Discontinue

SM-1741-A

INSTRUCTION MANUAL

FOR

MODEL SELEX CONVERTER UNIT

Please read this operation manual carefully before using this product, particularly the section describing safety.

Retain this operation manual with the product for further consultation whenever necessary.

CKD Corporation

For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, read this operation manual carefully for proper operation.

Observe the cautions on handling described in this manual, as well as the following instructions :

⚠ Precautions

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

Thank you very much for purchasing the CKD's products.
This SELEX CONVERTER UNIT is a fruit of our long years of accumulated experience.

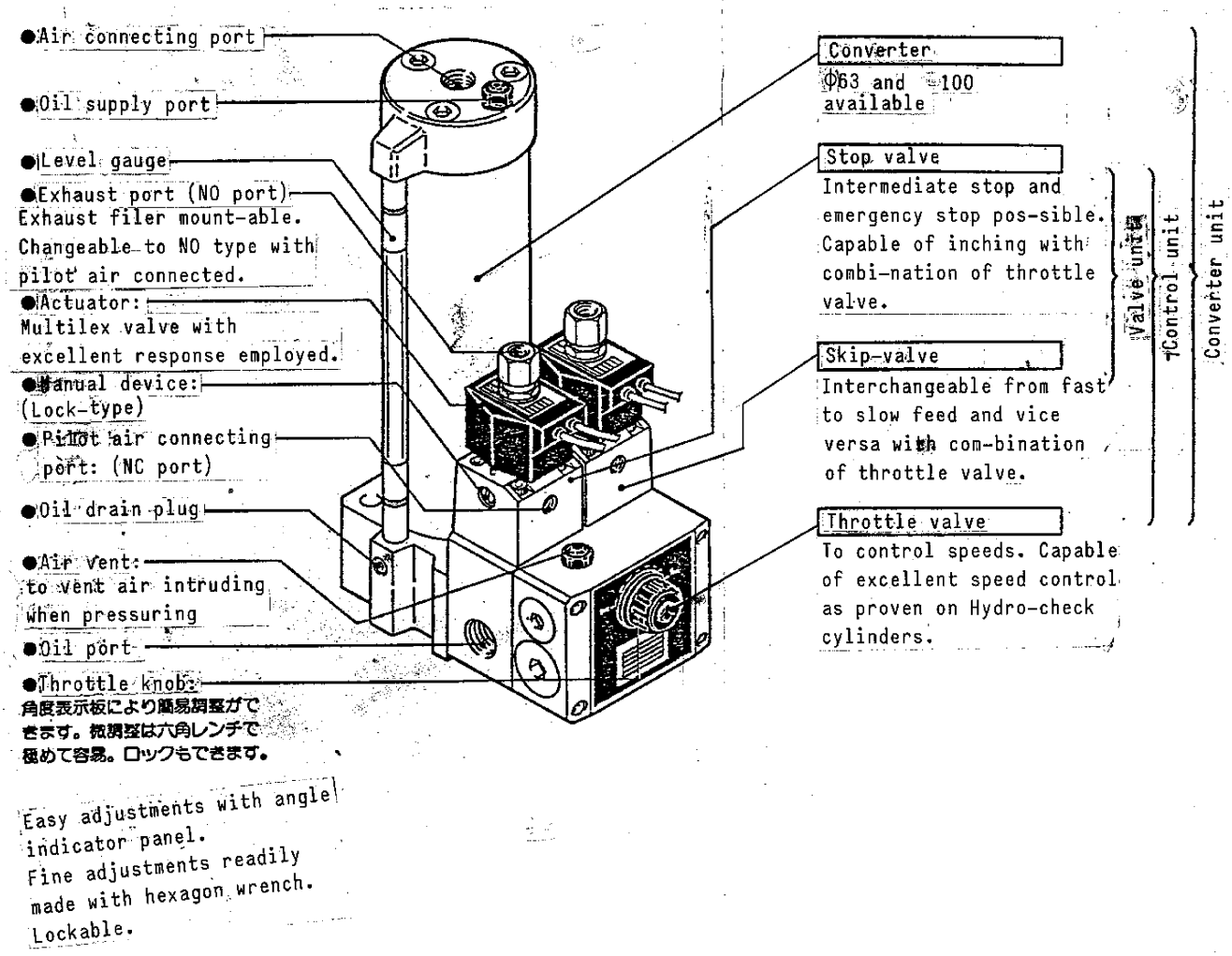
This INSTRUCTION MANUAL deals with the basic items regarding the installation, operation, maintenance, etc. required for bringing the efficiency of the SELEX CONVERTER UNIT into full play.

