Anti-vibration Check valve						
MKT	Series					
Valve nominal size						
50 to 300mm						
Max.working pressure MPa	Working temperature range C					
0 1.0	0					
2.0	NBR 60 EPDM 100					



Complete prevention of chattering. A new generation of check valves that reduce piping space and allow direct attachment of the pump.

		MKT Standard specifications			
Valve Design		Wafer-type double-plate check valve			
Valve nominal s	size	50, 65, 80, 100, 125, 150, 200, 250, 300mm Valve size below 50mm and above 300mm are manufacture to order.			
Valve type		Check valve with bypass			
Applicable flang	ge standard	JIS 10K, 16K, 20K, ASME B16.5 Class125/150			
Face-to-face di	mensions	JV8-1 (stainless steel valves, wafer-type check valves), SAS358			
Max. working p	ressure	2.0MPa			
Allowed flow ve	locity	0.5 m/s to 10 m/s			
Seat leakage		Tight shut			
Toot proceure	Pressure resistance of body	3.0MPa			
rest pressure	Valve seat leak	High-pressure test 2.2MPa(hydraulic), Low-pressure test 0.04MPa(pneumatic)			
Working tempe	rature range	NBR sheet : 0 to 60 degrees C			
(without freezing	g)	EPDM sheet : 0 to 100 degrees C			
	Main body	A536 Gr. 65 - 45-12 (ductile iron), or A351 CF8 (stainless steel) \star			
Standard	Plate	A351 CF8 (SCS 13 equivalent)			
materials	Pin	304 stainless steel			
	Spring	304 stainless steel			
	Seat 1	NBR, EPDM*			
Pipe gasket		Required (please purchase a commercially available gasket that satisfies the flange standards)			
Coating		Resin baked finish (Munsell 2.5BG 6/12-Green)			
Coating		CF8 valve body is without coating			

Main body: stainless steel. Seat: Regarding Teflon®, we will inform you when decided at the time of product launch.

1. A rubber seat has been baked onto the valve seat surface.

* Never use an EPDM rubber seat is ring if the valve being used for oil or for a fluid containing even a slight amount of oil.

* In order to prevent the valve vibration at the time of operation, please keep the "MKT SELECYTION CRITERIA"

MKTSeries



Flow speed is indicated by arrow size.

Based on fluid theory and vibration analysis, we have achieved a new mechanism that does not allow chattering even at high flow speeds and during fluid fluctuations.

MKT Theory of chattering prevention

Based on laboratory work centering on the chattering phenomenon in conventional check valves, we revealed the nature of the various mechanical problems that cause chattering. By means of a theoretical quantification of the factors that affect chattering based on fluid analysis and vibration analysis, we have succeeded in developing a check valve that provides stable operation without chattering even at high flow speeds and during fluid fluctuations.

When conventional check valves are used at high flow speeds or during speed fluctuations, the fluid force causes rotational movement of the disc and changes its angle. The change of angle in turn changes the action of the fluid force on the disc. This cyclical change in the fluid force continuously causes the rotational vibration of the disc that is called chattering. Using our self-developed TOMOE OAM33 fluid analysis program (based on the Navier-Stoke equations with the addition of reverse-flow analysis capability), we obtained the fluid force for a variety of shapes, and by combining these with vibration equations for the disc system, we were able to obtain a quantitative understanding of the chattering phenomena in check valves.

The angle of rotation θ of the disc is given by

$$I \frac{d^2}{dt^2} + \left\{ C - \left(, V \right) \right\} \frac{d}{dt} + K = 0 \dots (1)$$

where I is the moment of inertia of the disc, C is the damping coefficient of the disc support, K is the elastic modulus of the disc spring, V is the flow velocity, and α is the coefficient of variation of the fluid which varies depending on the angle of rotation of the disc θ and the fluid velocity. When $\alpha > C$ in the second term on the left side of Equation (1), self-excited vibration occurs.

By quantifying the effects of various factors (flow path shape, stopper position, etc.) on the coefficient of variation of the fluid α based on fluid analysis and laboratory work, we were able to create an optimum design. Based on this optimum design, we have developed the MKT Series of Anti-Vibration Check Valves. In addition to preventing chattering at high flow speeds and during speed fluctuations, these valves dramatically reduce cavitation.

