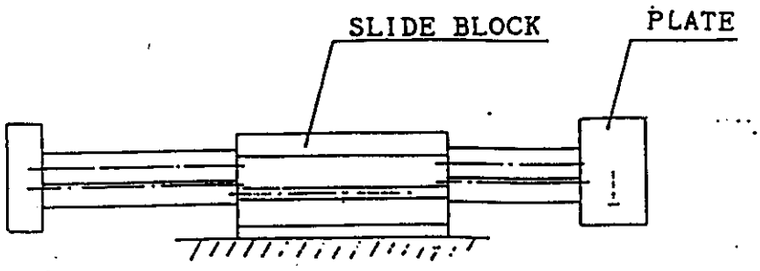


Fig.1.Mounting with SLIDE BLOCK. = Prohibitted =

Machining of installation part on PLATE portions are allowed 2 sorts illustrated in the following diagram. Those selections are for the surface to be installed and also location to be installed.

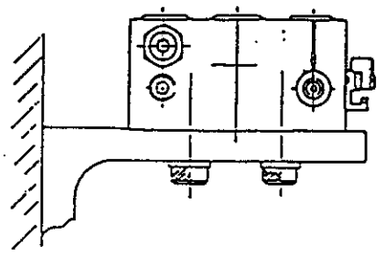


Fig.2.Stabilizing from underneath. (Using plate part.)

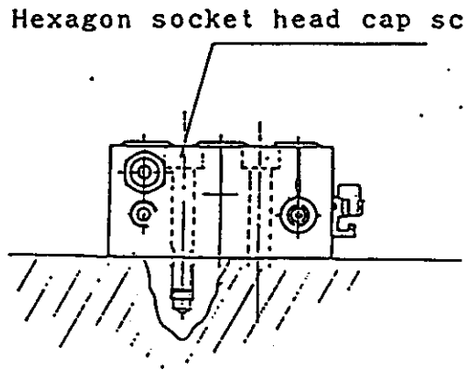


Fig.3.Stabilizing from upper (by hexagon socket head cap screw.)

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1 - 3.About pipings:

Piping ports are located at plate A side(thinner plate) with capability of moduliarized piping. No piping ports are located at plate B side(thicker plate), this should be noticed.

(Note)When pipings ports are required both sides, it is avail -able at option basis.

In a case of with auto-switch.
Although piping ports are located at one side only (plate A, thinner plate side), installation rail for auto-switch can be mounted either sides.

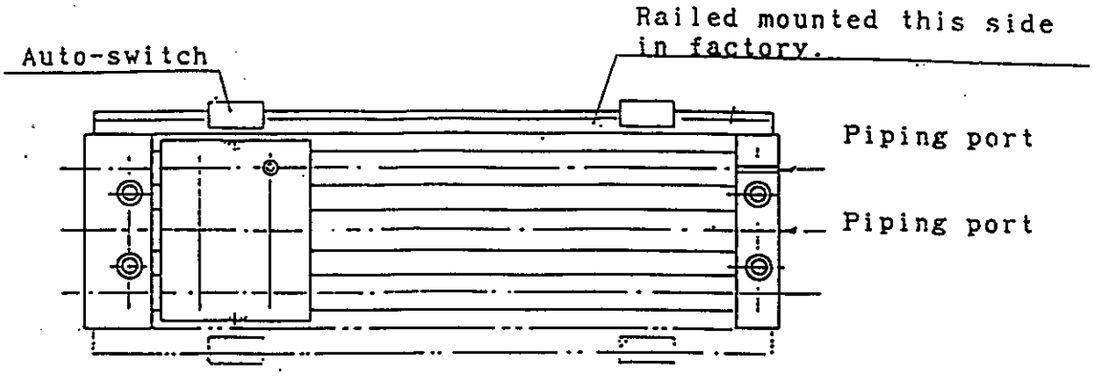


Fig.4. In case of with Auto-switch.

1 - 4.Cautions to use Auto-switch.

1 - 4 - 1)Switch mounting rail(CDY1S15 larger) has a peculiar configuration to allow lead wire to stay in its groove(Fig.5).

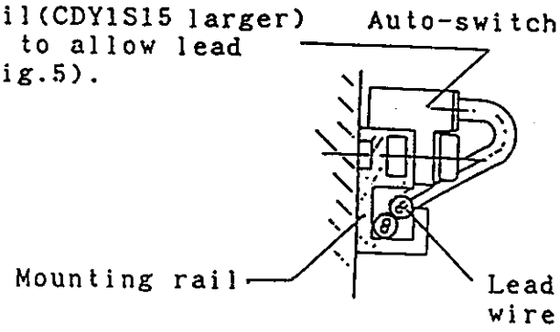


Fig.5.Switch mounting rail.

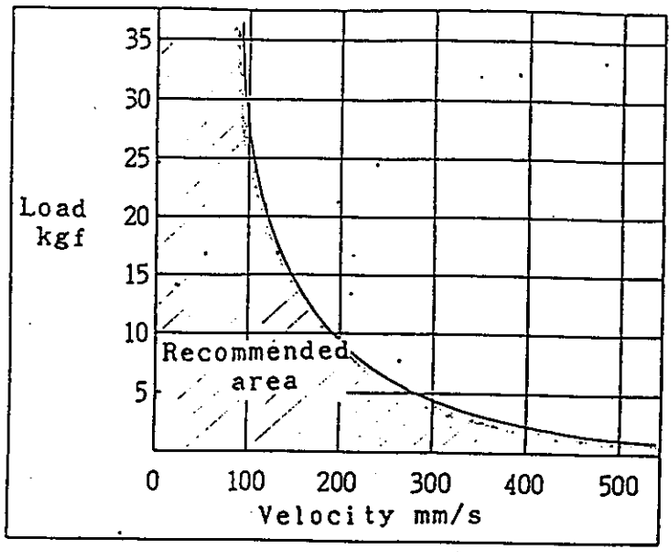
1 - 4 - 2)It's possible to install the auto-switch at half way. However, thinking of response time of load relay, ad-

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justment is needed in order to detect the cylinder velocity within 300mm/sec.

