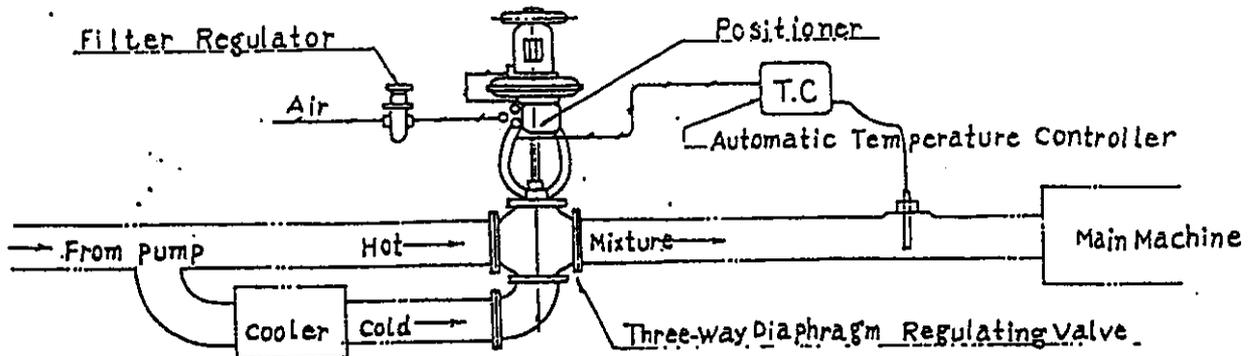




Flow Diagram (Practical Example)

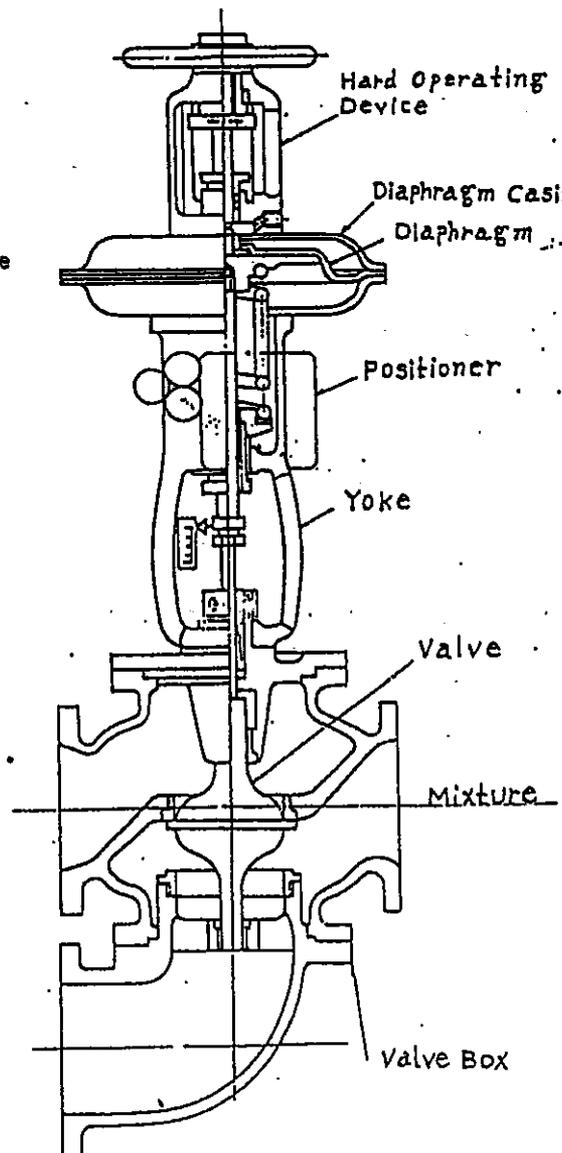


This three-way diaphragm regulating valve, which is put in action by the operating air pressure, is designed to regulate the flow of both the cold and hot fluids in order to keep the temperature of their mixture at a constant degree, and the temperature will be measured by the automatic temperature controller. This valve regulates the flow of the fluids in close inter-action with the automatic temperature controller, and the double valve seats are fitted under the diaphragm motor. The valve body is shaped in the way of maintaining the total flow stationary at any position of the lift. Moreover, the hand operating device on the top is designed to keep the valve at any optional position without relying on the supply source of air at all.

