

〔マルチスプリングアクチュエータの取扱説明書について〕

マルチスプリング式アクチュエータ (MS-□DM/□RM) を取扱う際には、取扱説明書「マルチスプリング型ダイヤフラムアクチュエータ (J-1465)」をご使用下さい。

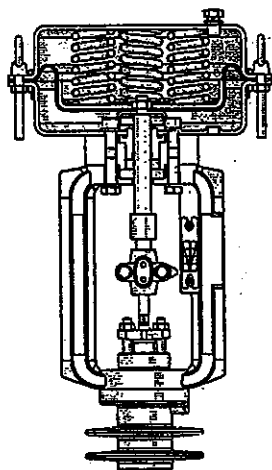
但し、本取扱説明書にはアクチュエータ部の取扱いに限定した内容となっておりますので、調節弁を取扱う際の一般的な注意事項や弁本体部に関する記載がありません。従いまして、調節弁一般につきましては、取扱説明書「ダイヤフラム式調節弁 (J579)」をご使用下さい。

〔Instruction manual of multi spring actuator〕

When it uses the multi- spring type actuator (MS-□DM/□RM), please refer to instruction manual 「MULTI SPRING PNEUMATIC DIAPHRAGM ACTUATOR (E-1465)」 .

But, the contents of the instruction manual are limited for the operation of the actuator part.

Therefore, when it refers general notice for the control valves or operates a valve body part , please refer to instruction manual 「DIAPHRAGM CONTROL VALVE (E579)」 .





E-1465

REVISION

改正 : 0

PAGE

ページ : - of -

INSTRUCTION BOOK

TYPE NS 235,270,324,430 RM/DM
MULTI SPRING PNEUMATIC
NAME DIAPHRAGM ACTUATOR

Pneumatic Actuator Operating Manual

1.INTRODUCTION

2.GENERAL

3.ACTUATOR DESCRIPTION

4.UNPACKING

5.AIR PIPING

6.ACTUATOR REMOVAL

7.MAINTENANCE

8.MOVEING AND LIFTTING

9.ASSEMBLY DRAWING

The following instructions should be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Throughout the text, safety and/or caution notes will appear and must be strictly adhered to; otherwise, serious injury or equipment malfunction could result.

1. INTRODUCTION

The following instructions are designed to assist maintenance personnel in performing most of the maintenance required on the MS-□RM/DM actuator. NAKAKITA has highly skilled service engineers available for start-up, maintenance and repair of our actuators and component parts. Arrangements for these services can be made through NAKAKITA Business. When performing maintenance, use only NAKAKITA replacement parts. Parts are obtainable through NAKAKITA Business. When ordering parts, always include Model and Serial Number of the unit being repaired.

2. GENERAL

These installation and maintenance instructions apply to the NAKAKITA Model MS-□RM/DM actuator regardless of the valve body on which it is used. Actuator part numbers and recommended spare parts required for maintenance are listed in the parts list. The model number and action of the actuator are shown as part of the model number listed on Specification Sheets actuator. The actuator size can be identified by means of the diaphragm case diameter indicated by assemble drawing.

3. ACTUATOR DESCRIPTION

The MS-□RM/DM Series are designed using powerful multi-spring type diaphragm actuator. And it is compact and lightening that compare with using DY-series from before.



For full automatic operation, the hand-wheel must be placed in the neutral position. If the hand-wheel is not in the neutral position, travel will be limited.

4. UNPACKING

Care must be exercised when unpacking the equipment to prevent damage to the accessories and component parts. Should any problems arise, contact NAKAKITA Business.

5. AIR PIPING

The Model MS-□RM/DM actuator is designed to accept Rc1/4" or Rc3/8" air supply connections. If the actuator has been supplied with accessories, they are piped at the factory.



Do not exceed pressure indicated on Specification Sheets.

6. ACTUATOR REMOVAL

Maintenance on the valve body normally requires removal of the valve actuator. The steps in removal of the actuator are different depending on whether the actuator is air to close or air to open.

Note : *Actuator action may be checked by referring to the valve Specification □ RM indicates unit is air to open and □ DM indicates unit is air to close.*

6.1 MS-□RM (Air less close)

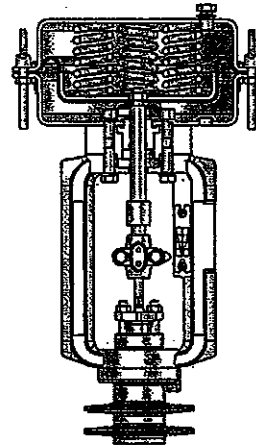
- A. Supply air pressure to open the valve(20~30%) to actuator and rotate hand-wheel to the neutral position.