Our products are produced under severe quality control

You are requested to throughly read through this INSTRUCTION MANUAL before using the regulator, and to perform correct operation and maintenance.

CONTENTS

1. General description of product



2. How to see the Model Number

Converter unit

(C U) (A)-(B)-(C)(D)-(E)(F)(G)

Example of model code

● CU63 - 100 - 32 - 1

Converter unit	
(A)	Converter tube I.D. ϕ63 mm
(B)	Converter stroke 100 mm
(C)	Valve unit with stop-valve, skip-valve
(D)	Flow control range of throttle valve 0.1 - 28 ℓ/m
(E)	AC100V 50.60Hz AC100V 60 Hz

Converter

(C U T) (A)-(B)

● CUT100 - 200

Converter	
(A)	Converter tube I.D. ϕ63 mm
(B)	Converter stroke 200 mm

Control unit

(C U C) (C)(D)-(E)(F)(G)

● CUC10 - 22E1

Control unit	
(C)	Valve unit with stop-valve
(D)	Without throttle valve
(E)	AC200V 50/60Hz, AC220V 60Hz
(F)	Grommet coil with DIN terminal box
(G)	NC piping port with exhaust filter

Ⓐ Tube I.D.		Ⓑ Stroke (mm)		Ⓒ Valve unit		Ⓓ Throttle valve (Flow control range	
Mark		ϕ 63	ϕ 100	Mark		Mark	
63	ϕ 63	50	200	0	Without stop & skip valves	0	Without throttle valve
100	ϕ 100	100	315				
		200	400	1	With stop valve	1	0.06 - 3.5 ℓ/min. (option)
		315	500	2	With skip valve		
		400	630	3	With stop & skip valves	2	0.10 - 28 ℓ/min. (standard)
		500					

Ⓔ Voltage		Ⓕ Coil (option)			Remark
Mark		Mark			
		Non mark		Grommet coil lead wire	AC
1	AC100V 50/60Hz	2	E	Grommet coil with DIN terminal box *	
	AC110V 60Hz	3	K	Open frame coil with sq. terminal box *	AC,DC
2	AC200V 50/60Hz	2	G	Grommet coil with DIN terminal box	AC
	AC220V 60Hz	2	H	Grommet coil with DIN terminal box & lamp	
3	DC24V	3	A	Open frame coil B-grade mold	AC,DC
4	DC12V	3	H	Open frame coil with lamp and B-grade mold sq. terminal box *	
5	DC48V	5	A	Open frame coil with B-grade mold, diode incorporated	AC
6	DC100V	5	K	Open frame coil with B-grade mold, diode incorporated, sq. teminal box *	
7	Others	5	H	Open frame coil with B-grade mold, diode incorporated, sq. teminal box *	
9	Air suction (Manufactured upon order)	4	A	Open frame coil, H class coil	AC
		4	H	Open frame coil with lamp, H class coil, sq. terminal box *	

* PF 1/2

Ⓖ Exhaust filter	
Mark	
Non mark	Without filter
1	Pipe connecting port for NC
2	Pipe connecting port for NO

3. Caution in installation and piping

3-1 Installation

(1) Always mount converter unit and converter vertically.

(2) Mount converter unit and converter at the places where the lower limit of fluid surface in converter should be higher than the upper limit of fluid in actuator. (Provide a vent plug on the top of fluid part in actuator if it should not. See Fig. 4.)

3-2 Piping

(1) For piping after filter, use corrosion resisting materials.

(2) Blow off foreign matters and chips in pipe before piping.

(3) Excessive difference in internal diameters of pipes in piping can not ensure steady speed.

(4) Specified speed can not be obtained if jointed parts are choked or there are many parts bent 90°.

(5) When piping to products, give attention to the amount of sealing agent and the place to apply it on, and to the place to bind sealing tape on, in order to prevent sealing agent and tape from coming into the pipe.

(6) Connect converter unit and control unit in the direction of control (meter-out control) of driving devices.

(7) Check to see there is no leaks in connected part after piping.