Operating air pressure (full open - full close): 20 - 100 kPa

Supplied air pressure (positioner input):

140 kPa





# INSTRUCTION BOOK

TYPE. NS DY-M , 739

TEMPERATURE CONTROLLING

THREE WAY MIXING VALVE

NAME CYLINDER POSITIONER

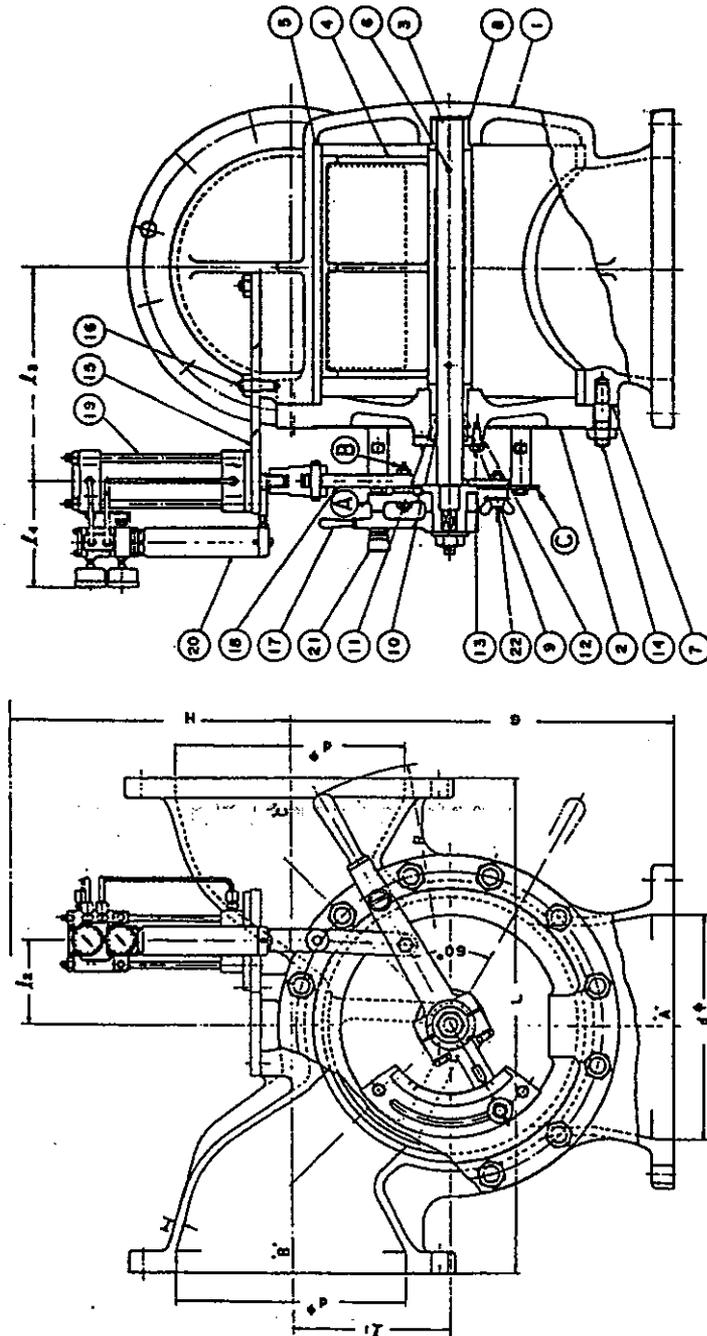
 NAKAKITA SEISAKUSHO CO., LTD.

1-1, Futsunomimachi, Daito-City, 574-8691 Osaka TEL. (072) 871-1341  
FAX. (072) 874-7501 (072) 871-7871  
TELEX. (331) 129 NAKAKITA SEISAKUSHO DIT

No.