* Patent are pending for this product in 126 countries throughout the world.

Vibration frequency characteristics



As indicated above, there are no vibration peaks at any of the frequencies and damage due to vibration is prevented.

Previous product



Helps reduce installation space, resulting less cost and lesser time.

MKT Features

Over 80% of piping space reduced around pump

Designed for anti-vibration, that previouly found on the upstream side of check valves is no longer necessary and the piping space around the pump has been greatly reduced.

Direct pump installation possible

Designed for anti-vibration, the pump can now be installed directly. In fact, it achieved a smaller bore diameter that is 2 to 3 sizes smaller than previous one.

Prevents water hammer

The combination of a light, compact plate with a small moment of inertia and an optimized spring quickly stop the flow when the pump is turned off, preventing water hammer.

The figure below contains measurement data of pressure fluctuations when the pump is suddenly stopped. Compared to other models, the MKT series has a smaller pressure fluctuation amplitude on the downstream side which makes it effective in preventing water hammer.



MKT Expanded view of components

MKT Disc Expanded View/ Parts List

Q'ty

1

1

Remarks

Description

No.

1

Body

2L Left plate

3 Spring 1 Comm, 320 mm, 320		2R	Right plate	1	
4 Hinge pin 1 6 Solp pin 1 7 6 Solt 8 Felorities 2 9 Felorities 2 9 Felorities 2 10 Eye boil 1 12 Header thread 1 13 Lock boil 1 24 Hesselet et server 2 10 Eye boil 1 23 Collar 1 23 Collar 1 23 Collar 1 23 Collar 1 24 Hesselet et server 1 25 Seal washer 4 22 Song on nut 1 23 Collar 1 24 Hesselet et server 1 25 Seal washer 4 29 Sterver 1 30 - - 30 - -		3	Spring	1	200 mm, 250 mm, 300 mm: 2
5 Stop pin 1 Vulcanized to body 7 Hexagon nut 4		4	Hinge pin	1	
6 Seat 1 Vulcanized to body 7 Hexagon nut 4 9 Tellon washer 2 9 Tellon washer 1 10 Eye bolt 1 12 Handle wheel 1 13 Lock bolt 1 14 Stopper 1 15 Hexagon nut 1 21 Handle wheel 1 14 Stopper 1 15 Hexagen nut 1 20 Spring low washer 1 21 Hexagen 1 22 Hexagen nut 1 23 Scali washer 4 29 Spring low washer 1 20 Baeria 1 21 Hexagen 1 23 Soping low washer 1 24 Hexagen 1 25 Soping low washer 1 30 Hexagen 1		5	Stop pin	1	
7 Hexagon nut 4 8 Teifon washer 2 9 Teifon washer 4 10 Eye boit 1 11 Stopper 1 13 Lock boit 1 14 Stopper 1 15 Hexagon nut 1 16 Oring 1 20 Soincilo 1 21 Hexagon nut 1 20 Soincilo 1 21 Hexagon nut 1 22 Soincilo 1 21 Hexagon nut 1 22 Soincilo 1 23 Dearing 4 30 Bearing 4 30 Passon 1 30 Bearing 4 30 Passon 1		6	Seat	1	Vulcanized to body
7 8 Teflon washer 2 9 Teflon washer 4 9 Teflon washer 1 12 Handle weel 1 13 Lock bolt 1 14 Stopper 1 15 16 Oring 10 14 Stopper 1 1 20 Spindle 1 1 21 Hexage status 1 2 20 Spindle 1 2 21 Hexage status 1 2 22 Spinglox washer 1 2 23 Spinglox washer 1 2 24 Hexage status 1 2 25 Spinglox washer 1 2 30 9 30 1 1 1 30 9 <td< td=""><td></td><td>7</td><td>Hexagon nut</td><td>4</td><td></td></td<>		7	Hexagon nut	4	