4. Oiling

The most appropriate oiling is to fill oil from a port after vacuumizing with vacuum pump from the other port, by utilizing an air connecting port and oil supply port on the converter after piping to cylinders. Thus the oil can be filled without air intrusion. (In the case of products with stop-valve, start the vaccum pump after undermentioned ④.)

4-1 Oiling procedure

(A) If the converter is installed higher place than the cylinder (Fig. 2.):

(1) Always travel the piston in the cylinder to the stroke end on which the lubrication is made.

(2) Loosen air vent plug of throttle valve. (Fig. 3.)

(3) If the unit is equipped with the stop valve, apply 0.3MPa pressure to the pilot air supply port of stop valve, and keep the stop valve being OPEN with manual device. (Table 1.)

(4) Open the oil supply plug of converter and fill it with oil.

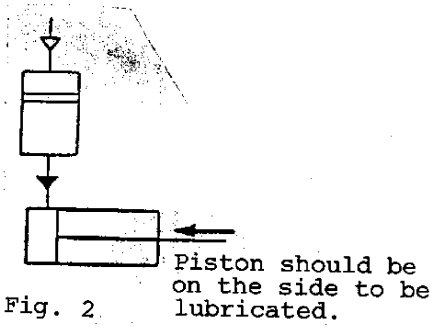


Fig. 2

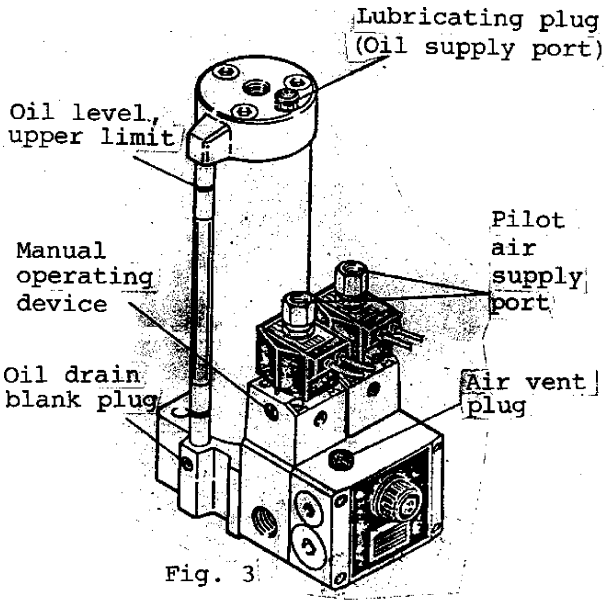


Fig. 3

(5) Close the air vent plug when the air stops flowing out with oil from the air vent plug of throttle valve.

(6) Fill the converter with oil up to the upper limit.

(7) To supply the cylinder installed on opposite side with oil, repeat the steps (1) to (6) in this procedure.

		140	Original position	140
Valve condition	NC type	OPEN	CLOSE	CLOSE
	NO type	CLOSE	OPEN	CLOSE

Table 1

(B) If the converter is installed lower position than the cylinder (Fig. 4.):
(Avoid taking this method as much as possible since it is difficult to vent the mixed air.)
On the steps (2) and (5) in the above procedure, use the air vent plug provided on the highest position of the oil used in the cylinder in stead of air vent plug of throttle valve
On the step (4), apply 0.05MPa pressure to the air supply port of converter to make oil folw into the cylinder. Follow the above procedures for other steps of oiling.

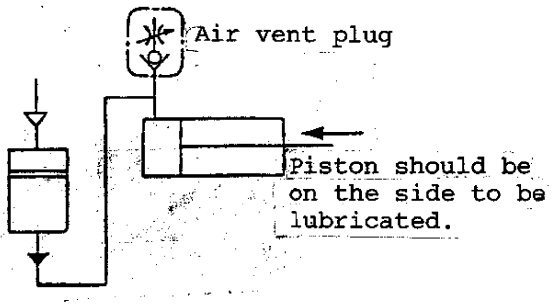


Fig. 4

4-2 Work oil

(1) Use hydraulic oil with viscosity of 20 to 100mm/s at the temperature ranging from 5 to 50 ℃.
Noninflammable hydraulic oil, machine oil and spindle oil can not be used.