[No force exerted on the stem connector]

- B. Check the travel indicator (34A) against the travel scale (28) to insure that the plug is up (off the seat).

Note: *No air pressure is required to the actuator since the spring pressure tends to close the valve.*

- C. Remove actuator from the valve body.

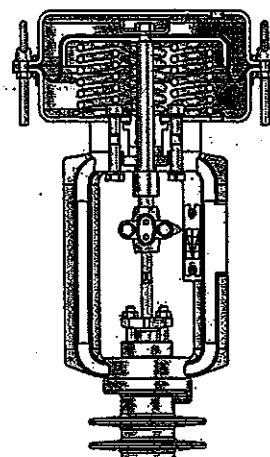


Care should be taken in handling the actuator to prevent damage to gauges, tubing, and component parts.

6.2 Air to close, MS-□DM

Since removal of the valve plug stem from the actuator stem connector requires that the valve plug be off the seat, special provisions are necessary to assure that the valve is in the opened position.

- A. Shut off air supply to the actuator.
B. Disconnect air supply piping to the actuator.
C. Check the travel indicator (34A) against the travel scale (28) to insure that the plug is up (off the seat).
D. Loosen stem Connector (34A).
E. Remove actuator from the valve body.



Care should be taken in handling the actuator to prevent damage to gauges, tubing, and component parts.

7. MAINTENANCE



When disassembling a diaphragm actuator, put match marks on all joining faces and reassemble according to these marks.

7.1 Replacing diaphragm, air less close(MS-□RM)



It is recommended that disassembly or assembly work on these actuators be done in an upright position.

- A. Shut off air supply to the actuator, isolate the control valve process pressure to eliminate the valve from moving with spring tension removed.
- B. If valve is equipped with a hand-wheel, rotate hand-wheel to a neutral position.
- C. Remove diaphragm case cap screws and nuts (31 & 33A).



Diaphragm case is under spring tension and is equipped with tension bolts (63 & 33A) which must be removed last.

- D. Remove tension bolts(Eye-Bolt) (63&33A) in multiple steps to relieve spring tension gradually. Remove upper diaphragm case (5).
- E. Note position of springs (19) and spring guide (16) [if equipped] in the diaphragm plate (12), before to remove these parts.
- F. Remove lock nut (61A) and washer (61B).
- G. Remove diaphragm plate (12) and diaphragm (25).
- H. Replace the new diaphragm (25) on the diaphragm plate (12).
- I. All other sizes, coat the actuator stem threads (11) and bolts & nuts threads with anti-seize compound.
- J. Checking placement of spring guide (16), reassemble diaphragm(25), diaphragm plate(12), washer(61B) then lock nut(61A) in proper locations.
- K. Position springs (19) and spring guide(16) in the diaphragm case.
- L. Reassemble upper diaphragm case (5) and tension bolts (63 & 33A)

Note : Tension bolts should be spaced equally around the bolt circle of the case.

- M. Tighten the tension bolts (63&33A) in equal steps until the cases meet. Reassemble the remaining diaphragm case bolts (31) and nuts (33A).



Tighten diaphragm case bolts and nuts evenly. Do not over-tighten as this could possibly warp the diaphragm cases.

- N. If so equipped, rotate hand-wheel to the desired position.

7.2 Replacing diaphragm, air less open(MS-□DM)

- A. Shut off air supply to the actuator and remove air piping from the upper diaphragm case (5).
- B. Remove the two connector bolt & nut (34A & 34B).
- C. Remove diaphragm case bolts and nuts (31 & 33A).



Diaphragm case is under spring tension and is equipped with tension bolts (63 & 33A) which nut be removed last.

- D. Remove tension bolts (63 & 33A) in multiple steps to relive spring tension gradually. Remove upper diaphragm case (5).
- E. Remove lock nut (61A) and washer (61B).
- F. Replace new diaphragm (25) on the diaphragm plate (12).
- G. All other sizes, coat the actuator stem threads (11) and bolts & nuts (31 & 33A) with anti-seize compound. Install washer (61B) and lock nut (61A).
- H. Reassemble upper diaphragm case (5) and tension bolts (63 & 33A).
Note : Tension bolts should be spaced equally around the bolt circle of the case.
- I. Tighten the tension bolts (63 & 33A) in equal steps until the cases meet. Reassemble the remaining diaphragm case bolts (31) and nuts (33A).
- J. Position top and bottom stem connectors (34A) and reassemble the two bolt & nut (34B) and recalibrate the seated position of the valve.
- K. Swing hand-wheel assembly back up into place.