1 - 4 - 3)As to precautions for circuit diagram of switch inside, protection box of contact point, etc., please refer to catalogue of Rod-less cylinder (CY1 series).

1 - 5.About using adjust bolt (damper).
Stroke can be adjusted by standard adjust bolt at its stroke end. In viewpoint of endurability, its operation is advised within range of loads and velocity shown in the following diagram to stop by adjust bolt.



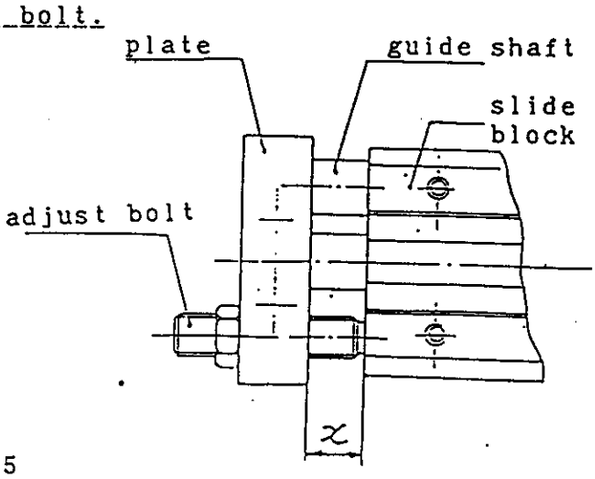
Standard adjust bolt: Relation between loads and velocity

Note)Operation beyond above legal range, use of shock absorber(RB series of SMC) is advised.

Even at working pressure over holding force, no anxiety for piston jumping is needed at the stroke end. However, when stroke (of minus side)is adjusted more than stated figure x (in table 1) by adjust bolt (like shock absorber), care should be taken to adjust under maximum working pressure.

Table 1.Adjusting span of adjust bolt.

Model	adjust: x mm
CY1S6H	1.5
CY1S10H	2.5
CY1S15*	4.0
CY1S25*	5.0
CY1S32*	6.0
CY1S40*	6.5



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1 - 6.Precautions of with shock absorber.

1 - 6 - 1)RB Series (of SMC) shock absorber can be installed at the part to fit adjust bolt.

1 - 6 - 2)Adjustment is possible at stroke end by shock absorber as by adjust bolt.

Note)About adjusting span, please refer to item 1 through 5 of Table 1.

1 - 6 - 3)Screws at bottom of the body, shock absorber must not be turned (they are not adjustment screw), loosening those may cause leakage.

1 - 6 - 4)Nut tightening torque to install shock absorber to the plate part should be subject to following Table 2.

Table 2.Tightening torque of the nut to shock absorber.

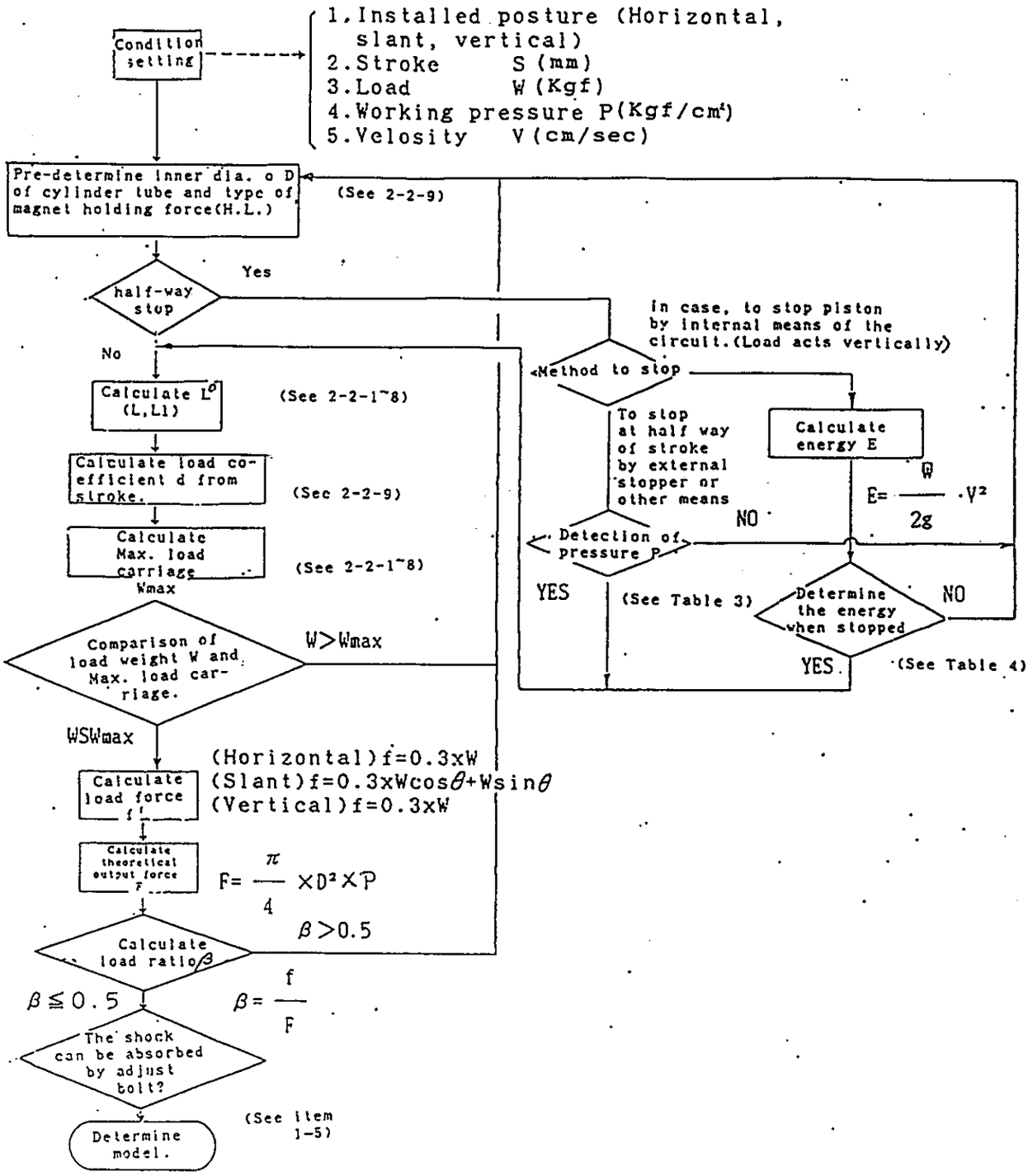
Model	RB0806	RB1007	RB1412	RB2015
External screw mm	M8	M10	M14	M20
Nut tightening torque kgf·m	0.17	0.32	1.1	2.4

