

V0149

Catalog Section **V**
 Series **3970**
 Product Data —
 Issue Date **0881**



Johnson Controls, Inc.
 507 E. Michigan Street
 P.O. Box 423
 Milwaukee, WI 53201

**V-3970 N.C. Cast Brass Valve
 Steam or Water
 1 1/2 & 2" Screwed Ends**

DISCONTINUED
 5-3-89
 V-3974
 1 1/2"
 V-5254
 2 1/2"

The V-3970 normally closed valve is designed to accurately regulate the flow of steam or hot and cold water through coils or heat exchangers of all types. It is available with or without a factory installed V-3000 exposed type pneumatic actuator; enclosed actuators are also available, order separately. The V-3000 actuator has a die cast aluminum housing and a molded, synthetic rubber diaphragm that provides a constant effective area through the valve travel. By loosening a single set screw, the complete actuator assembly can be removed, without disturbing the remainder of the valve assembly. A V-3970 valve, less actuator, can also be used with a T-3110 or T-3310 Valve Top Thermostat. Actuator and valve provide a Push Down to Open (PDO) combination for normally closed applications.

A modulating valve plug, with a replaceable composition disc especially compounded for steam and water service, provides an equal percentage relationship between valve lift and flow at a constant pressure drop.

Operation

Air pressure from a pneumatic controller is applied to the diaphragm of the actuator which moves the piston against the forces of the internal spring and the fluid. The piston will move the valve plug to a position where the diaphragm pressure and fluid forces are balanced against the spring force. These fluid forces will cause the operating range to shift from the nominal spring range.

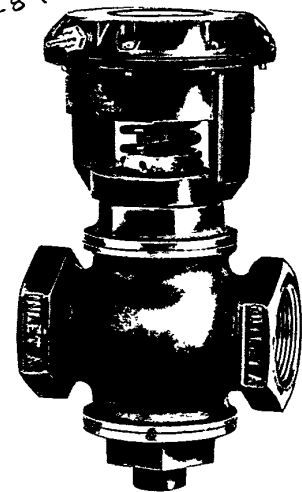
This valve is available with a V-9502 Positioner where sequential operation is desired or positioning

power is required. The positioner is factory adjusted to the low end of the nominal spring range of the valve. For additional adjusting instructions, refer to V-9502 Product Data.

Installation

It is recommended that the V-3970 be mounted in an upright position in a conveniently accessible location. Sufficient clearance must be allowed for actuator and trim removal. The V-3970 must be piped so that the valve seats against the flow.

Warning: Control air tubing must be disconnected before servicing. Failure to do so may result in personal injury.



V-3970 with V-3000 Actuator

Specifications

Product	V-3970 N.C. Steam or Water Valve
Models & Sizes	See Table 1
Body Style & Sizes	Globe 1-1/2 and 2 in. Connections (N.P.T.)
Control Air Connection	Barbed Fitting for 5/32 or 1/4 in. O.D. Poly tubing
Normal Position	Closed — Control Signal Opens
Max Pressure & Temperature	Steam 35 PSIG (245 kPa); 281F (138°C)
	Water 200 PSIG (1400 kPa) Between -20 and 150F (-29 and 66°C) Decreasing to 155 PSIG (1085 kPa) @ 281F (138°C)
Maximum Control Pressure	30 PSIG (210 kPa)
Spring Range (Nominal)	9 to 13 PSIG (63 to 91 kPa)
Valve Plug	Equal Percentage Characteristic
Ambient Operating Temperature Limits	-10 to 150F (-23 to 66°C)
Maximum Storage Temp.	150F (66°C)
Material	Body Cast Brass
	Actuator Die Cast Aluminum
	Trim Brass
	Stem Stainless Steel
	Stem Packing Synthetic Elastomer U-Cup
	Diaphragm Synthetic Rubber
	Disc Replaceable Composition
Accessory (Order Separately)	Valve Position Indicator

THIS IS WARNING SEE CHART IN DATA BOOK

"The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products."

