Refinite

WATER CONDITIONING CO.

WORLD WIDE

OPERATION AND MAINTENANCE MANUAL

Building RR-85 Camp Lejeune, N.C.

CONTRACT NO. N62470-81-C-1454

GENERAL CONTRACTOR: CWC, INC.
Jacksonville, Florida (904) 737-0844

Subcontractor: Ray Goodwin Construction Co.
Athens, Tennessee

REPAIRS TO WATER/SEWAGE FACILITIES

BUILDING RR-85

MARINE CORPS BASE,

CAMP LEJEUNE, NORTH CAROLINA

GENERAL CONTRACTOR

CWC, INC.

P. O. BOX 5579

JACKSONVILLE, FLORIDA 32207

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CAMP LEJEUNE FILTERS AND SOFTENERS

The equipment supplied by Refinite Water Conditioning Company for Camp LeJeune consists of two (2) vertical pressure filters, valves for a third and two (2) water softeners. The whole system is fully automatic in operation and is controlled by a Refinite Hydro-Commander using a Modicon 84 programmable controller. All operations for backwashing the filters and regeneration of the softeners is carried out by the use of Refinite/Aquamatic multi-port valves.

Please refer to Refinite drawings RF-910-1F and RF-910-5, this show the three vertical pressure filters and softeners with automatic multi-port valves, also refer to Refinite drawing RF-910-14 which shows in diagramatic form the connections to and from the filters and softeners. With reference to the filters, it will be noted that the multi-port valve is in the center of the pipe layout, however, there are two valves which control the inlet water to the multi-port valve. These are both automatic valves and are a necessary adjunct to the multi-port valve because they control whether the water entering the valve will be backwash water or raw water. In normal operation, the raw water valve will be open, water will pass into the multi-port valve, flow through the top of the filter downwards through the filter back into the multi-port valve and into service.

After the filter have been in operation for a length of time, they will require backwashing. Backwash will be initiated by the loss of head on one of the filters indicating that there is build-up on the media bed. The loss of head gauge will send a signal to the Hydro-Commander which will, through its program, send a signal which will cause the raw water valve to close and the backwash valve to open. At the very same time, a signal will be sent to the multi-port valve which will index round to the backwash position. A limit switch will stop the motor running at the correct position; ready for backwash. During backwash, the surface wash system will also operate to clean the bed. The Hydro-Commander will rinse the filter and return it to service.

This is a very simple arrangement, during the backwash of one filter, the Hydro-Commander will block out any signals coming from the other two filters to ensure that only one filter can backwash at a time. However, the filter next in line will be memorized by the Hydro-Commander which, at the end of backwashing, the first filter to be backwashed will then start backwashing, the second and so on. These need not necessarily be in their numerically order.

In the case of the softeners, the operation is very similar, a meter will measure the amount of soft water that has passed through it. When it reaches the predetermined amount, send a signal to the Hydro-Commander which will index the electric motor driven multi-port valve to the backwash position. The softener will be backwashed, the brine pump will be started, softener will be brined and the Hydro-Commander will then send a signal to move the valve into the "rinse" position. The softener will be rinsed and then the Hydro-Commander will return the valve to the service position. In all cases, the time of each event is automatically controlled by the Hydro-Commander.

DATE	SYM	REVISION RECORD	DR.	CK.

MODICON 84
PROGRAMMABLE
CONTROLLER

INLET

LOSS OF HEAD GAUGE

MOTOR-DRIVEN MULTIPORT VALVE (TYPICAL)

FILTER 1

FILTER 2

FILTER 3

OUTLET

BRINE METER

MOTOR-DRIVEN MULTIPORT VALVE

BRINE

WATER

SOFTENER 1

SOFTENER 2

BRINE TANKS

FILTER SCHEMATIC

SOFTENER SCHEMATIC

TOLERANCES (EXCEPT AS NOTED)	CAMP LEJEUNE, N.C.		
DECIMAL ±		SCALE NONE	DRAWN BY MJG APPROVED BY
FRACTIONAL ±	TITLE FILTER & SOFTENER SCHEMATIC		
ANGULAR ±	DATE 5-2-83	DRAWING NUMBER RF-910-14	

RUNNING 40-21

WORLD—WIDE

Refinite

WATER CONDITIONING CO.