8. MOVEING AND LIFTTING



Do not lift the whole valve by using this eye nut.

Danger of falling down of valve. This is only lift or move for actuator.

9. Assembly Drawing

It attaches the following assembly drawing to the next pages.

- REVERSE ACTION ACTUATOR (AIR LESS CLOSE)
- DIRECT ACTION ACTUATOR (AIR LESS OPEN)
- HANDWHEEL UNIT(AIR LESS CLOSE)
- HANDWHEEL UNIT(AIR LESS OPEN)

• REVERSE ACTION ACTUATOR (AIR LESS CLOSE)

PARTS No.	PARTS NAME	MATERIAL	Q'TY	REMARKS
1	BODY	FC200	1	
3	BONNET	FC200	1	
4	YOKE	FC0450	1	
5	UPPER DIAPHRAGM CASE	SPHC	1	
6	LOWER DIAPHRAGM CASE	SPHC	1	
7	VALVE	★	1	
10	VALVE STEM	SUS316	1	
11	DIAPHRAGM STEM	SUS304	1	
12	DIAPHRAGM PLATE	SPHC	1	
13	CAGE	★	1	
14	STOPPER	SPHC	1	
16	SPRING GUIDE	SPHC	1	
19	SPRING	SWOSC-V	4	U-235, 270 J-324, 430
20	ROUND NUT	SCS13A	1	
21	PACKING SEAT	SUS316	1	
22	LANTERN RING	SUS316	1	
23	GLAND	SUS316	1	
24	GLAND FLANGE	FC0400	1	
25	DIAPHRAGM	EPDM	1	
28	SCALE	SUS304	1	
29	STUD BOLT	S45C	4	BORE 32~150 J-235, 270 J-324, 430
30A	BOLT	SUS304	4	U-235, 270 J-324, 430
30B	SEAL WASHER	SS400+NBR	4	U-235, 270 J-324, 430
31	BOLT	SUS304	14	U-235, 270 J-324, 430
32	NUT	S45C	4	BORE 32~150 J-235, 270 J-324, 430
33A	NUT	SUS304	16	U-235, 270 J-324, 430
33B	WASHER	SUS304	32	U-235, 270 J-324, 430
34A	STEM CONNECTOR	SCS13	1	
34B	BOLT & NUT	SUS304	2	
36A	BOLT	SUS304	2	
36B	NUT	SUS304	2	
38	GASKET	V#6590M	1	ASBESTOS FREE
39	PACKING	P#4518	1	ASBESTOS FREE
45A	STUD BOLT	SS400	2	
45B	NUT	SS400	2	
50	EYE NUT	SUS304	2	
55	O-RING	EPDM	1	
56	O-RING	EPDM	1	
57	O-RING	EPDM	1	
58	YOKE PLATE	S20C	1	
59	DIAPHRAGM STEM GUIDE	S20C	1	
60A	BOLT	SUS304	4	
60B	WASHER	SUS304	4	
61	LOCK NUT	SUS304	1	
62	VENT CAP	MC NILON	1	
63	TIGHTENING BOLT	SUS304	2	

REV.	BY/DATE	CHKD/DATE	APPD/DATE
1	K. ONO FEB. 24 '05	MS-CODD 10K (125 ^h) 32A~300A	DIAPHRAGM CONTROL VALVE (FC200-TRIM)
2	T. NAKAO FEB. 24 '05	N. KUROKI FEB. 24 '05	
3	NAKAKITA SEISAKUSHO CO., LTD.	AKCD6682ARE	0