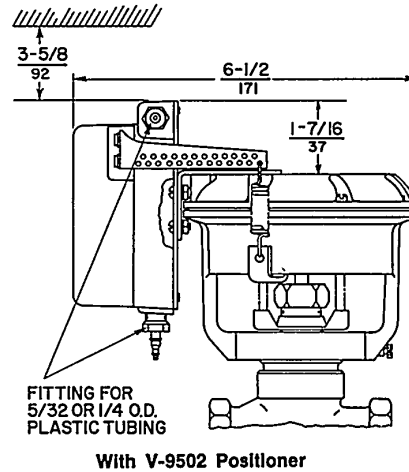
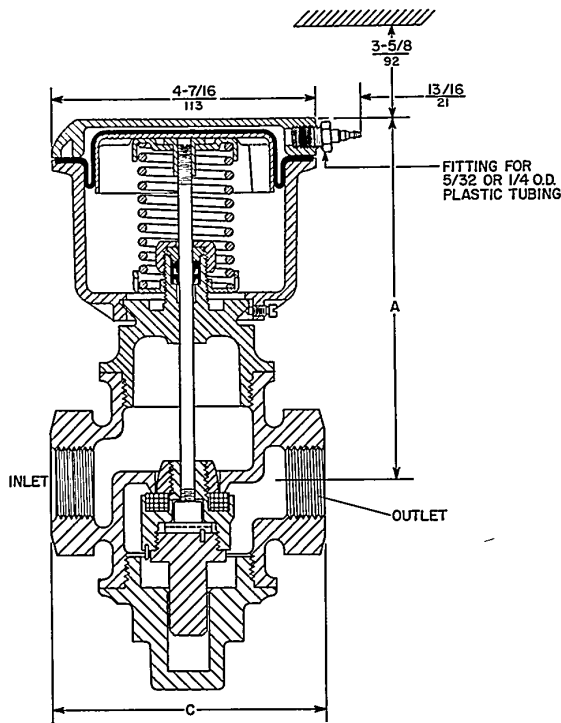
V-3970

Dimensions **in.**
mm

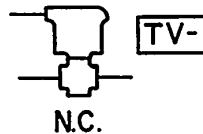
Size In.	Dimensions in. mm	
	A	C
1-1/2	5-15/16	4-7/8
	151	124
2	6-7/16	5-1/8
	163	130

Table 1
Nominal Valve Properties

Size In.	C _v /k _v Factor	Spring Range PSIG kPa	V-3970 Code Number		
			with V-3000 Actuator	Less Actuator	with Positloner
1-1/2	17	9-13	1008	8	1010
	14				
2	27	63-91	1009	9	1011
	23				



**Application and Drawing
Identification**

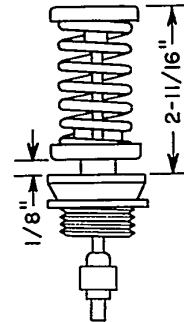
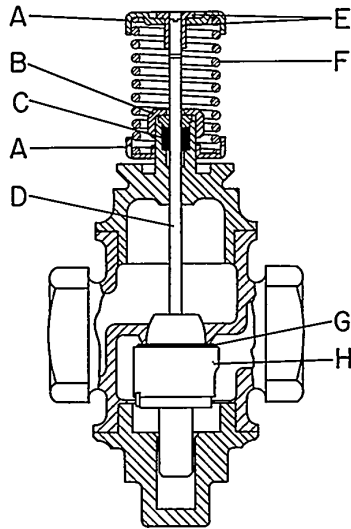


See BES 45-2.03-1



Johnson Controls, Inc.
Systems & Services Division
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

V-3970 Normally Closed Valve 1/2 thru 2 in.



J Inner Valve and Spring Assembly with Modulating Plug. Kit Form, to be Assembled in Field.

