Control drive
Instruction Manual
Type：SE-01H ～ SE-80H

Index

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（E)IM-SE-00-R1

Caution

Please read before installing or using this instrument.

⚠ Warning

Ignoring this warning may cause death or serious injury.

■When attaching parts, removing screws, removing pressure gauges or dismantling, make sure to stop the supply air and confirm pressure in the circuit is zero.

■When driving this unit for test or checking, do not touch the parts such as the shafts, the lever arms or the chains.

⚠ Caution

Ignoring this caution may cause injury or physical jam.

■Drain or objects in the supply line may cause stuck in the circuit and cause malfunctions. Please attach air filter 5 μ m or below before the SUP of positione, and supply dry clean air by dryer.

■Be sure to cut off the supply air pressure when inspecting the objects of orifice or filter mesh.

■When piping, flush in the pipe enough.

■When piping the pipe orfittings attach the seal tape or liquid seal leaving 2 threads from the edge. Or soak seals.

■Lubricators may cause stuck in the orifice or nozzle. Please do not use lubricators

1. Introduction

Control drive is a device which controls flow of butterfly valve, louver damper, fan inlet vane etc by remote, with high accuracy. It consists of units, such as air cylinder, positioner, air control set, position transmiter.

2. Specification

Structure	totally enclosed outdoor type
Ambient temperature	Standard temp. model : −10℃to50℃ High temp. model : 0℃to100℃
Humidity	under 85%(Noncondensing)
Rated use	Continuity
Input signal	Electrical signal: DC4to20mA Pneumatic signal: 0.02to0.1MPa(20to100kPa)
Supply airpressure	0.14to0.70MPa (140to700kPa)
Airconsumption	11Nℓ/min (supplying 0.4MPa air pressure in balancing state)
Material	SUS304 Paint color: Munsell 7.5BG6/1.5 Light gray(case of SS400)
Hysteresis	2%/F.S
Linearity	±3%/F.S
Characteristics	Linear. Equal percentage. ReverseEqual percentage.

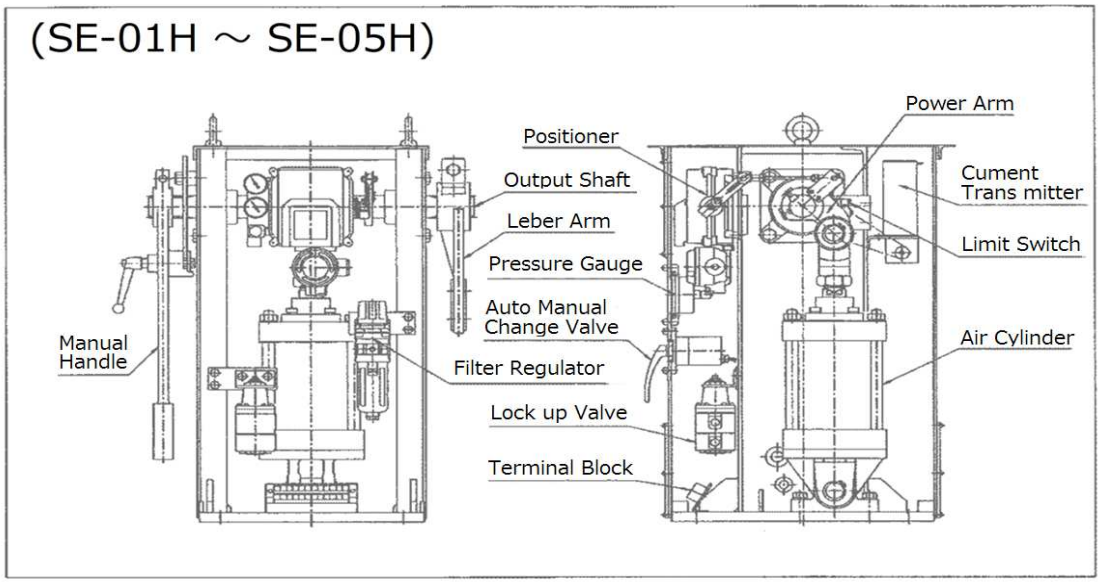
Model Number List

Model	Rated torque N-m(kgf-m) Supply air pressure			Dimensions of the cylinder (mm)			Estimated weight (kg)
	0. 4MPa	0. 5MPa	0. 55MPa	The diameter of the piston	Stroke	The diameter of the rod	
SE-01H	123 (12.6)	152 (15.5)	167 (17.0)	φ100	100	φ30	70
SE-02H	196 (20.0)	245 (25.0)	274 (28.0)	φ125	100	φ36	80
SE-05H	323 (33.0)	412 (42.0)	451 (46.0)	φ160	100	φ40	160
SE-08H	627 (64.0)	784 (80.0)	872 (89.0)	φ180	150	φ45	190
SE-15H	1039 (106.0)	1313 (134.0)	1421 (145.0)	φ200	200	φ50	280
SE-25H	1568 (160.0)	1960 (200.0)	2156 (220.0)	φ200	300	φ50	380
SE-40H	2489 (254.0)	3126 (319.0)	3430 (350.0)	φ250	300	φ60	440
SE-60H	4155 (424.0)	5194 (530.0)	5684 (580.0)	φ300	350	φ70	620
SE-80H	5341 (545.0)	6664 (680.0)	7350 (750.0)	φ300	450	φ70	720