SIZE	VALVE	BORE	Q'CASE	REMARKS
32-100	SUS 430 HEAT TREATMENT HRC28-30	45 Kc~9.30	SCS 14 HAND C/P PLATING	1
125	HEAT TREATMENT HRC28-30	55 Kc~16.26.380	SCS 14 HAND C/P PLATING	2
~300	HEAT TREATMENT HRC28-30	65 Kc~26.380	SCS 14 HAND C/P PLATING	3
32-100	STELLITE (SEAT)	45 Kc~9.30	SCS 14 HAND C/P PLATING	4
125	STELLITE (SEAT)	55 Kc~16.26.380	SCS 14 HAND C/P PLATING	5
~300	STELLITE (SEAT)	65 Kc~26.380	SCS 14 HAND C/P PLATING	6
32-100	STELLITE (SEAT & GUIDE)	45 Kc~9.30	SCS 14 HAND C/P PLATING	7
125	STELLITE (SEAT & GUIDE)	55 Kc~16.26.380	SCS 14 HAND C/P PLATING	8
~300	STELLITE (SEAT & GUIDE)	65 Kc~26.380	SCS 14 HAND C/P PLATING	9
32-100	SUS 316 HEAT TREATMENT HRC28-30	45 Kc~9.30	SCS 14 HAND C/P PLATING	10
125	SUS 316 HEAT TREATMENT HRC28-30	55 Kc~16.26.380	SCS 14 HAND C/P PLATING	11
~300	SUS 316 HEAT TREATMENT HRC28-30	65 Kc~26.380	SCS 14 HAND C/P PLATING	12
32-100	SUS 316 HEAT TREATMENT HRC28-30	45 Kc~9.30	SCS 14 HAND C/P PLATING	13
125	SUS 316 HEAT TREATMENT HRC28-30	55 Kc~16.26.380	SCS 14 HAND C/P PLATING	14
~300	SUS 316 HEAT TREATMENT HRC28-30	65 Kc~26.380	SCS 14 HAND C/P PLATING	15

ARROW STATUS SHALL BE ADOPTED

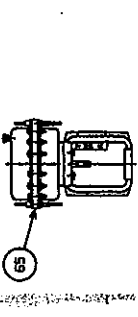
TOP HANDLE



POSITIONER

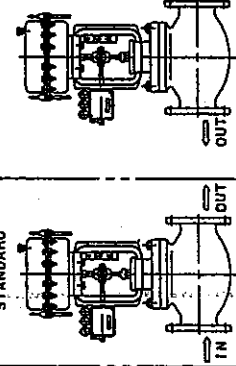


POSITIONER



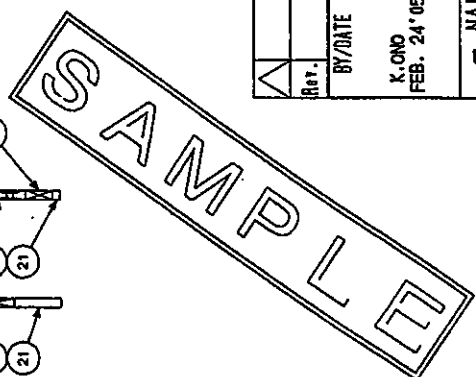
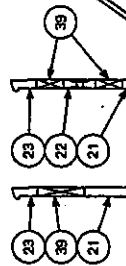
BORE 200~300