Item	Name of Part	Code No.
A	Spring Plate Kit (Upper and Lower)	V-9999-612
B	Packing Nut	V-3752-646
C	Packing Kit	V-9999-608
D	Stem and Swivel Assembly Includes: Stem, Swivel and Swivel Locknut Pin for Valve Size (in.)	
	1/2	V-3970-634
	3/4	V-3970-635
	1	V-3970-636
	1-1/4	V-3970-636
	1-1/2	V-3970-637
	2	V-3970-638
E	Stem Connector and Stem Lock Screw (5 each)	V-3000-610
F	Springs 4 to 8 PSIG Valve Size (in.)	
	1/2 - 3/4	V-3752-640
	1 - 1-1/4	V-3752-642
	1-1/2 - 2	V-3752-644
	Springs 9 to 13 PSIG Valve Size (in.)	
	1/2 - 3/4	V-3752-641
	1 - 1-1/4	V-3752-643
	1-1/2 - 2	V-3752-645

Item	Name of Part	Code No.
G	Disc Only Valve Size (in.)	
	1/2	V-3020-621
	3/4	V-3011-600
	1	V-3011-601
	1-1/4	V-3011-602
	1-1/2	V-3020-606
	2	V-3020-607
H	Disc Assembly Includes: Disc, Disc Holder, Modulating Plug, and 3 Pins Size (in.)	
	1/2	V-3970-628
	3/4	V-3970-629
	1	V-3970-630
	1-1/4	V-3970-631
	1-1/2	V-3970-632
	2	V-3970-633
J	Inner Valve and Spring Assembly, 9 to 13 PSIG Spring Valve Size (in.)	
	1/2	V-3970-600
	3/4	V-3970-619
	1	V-3970-620
	1-1/4	V-3970-621
	1-1/2	V-3970-622
	2	V-3970-623

For Actuator Repair Parts see V-3000 Product Data

R-V-3970-2



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REPAIR PARTS R-V-3970-2

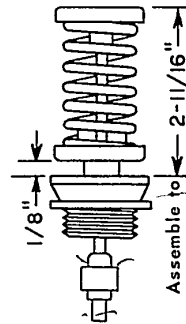
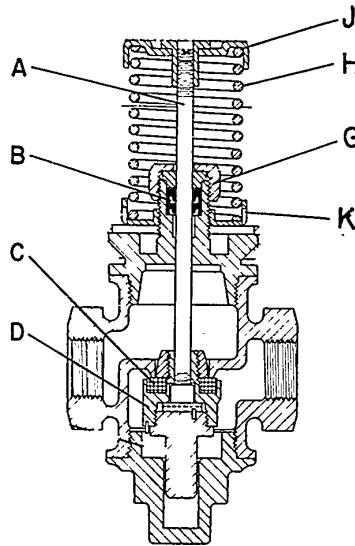
DISCONTINUED
SEE NEW COPY

Johnson V-3970 Water or Steam Valve

Normally Closed

Single Seat

Modulating Plug



F Inner Valve and Spring Assembly with Modulating Plug. Kit Form to be Assembled in Field.

USE CODE NUMBER ONLY WHEN ORDERING

Item	Name of Part	Order In Multiples of	Code No.	
A	Stem and Swivel Assembly Includes: Stem, Swivel and Swivel Locknut Pin for			
	Valve Size			
	1/2"		V-3970-634	
	3/4"		V-3970-635	
	1"		V-3970-636	
	1 1/4"		V-3970-636	
B	Packing Kit	10	V-4322-620	
	Disc Only	Valve Size		
		1/2"	10	V-3020-621
		3/4"	10	V-3011-600
		1"	10	V-3011-601
		1 1/4"	10	V-3011-602
1 1/2"		10	V-3020-606	
D	Disc Assembly Includes: Disc, Disc Holder, Modulating Plug, and 3 Pins.			
	Size Cv			
	1/2"	2.2	V-3970-628	
	3/4"	3.8	V-3970-629	
	1"	6.9	V-3970-630	
	1 1/4"	11.0	V-3970-631	
1 1/2"	17.0	V-3970-632		
2"	27.0	V-3970-633		