2 3 4 5 5 4 4 5 5 6 6 7 5 10 10 10 10 10 10 10 10 10 10		8	Teflon washer	2	
20 10 12 14 10 10 14 10 10 10 10 10 10 10 10 10 10		9	Teflon washer	4	
12 Handle wheel 1 13 Look bolt 1 14 Stopper 1 15 Hexagon nut 1 16 Original 1 20 Spindle 1 21 Hexagon nut 1 20 Spindle 1 20 Spindle 1 21 Hexagon nut 1 22 Spindle 1 23 Spindle 1 24 Hexagon nut 1 25 Spindle 1 29 Spindle 1 20 Spindle 1 25 Spindle 1 29 Spindle 1 29 Spindle 1 29 Spindle 1 20 Spindle 1 29 Spindle 1 30 Search 1 30 Search 1 30		10	Eve bolt	1	Only 150mm and over
4 13 Lock bolt 1 14 Stopper 1 1 1 15 Hexadon nut 1 1 1 1 16 Oring 1		12	Handle wheel	1	
5 14 15 14 15 14 15 14 15 14 15 14 15 14 15 16 10 11 12 14 15 16 10 11 12 14 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 14 12 12 14 12 12 14 12 12 14 12 12 14 12 12 14 12 12 14 12 12 14 12 12 14 12 15 10 10 12 15 10 10 10 10 10 10 10 10 10 10	4	13	Lock bolt	1	
5 Hersocket set screws 2 16 Oring 1 20 Spindle 1 21 Hexagon nut 1 28 Seal washer 4 29 Sping lock washer 1 28 Seal washer 4 29 Sping lock washer 1 20 Sping lock washer 1 30 Bearing 4 31 By-Pass seat 1 30 28 1 Only 250, 300mm		14	Stopper	1	
99 99 10 10 10 10 10 10 10 10 10 10	5	15	Hex.socket set screws	2	
99 20 Spindle 21 Hexagon nut 1 22 Solar 23 Collar 23 Collar 23 Collar 23 Collar 20 Bearing 4 29 Spindle 29 Spindle 20 Bearing 4 20 Bearing 4 20 Seal vasher 1 20 Bearing 4 20 Seal vasher 1 20 Seal vasher 20 Seal		16	O ring	1	
99 21 Hexagon nut 1 23 Collar 24 Collar 23 Spring lock washer 23 Spring lock washer 23 Spring lock washer 30 Bearing 4 30 Bearing 4 30 Bearing 4 30 Bearing 4 30 Bearing 51 If 51 If		20	Spindle	1	
23 Collar 24 Seal washer 4 25 Seal washer 1 29 Seal washer 1 30 Bearing 4 51 By-Pass seat 1 99 Sleeve 1 Only 250, 300mm 99 Sleeve 1 Only 250, 300mm 13 13 15 115 12 14 15 12 15 14 15 12 15 14 15 12 15 12 15 14 15 12 15 14 15 12 15 12 15 14 15 12 15 15 16 20 15 15 16 20 17 15 12 17 15 12 17 15 12 17 15 12 18 10 12 12 18 10 12 12 19 250, 300mm 19 250, 300mm 10 10 12 12 10 10 10 10 10	99	21	Hexagon nut	1	
20 20 20 20 20 20 20 20 20 20		23	Collar	1	
29 Spring lock washer 1 30 Bearing 4 30 Bearing 4 51 By-Pass seat 1 99 Sleeve 1 1	Y II a t	26	Seal washer	4	
30 Bearing 4 51 By-Pass seat 1 99 Sleeve 1 1 0 0 1 0 </td <td></td> <td>29</td> <td>Spring lock washer</td> <td>1</td> <td></td>		29	Spring lock washer	1	
Si By-Pass seat 1 30 9 Sleeve 1 Only 250, 300mm 1		30	Bearing	4	
30 21 30 21 30 30 21 30 30 30 30 30 30 30 30 4 51 16 20 51 16 20 13 13 14 10 12 20, 300mm 10 10 12 10 10 10 10 10 10 10 10 10 10		51	By-Pass seat	1	
$\begin{array}{c} 0 \\ 3 \\ 3 \\ 2 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3$		99	Sleeve	1	Only 250_300mm
		20		-15	12 29 21 0 0 0 0

MKT Principal dimensions



MKT Dimension

Nomin	al size	Dimension(mm)					Approx.Mass (kg)	
mm	inch	d	D	L	Н	SCS	FCD	
50	2	58	101	60	135	2.7	2.5	
65	2 1/2	74	121	67	142	3.7	3.5	
80	3	87	131	73	149	4.7	4.4	
100	4	105	156	73	186	6.2	5.9	
125	5	134	187	86	200	9.2	8.7	
150	6	160	217	98	213	13.1	12.4	
200	8	210	267	127	239	22.6	21.5	
250	10	258	330	146	282	37.5	35.6	
300	12	306	375	181	308	56.2	53.4	