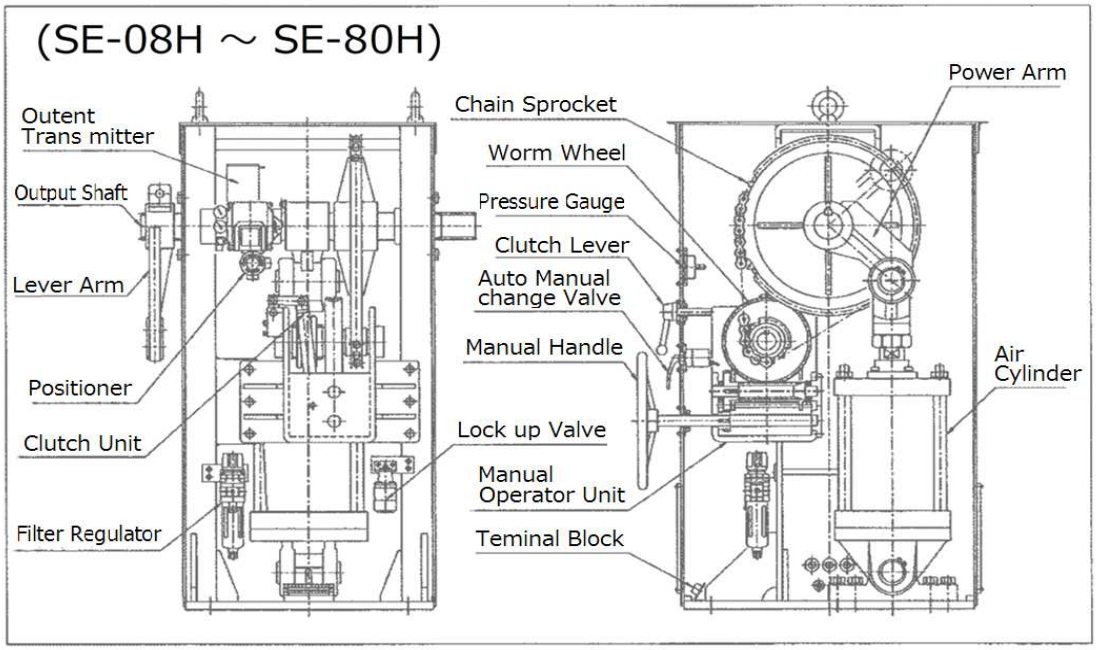
3. Structure

Please refer to the figure below, in inspection and maintenance of control drive.

3-1.Manual lever type



3-2.Handwheel type



4. Transportation and installation

4-1.How to carry

To lift the control drive, please insert the hook into the eyebolt at the top of the frame. (Figure 4-1)

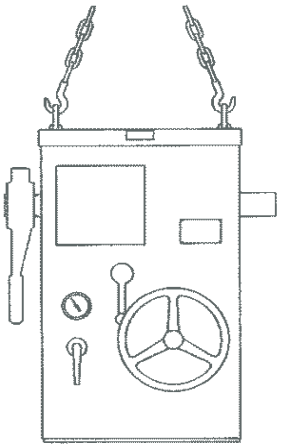


Figure 4-1

4-2.Where to install

The installation site must a firm, level floor
as to withstand the output of the control drive.
Please select the location does not interfere with the lever arm and the link mechanism of control drives.
Recommended to keep space for mainteance around the unit, 600 mm or around.

4-3.Installation

① Remove the cover in front and rear,
confirm to secure the control drive with a total of four anchor bolts.
Anchor bolts and nuts tightened sufficiently.
Please use the wrench and offset so as not to loose.

② Please take care for the below when to connect linkage.
To keep rated torque, lever arm and linkage lever(turnbuckle) should make right angle(i.e. 90°) at 50% open.(Figure4-2)

Atenttion: Mounting angle of the lever arm can be changed at the position of 360 °
by 10° to 20° against output shaft.
The link is connected correctly to match its center line with the center line of lever arm. (Figure4-2)

The lever arm is connected to the torque shaft with spline and movable to the direction of torque shaft, in order for fine-adjustment.
In moving lever arm, please make sure that spline joint has enough biting length.