Item	Name of Part	Order In Multiples of	Code No.
F	Inner Valve and Spring Assembly, 9-13 psi Spring		
	Valve Size Cv		
	1/2"	2.2	V-3970-600
	3/4"	3.8	V-3970-619
	1"	6.9	V-3970-620
	1 1/4"	11.0	V-3970-621
	1 1/2"	17.0	V-3970-622
2"	27.0	V-3970-623	
G	Gland Nut	5	V-3752-646
H	Springs 4-8#		
	Valve Size		
	1/2" - 3/4"	5	V-3752-640
	1" - 1 1/4"	5	V-3752-642
	1 1/2" - 2"	5	V-3752-644
	Springs 9-13#		
Valve Size			
1/2" - 3/4"	5	V-3752-641	
1" - 1 1/4"	5	V-3752-643	
1 1/2" - 2"	5	V-3752-645	
J	Spring Plate (Upper)	5	V-3752-674
K	Spring Plate (Lower)	5	V-3752-675

NOTE: For Actuator Repairs, Refer to Sheet R-V-3000-2



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REPAIR PARTS R-V-3970-2

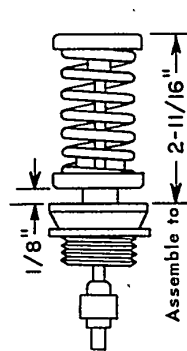
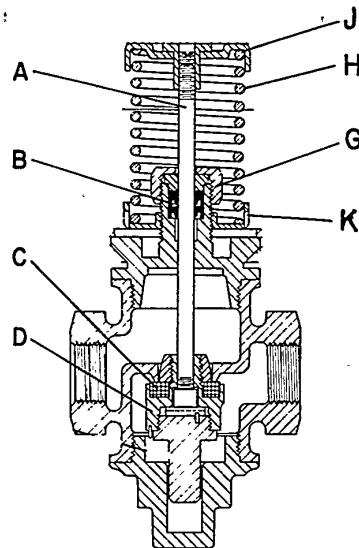
DISCONTINUED

Johnson V-3970 Water or Steam Valve

Normally Closed

Single Seat

Modulating Plug



F Inner Valve and Spring Assembly with Modulating Plug. Kit Form to be Assembled in Field.

USE CODE NUMBER ONLY WHEN ORDERING

Item	Name of Part	Order In Multiples of	Code No.
A	Stem and Swivel Assembly Includes: Stem, Swivel and Swivel Locknut Pin for		
	Valve Size		
	1"		V-3970-636
	1 1/4"		V-3970-636
	1 1/2"		V-3970-637
B	Packing Kit	10	V-4322-620
	Disc Only		
C	Valve Size		
	1/2"	10	V-3020-621
	3/4"	10	V-3011-600
	1"	10	V-3011-601
	1 1/4"	10	V-3011-602
	1 1/2"	10	V-3020-606
D	Disc Assembly Includes: Disc, Disc Holder, Modulating Plug, and 3 Pins.		
	Size Cv		
	1"	6.9	V-3970-630
	1 1/4"	11.0	V-3970-631
	1 1/2"	20.0	V-3970-632
	2"	35.0	V-3970-633

Item	Name of Part	Order In Multiples of	Code No.
F	Inner Valve and Spring Assembly, 9-13 psi Spring		
	Valve Size Cv		
	1/2"	2.2	V-3970-600
	3/4"	3.8	V-3970-619
	1"	6.9	V-3970-620
	1 1/4"	11.0	V-3970-621
	1 1/2"	20.0	V-3970-622
	2"	35.0	V-3970-623
G	Gland Nut	5	V-3752-646
H	Springs 4-8#		
	Valve Size		
	1/2" - 3/4"	5	V-3752-640
	1" - 1 1/4"	5	V-3752-642
	1 1/2" - 2"	5	V-3752-644
	Springs 9-13#		
Valve Size			
1/2" - 3/4"	5	V-3752-641	
1" - 1 1/4"	5	V-3752-643	
1 1/2" - 2"	5	V-3752-645	
J	Spring Plate (Upper)	5	V-3752-674
K	Spring Plate (Lower)	5	V-3752-675

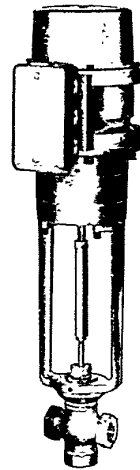


JOHNSON SERVICE COMPANY
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PRODUCT
DATA
VB-3970

JOHNSON VB-3970
N.C. Steam or Water Valve
1/2" thru 2" Cast Brass 2 1/2" thru 6" Cast Iron
150 psig Body Rating

The Johnson VB-3970 Normally Closed Valve is designed to regulate the flow of steam or water through coils or heat exchangers of all types. This valve is accurately positioned by a VA-3200, VA-3400 or VA-5000 actuator.