MOUNTING METHOD

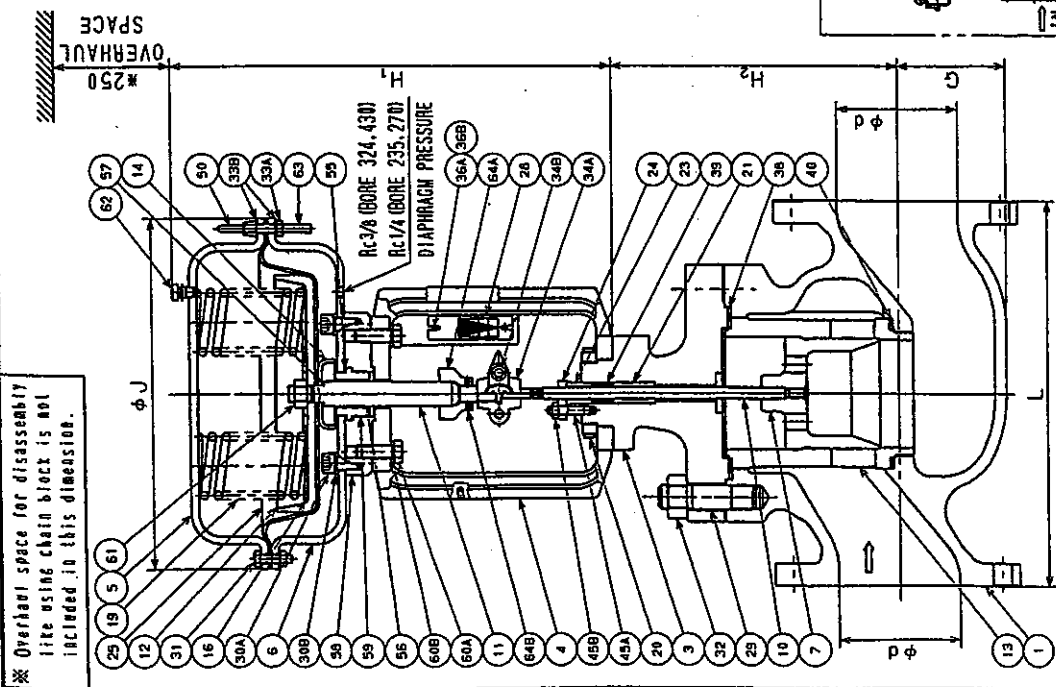


PACKING TYPE

SINGLE PACKING, DOUBLE PACKING WITH LANTERN RING



J	H ₁	ACTUATOR TYPE
235	517	235RM1
270	530	270RM1
270	555	270RM2
324	643	324RM1
324	668	324RM2
430	801	430RM1
430	872	430RM2
430	948	430RM3



※ Overhaul space for disassembly like using chain block is not included in this dimension.

NOMINAL BORE	A	B	d	G	H ₂	H ₁	FLANGE OR RATING TRAVEL L (FACE TO FACE)	UNIT (mm)
32	11/4	32	43	200	15	15		
40	1 1/2	40	51	183	222	15		
50	2	50	62	199	254	25		
65	2 1/2	65	66	215	276	30		
80	3	80	73	232	298	35		
100	4	100	91	297	352	35		
125	5	125	116	327	403	40		
150	6	150	134	357	451	50		
200	8	200	139	412	543	70		
250	10	250	174	472	673	100		
300	12	300	196	522	737	100		

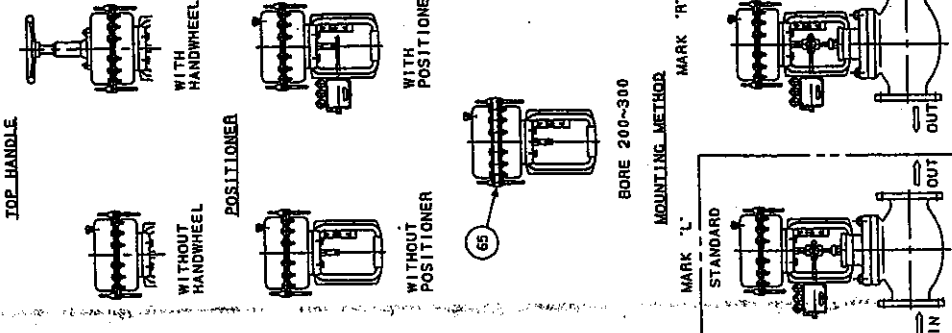
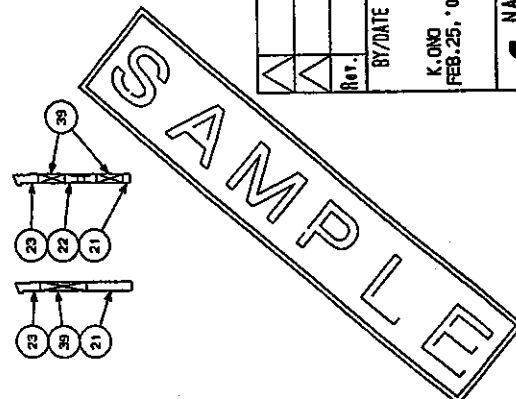
• DIRECT ACTION ACTUATOR (AIR LESS OPEN)

PARTS No.	PARTS NAME	MATERIAL	Q'TY	REMARKS
1	BODY	FC200	1	
3	BONNET	FC200	1	
4	YOKE	FC2450	1	
5	UPPER DIAPHRAGM CASE	SPHC	1	
6	LOWER DIAPHRAGM CASE	SPHC	1	
7	VALVE	SUS316	1	
10	VALVE STEM	SUS316	1	
11	DIAPHRAGM STEM	SUS304	1	
12	DIAPHRAGM PLATE	SPHC	1	
13	CAGE	SPHC	1	
14	STOPPER	SPHC	1	
16	SPRING GUIDE	SPHC	1	
19	SPRING	SWOSC-V	4	J-235.270 J-324.430
20	ROUND NUT	SCS13A	1	
21	PACKING SEAT	SUS316	1	
22	LANTERN RING	SUS316	1	
23	GLAND FLANGE	FC2400	1	
24	DIAPHRAGM	EPDM	1	
25	SCALE	SUS304	1	
29	STUD BOLT	S45C	4	BORE 32~150 BORE 200~300
30A	BOLT	SUS304	4	J-235.270 J-324.430
30B	SEAL WASHER	SS400+NR	4	J-235.270 J-324.430
31	BOLT	SUS304	10	J-235.270 J-324.430
32	NUT	S45C	4	BORE 32~150 BORE 200~300
33A	NUT	SUS304	12	J-235.270 J-324.430
33B	WASHER	SUS304	24	J-235.270 J-324.430
34A	STEM CONNECTOR	SCS13	1	
34B	BOLT & NUT	SUS304	2	
36A	BOLT	SUS304	2	
36B	NUT	SUS304	2	
38	GASKET	V#6590M	1	ASBESTOS FREE
39	PACKING	P#4519	1	ASBESTOS FREE
40	GASKET	V#6590M	1	ASBESTOS FREE
45A	STUD BOLT	SS400	2	
45B	NUT	SS400	2	
50	EYE NUT	SUS304	2	
55	O-RING	EPDM	1	
56	O-RING	EPDM	1	
57	O-RING	EPDM	1	
58	YOKE PLATE	S20C	1	
59	DIAPHRAGM STEM GUIDE	S20C	1	
60A	BOLT	SUS304	4	
60B	WASHER	SUS304	4	
61	LOCK NUT	SUS304	1	
63	TIGHTENING BOLT	SUS304	2	