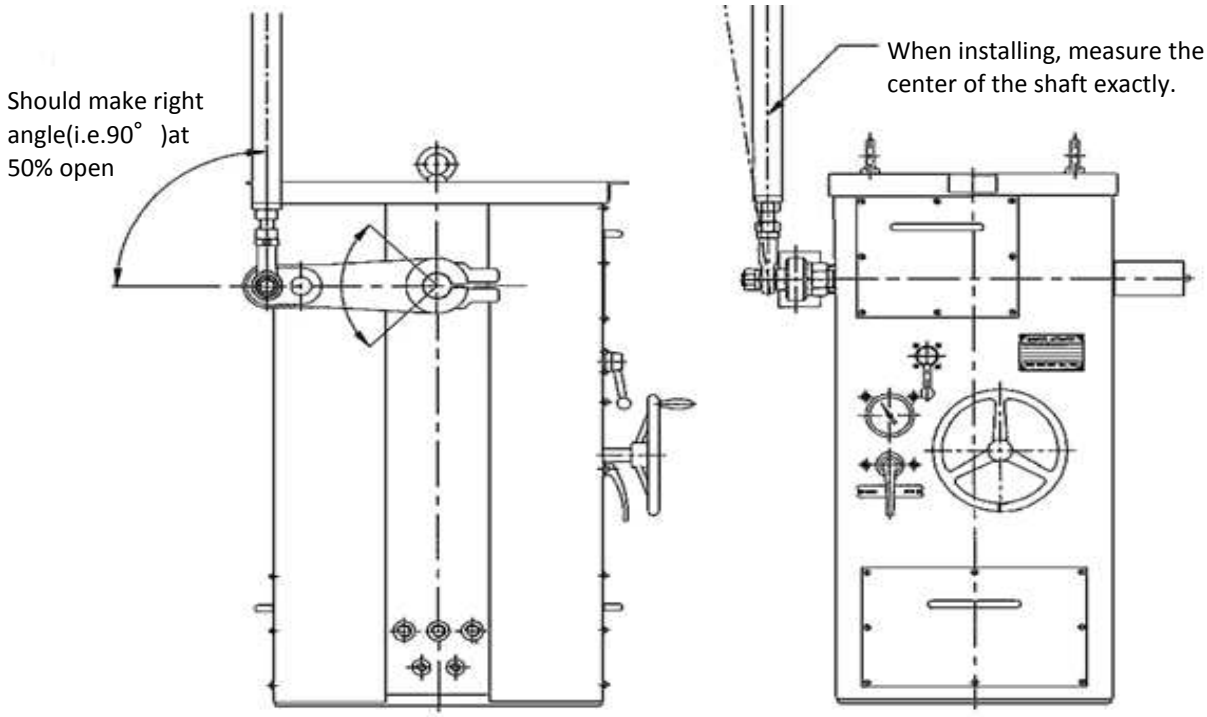
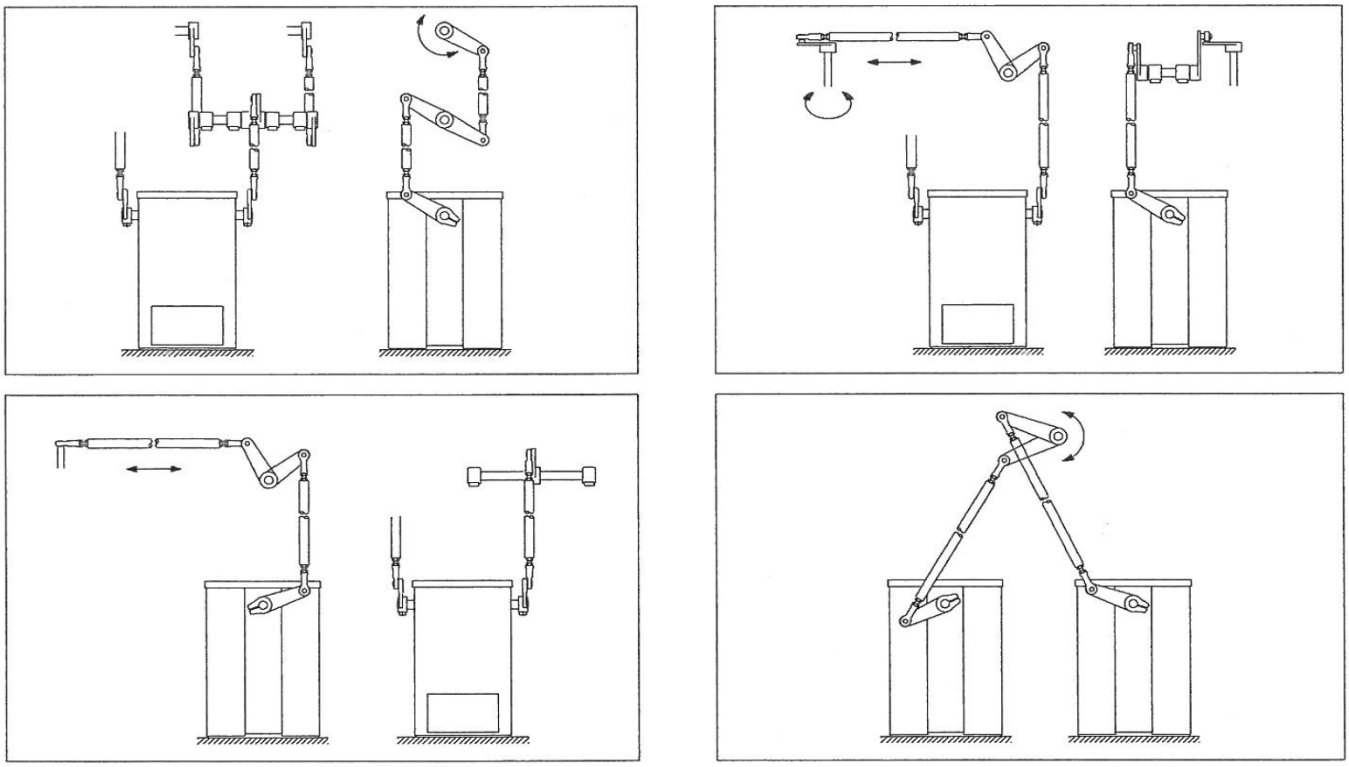


Figure4-2

4-4.Examples of installation



5. Piping and Wiring

5-1.Air piping connection

Supply pressure is connected to the air supply connection(PT1/4) in Figure 5-1.

Dirt in pipe may cause failure of the positioner or solenoid valve.
Please always flushing the tube before connecting.

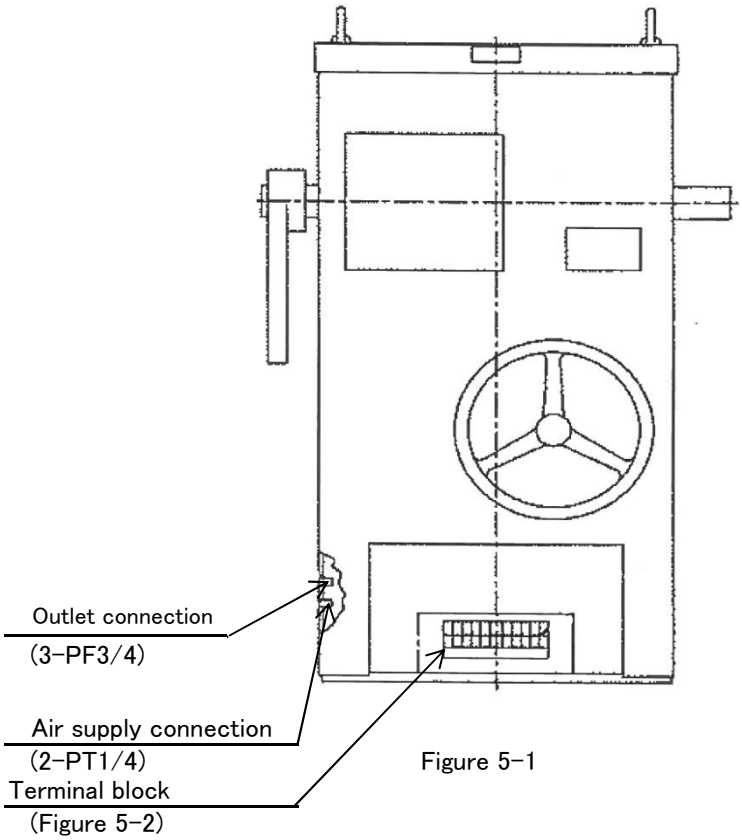


Figure 5-1

1	2	3	4	P	N	P1	N1	R	T	R1	T1

Type of switch	Number of terminal	Specification
Limit switch	1,2	Open
	3,4	Close
Electro-pneumatic positioner	P(+)	DC 4～20mA
	N(−)	
Feedback signal	P1	DC 4～20mA
	N1	
Power source for feedback signal	R	AC 110V/220V
	T	
Power source for space heater	R1	AC 110V/220V
	T1	