VB-3970 N.C.
Valve with
VA-3200
Actuator

Installation

It is recommended that the VB-3970 valve be mounted in an upright position. It must be piped so that the valve seats against the flow and arranged so that the actuator can be easily removed and replaced.

C_v Factor Table

Valve Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6		
C _v Factor	0.9	1.7	2.2	3.8	6.9	11	17	27	54	83	150	237	344

Specifications

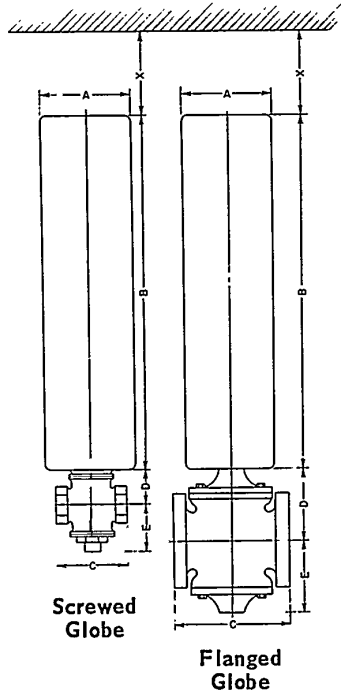
PRODUCT		VB-3970 NORMALLY CLOSED VALVE	
SERVICE		STEAM OR HOT AND COLD WATER	
BODY PATTERN SIZES AND SERVICE CONNECTIONS	SCREWED GLOBE	1/2 THRU 2 IN.	
	125 psig FLANGED GLOBE	2-1/2 THRU 6 IN.	
VALVE PLUG		EQUAL PERCENTAGE CHARACTERISTIC	
BODY RATING		150 psig (10.5 kp/cm ²)	
MAX. PRESSURE & TEMPERATURE	STEAM	35 psig (2.5 kp/cm ²); 281F (138C)	
	WATER	150 psig (10.5 kp/cm ²); 281F (138C)	
MATERIALS	BODY	1/2-2 IN.	CAST BRASS, NATURAL FINISH
		2-1/2-6 IN.	CAST IRON, BLACK LACQUER FINISH
	TRIM	1/2-2 IN.	BRASS
		2-1/2-6 IN.	BRASS, WITH REPLACEABLE SCREWED-IN SEAT
	STEM		STAINLESS STEEL
	DISC		REPLACEABLE COMPOSITION
STEM PACKING	1/2-4 IN.	U-CUP, ELASTOMER	
	3-6 IN.	TEFLON ROPE (VA-3400 ONLY)	
ACTUATORS (ORDER SEPARATELY)	VA-5000	1/2 - 2 IN. VALVES	
	VA-3200	1/2 - 4 IN. VALVES	
	VA-3400	3 - 6 IN. VALVES	

PRODUCT
DATA
VB-3970



JOHNSON SERVICE COMPANY
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Dimensions



Actuator

ACTUATOR	A	B	X*
VA-5000	3-1/4	9-1/4	4-3/4
VA-3200	7-3/4	15-7/8	5-3/4
VA-3400	15-1/4	28-1/4	5-1/2

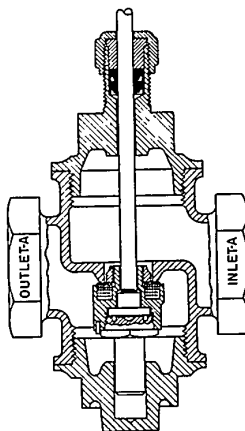
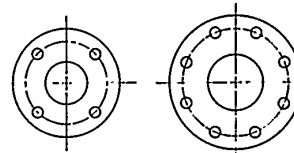
* X is the minimum clearance required to remove the actuator.