(2) Recommended oil
We recommend you to use the hydraulic oils listed below, with viscosity of 40mm/s at the specified working oil temperature.

FUJI KOSAN:		Fukkol Hydrol X 22
NIPPON OIL:		Super Hydrand 22
MITSUBISHI:		Diamond Power Fluid 18
SHELL	:	Shell Tellus C22
ESSO	:	Unibis J26
MOBIL	:	Bell City No. 10
MARUZEN	:	Swa Fluid 22

4-3 Changing oil

(1) Change oil, when the oil is contaminated, emulsified, discolored or degraded, with new one.
IMPORTANT: Always use the same kind of oil when changing.

Appearance	Odor	Conditions	Remedy
Transparent and no change in color	Good	Good	Usable
Transparent but light in color	Good	Other kind of oil is mixed	Check for viscosity, use if possible
Changed into milky color	Good	Air bubble or moisture is mixed	Separate the moisture. (by the maker)
Changed into dark brown color	Malodor	Oxidized due to deterioration	Change oil
Transparent but there is small black spots	Good	Foreign matters are mixed	Filter the oil and use.

Table 2. Visual method to judge oil

(2) Drain oil after releasing the pressure (internal pressure by compressed air load) in the converter unit. When draining the oil in the converter, drain it out of blank oil drain plug shown in Fig. 2.

5. Operation and adjustments

5-1 Manual operation

It is convenient to use manual control device of stop valve or skip valve during trial operation or oiling. (See Fig. 5.)
Turning the manual control device clockwise from the original position (as shown in Table 1) makes the valve (NC type) open and returning it to the original position (about 140 degree in counterclockwise direction) makes the valve close.
The NO type valve actuates just in the opposite manner to the NC type.

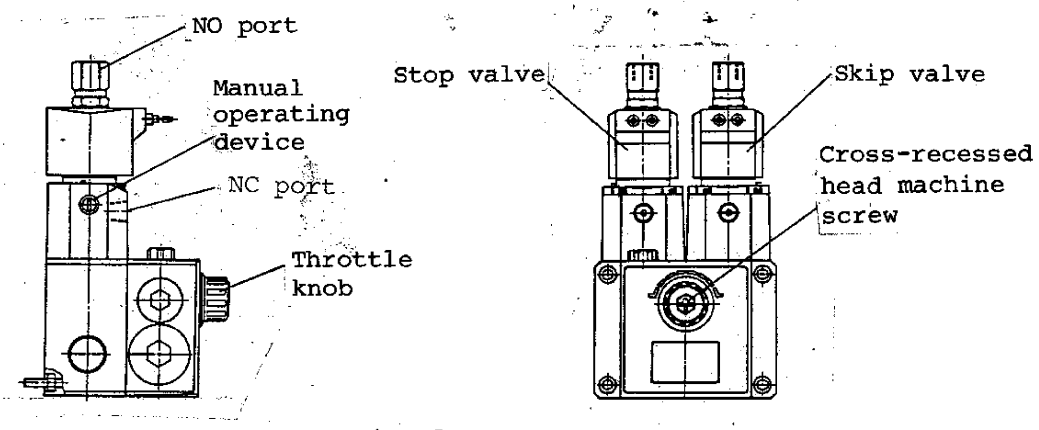


Fig. 5.

5-2 Flow control

(1) Loosen the cross-recessed head machine screw (M5) to release the lock.

(2) Regulate the flow to the specified rate with the throttle knob.
(The piston speed will increase when the knob is turned counterclockwise. Fine adjustments can be made through the hexagon hole (width 10), inserting the hexagon wrench.

(3) Lock the throttle knob by tightening the cross-recessed head machine screw.

5-3 Intermediate stop and 2-step speed change over for fast feed (slow feed)

(1) Both stop valve and skip valve are of pilot-poppet type. The valves are changed over by controlling pilot air by turning ON and OFF the coil.

(2) Both stop valve and skip valve become normal closed type when they are connected to NC port. On the other hand, they become normal open type when they are connected to NO port.

(3) In the normal close type, the valves will close at emergency or when the pilot air is 0.3MPa or below. The stop valve will stop the piston at the intermediate position and keep its position. Also the skip valve will control the cylinder speed from fast feed to slow feed depending upon the degree of opening of the throttle. In the case of normal open type, the valve opening and closing motions reverse and the operating conditions of cylinder will vary.