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2.Allowable loads and its selecting method.

2 - 1.About selection procedures.

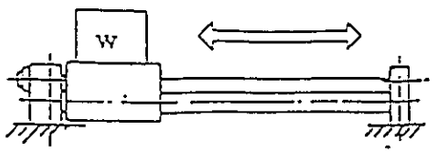
Selection procedures of CYlS* (Slider type)



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2 - 2. Information to select Rod-less Cylinder. (CY1S; Slider type)

2-2-1) Horizontal movement (Installed on the floor.)

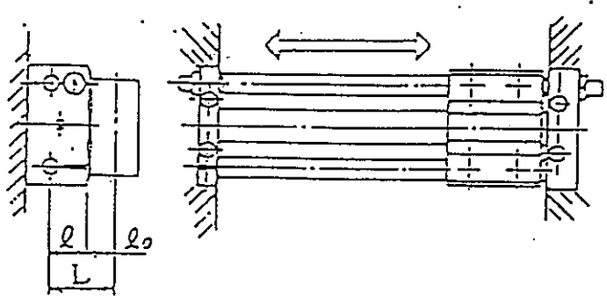


Max. Load capacity. (Slide block at center) (Kg)

	CY1S 6	10	15	25	32	40
W	1.8	3.0	7.0	20.0	30.0	50
~st (MAX)	~300st	~300st	~500st	~500st	~600st	~600st

Fundamental figure for design.
Max. load weight is defined to obtain 60% of the figure of Max. thrust (P=7kgf/cm2). Above figures for weight may be changed depending on length of the stroke of each cylinder subject to deflection limit of guide shaft. (Coefficient α should be noticed.)

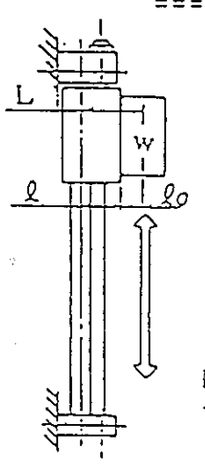
2-2-2) Horizontal movement. (Installed on wall)



	Allowable Load [kg]
CY1S 6	$\frac{\alpha \cdot 5.44}{7 + 2\ell_o}$
10	$\frac{\alpha \cdot 12.0}{8.4 + 2\ell_o}$
15	$\frac{\alpha \cdot 36.4}{10.6 + 2\ell_o}$
25	$\frac{\alpha \cdot 140}{13.8 + 2\ell_o}$
32	$\frac{\alpha \cdot 258}{17 + 2\ell_o}$
40	$\frac{\alpha \cdot 520}{20.6 + 2\ell_o}$

L: Distance from center of the guide to the center of the load. (cm)
ℓ: Distance from center of the guide to installation surface. (cm)
ℓo: Distance from installation surface to the center of the load. (cm)

2-2-3) Vertical movement.



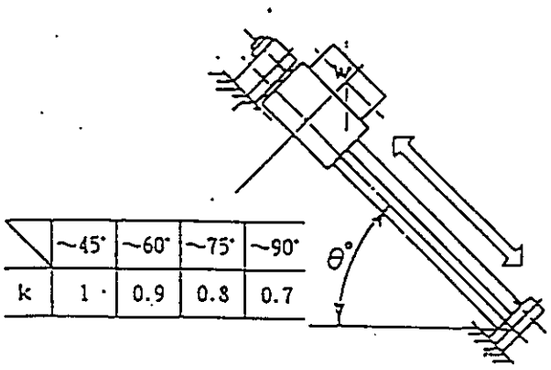
*Note) In principle, not allowed to apply. (Reference) ⟶

	Allowable load [kg]
CY1S 6	$\frac{1.33}{1.9 + \ell_o}$
10	$\frac{4.16}{2.2 + \ell_o}$
15	$\frac{13.23}{2.7 + \ell_o}$
25	$\frac{44.0}{3.4 + \ell_o}$
32	$\frac{88.2}{4.2 + \ell_o}$
40	$\frac{167.8}{5.1 + \ell_o}$

Note) Safety factor is taken into consideration to pre-vent from falling.