Figure 5-2

5-2.Electrical wiring

① There are three connection mouths for outlet connection.
Use 2-PT3/4 outlet for electric wiring. One remainder is a spare.(figure 5-1)

② Please be careful so that rainwater does not invade the control drive inside when wiring.

③ When an electrical component of non-explosion proof type is installed in the control drive, the wiring between the terminal stand and the electrical components is finished in the factory.

④ When the wiring connection from electric units of pneumatic drive to a terminal stand is done, please connect wiring to a terminal according to a wiring distribution diagram and numbers marked on the top surface of terminal. (figure 5-3)

(Example of wiring)

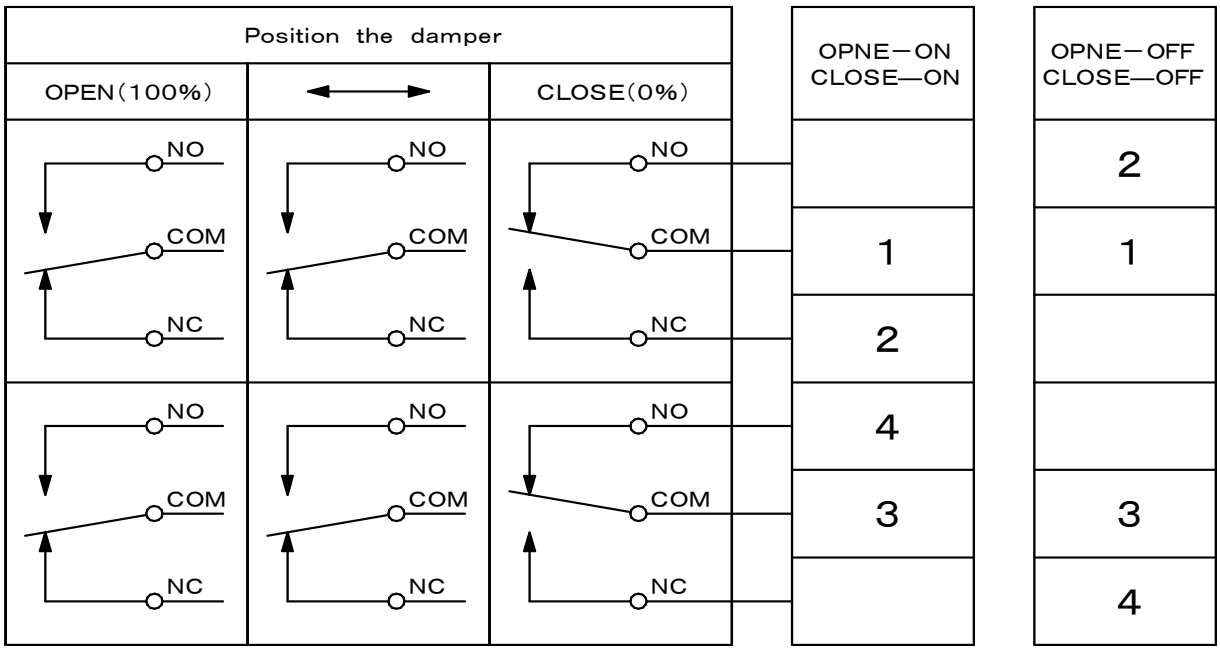


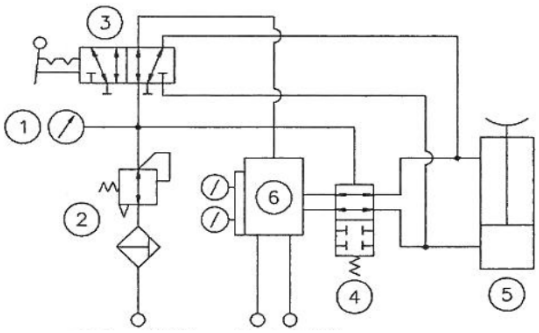
Figure 5-3

6. Auto/Manual Switching

6-1.Explanation about the piping

To change operation from Auto to manual, use Auto-Manual Change valve.
Once Auto-Manual Change valve is set to MANUAL, the air supplied to the positioner is shut down.
At the same time, upper and lower room of air cylinder is connected with bypass, and operation is set to manual.
(Please refer to 6-2. Switching procedure of the automatic - manual operation)

Automatic control

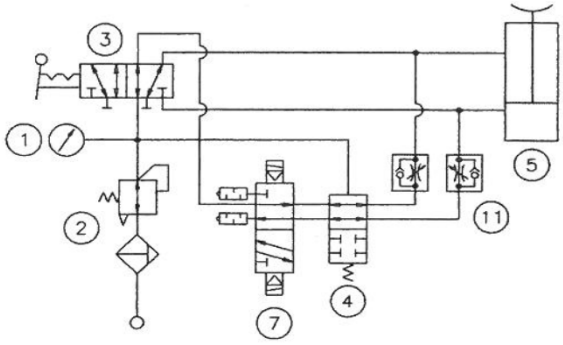


Air supply Input signal

・Air accessories

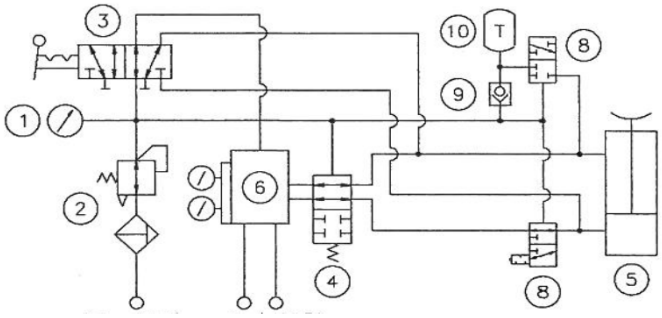
1. Pressure gauge
2. Filter regulator
3. Auto-Manual Change valve
4. Lock up valve
5. Air cylinder
6. Positioner
7. Solenoid valve
8. Master valve
9. Check valve
10. Spare pressure tank
11. Speed controller