MKT SELECYTION CRITERIA

1. For water use

Flow Direction			MKT specification		
		Ave. Flow velocity	Valve structure	Spring	
		0.5m/s to 2m/s		Low Torque (*2)	
Орном		2m/s to 10m/s		Standard	
Horizontal Piping		2m/s to 10m/s	Standard	Standard	
Down flow (*1)		1m/s to 5m/s		High Torque	

*1: Depending on the conditions, valve seat leakage may occur during check valve when there is down flow. Please inquire with our sales persons.

*2: In the case of 250, 300mm. It is used standard torque spring.

*3: When used out of the above-mentioned range, and an expansion pipe is after a pump exit or a bend pipe and MKT is installed immediately after that, there is no problem in use though a little metallic sound might be generated.

*4: In the cases of other than the above. Please inquire with our sales persons.

2. For Gas Use

It can use with only Up Flow and differential pressure are only in 0.1MPa to 2.0MPa. And please use the Low torque spring.

MKT Applicable pipe list in case of A

Nomin	al size	SGP Sch20	Sch40	Sch10S	Sch20S	
mm	inch		301120	301140	301103	301203
50	2					
65	2 1/2					
80	3					
100	4					
125	5					
150	6					
200	8					
250	10					
300	12					

MKT Applicable pipe list in case of B

Nomir	nal size	SCD	Sob20	Sch40	Sob10S	Sch20S
mm	inch	307	301120	301140	301103	301203
50	2					
65	2 1/2					
80	3					
100	4					
125	5					
150	6					
200	8					
250	10					
300	12					

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Nomin	al size	Minimum internal
mm	inch	(mm)
50	2	35.0
65	2 1/2	45.5
80	3	56.0
100	4	80.6
125	5	98.2
150	6	122.1
200	8	156.8
250	10	204.7
300	12	222.9

Remark: : Installation possible, -: No standard





MKT CRACKING PRESSURE (OPENING PRESSURE)

Nominal size			Standard torque spring		Low torque spring	
mm	inch	CV value	mmAq	MPa	mmAq	MPa
50	2	46.0	116	0.00114	12	0.00012
65	2 1/2	74.5	113	0.00111	13	0.00013
80	3	138	160	0.00157	22	0.00022
100	4	251	82	0.00080	16	0.00016
125	5	435	49	0.00048	12	0.00012
150	6	685	58	0.00057	15	0.00015
200	8	1340	79	0.00077	16	0.00016
250	10	2330	59	0.00058	12	0.00012
300	12	3760	50	0.00049	10	0.00010

Minimum required pressure difference for flowing in forward direction

MKT Piping bolt and nut sizes

Nominal size		110401/	110101/	110001/	
mm	inch	JISTUK	JISTOK	JISZUK	ASIME B 16.5 Class 150
50	2	4-M16×140×35	8-M16×140×35	8-M16×140×35	4-U5/8-11×145×40
65	2 1/2	4-M16×150×40	8-M16×150×40	8-M16×150×40	4-U5/8-11×160×40
80	3	8-M16×160×40	8-M20×175×50	8-M20×175×50	4-U5/8-11×170×40
100	4	8-M16×160×40	8-M20×175×50	8-M20×175×50	8-U5/8-11×170×40
125	5	8-M20×180×50	8-M22×200×50	8-M22×200×50	8-U3/4-10×190×50
150	6	8-M20×200×50	12-M22×215×50	12-M22×215×50	8-U3/4-10×205×50
200	8	12-M20×230×50	12-M22×240×50	12-M22×240×50	8-U3/4-10×240×50
250	10	12-M22×260×50	12-M24×275×60	12-M24×275×60	12-U7/8-9×265×55
300	12	16-M22×300×50	16-M24×315×60	16-M24×315×60	12-U7/8-9×305×55

Remark: *Use a hexagon nut with 80% threading. *Material: "SS400" (Unichrome plating) The bolt lengths are in accordance with JIS and thickness of steel flanges.

Long bolts and nuts