6. General precautions

(1) Use clean compressed air with less moisture. (Recommended filter: 1137-2CE)

(2) In case of using the converter unit, the supply pressures to the converter and the valve unit shall be the same (more than 0.3MPa).

(3) Attach a filter to the entrance of exhaust port when the unit is used at dusty place.
(CKD made filter: CU-filter)

(4) Do not use the unit where chemicals are used, otherwise the oil gauge tube (polycarbonate) will be deteriorated. (See Table 3.)

(5) Do not use the unit close to any heating source.
If water temperature rises while the cylinder is stopped at the intermediate position, it will cause the stop valve stop.
(Suitable ambient temperature: 5 to 50 °C).

(6) In the case of single-side hydraulic control type, air and oil may leak inside the cylinder. Make periodic inspections and vent the air and add oil.

(7) Stop the pressure to the converter while the converter is not going to be used for a long time.

(8) Make periodic inspection once or twice a month in order to maintain the converter unit always good condition.

Inspection items

(a) Deterioration of oil

(b) Oil level

(c) Piston speed and change of cycle time

(d) Oil and air leakage to the outside

(e) Actuation of stop valve (whether driving device stops at the intermediate position or not.)

(f) Actuation of skip valve (whether operating speed of driving device changes or not.)

(g) Looseness of screws

Table 3. Table for chemicals resistance

Do not use the unit under the following circumstances.

Division	Chemicals
Acid	Hydrochloric acid, sulfuric acid, nitric acid, fluoro acid, phosphoric acid, chromic acid
Alkali	Caustic soda, caustic potash, slaked lime, aqueous ammonia, potassium carbonate, alkali substance
Inorganic base	Sodium sulphide, potassium nitrate, potassium dichromate, sodium sulpate
Aromatic hydrocarbon	Aryl radical, Benzene, toluene, xylene, ethyl benzene, stylene
Chlorinated apliphatic hydrocarbon	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlene, perchlene, carbon tetrachloride
Chlorinated aromatic hydrocarbon	Chlorobenzene, dichlorobenzen, B.H.C.
Petroleum component	Solvent, naphtha, gasoline
Alcohol	Methyl-alcohol, ethyl alcohol, micro hexanol, benzyl alcohol
Phenol	Phenol, cresol, napthol
Ether	Methyl ether, methyl ethyl ether, ethyl ether, ethylene glycol
Keton	Aetone, methyl ethyl keton, cyclohexane, aceto-phenon
Carboxylic acid	Formic acid, Acetic acid, buthyl acid, acrylic acid, oxalic acid, phthalic acid
Phosphatic ester	Phthalic dimethyl, diethyl, dibuthyl,dioctyl
Oxyacid	Glycolic acid, lactic acid, malic acid, citric acid, tartaric acid

Division	Chemicals
Nitro compound	Nitro methane, nitro ethane, nitro ethylene, nitro benzene.
Amine	Methyl amine, dimethyl amine, ethyl amine aniline, acetanilide.
Nitrile	Aceto-nitrile, acrylonitrile, benznitrile, acetonitrile

7. Maintenance and inspection

7-1 Periodic inspection

Make inspection once or twice a month in order to maintain the converter unit always best condition.

(1) Inspection items

(a) Deterioration of oil

(b) Oil level

(c) Piston speed and change of cycle time

(d) Oil and air leakage to the outside

(e) Actuation of stop valve (whether driving device stops at the intermediate position or not.)

(f) Actuation of skip valve (whether operating speed of driving device changes or not.)

(g) Looseness of screws

If any of the above item is not satisfied, add or change oil, retighten loosened parts, or disassemble to correct troubles.

(2) Disassembly and inspection items

(a) Flaws and settling on plunger surfaces

(b) Flaws and settling at valve seat of cylinder block

(c) Flaws and wear and tear on the internal surfaces of cylinder block

(d) Flaws, wear and tear on piston surfaces

(e) Flaws on valve stem, flaking and rust on plating

(f) Flaws and settling on valve body and valve seat

(g) Foreign matters caught in throttle groove

(h) Flaws, wear and tear on packings at sliding parts

(i) Deformation of fixing gasket in use for years

If any of the above item is not satisfied, repair or replace with new parts.

7-2 Disassembly and reassembly

(A) Disassembling

1) Disassembling of converter unit (Fig. 6.)