Controling ON-OFF



Air supply

Auto shut(open) control

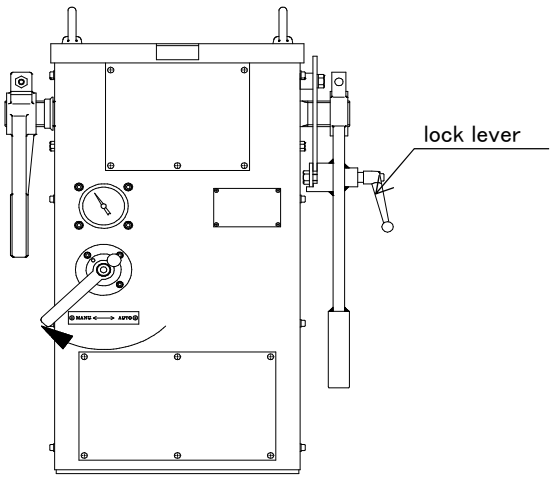


Air suppy Input signal

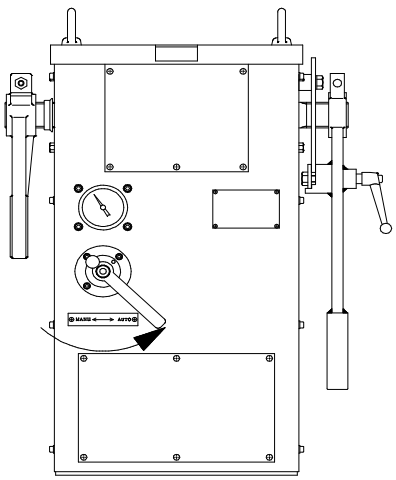
6-2.Switching procedure of the automatic - manual operation

1) Manual-operation of the lever model (SE-01 - SE-05H)

The manual lever and output lever is directly connected, so as for easy operation.
To switch to manual operation, put the knob of Auto-Manual Change valve in the front of control drive to "MANUAL".
At the time, the output torque of control drive falls. If the unit is in operation,
please close the lock lever at the upper part of manual lever to clockwise to lock manual lever.
To restore auto operation, please input signal to set the same position as control drive indicator
and then switch the Auto-Manual Change valve to "AUTO".



Autol→Manual



Manual→Auto

2) Hand-operation of the wheel handle model (SE-08H – SE-80H)
To switch from Auto operation to Manual operation, please follow the procedure of a explanation plate in the front of the control drive unit.

A. switching from Auto operation to Manual operation
Please turn a clutch lever below the small window to manual position (position manual clutch is ON).

Attention: In case the clutch does not go well, turn the wheel handle to the suitable direction where the clutch bites well.

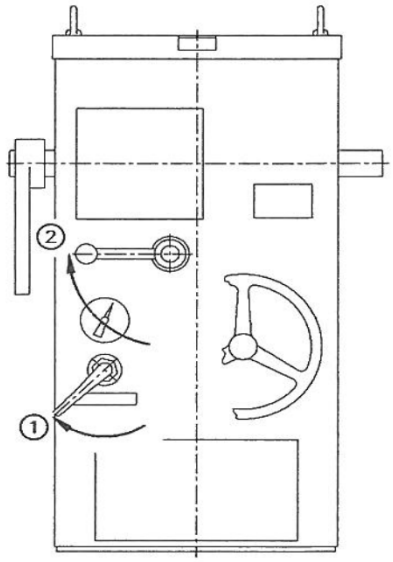
Please turn a Auto-Manual Change valve below input signal pressure gauge to the Manual position.

B. Switching from Manual operation to Auto operation
When the input signal is sent, please turn a Auto-Manual Change valve below the input signal pressure gauge to the Auto position.

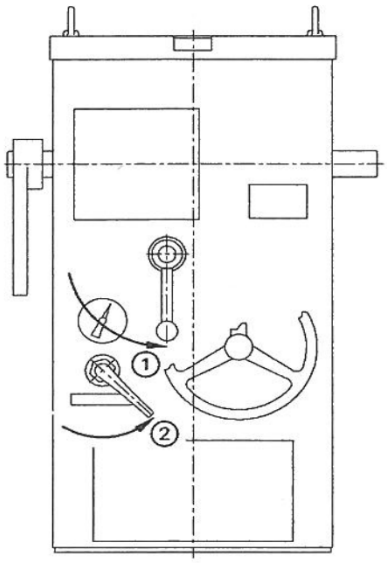
Please make an input signal agree with the position, where the wheel handle can move easily.
Once the input signal and the position agree, the clutch lever can be set to Auto position.
(position manual clutch is OFF)

Attention: Please finish this switching procedure for sure.
If not, the trouble may be caused, such as the spline of the clutch unit being damaged.

Attention: To avoid the damage of the clutch unit, switching from auto operation to manual operation shall be done while the drive unit keep still.