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2-2-4)Slant movement(Moving direction)

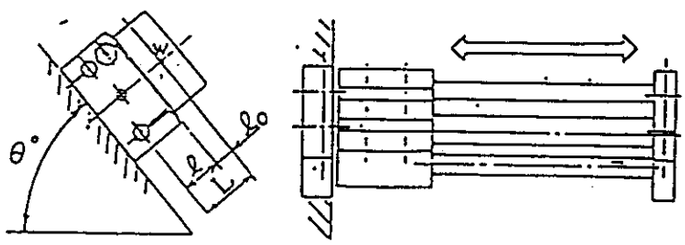


	~45°	~60°	~75°	~90°
k	1	0.9	0.8	0.7

	Allowable Load [kg]
CY1S 6	$\frac{\alpha \cdot 5.1 \cdot K}{3\cos\theta + 2(1.9+\ell_o)\sin\theta}$
10	$\frac{\alpha \cdot 10.5 \cdot K}{3.5\cos\theta + 2(2.2+\ell_o)\sin\theta}$
15	$\frac{\alpha \cdot 35 \cdot K}{5\cos\theta + 2(2.7+\ell_o)\sin\theta}$
25	$\frac{\alpha \cdot 120 \cdot K}{6\cos\theta + 2(3.4+\ell_o)\sin\theta}$
32	$\frac{\alpha \cdot 210 \cdot K}{7\cos\theta + 2(4.2+\ell_o)\sin\theta}$
40	$\frac{\alpha \cdot 400 \cdot K}{8\cos\theta + 2(5.1+\ell_o)\sin\theta}$

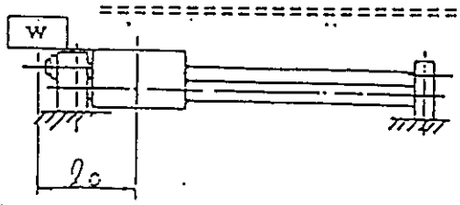
Angle coefficient K;
K = [~45° (= θ)]=1, [~60°]=0.9, [~75°]=0.8, [~90°]=0.7

2-2-5)Slant movement(Vertical to moving direction.



	Allowable Load [kg]
CY1S 6	$\frac{\alpha \cdot 5.44}{3.2+2(1.9+\ell_o)\sin\theta}$
10	$\frac{\alpha \cdot 12.0}{4+2(2.2+\ell_o)\sin\theta}$
15	$\frac{\alpha \cdot 36.4}{5.2+2(2.7+\ell_o)\sin\theta}$
25	$\frac{\alpha \cdot 140}{7+2(3.4+\ell_o)\sin\theta}$
32	$\frac{\alpha \cdot 258}{8.6+2(4.2+\ell_o)\sin\theta}$
40	$\frac{\alpha \cdot 520}{10.4+2(5.1+\ell_o)\sin\theta}$

2-2-6)Center of the load travels direction of the movement.

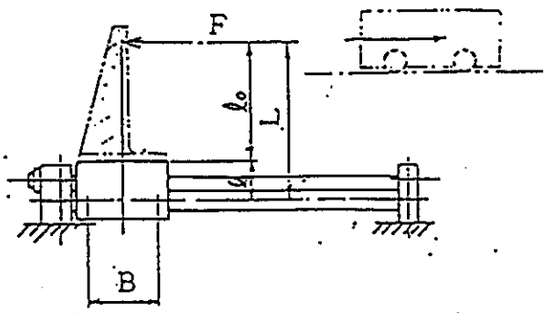


	Allowable load [kg]
CY1S 6	$\frac{\alpha \cdot 2.55}{\ell_o + 3}$
10	$\frac{\alpha \cdot 5.25}{\ell_o + 3.5}$
15	$\frac{\alpha \cdot 17.5}{\ell_o + 5.0}$
25	$\frac{\alpha \cdot 60}{\ell_o + 6.0}$
32	$\frac{\alpha \cdot 105}{\ell_o + 7.0}$
40	$\frac{\alpha \cdot 200}{\ell_o + 8.0}$

lo:Distance from center of the slide block to center of gravity of the load(cm).

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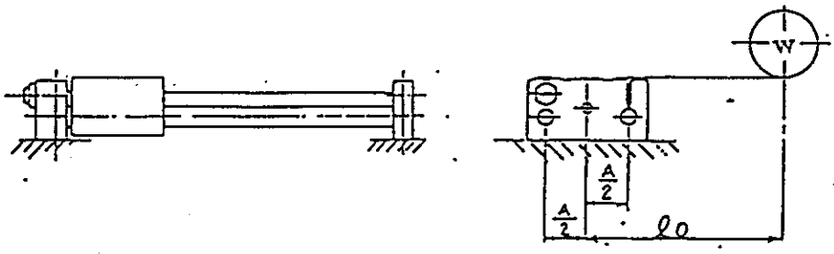
2-2-7)Horizontal movement.(push the load, pusher)



F:Resistance force against actuation(kg)
(positon lo from slide block)
B:Length of bush.

	Allowable load [kg]
CY1S 6	$\frac{\alpha \cdot 2.55}{1.9 + \ell o}$
10	$\frac{\alpha \cdot 5.25}{2.2 + \ell o}$
15	$\frac{\alpha \cdot 17.5}{2.7 + \ell o}$
25	$\frac{\alpha \cdot 60}{3.4 + \ell o}$
32	$\frac{\alpha \cdot 105}{4.2 + \ell o}$
40	$\frac{\alpha \cdot 200}{5.1 + \ell o}$

2-2-8)Horizontal movement.(The load travels lateral direction 1)



	Allowable Load[kg]
CY1S 6	$\frac{\alpha \cdot 3.80}{3.2 + \ell o}$
10	$\frac{\alpha \cdot 8.40}{4 + \ell o}$
15	$\frac{\alpha \cdot 25.48}{5.2 + \ell o}$
25	$\frac{\alpha \cdot 98}{7.0 + \ell o}$
32	$\frac{\alpha \cdot 180}{8.6 + \ell o}$
40	$\frac{\alpha \cdot 364}{10.4 + \ell o}$

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How to obtain α when select allowable load.