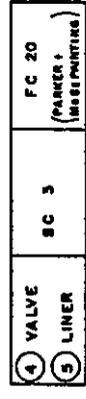
E 273

Record

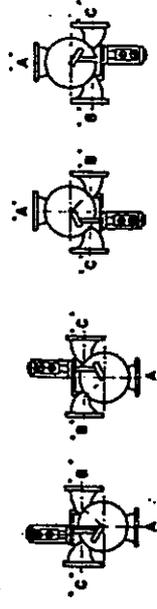


NO.	PARTS NAME	MATERIAL (J.I.S)	QUANTITY	REMARKS
1	BODY	FC 20	1	
2	BONNET	FC 20	1	
3	STEM	SUS 304	1	
4	VALVE	SUS 304	1	
5	LINER	SUS 304	1	
6	PISTON	V 1 900	1	
7	PACKING	SUS 304	2	HARD SE PLATING
8	BUSH	H.B.R.	2	HARD SE PLATING
9	GLAND	H.B.R.	2	
10	O RING	SS 41	1	
11	O RING	SS 41	1	
12	COVER	SS 41	1	
13	BOLT	SS 41	4	SOLE 125-175 SOLE 200-210 SOLE 400 SOLE 450
14	STUD BOLT & NUT	SS 41	4	
15	PLATE	SS 41	1	
16	STUD BOLT & NUT	SS 41	4	SOLE 125-200 SOLE 200-210 SOLE 400 SOLE 450
17	HAND LEVER	FCMB-28	1	
18	LEVER	SS 41	1	
19	POWER CYLINDER		1	
20	POSITIONER		1	
21	BOLT	SS 41	1	
22	BUTTERFLY BOLT	SS 41	1	

-E- TRIM



Mounting Method



NOMINAL BORE	mm	inch	JIS R 16		ANSI B 16.3		JIS 10K/20K		FLANGE OR RATING		STROKE					
			L	G	L	G	L	G	L	G	L	G				
125	3	1.25	242	285	7	90	112	127	149	320	250	328	254	328	254	120
150	6	1.50	327	293	8	105	112	127	149	360	285	368	289	368	289	120
175	7	1.75	507	293	9	123	112	127	149	410	330	418	334	418	334	120
200	8	2.00	482	293	9	140	112	127	149	450	365	450	367	450	367	120
225	9	2.25	463	293	10	150	112	127	149	500	400	502	404	502	404	120
250	10	2.50	463	293	10	175	112	127	149	550	435	540	440	538	439	120
300	12	3.00	463	350	11	210	112	127	149	660	510	668	514	668	514	120
350	14	3.50	478	350	12	235	112	127	149	730	565	740	570	738	569	120
400	16	4.00	478	350	13	265	112	127	149	820	645	834	652	832	651	120
450	18	4.50	478	350	15	315	112	127	149	960	725	940	735	938	733	120

MIXTURE	A' SIDE	OUTLET	B' SIDE	INLET	BYPASS	C' SIDE	INLET	COOLER

ROUTING	A' SIDE	INLET	B' SIDE	OUTLET	C' SIDE	OUTLET

Valve NO.		Basic Model		Seal		Weight		Type NS DY-M	5, 10
								BORE	125 - 450 mm
Ship NO.		Approved		Designer				POSITIONER	~CYLINDER
									3 WAY MIXING VALVE
		Date	February 12, 1977						
		NAKAKITA SEISAKUSHO CO., LTD.							
									D.W.G NO. KD007348

## 1. General Description

This 3-way mixing valve, which is installed in the cooling pipe lines of the main engine and is driven by the power cylinder working according to the signals of the temperature controller, performs to maintain the temperature of the cooling line of the engine always at a constant degree by controlling the water flow passing and bypassing the cooler according to the loading condition of the engine. The valve body has three ports. The port which is always held open is the common port. One of the remaining two ports is connected to the cooler side and the other to the bypass side. The valve (4) which is supported by the stem at the center of the body turns round the inside of the liner (5) to adjust the opening of the cooler and bypass side ports. These two ports are so designed to make the flow rate passing the valve always constant at any opening. For automatic operation, the drive unit is connected to the pin at the top end of the lever (B). A manual handle is provided to this valve to allow direct operation by hand in the event there is no available working air.

2. Flow Direction

This valve can be used either in branch type (with the water flowing from the common port to other two ports) and mixing type (contrary to the branch type).

Arrow marks are casted on the body of this valve to show the flow directions, according to which piping should be arranged.

Branch type . . . . . 

Mixing type . . . . . 

A nameplate showing openings is attached to the stand of the cover. The marks at both ends of this nameplate show the full open of the ports through which the water flows in the arrow marked direction.

The center of the full scale shows the valve in the mid-opening position where the water flow is divided into two parts.

3. Fine Adjustment of Opening

Operating angle of the valve is maximum 60", while the stroke for of the drive unit is 120 mm. Since the pin (B) is movable for  $\pm 10$  mm, the relation between the valve opening and the stroke of the drive unit should be accurately adjusted by shifting the pin (B).