VERTICAL PRESSURE FILTERS

GENERAL CONTRACTOR

CWC, INC.

P. O. BOX 5579

JACKSONVILLE, FLORIDA 32207

QTY	MODEL #	SIZE	DESCRIPTION
2	RVF-872	96" Diameter 72" Vertical Straight Side Shell	Designed to Section VIII Div., I of ASME Boiler and Pressure Vessel Code Working Pressure - 100 psi Hydrostatic Test - 150

REFINITE WATER CONDITIONING DRAWING #RF-910-1

OPERATION OF REFINITE/AQUAMATIC MULTIPORT VALVE

FILTERS

General

The multiport valve controls the service, backwash and rinse modes of each filter. There is one (1) multi-port valve per filter. Associated with the multi-port valves are automatic valves which shut the lines off to allow the multi-port valve to index and also to change from raw water feed to the valve to backwash water feed. There is also on each valve body a small solenoid valve to relieve pressure when the valve is indexing. Also, there is an automatic valve on the surface wash supply line.

General Description of the Valve

The valve is of the lift and turn type. That is, the valve consists generally of two main items; a "backplate" with various ports in it, (the backplate also has a heavy rubber gasket covering the space between the ports on which the stemplate seats) and a "stemplate" which rotates to position the valve for the various modes. There are five main connections to the valve, at the back for raw water feed or backwash inlet, one to the top of the filter, one to the bottom, one for filtered water outlet, and the fifth connection is backwash waste.

At the top of the valves is a rectangular metal box (gear box) containing the mechanism that lifts and turns the stemplate. To operate the valve , the stemplate must first be lifted and then rotated (or indexed) to the correct position. As soon as it arrives at the correct position, it is moved back onto the rubber gasket in the position to allow the appropriate mode to be carried out. In the gear box are two shafts; one is an extension of the stemplate spindle, at the top of which is a yoke which is attached to a powerful solenoid. The yoke permits the stemplate spindle to rotate. Securely fastened to the stemplate extension is a large gear wheel which is driven by a second spindle in the box. The second spindle is driven directly by a geared down electric motor mounted on top of the gear box. This second shaft has a small pinion which engages with the large gear wheel on the stemplate shaft extension. The two gears are of sufficient width so that the gear wheel on the stemplate extension can move upwards or downwards and still remain in mesh with the small pinion on the drive shaft.

In operation, on receipt of a signal from the control panel, the solenoid pulls the stemplate shaft forward against a spring and holds it there. The electric motor then drives the stemplate spindle via the pinion and gear wheel and moves it into the correct position. When the correct position is reached (indexed) the electric motor stops, the solenoid is released and the spring returns the stemplate

onto the backplate.

The detailed operation is as follows:

Assume the valve is in position #1 - Service

Position #1 - Service

In "service" position, raw feed water enters the valve from the back onto the top of the stemplate, through the service position orifice, flows to the top of the filter, out through the bottom of the filter, into the underside of the stemplate and through the feed passage to the filtered water outlet. In this position, the "service" microswitch is open.

Movement to Position #2 - Backwash

After the filter has been in operation for a period of time, accumulation of material on the bed will cause an increase in loss of head across the bed. A signal will be sent from the differential pressure switch to the control panel. The control panel will send a signal to close the backwash supply valve (this should already be closed) raw water feed and filter outlet. At the same time, the small solenoid valve on the body of the multiport valve will open releasing pressure on top of the stemplate. A signal is then sent to the lift-solenoid control relay which is mounted in a junction box on the outside of the valve gear box. This relay closes and power is sent to the stemplate lift solenoid. The solenoid activates, pulling the stemplate away from the valve backplate and against the stemplate returning spring.