Valve Body

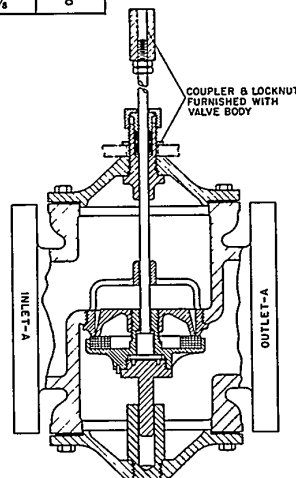
VALVE SIZE (in.)	DIMENSIONS (in.)		
	C	D	E
1/2	2-3/4	1-5/8	1-9/16
3/4	3-1/4	1-15/16	1-15/16
1	3-3/4	2-1/4	2-9/16
1-1/4	4-1/4	2-3/8	2-5/8
1-1/2	4-7/8	2-3/4	3
2	5-1/8	3-1/8	3-1/16
2-1/2	7-1/4	4-11/16	5-1/16
3	8-5/8	5-5/16	5-5/16
4	10-1/2	6-5/16	6-5/16
5	12-1/2	6-7/8	6-7/8
6	14-1/2	8-3/16	8-3/16

Flange and Bolt Circle Dimensions (in.)

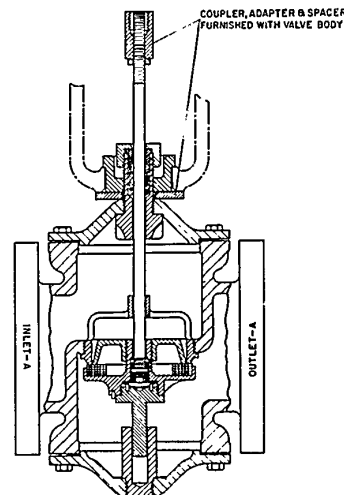
Valve Size (in.)	Dia. of Flange	Thickness of Flange	Dia. of Bolt Circle	Dia. of Bolt Holes	No. of Bolt Holes
2 1/2	7	11/16	5 1/2	3/4	4
3	7 1/2	3/4	6	3/4	4
4	9	1	7 1/2	3/4	8
5	10	1 5/16	8 1/2	7/8	8
6	11	1 5/16	9 1/2	7/8	8



1/2" thru 2" Screwed Valves



2-1/2" thru 4" Flanged Valves (VA-3200 Actuator)



3" thru 6" Flanged Valves (VA-3400 Actuator)