(a) Always turn the power off, stop supplying compressed air, and release residual pressure and oil before disassembling.

(b) Disconnect all pipings and wirings connected to the device.

(c) The device can be separated to each sub-component by removing hexagon socket head bolts on the front of throttle valve. Disassemble each sub-component in conformity with the procedures mentioned below.

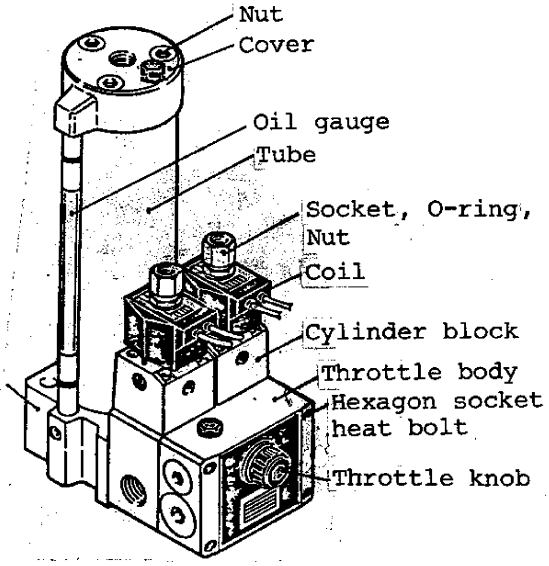


Fig. 6

2) Disassembling of converter (Figs. 6 & 7.)

(a) The cover, tube, oil gauge and cap can be separated by removing the nuts on the top of converter.

(b) The partition plate can be removed by removing the cover and hexagon socket head bolts inside the cap.

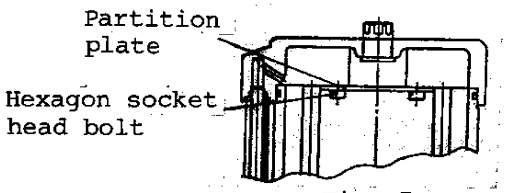


Fig. 7

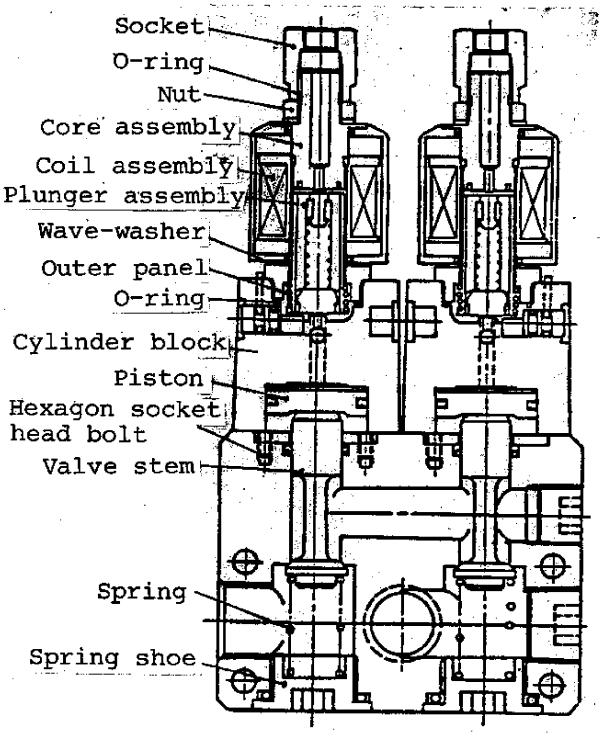
3) Disassembling of valve unit (Fig. 8.)

(a) The coil and wave-washer can be taken off by removing the socket, O-rings and nuts.

(b) The plunger, outer springs and O-rings can be taken off by removing the core-assembly.

(c) The cylinder block and packing can be taken off by removing the hexagon socket head bolts. Shake the cylinder block to separate the piston by means of inertia.

(d) The spring and valve stem can be taken off by removing the spring shoe.



4) Disassembling of throttle valve (Fig. 9)

(a) The throttle knob and throttle can be taken off by removing the cross-recessed head bolt in the middle of throttle knob.

(b) The spring and steel ball can be taken off by removing the spring shoe.