4. Shift from Auto. to Manual Control and from Manual to Auto Control

Auto. Control to Manual Control: To release the automatic control, remove the bolt. Then the opening of the valve can be directly adjusted manually by the handle. To fix the valve at a certain mid-opening point, lock the pointer by turning the bolt to the "Lock" position of the scale plate.

Manual Control to Auto. Control: To return to automatic control, set the handle to the lever, then screw down the bolt to the original place and tightly lock it up. If, in this case, the valve is under manual control, be sure to set the handle to the lever after changing the signal of the drive unit; otherwise disturbance will be caused, which will result in hunting.

While in automatic control, be sure to reset the bolt to the "Auto" position of the scale plate without locking it to the plate.

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I N S T R U C T I O N  
\*\*\*\*\*

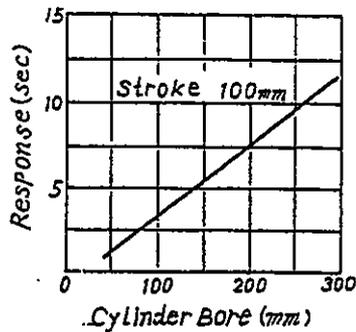
Type NS739 (1P200-02) CYLINDER POSITIONER

1. INTRODUCTION:

NS739 Positioner provides accurate and stable positioning of air cylinders used in process control, servo control and other general industries. Designed compactly for easy installation and maintenance.

2. SPECIFICATIONS:

Supply Pressure	300-700 kPa
Signal Pressure	20-100 kPa
Linearity	Less than $\pm 2\%$
Hysteresis	Less than 1%
Repeatability	Less than 1%
Sensitivity	Less than 1%
Air Consumption	Less than 30 Nl/min.
Max. Air Flow	250 N/min. (at 500 kPa supply)
Supply Pressure Variation	0.5% (at 500 $\pm$ 50 kPa supply)
Applicable Cylinder (mm)	40 or larger diameter; 300 or shorter stroke.
Operating Temperature	5°C - 60°C
Response Time	Refer to the chart in the next page.



3. OPERATION: (Ref. Fig. 1)

Signal pressure from controller enters the input chamber (2). By the effect of the difference of the pressurized area the diaphragms (3) moves varying clearance between the nozzle and the diaphragms. The back pressure in the nozzle changes accordingly. If the force of diaphragm (5) overcomes that of diaphragm (6), the spool (7) slides permitting the supply air to enter the cylinder through OUT-1 and allowing the air in OUT-2 to exhaust. The movement of the cylinder stem is transmitted to the feed back spring (10) through the connecting rod (9). The cylinder stem moves on until the feed back spring force balances with the force of the input chamber (2). Consequently, the cylinder can be positioned exactly in relation to the signal pressure. Span Adjuster (11) and Zero Adjuster (12) are provided for the adjustment of the feed back spring.