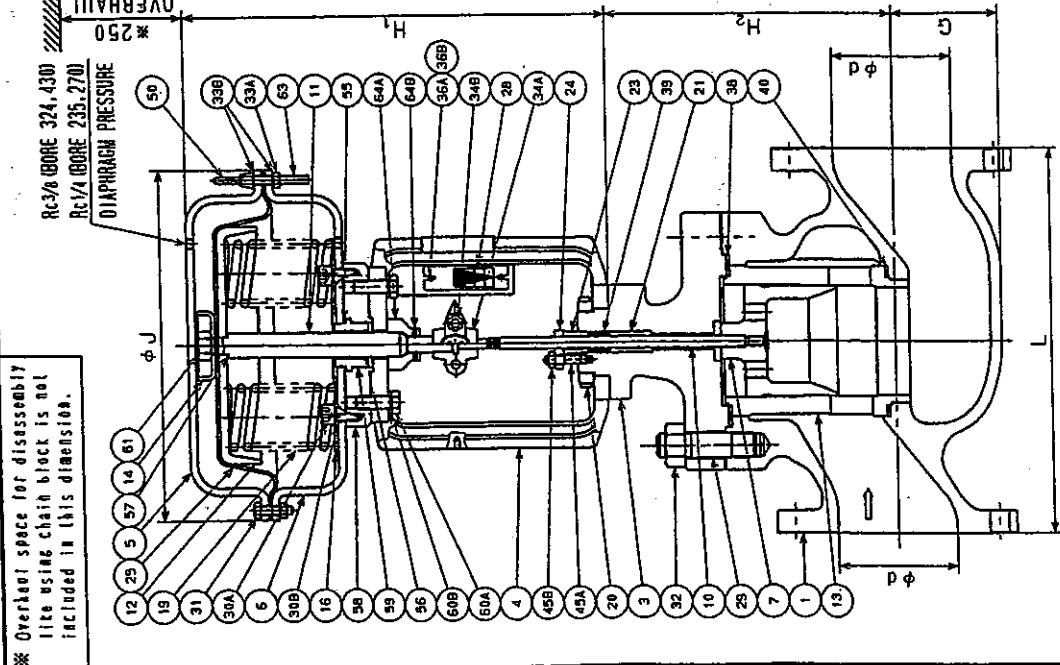
REV. NO.	BY DATE	CHKD DATE	APPD DATE
1	K. ONO FEB.25. '05	MS-C000 10K (125 th) 32A-300A	SCALE MISS
DIAPHRAGM CONTROL VALVE (FC200-TRIM)			
NAKAKITA SEISAKUSHO CO., LTD.			
AKCD6732ADE			
Rev. 0			

NO.	VALVE	BORE	SCALE
32-100	TREATMENT HRC26-39	32 40 45 50	SCS 14
125	TREATMENT HRC26-39	125 150 175 200 225 250 275 300	SCS 14
~300	TREATMENT HRC26-39	300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000	SCS 14
32-100	STELLITE (SEAT)	32 40 45 50	SCS 14
125	STELLITE (SEAT)	125 150 175 200 225 250 275 300	SCS 14
~300	STELLITE (SEAT)	300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000	SCS 14
32-100	STELLITE (SEAT)	32 40 45 50	SCS 14
125	STELLITE (SEAT)	125 150 175 200 225 250 275 300	SCS 14
~300	STELLITE (SEAT)	300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000	SCS 14
32-100	STELLITE (SEAT)	32 40 45 50	SCS 14
125	STELLITE (SEAT)	125 150 175 200 225 250 275 300	SCS 14
~300	STELLITE (SEAT)	300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000	SCS 14