Following this, the control panel sends a signal to the drive motor. (Note that this signal by-passes the "open" position of the position #1 microswitch to enable power to be supplied to the drive motor and rotate it). The drive motor will now rotate driving the stemplate round via the drive shaft, small pinion, large gear wheel and stemplate extension spindle. Note that while this is in operation, the solenoid is still holding the stemplate away from the backplate. The motor will continue to run and the stemplate rotates until it gets to position #2, at which time the microswitch for position #2 will "open" stopping the electric motor and stopping further movement of the stemplate (indexing). Once the stemplate is in this position, solenoid power will be cut off and the stemplate return spring will return the stemplate to the backplate ready for operation .

The control panel will then send a signal to close the small solenoid valve on the multi-port valve body and will then open the backwash supply valve and start the backwash timer. Immediately following this, the surface wash valve will open and the surface wash timer will start running. At the end of the surface wash time (which is shorter than the backwash time) the surface wash timer will time out and the surface wash valve will close. Shortly after this, the backwash timer will time out and a signal will be sent to the control panel. The control panel will close the backwash supply water valve and will open the small solenoid on the valve body releasing pressure in the valve body.

Movement to Position #3 - Rinse

A signal will then be sent from the control panel to the solenoid control relay which will lift the stemplate, the drive motor will then rotate the stemplate, (the microswitch will be by-passed) and index the valve to position #3 rinse. At position #3, the drive motor will stop, the solenoid will release the stemplate and the spring will return it to the backplate.

The controller will then close the small solenoid on the body of the valve and open the raw water feed valve. Raw water will pass into the multi-port valve, will be ported by the valve to the top of the filter out through the bottom and will then pass through the waste line to be wasted during the rinsing operation. At the same time, a timer will start controlling the period of rinse. At the end of the rinse period, the timer will time out, send a signal to the control panel which will close the raw water feed valve, open the small solenoid on the valve body, lift the stemplate and rotate it back to position #1.

Note that at each movement of the valve, the auxiliary valves are closed and pressure is relieved from the body of the valve. It is an important part of the operation to relieve pressure and allow the stemplate to be lifted off its seat.

Notes: The stemplate lift solenoid is designed for approximately 10 minutes operation and can well stand the short period of time, that is, energized while the valve is being indexed. The position of each mode, in other words, where the valve is indexed to, is controlled by the position of the microswitch cam mounted on the stemplate spindle extension. It is important that the valve stemplate when power is taken off the solenoid. To adjust the microswitch, two small Allen screws are slackened and the cam moved in the appropriate direction.

The large gear wheel and small pinion are lubricated at the factory and it is unlikely that they would require any lubrication for many years. However, at three monthly intervals, the cover should be taken off the gear box and the amount of lubricant on the gears checked, they should just have a thing coating of grease.

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WORLD—WIDE

Refinite

WATER CONDITIONING CO.

FILTER VALVES

GENERAL CONTRACTOR

CWC, INC.