Auto→Manual



Manual→Auto

7. Adjustment of accessories

7-1.Positioner (Please refer to the positioner manual for detail)

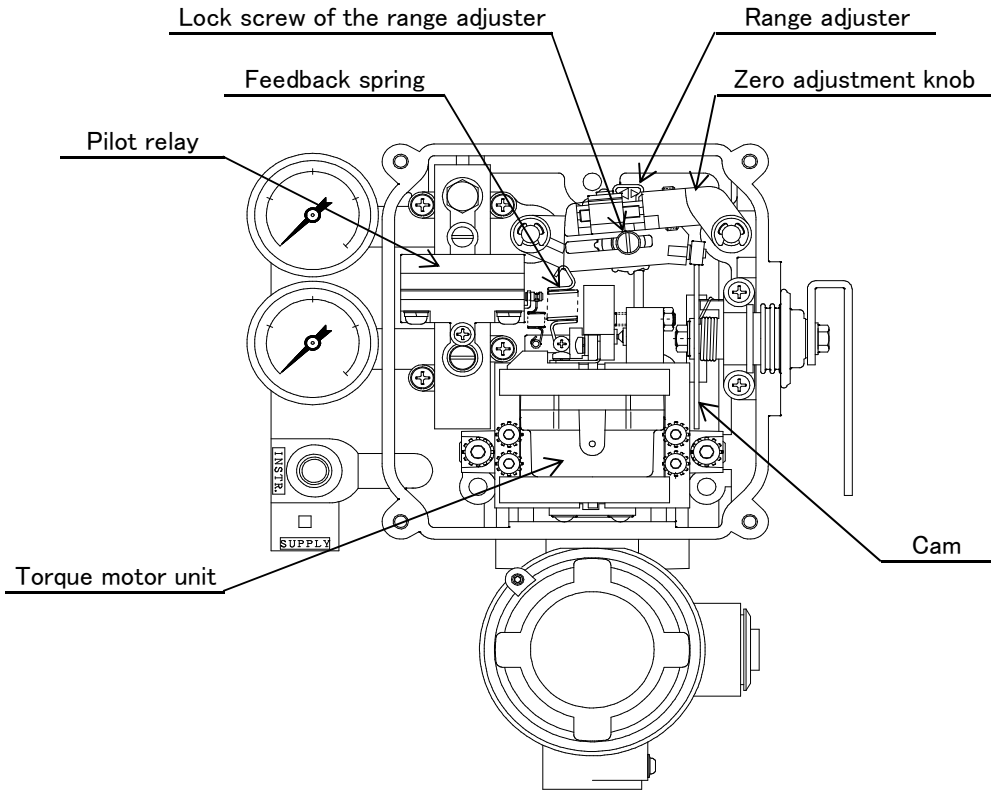
The start position of cam should agree with the contact point of cam roller, at 0% (or 100%) signal of drive units.

First, please send an input signal of 4mA, and, regulate the tension of the spring with a zero adjustment knob so that the position of the drive unit becomes 0%.
Next, loosen the lock screw of the range adjuster in the range of 4to20mA input signal to be able to operate a drive unit by a full stroke.

Please do zero adjustment again because zero point change when the range adjuster is moved.
Please continue a readjustment and the span adjustment of zero point,
so the position to be 50% (22.4% for square-law cam) at12mA input signal.

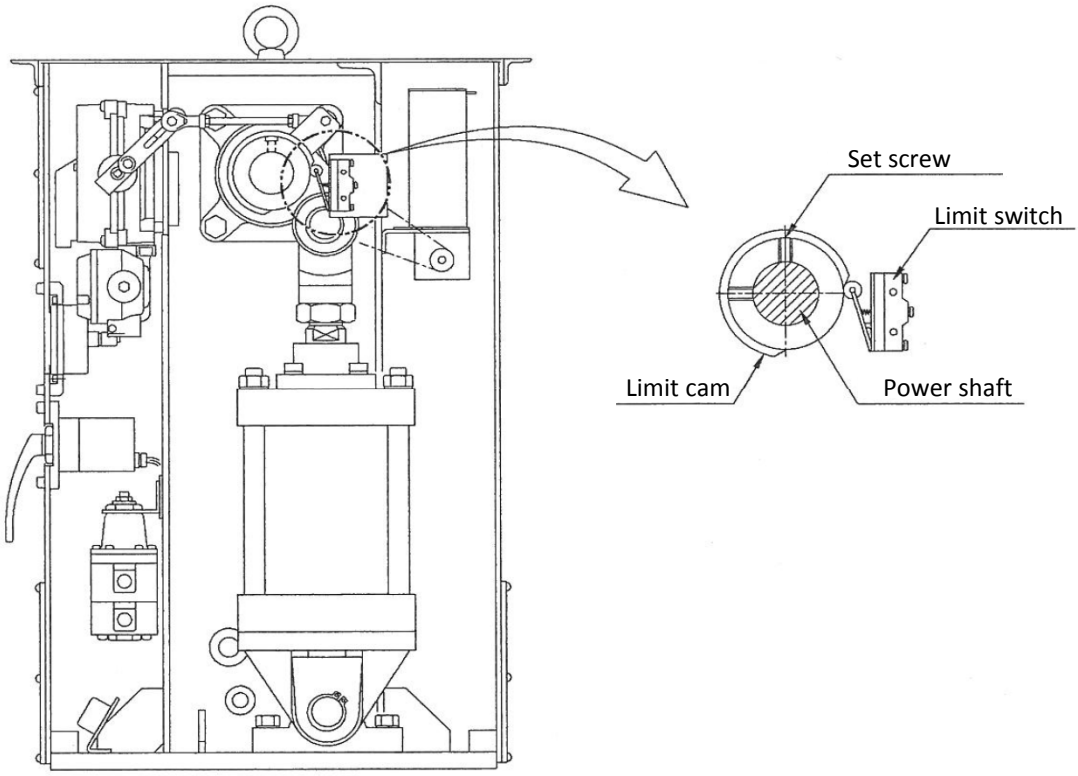
After this adjustment pneumatic drive works in a full stroke in response to the input signal of 4to20mA.
Please make sure to tighten a lock screw after span adjustment.