PACKING TYPE
SINGLE PACKING DOUBLE PACKING
XTRA LANTERN RING

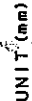
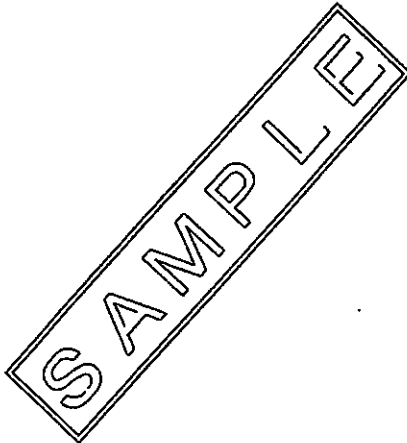




J	WITH HANDWHEEL	WITHOUT HANDWHEEL	ACTUATOR TYPE
235	538	352	235DM1
270	555	369	270DM1
270	580	394	270DM2
324	680	423	324DM1
324	705	448	324DM2
430	865	525	430DM1
430	930	590	430DM1J
430	1036	666	430DM1J2



NOMINAL BORE	A	B	d	G	H ₂	UNIT (mm)
32	11/4	32	43	177	15	
40	1 1/2	40	51	183	15	
50	2	50	62	199	25	
65	2 1/2	65	73	215	30	
80	3	80	83	232	35	
100	4	100	91	297	35	
125	5	125	116	327	40	
150	6	150	134	352	45	
200	8	200	139	412	70	
250	10	250	174	472	100	
300	12	300	196	522	100	

* Overhaul space for disassembly
like using chain block is not
included in this dimension.

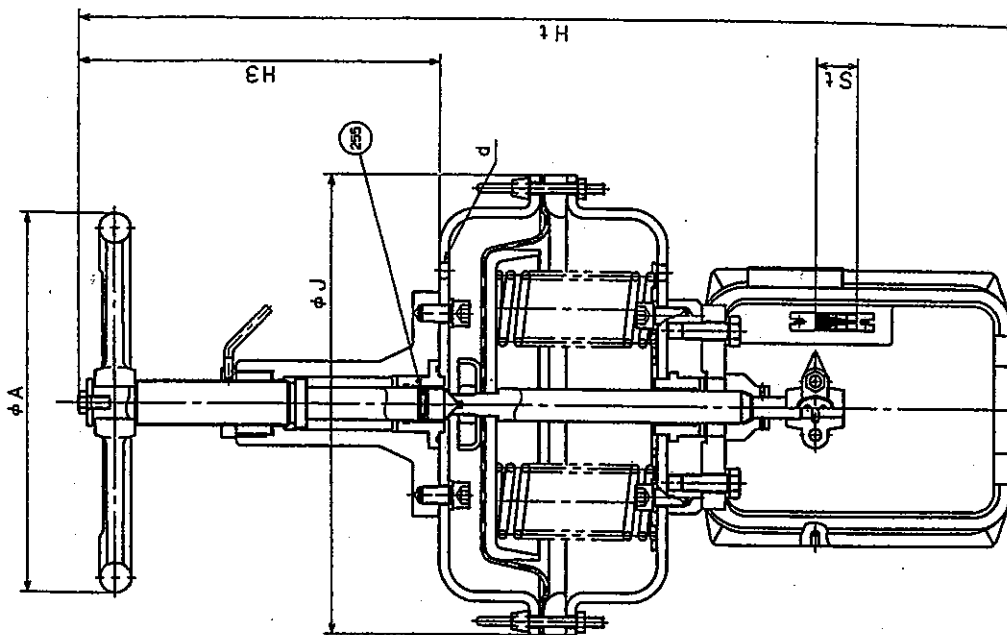


	NAKAKITA SEISAKUSHO CO.,LTD.		ENG. file.		AKAC284XXRE 0	
	BY/DATE K. ONO Feb. 17. '05		CHKD/DATE T. NAKAO Feb. 17. '05		APPRO/DATE N. KUROKI Feb. 17. '05	
REVISIONS		TYPE MS TOP HANDWHEEL FOR MULTI SPRING REVERSE ACTION ACTUATOR		BY/DATE CHKD/DATE APPRO/DATE		SCALE FIGURE 