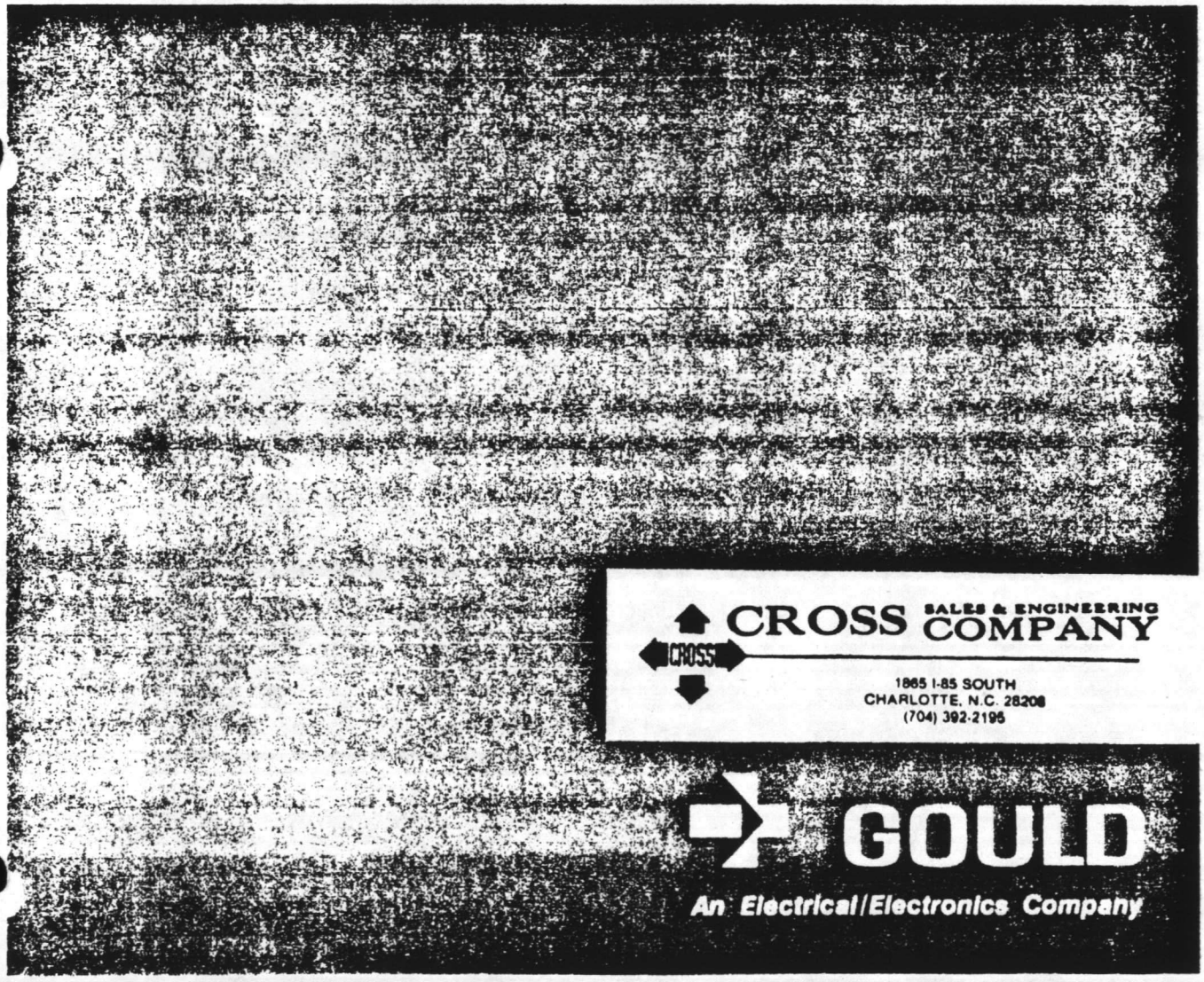
QTY	MANUFACTURER	SIZE
3	Refinite/Aquamatic Motor Driven Multi-port Valves	4"
1	Aquamatic Diaphragm Valves (Auxiliary)	4"
2	Motor Operated Diaphragm (Auxiliary)	4"
2	Hoffman	1"

NOTE: The three (3) Refinite/Aquamatic motor driven multi-port valves are the main control valves. The 4" auxiliary valves are to control either the raw water or backwash water to the main valve.

Gould Modicon

USER'S MANUAL

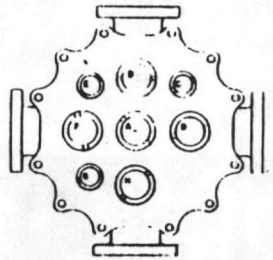
MODICON MICRO 84 PROGRAMMABLE CONTROLLER



SECTION 1
INTRODUCTION

In an industrial environment, relays and solid-state electronic devices are used to provide the necessary control signals for control system applications. A relay can be either an electro-mechanical device or a solid-state electronic device that is "hardwired" to perform a particular function. When the application in which an electro-mechanical device is used is changed, the device must be modified (from normally closed to normally open, for example). In the case of a "hardwired" device, it must be replaced with one that is tailored to the application.