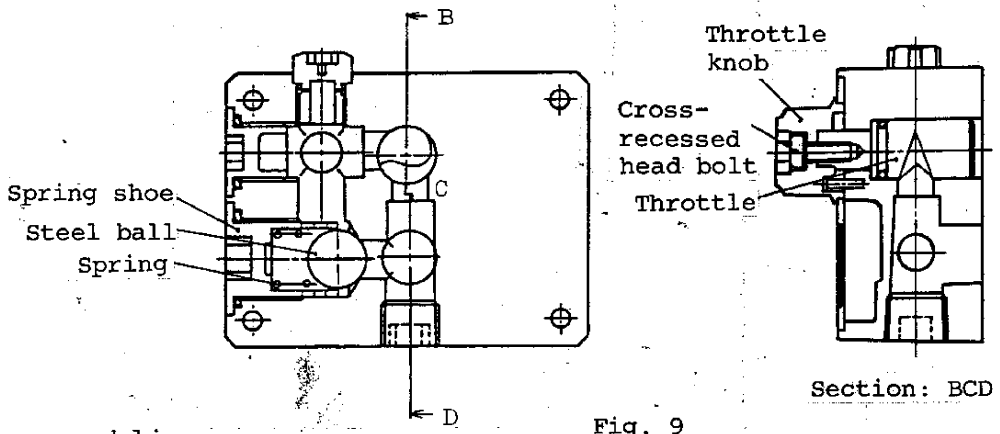


Fig. 9

(B) Reassembling

(1) Wash or clean each part. Do not wash in organic solvent.

(2) Carefully assemble by reversing disassembling procedure, after washing or cleaning.

(C) Inspection

1) Leakage inspection

(a) Apply pressure (in use) to the air supply port of converter and check leakage from each sealing part.

(b) Internal leakage inspection

i) Sealing part of plunger

Apply 0.5MPa pressure to a pilot air supply port of either stop valve or skip valve. The leakage at the other supply port be within 10 cm^3 /min (standard at delivery).

ii) Piston sealing part

Apply pressure (in use) to the pilot air supply ports of stop valve and skip valve. The leakage at exhaust port be within 50 cm^3/min (standard at delivery).

2) Operation inspection

Check to see if the sliding parts (plunger, piston, valve stem, etc.) of the stop valve and skip valve should function normally. It is recommended to check the function when the valve unit is separated individually. (The operating condition of valve stem is visible from piping port.)

Apply 0.3MPa pressure or pressure in use to pilot air supply port and employ change-over operation to rated voltage. Make sure of it by means of working condition of driving device when oiling or piping arrangement is made.

8. Trouble-shooting and remedy

Symptoms (driving device)	Cause	Remedy
(1) Does not operate or intermediate stop does not released.	Directional control valve does not function	Check wiring and repair. Repair or replace the directional control valve.
	The power to the stop valve is not turned on. (Power is properly connected in NO type.)	Turn the power on. (Cut off the power.)
	Stop vlave is manually closed.	Correct the rotating position of the manual rod.
	No pressure is applied to the driving device and stop valve.	Apply pressure Increase pressure
	Damaged on piston packing	Replace
(2) Speed is slow	Incorrect selection of throttle valve	Replace
	Excessively large load	Increase pressure.
	A bottom hole of piping port of cyliner is too small.	Make it bigger.
	Pipe connecting port is too small.	Make it larger.
	Pipe is too long.	Relocate the converter unit to shorten the piping.
	Too many bendings (90°)	Correct the piping conditions.
	Oil viscosity is too high	Change with low viscosity oil.
	Oil viscosity index is low	Change with higher viscosity index.
(3) Speed is unstable.	Speed is lower than the lowest feed limit of throttle valve	Correct the throttle valve exchange speed.