α is a coefficient which is determined by particular stroke because it changes depending on stroke of each cylinder (as shown in page 6 of catalogue for CY1S.)

An example)In case of CY1S25*-650.

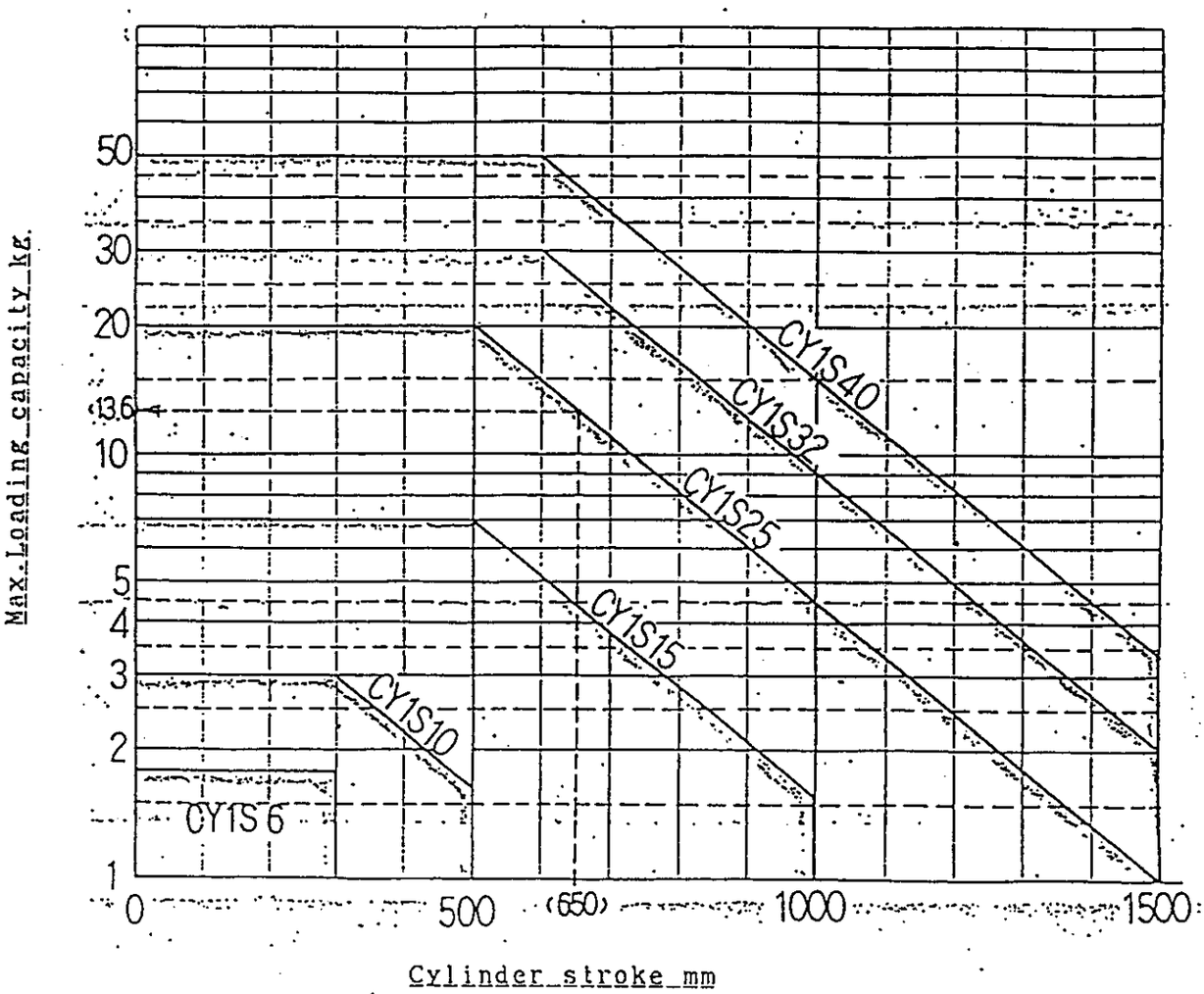
(1)Max. Load to carry=20kg (2)Max.Load to carry at .650=13.6kg

(3)It is therefore,

$$\alpha = \frac{13.6}{20} = 0.68$$

Mathematical formula to obtain α.

	CY1S 6	CY1S 10	CY1S 15	CY1S 25	CY1S 32	CY1S 40
α=	1	$\frac{10^{0.86-1.3\times10^{-3}\times ST}}{3}$	$\frac{10^{1.5-1.3\times10^{-3}\times ST}}{7}$	$\frac{10^{1.98-1.3\times10^{-3}\times ST}}{20}$	$\frac{10^{2.26-1.3\times10^{-3}\times ST}}{30}$	$\frac{10^{2.48-1.3\times10^{-3}\times ST}}{50}$



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3.Regarding half-way stop.

3-1.In case to stop by external stopper(adjust bolt, shock absorber and etc,.)
Care should be taken for the followings,when it's stopped at half-way of the stroke by external stopper (damper shock absorber and etc,.)

3-1-1)Maximum working pressure.
Operation of this device should be performed within stated figure in Table 3. of working pressure. Setting working pre-ssure above those figures may cause getting out of place of sliding block acting force on travel part of piston side and external side exceeding holding force of those.