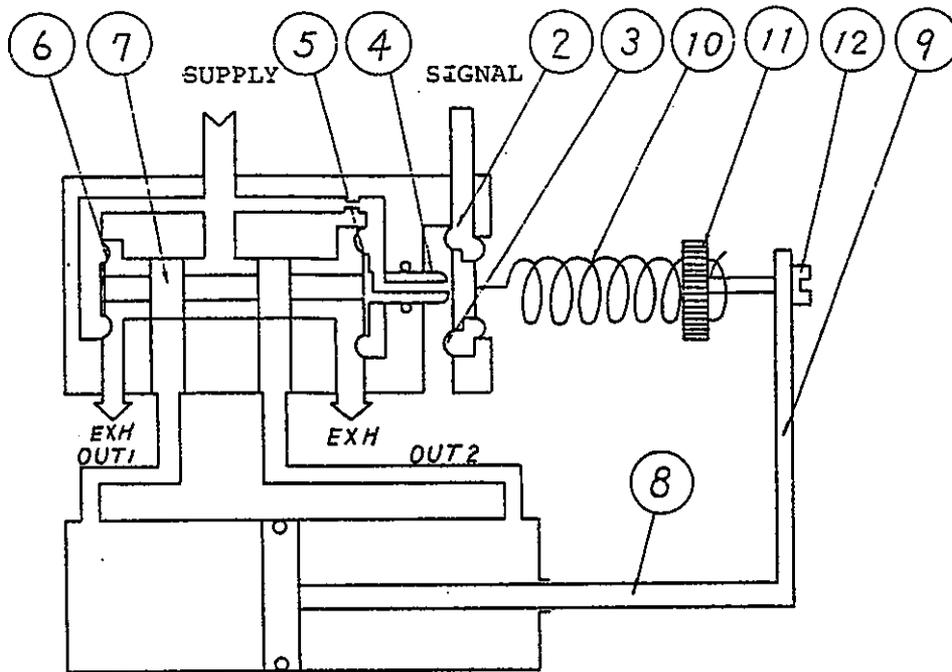
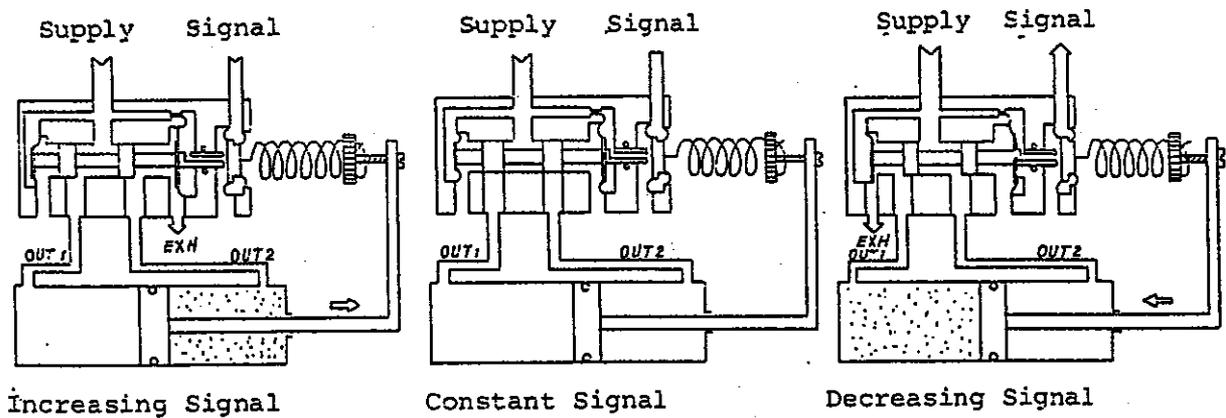


Fig. 1



Increasing Signal

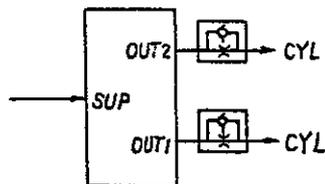
Constant Signal

Decreasing Signal

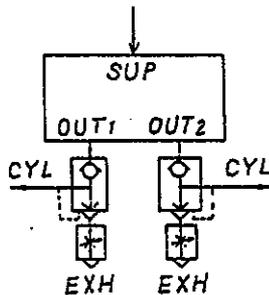
4. INSTRUCTION:

- 1) Supply air must be dry and dust free. SMC Mist Separator is recommended for perfect filtration.
- 2) If the cylinder requires air line lubrication, the lubricator should be installed in the output air lines and not in the supply air line.
- 3) The Positioner should be protected from vibration as it may cause oscillation of the feed back spring.

- 4) Use copper or brass tubes for pipe line arrangement and blow them out before installation.
- 5) For slower cylinder speed, install speed control valves as illustrated below.



- 6) For faster cylinder speed, install quick exhaust valves and metering valves as illustrated below. Metering valves control exhaust speed.



- 7) Speed control may be required when cylinder operates too fast (2 sec/full stroke or less), as it may cause overshooting or hunting.

5. TROUBLE SHOOTING:

Trouble	Possible causes	Solutions
Cylinder does not move when signal pressure increases or decreases.	Fixed orifice is clogged.	Remove the orifice and clean it with a pin of 0.4 mm. diameter.
Cylinder responds to signal intermittently.	Stuck dust is restricting the movement of spool. Fixed orifice is clogged.	Clean spool and sleeve. Clean the orifice.
Cylinder does not operate when signal increases past 20 kPa. Or, cylinder operates with signal of less than 20 kPa.	Zero Adjusting Screw is not correctly adjusted.	Loosen the lock nut and adjust Zero point.
Cylinder stroke obtained is not in relation to the input air pressure (20-100 kPa).	Adjustment of Span Adjuster is not correct.	Remove the set screw of the outer tube and give ideal adjustment while maintaining input signal at 60 kPa. The span is adjusted by changing number of effective turn of the spring. Zero adjustment should incorporate.

6. DIMENSIONS (Millimetres)