If linearity is out of range(±3), please adjust the length of turnbuckle and lever arm.
Turnbuckle is connected to the feedback lever of positioner.
Lever arm is connected to the output shaft of control drive unit.



7-2.Limit switch

The position of the limit switch is adjusted at the factory.
In most case no need for adjustment.
In case adjustment of operating point is necessary, loosen the screw of a cam attached to the output shaft, and adjust the position of the cam.



8. Changing rotate direction of output shaft

8-1.Direct Action

When the piston of the power cylinder moves to the upper direction by signal increase, it is called Direct Action.
In the view from the right side, output shaft turns counter-clockwise.

8-2.Reverse Action

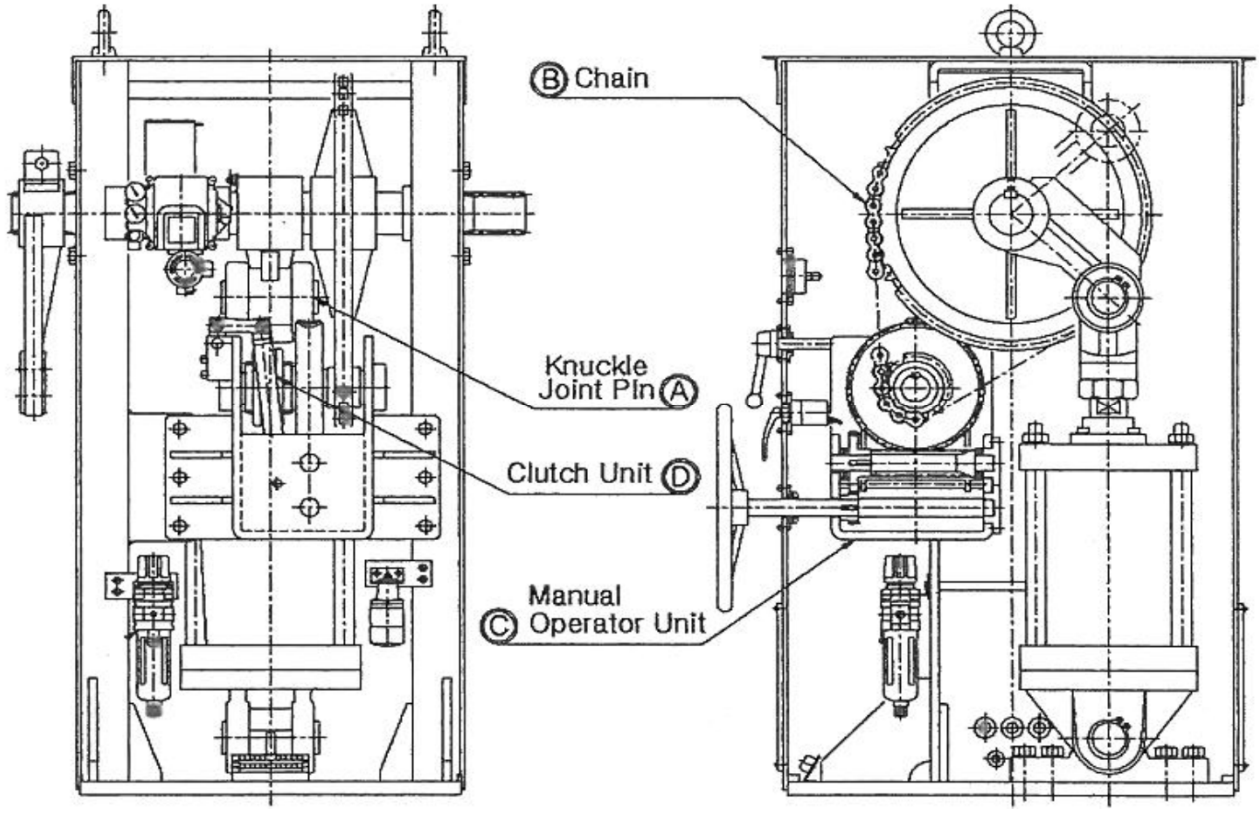
When the piston of the power cylinder moves to the lower direction by signal increase, it is called Reverse Action.
In case of the reverse action, the output shaft moves the opposite direction of Direct Action.

8-3.When switching from the Direct Action to Reverse Action,

1) Please exchange plumbing connection of the output mouth of the positioner, or, please exchange the plumbing connection of cylinder at the lower part and the upper part.
2) Remove the cover of the positioner and turn a cam incorporated in the positioner to the opposite side, (please confirm the marking of the cam front.)
To switch from the Reverse Action to the Direct Action, please reverse the procedure above.

9. Maintenance

①At least two times a year, please place the following designated oil.
②Please check whether a main part and a wheel handle system work normally every three months.
③Please check the packing of the power cylinder once a year and change the packing if necessary.



List of lubrication

Position	A Knuckle Joint Pin	B Chain	C Manual Operator Unit	D Clutch Unit
Quantity	5cc	20cc	100cc	5cc
Period	1 year			
Grease	general grease for machinery			

At the beginning, lubrication is not necessary because of its enclosed structure, but depending on the ambient environment, occasional lubrication in appropiate period is required.

10. Periodical inspection

Please maintain periodically, with reference to the table of periodical inspection below.
Please refer to the 3.Structure (page 3) and 9.Maintenance (page 10) for arrangement of parts and units.

When detaching the units, be sure to prevent the falling or unexpected moving,
stopping the supply air and supply power, and exhaust enough from each units.
When restarting, be sure to prevent the pop out of the parts pushed by the air pressure.