Table 3.Limit of working pressure when it's stopped half-way.

Cylinder Bore	Model	Holding force (N)	corresponding force to holding force(MPa)	Limit of working pressure when it's stopped halfway (MPa)
φ6	CY1S6H	19. 6	0. 7	0. 55
φ10	CY1S10H	53. 9	0. 7	0. 55
φ15	CY1S15H	137. 3	0. 79	0. 65
	CY1S15L	81. 4	0. 47	0. 40
φ25	CY1S25H	362. 8	0. 75	0. 65
	CY1S25L	220. 6	0. 46	0. 40
φ32	CY1S32H	588. 4	0. 74	0. 65
	CY1S32L	357. 9	0. 45	0. 40
φ40	CY1S40H	921. 8	0. 75	0. 65
	CY1S40L	568. 8	0. 46	0. 40

Mathematical formula to calculate equivalent holding force.

$$Po = \frac{4 \cdot F}{\pi D^2}$$

Po;Equivalent holding force

F;Holding force

D;Inner diameter of cylinder tube.

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Using this device within given range of working pressure, travel part of piston side and external side never gets out of place. If it's still got out of the place, it may be occurred due to wrong allocation of travel parts each other. In such case occurred, relieve half-way stop functions and at stroke end push travle part manually(or apply equivalent pressure to holding force to travel part at piston side) to right position.

3-2. In case to stop it half-way in pneumatic circuit.
To stop half-way in pneumatic circuit,following cares should be taken.

3-2-1)Half-way stop requiring with high accuracy is unattainable.
Where required high accuracy half-way stop,air-hydraulic type(semi-standard) combining with air-hydro unit (CC series) is recommended. To place order this combination with air-hydro unit, just add -X116 to the end of the parts number. This option is available only sizes larger than ø 25.

3-2-2)Care should be taken for kinetic energy of the load.
When half-way stop function is performed by closed-center type of directional control valve (same thing is occurred when stop valve of hydro system is used), it may cause to run-away of the load (together with slide block.)
Figures in Table 4. shows kinetic energy which holding force can absorb. Those figures should be referred to use this device under conditions, that enable half-way stop in relation of load and velocity.

Table 4. Kinetic energy possible to stop half-way(Reference)

Tube bore (mm)	Model	Holding force (N)	Kinetic energy possible to stop intermediately (J)
ø6	CY1S6	19. 6	6.86×10^{-3}
ø10	CY1S10	53. 9	2.94×10^{-2}
ø15	CY1S15H	137. 3	1. 30
	CY1S15L	81. 4	7.6×10^{-2}
ø25	CY1S25H	362. 8	0. 45
	CY1S25L	220. 6	0. 27
ø32	CY1S32H	588. 4	0. 88
	CY1S32L	357. 9	0. 53
ø40	CY1S40H	921. 8	1. 53
	CY1S40L	568. 8	0. 95

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4.About air to be used.

Since this cylinder is oilless-enclosedtype,air to be supplied should be filtered by SMC made AF Series air filter and be regulated by AR Series regulator.

When it is needed to lubricate, turbine oil (ISO VG32) is recommended.

5.Maintenance.

When this device is disassembled to replace piston packing, wear ring and etc., care should be taken for following points.

5-1.To remove sliding block or piston from cylinder tube, holding force must be released by shifting positions of sliding block and piston forcibly. Removing those without doing so, respective magnets call each other directly and may become impossible to separate.

5-2.Upon completing above works to separate respective travel parts, by loosening hexagon head cap screw(at plate A side,) remove cylinder tube and plate A from guide rod A and B. (While replacing works (of packing, so on), other parts should not be disassembled, disassembling other parts may cause to air leakage.)

5-3.Magnet assembly(piston travel part and external travel part) must not be disassembled. Disassembling this may cause to decrease of holding force and other defects.

5-4.Piston side travel part and external travel part have a direction(L type and $\phi 6.\phi 10$)
The diagram could be referred to. Let external travel part (slide lock) and piston contact and insert into cylinder tube to form positions shown in the diagram.
When posture becomes as (b), turn only piston reverse to insert.

5-5.When handle magnet assembly, watch on your arm should be put off (particularly analog one) not to get influence from strong magnetic field.

5-6.Thorough care should be taken for the magnet not to drop on the floor or knock against metal.

6.Other precautions.

6-1.Parts made of iron are used in travel part so care should be taken no water drops coming on the cylinder tube.

6-2.Grease should be periodically applied to bearing part of slide block.(Please refer to suitable grease in Table 5)

6-3.When it is reassembled, thorough air-flashing to pipings

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are required not to allow dirts or cutting chips stay in -side.

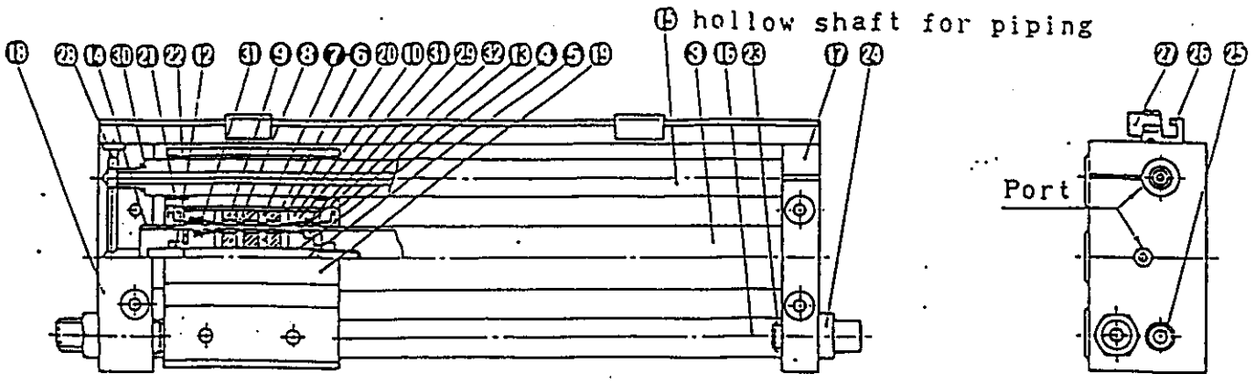
6-4. Care should be taken not to make flaw or gouge on external surface of cylinder tube and guide rod. Leaving those flaw or gouge may promote damage of scraper, wear ring and bush and thus cause to malfunction.