Symptoms (driving device)	Cause	Remedy
(3) Speed is unstable	Oil amount is insufficient.	Fill oil up to the specified level.
	Air is mixed. 1. Pressure applied to converter for a long time 2. Extreme difference in internal diameters of pipes 3. Possibility of piping bent 90° (Particularly in higher speed) 4. Loosened screws 5. Internal air leakage of single-side hydraulic controlled cylinder. 6. Lower viscosity index of oil	Vent air and insepct the following items; Stop pressuring. Correct piping. Correct piping. Retighten the screws. Replace piston packing. Replace with higher index oil.
	Misalignment at installation	Correct Alter the mounting style.
	Extreme load variations	Minimize the load variation Increase pressure. Enlarge internal diameter of cylinder.
	Heavy load applied.	Provide a guide. Correct installating condition, alter the mounting style.
(4) Cylinder does not stop at intermediate position	The power to the stop valve is turned on. on. (Power is not properly connected in NO type.)	Cut off the power. (Turn on the power.)
	Stop vlave is manually opened.	Correct the rotating position of the manual rod.
	Damaged springs	Replace
	No pressure (Only for NO type)	Apply pressure Increase pressure

Symptoms (driving device)	Cause	Remedy
(5) Intermediate stop is not kept.	Oil leaks in the cylinder. Loosened screws Damaged poppet valve seat Foreign matters caught in poppet valve seat	Replace piston packing. Tighten screws. Replace Disassemble and clean
(6) Slow feed not possible	The power to the skip valve is turned on. (Power is properly connected in NO type.)	Cut off the power. (Turn off the power.)
	Skip valve is manually opened.	Correct the rotating position of the manual rod.
	No pressure is applied to the driving device and stop valve.	Apply pressure Increase pressure
	Damaged spring	Replace
	No pressure (Only for NO type)	Apply pressure
(7) Fast forward not possible	The power to the skip valve is not turned on. (Power is properly connected in NO type.)	Turn the power on. (Cut off the power.)
	Skip vlave is manually closed.	Correct the rotating position of the manual rod.
	No pressure	Apply pressure Increase pressure
(8) Extreme oil decrease	Loosened screws	Retighten screws.
	Oil leakage from the cylinder rod.	Replace rod packings. Check and correct lateral load.
	Internal oil leakage of single-side hydraulic controller cylinder	Replace piston packing. Check and correct lateral load.
	Oil leakage from the directional control valve 1. Excessive oil amount 2.	Check oil amount Refer to the section "Speed is unstable" in this chart.

9. Expendable parts

Converter section

Expendable parts kit			
Tube I.D. (mm) / Part No. & name		ϕ 63	ϕ 100
Kit No.		CUT-63K	CUT-100K
4	Gasket for cylinder	ARP568-038	G-105
8	Gasket for oil gauge	P-8	P-8
-	Gasket for tie rod	ME9174-2	P-12
-	Gasket for fill plug	ARP568-013	ARP568-013
-	Gasket for cap	P-29	P-36

Note) The gaskets for cap; P29 and P36 are necessary for the converter unit. It is not necessary for only converter.

Valve unit section

Stop and skip vlaves Part No. & name		Stop valve & skip valve	Stop valve	Skip valve
Kit No.		CUC-3XK	CUC-2XK	CUC-1XK
2	O-ring	AN6227B-#7	AN6227B-#7	AN6227B-#7
6	O-ring	ARP568-016	ARP568-016	ARP568-016
9	Plunger ass'y	GD-100171	GD-100171	GD-100171
11	Outer spring	GD-100062	GD-100062	GD-100062
15	O-ring	CE-607280	CE-607280	CE-607280
16	O-ring	AN6227B-#3	AN6227B-#3	AN6227B-#3
20	Piston packing	PGY-30	PGY-30	PGY-30
23	Packing for valve stem	PS-14	PS-14	PS-14
29	Gasket for spring	P-24	P-24	P-24
30	Gasket for valve	P-15	P-15	P-15
32	Gasket for valve	P-21	P-21	P-21
33	Gasket for valve	P-18	P-18	P-18
-	Gasket for blind lid	-	P-28	P-28
-	Gasket for rod	-	P-14	-

Note) In case of the use of CUC-2XK in the stop valve body, P-14 and P-21 can not be used. For converter unit and control unit, P-21 can not be used.

Throttle valve section

Expendable parts kit			
Application / Part No. & name		Converter unit & control unit	Throttle valve
Kit No.		CUC-X2K	CUC-02K
5	Gasket for fill plug	ARP568-013	ARP568-013
6	Gasket for blind plug	P-16	P-16
8	Gasket for spring	P-22	P-22
19	Gasket for throttle	P-12	P-12
	Gasket for spring	-	P-24
	Gasket for valve	-	P-15
	Gasket for valve	-	P-21
	Gasket for valve	-	P-18
	Gasket for blind lid	-	P-28
	Gasket for rod	-	P-14