Table of Periodical inspection

○Check (exchange defective article) ◇Check&Cleaning ■Exchange △Check, Applying grease

Unit	Period (year)					Description
	1	2	3	4	5	
Clutch unit Knucle joint pin Chane sprocket Manual operator unit Manual handle Output shaft Lever arm Power arm Arm wheel Clutch lever	△	△	△	△	△ ○	indicator error may increase damage to the moving element wearing of the moving element garbages
Filter regulator					○	looseness of screws
Lock up valve					○	degradation
Pressure gauge	○		○		○	degradation, wearing
Auto/Manual switch valve	○	○	○	○	○	dirt, stuck
Electronic transmitter Limit switch Terminal block	○		○		○	looseness of terminal screws
Positioner	Refer to the positioner manual					
Air Cylindar (Packings are encouraged to be replaced by motion 1000㎞ or 5 years)	◇		◇		○	wearing or damage of the rod damage or degradation of packings

11. Maintenance of the cylindar

11-1.How to dismantle the cylindar

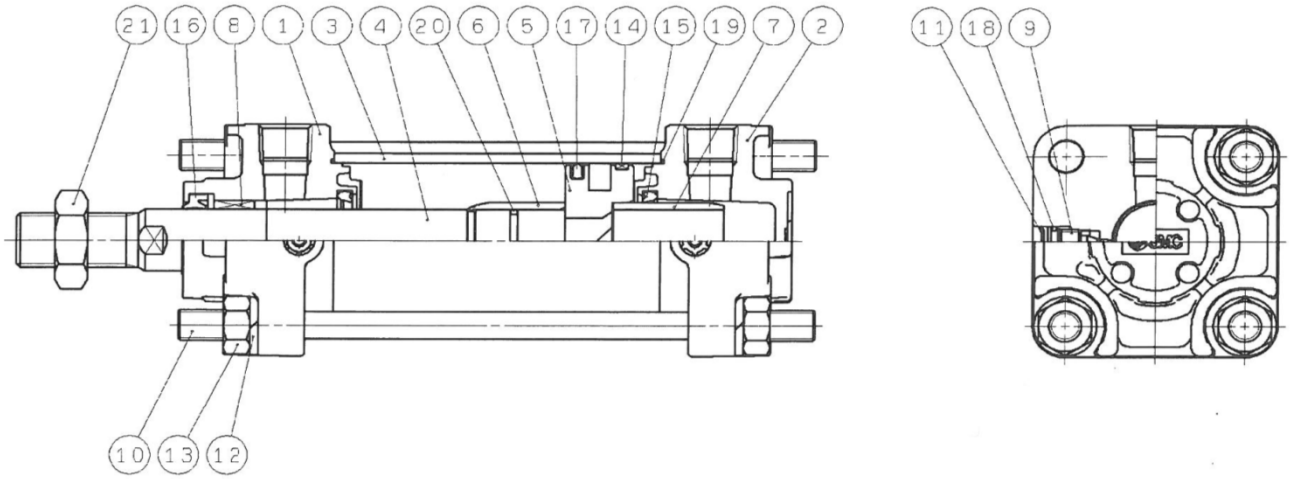
* Dismantling shall be done in the open dustless space.
* When dismantling the cyllindar, please protect the plumbing so that objects will not invade inside.
* When dismantling, take care not to hurt the sliding portion (piston rod or inside tube).
* When pulling up rod cover from piston, please confirm no burrs are found at the point of piston rod. If found, please remove the burr to protect packing and bush.

1) Loosen a nut of tierod with socket wrench, and remove from tierod.
2) Remove 4 tierods from cover.
3) Pull up the rod cover from piston rod. Take care not to hurt the packing or bush.
4) Pull straight the piston rod, and remove from cylinder tube.
5) Remove piston packing with hands.
   Push one side of piston packing and pick up the other end.
   Please refrain from using screwdrivers so as not to hurt.
6) Remove cylinder tube from head cover.
7) Dismantle cover. (Rod cover or head cover)
   7-1) Remove Cylinder tube gasket.
   7-2) Remove rod packing by precision screwdrivers. Take care not to hurt.
   7-3) Remove cushion packing.
   * Bush is press-fitted in to the rod cover and hard to remove from it.
     If defected, please exchange the whole rod cover assembly.

11-2.Assemble of packings

* Apply grease to the packings.
* Take care not to set the rod packing and cushion packing in the wrong way
* Concerning the packing other than rod packing and cushion packing,
  apply grease rubbing to the inner side of bush after setting the packing.
* When exchanging a packing, please exchange all the packings.

11-3.Cylindar structure



11-4.Parts table

No	name	qty	materials	description
①	rod cover	1	Aluminum diecast	Metalic paint
②	head cover	1	Aluminum diecast	Metalic paint
③	cylindar tube	1	Aluminum alloy	Hard anodized aluminium
④	piston rod	1	Carbon steel	Hard chrome plating
⑤	piston	1	Aluminum alloy	Chromate
⑥	cushion ringB	1	Brass	
⑦	cushion ring	1	Brass	
⑧	bush	1	Leaded bronze castings	
⑨	cushon valve	2	Steel wire	Nickel plate
⑩	tierod	4	Carbon steel	Corrosion resistance unichrome
⑪	stopper ring	2	Spring steel	
⑫	spring nut	8	Steel wire	Unichrome
⑬	tierod nut	8	Rolled steel	Nickel plate
⑭	wear ring	1	Resin	
⑱	cushon valve packing	2	NBR	
⑳	piston gasket	1	NBR	
㉑	rod end nut	1	Rolled steel	Nickel plate

11-5.Exchangeable parts(packing set)

No	name	qty	materials
⑮	Cushon packing	2	Urethane
⑯	Rod packing	1	NBR
⑰	Piston packing	1	NBR
⑲	Cylindar tube gasket	2	NBR

Packing set includes each items above.

11-6.Packing set order number

Tube dia	Order number
ϕ100	MB100-PS
ϕ125	CS1N125A-PS
ϕ160	CS1N160A-PS
ϕ180	CS1N180A-PS
ϕ200	CS1N200A-PS
ϕ250	CS1N250A-PS
ϕ300	CS1N300A-PS

Please place an order by order number conforming dia of cylindar tube.

*Packing set includes glease pack.