6-5. Change holding force of magnet (for an example, CY1S25L ——→CY1S25H) is carried out in our plant. To ask for this, please contact with our sales office.

6-6. Expected use under present of water (warmed water), cool -ant and so on, is advised to consult with us.

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7.Diagram for internal structure and Parts List.



Parts List

No.	Name	Material	Ref.
3	Cylinder tube	Stainless	
4	Piston	Aluminum alloy	chromate
5	Shaft	Stainless	
6	Yoke at piston side	Rolled plate	zinc chromate
7	Yoke at external travel	Rolled plate	zinc chromate
8	Magnet A	rare earth magnet	alumi chromate
9	Magnet B	rare earth magnet	alumi chromate
10	Wear ringholder	Aluminum alloy	black alumite
11	Damper	urethane rubber	
12	Piston nut	carbon steel	zinc chromate
13	Stopper ring	carbon tool steel	
15	Guide shaft A	carbon steel	hard chrome plating
16	Guide shaft B	carbon steel	hard chrome plating
17	Plate A	Aluminum alloy	hard black alumite
18	Plate B	Aluminum alloy	hard black alumite
19	Slide block	Aluminum alloy	hard alumite
20	Tube at external travel side	Stainless Aluminum alloy	ø6~ø25 ø32,40
21	Spacer	Rolled plate	black zinc chromate
22	Bush	oleo bearing material	
23	Adjust bolt	chrome molybdenum steel	black zinc chromate
24	Hexagon nut	carbon steel	black zinc chromate
25	Hexagon socket bead cap screw	chrome molybdenum steel	black zinc chromate
26	Switch mounting rail	Aluminum alloy	
27	Auto-switch		
28	Plug	Brass	M-5P

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Spare parts

No.	parts name	material	parts number					
			ϕ6	ϕ10	ϕ15	ϕ25	ϕ32	ϕ40
⑩	wear ring A	special resin	—	CY-010-07A22999	CY-015-07A19920	CY-025-07A19921	CY-032-07A19922	CY-040-07A19923
⑪	wear ring B	special resin	CY-006-31823536	CY-010-07B22999	CYS015-07B24292	CYS025-07B24293	CYS032-07B24294	CYS040-07B24295
⑫	piston packing	NBR	DYP6	PPD-10	PPD-15	PPD-25-19	PPD-32	PPD-40
⑬	scraper	NBR	—	PDU-12Z	SDR25-16.6	SDR36-26.4	SDR43-33.6	SDR51-41.6
⑭	cylinder gasket	NBR	C8	C12.5	CA80-1509	C27	C32	C42
⑮	guide shaft gasket	NBR	C6	C8	C7	C8	C12	C18

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Table 5. Grease (Lithium soap base grease viscosity No.1 or 2.)

Name of grease	maker
Kyoseki rizonick grease No.1 - ditto - No.2	Kyodo Sekyu - ditto -
Listan No.1 -ditto-No.2 -ditto- EP1 -ditto- EP2	ESSO -ditto- -ditto- -ditto-
Daffny colonex grease No.1 -ditto-No.2	Idemitsu Kosan - ditto -
Diamond multi-purpose grease No.1 -ditto- No.2	Mitsubishi Sekyu -ditto-
Mobilux grease No.1 -ditto- No.2	Mobile Sekyu -ditto-
Shell alvania grease No.1 -ditto- No.2 Shell alvania EP grease No.1 -ditto- No.2 Dynamic grease MP1 -ditto- MP2 -ditto- S1 -ditto- S2	Shell -ditto- -ditto- -ditto- Daikyo Sekyu -ditto- -ditto- -ditto-

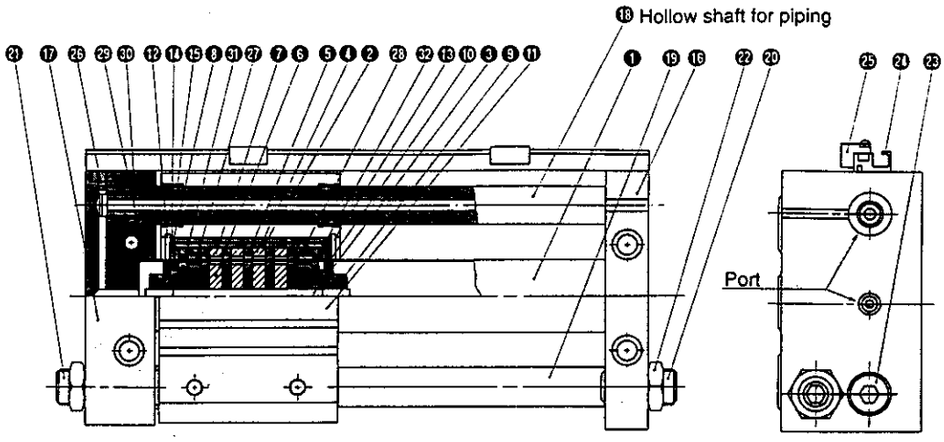
Name of grease	maker
Swalow grease remax - ditto - No.2	Maruzen Sekyu - ditto -
Kacoal multi-purpose grease No.1 - ditto - No.2	Fuji Kosan - ditto -
Multi-knock grease No.1 -ditto- No.2 Epi-knock grease No.1 - ditto - No.2	Nihon Sekyu - ditto - - ditto - - ditto -
Fuji sunlite grease No.2 - ditto - EM1 - ditto - EP1 - ditto - EP2	Showa Sekyu - ditto - - ditto - - ditto -
Zemico grease MP-1 - ditto - MP-2 - ditto - MH-1 - ditto - MH-2	General Sekyu - ditto - - ditto - - ditto -

Note:)Numbers with grease name directly means viscosity.