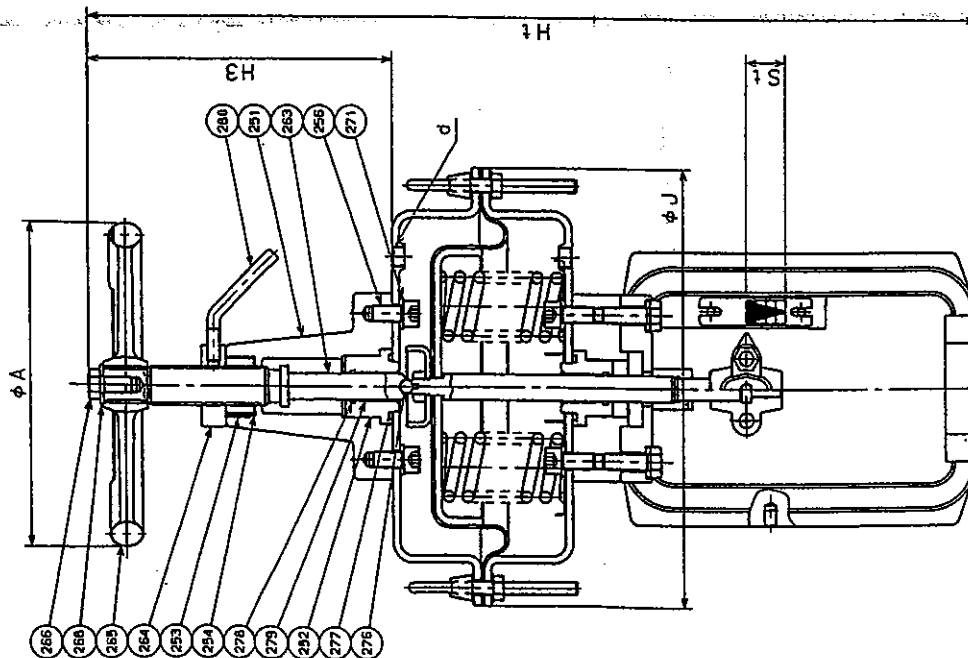
PARTS No.	PARTS NAME	MATERIAL	Q'TY	REMARKS
251	HANDWHEEL BODY	FC0450	1	
252	STEM GUIDE	S20C	1	
253	PIN	SUS304	1	
254	BUSHING	C3604BE	1	
255	THRUST BEARING	SUJ2	1	
256	BOLT	SUS304	4	J=235,270
263	HANDWHEEL STEM	SUS304	6	J=324,430
264	LOCK NUT	C3604BE	1	
265	HANDWHEEL	FC200	1	
266	BOLT	SUS304	1	
268	WASHER	SS400	1	
271	SEAL WASHER	SS400+NBR	4	J=235,270
276	BALL	SUJ2	6	J=324,430
277	O-RING	EPDM	1	
278	O-RING	EPDM	1	
279	BUSHING	C3604BE	1	
280	LEVER	SUS304	1	

SAMPLE

φJ=430



φJ=235, 270, 324



UNIT (mm)

MODEL	Ht	H3	A	J	d	MAX.S1
235DM1	538	186	200	235	Rc1/4	25
270DM1	555	186	200	270	Rc1/4	25
270DM2	580	186	200	270	Rc1/4	30
324DM1	680	257	250	324	Rc3/8	30
324DM2	705	257	250	324	Rc3/8	50
430DM1	865	340	350	430	Rc3/8	50
430DML1	930	340	350	430	Rc3/8	70
430DML2	1036	370	350	430	Rc3/8	100

REV.	REV. DATE	REV. DATE	REV. DATE	REV. DATE
1	2005.17.05	2005.17.05	2005.17.05	2005.17.05
2	2005.17.05	2005.17.05	2005.17.05	2005.17.05
3	2005.17.05	2005.17.05	2005.17.05	2005.17.05
4	2005.17.05	2005.17.05	2005.17.05	2005.17.05
5	2005.17.05	2005.17.05	2005.17.05	2005.17.05
6	2005.17.05	2005.17.05	2005.17.05	2005.17.05
7	2005.17.05	2005.17.05	2005.17.05	2005.17.05
8	2005.17.05	2005.17.05	2005.17.05	2005.17.05
9	2005.17.05	2005.17.05	2005.17.05	2005.17.05
10	2005.17.05	2005.17.05	2005.17.05	2005.17.05
11	2005.17.05	2005.17.05	2005.17.05	2005.17.05
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13	2005.17.05	2005.17.05	2005.17.05	2005.17.05
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