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REPAIR PARTS R-VB-3970-2

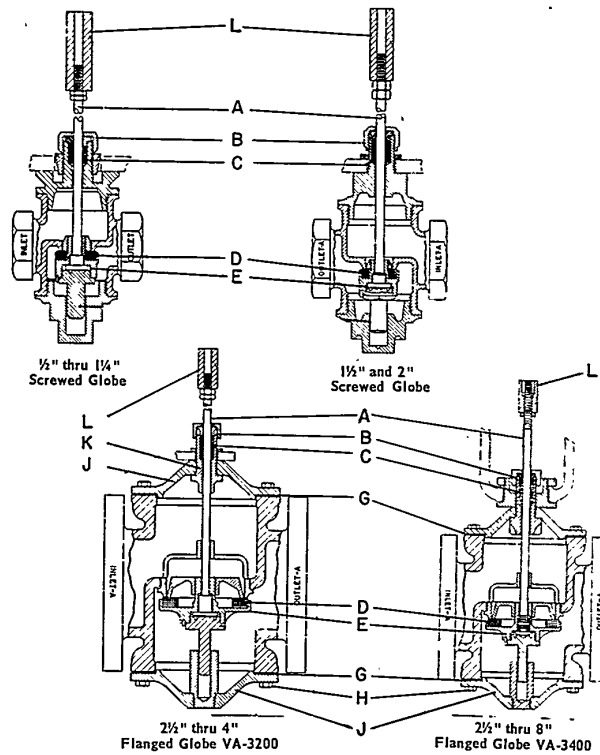
DISCONTINUED

Johnson VB-3970 Water or Steam Valve for Electric Actuator

Normally Closed

Single Seat

Modulating Plug



**ORDER FROM MILWAUKEE
USE CODE NUMBER ONLY WHEN ORDERING**

Item	Name of Part	Order in Multiples of	Code No.
A	Stem and Swivel Assembly Includes: Stem, Swivel and Lock Pin for:		
	Valve Size (After 1-1-68)		
	1"		V-3970-636
	1 1/2"		V-3970-636
	1 1/2"		V-3970-637
B	Gland Nut for:		
	Valve Shipping Date		
	1/2" - 1 1/4" ALL	5	V-3752-646
	1 1/2" & 2" After 1-1-68	5	V-3752-646
	1 1/2" & 2" Before 1-1-68	5	V-4510-6019
	2 1/2" - 4" (VA-3200) ALL	5	V-4510-6019
2 1/2" - 8" (VA-3400) ALL	5	V-4510-6020	

LIST OF PARTS CONTINUED ON NEXT PAGE



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ORDER FROM MILWAUKEE
USE CODE NUMBER ONLY WHEN ORDERING

Item	Name of Part	Order in Multiples of	Code No.
C	Packing		
	Valve Shipping Date		
	Valve Size Service		
	1/2" - 1/4" W&S	10	V-4322-620
	1 1/2" & 2" W&S	10	V-4322-620
D	Disc Only		
	Valve Size		
	1/2"	10	V-3020-621
	3/4"	10	V-3011-600
	1"	10	V-3011-601
	1 1/4"	10	V-3011-602
	1 1/2"	10	V-3020-606
	2"	10	V-3020-607
	2 1/2"	5	V-4710-610
	3"	5	V-4710-611
E	Disc Assembly Includes: Disc, Disc Holder, Modulating Plug and Pins		
	Valve Size Cv		
	1"	6.9	V-3970-630
	1 1/4"	11.0	V-3970-631
	1 1/2"	20.0	V-3970-632
	2"	35.0	V-3970-633
	2 1/2"	54.0	V-4710-694
	3"	83.0	V-4710-695
G	Gaskets (2 Req'd.)		
	Valve Size		
	2 1/2"	5	V-4710-626
	3"	5	V-4710-627
	4"	5	V-4710-629
	5"	5	V-4710-630
	6"	5	V-4710-631
8"	5	V-4710-632	

Item	Name of Part	Order in Multiples of	Code No.
H	Screws for Centerpiece and Bottom Cap		Purchase Locally Qty Req'd
	Valve Size Screw Size		
	2 1/2" 3/4" x 5/16"-18		(12)
	Hex Head Cap Screw		
	3" 7/8" x 3/8"-16		(12)
	Hex Head Cap Screw		
	4" 1" x 3/8"-16		(16)
	Hex Head Cap Screw		
	5" 1" x 1/2"-13		(16)
	Hex Head Cap Screw		
J	Centerpiece and Bottom Cap		
	Valve Size		
	2 1/2" (VA-3200)		V-5250-612
	3" (VA-3200)		V-5250-613
K	Centerpiece used as a Bottom Cap		
	Valve Size		
	2 1/2" (VA-3400)		V-5250-612
	3" (VA-3400)		V-5250-613
L	Stuffing Box		
	Valve Size		
2 1/2", 3", 4" (VA-3200)		V-5250-615	
L	Coupling Kits (Order from Dallas)		
	Valve Size Actuator		
	1/2" - 2" VA-5000		VZ-1000-8*
	1/2" - 2" VA-3200		VZ-1000-7*
	2 1/2" - 4" VA-3200		VZ-1000-3
	2 1/2" - 8" VA-3400		VZ-1000-4

* Used only on Valves Shipped after 3-1-69.

REPLACEMENT VALVE LESS BODY (1/2" - 2")
REFER TO R-V-3970-2 (REMOVE SPRING PARTS)