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Slider Type/Slide Bearing: Construction/Parts List

CDY1S25H



Parts List

No.	Description	Material	Note
❶	Cylinder tube	Stainless steel	
❷	External moving element side tube	Aluminum alloy	
❸	Shaft	Stainless steel	
❹	Piston side yoke	Rolled steel	Zinc chromate
❺	External moving element side yoke	Rolled steel	Zinc chromate
❻	Magnet A	Rare-earth metal magnet	
❼	Magnet B	Rare-earth metal magnet	
❽	Damper	Urethane rubber	
❾	Piston nut	Carbon steel	Zinc chromate
❿	Piston	*Aluminum alloy	Chromate
⓫	Slide block	Aluminum alloy	Hard alumite
⓬	Moving element spacer	Rolled steel	Nickel plating
⓭	Retaining ring	Carbon tool steel	Nickel plating

Parts List

No.	Description	Material	Note
⓮	Spacer	Rolled steel	Nickel plating
⓯	Bushing	Bearing material impregnated with oil	
⓰	Plate A	Aluminum alloy	Colored hard alumite
⓱	Plate B	Aluminum alloy	Colored hard alumite
⓲	Guide shaft A	Carbon steel	Hard chromium plating
⓳	Guide shaft B	Carbon steel	Hard chromium plating
⓴	Adjusting bolt A	Chrome-Molybden steel	Nickel plating
㉑	Adjusting bolt B	Chrome-Molybden steel	Nickel plating
㉒	Hexagon nut	Carbon steel	Nickel plating
㉓	Hexagon socket head cap screw	Chrome-Molybden steel	Nickel plating
㉔	Switch mounting rail	Aluminum alloy	
㉕	Auto switch	–	
㉖	Plug	Brass	Nickel plating

※ Brass in case of φ6~φ15.

Spare Parts/Exchange Parts

No.	Bore size	φ6		φ10		φ15		φ25		φ32		φ40	
	Packing set No.	CY1S6-PS-N		CY1S10-PS-N		CY1S15-PS-N		CY1S25-PS-N		CY1S32-PS-N		CY1S40-PS-N	
	Description	Parts No.	pcs.	Parts No.	pcs.	Parts No.	pcs.	Parts No.	pcs.	Parts No.	pcs.	Parts No.	pcs.
㉗	Wearing A	–	–	CY-010-07A22999	2	CY-015-07A19920	2	CY-025-07A19921	2	CY-032-07A19922	2	CY-040-07A19923	2
㉘	Wearing B	CY-006-07-23536	2	CYB10-36-A8009	2	CYS15-36-A8019	2	CYS25-36-A8021	2	CYS32-36-A8022	2	CYS40-36-A8023	2
㉙	Cylinder tube gasket	C8	2	C12.5	2	C17	2	C27	2	C34	2	C42	2
㉚	Guide shaft gasket	C6	1	C8	1	C7	1	C8	1	C12	1	C18	1
㉛	Piston packing	DYP6	2	PPD-10	1	PPD-15	1	PPD-25-19	1	PPD -32	1	PPD-40	1
㉜	Scraper	–	–	PDU-12Z	2	PDU-23x16	2	PDU-34x26	2	PDU-45x34	2	PDU-51x42	2

Applicable Grease (Soap group lithium grease with No.1 or No.2 consistency)

Grease name	Maker
Kyoseki Lisonix Grease No.1 Kyoseki Lisonix Grease No.2	Japan Energy
Lithtan No.1 Lithtan No.2 Lithtan EP1 Lithtan EP2	Esso Standard Sekiyu
Daphne Coronex Grease No.1 Daphne Coronex Grease No.2	Idemitsu Kosan
Diamond Multipurpose Grease No.1 Diamond Multipurpose Grease No.2	Mitsubishi Oil
Mobilux Grease No.1 Mobilux Grease No.2	Mobil Sekiyu

Grease name	Maker
Alvania Grease No.1 Alvania Grease No.2 Alvania EP Grease No.1 Alvania EP Grease No.2	Shell Sekiyu
Sunlight Grease No.2 Sunlight Grease EM1 Sunlight Grease EP1 Sunlight Grease EP2	Showa Sekiyu
Dynamic Grease MP1 Dynamic Grease MP2 Dynamic Grease S1 Dynamic Grease S2	Daikyo Sekiyu

Grease name	Maker
Kosmo Grease Dynamax No.1 Kosmo Grease Dynamax No.2	Kosmo Oil
Fukkol Multipurpose Grease No.1 Fukkol Multipurpose Grease No.2	Fuji Kosan
Multinoc Grease No.1 Multinoc Grease No.2 Epnoc Grease No.1 Epnoc Grease No.2	Nippon Oil
Gemico Grease MP-1 Gemico Grease MP-2 Gemico Grease MH-1 Gemico Grease MH-2	General Sekiyu

Note 1) The greese name No. shows the consistency.

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