A programmable controller (PC) is a solid-state device that directly replaces the relays and "hardwired" electronic circuitry. A programmable controller can be quickly modified to adapt to a new or changed application. MODICON introduced programmable controllers in the late 1960's. The first user was the automobile industry. Programmable controllers allowed them to avoid the time and expense of rewiring relay control systems at model changeover. Since then, the use of programmable controllers has expanded to cover a wide variety of industrial control system applications. Typical control system applications include machines used in cutting, grinding, and welding metals; equipment for assembling, packaging, and testing components and finished products; machinery for weighing, transferring, and otherwise handling materials; and systems for processing chemicals and foods.



PORT IDENTIFICATION
A - INLET PORT
B - DRAIN PORT
C - BRINE TO TOP OF TANK PORT
D - TOP OF TANK PORT
E - BRINE INLET PORT
F - OUTLET PORT
G - 3/8 - PIPE PORT
H - BOTTOM OF TANK PORT

PARTS LIST

PART NO.	PART NAME	QTY.
107-A	BACKPLATE & FLANGE ASSEMBLY	1
107-B	BACKPLATE & FLANGE ASSEMBLY	1
107-C	GASKET	
107-D	STEMPLATE	
107-E	LARGE PORT FERRULE	
107-F	STUFFING BOX FLANGE	
107-G	STUFFING BOX BUSHING	
107-I	STEMPLATE PIN	
107-J	STEMPLATE SHAFT	
107-K	EJECTOR NOZZLE (VENTURI ONLY)	
107-L	BACKPLATE GASKET	
107-M	STUFFING BOX STUD	
107-N	EJECTOR THROAT (VENTURI ONLY)	
107-P	STEMPLATE SPRING	
107-R	STEMPLATE SEAL (PISTON ONLY)	
107-S	STEMPLATE PISTON	
107-T	STEMPLATE BEARING	
107-U	STEMPLATE SEAL	
107-V	STEMPLATE BEARING	
107-W	STEMPLATE SEAL	
107-X	STEMPLATE BEARING	
107-Y	STEMPLATE SEAL	
107-Z	STEMPLATE BEARING	
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107-MF	STEMPLATE BEARING	
107-MG	STEMPLATE SEAL	
107-MH	STEMPLATE BEARING	
107-MI	STEMPLATE SEAL	
107-MJ	STEMPLATE BEARING	
107-MK	STEMPLATE SEAL	
107-ML	STEMPLATE BEARING	
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107-MN	STEMPLATE BEARING	
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107-MP	STEMPLATE BEARING	
107-MQ	STEMPLATE SEAL	
107-MR	STEMPLATE BEARING	
107-MS	STEMPLATE SEAL	
107-MT	STEMPLATE BEARING	
107-MU	STEMPLATE SEAL	
107-MV	STEMPLATE BEARING	
107-MW	STEMPLATE SEAL	
107-MX	STEMPLATE BEARING	
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107-MZ	STEMPLATE BEARING	
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107-NB	STEMPLATE BEARING	
107-NC	STEMPLATE SEAL	
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107-NJ	STEMPLATE BEARING	
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107-NU	STEMPLATE SEAL	
107-NV	STEMPLATE BEARING	
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107-NX	STEMPLATE BEARING	
107-NY	STEMPLATE SEAL	
107-NZ	STEMPLATE BEARING	
107-OA	STEMPLATE SEAL	
107-OB	STEMPLATE BEARING	
107-OC	STEMPLATE SEAL	
107-OD	STEMPLATE BEARING	
107-OE	STEMPLATE SEAL	
107-OF	STEMPLATE BEARING	
107-OG	STEMPLATE SEAL	
107-OH	STEMPLATE BEARING	
107-OI	STEMPLATE SEAL	
107-OJ	STEMPLATE BEARING	
107-OK	STEMPLATE SEAL	
107-OL	STEMPLATE BEARING	
107-OM	STEMPLATE SEAL	
107-ON	STEMPLATE BEARING	
107-OO	STEMPLATE SEAL	
107-OP	STEMPLATE BEARING	
107-OQ	STEMPLATE SEAL	
107-OR	STEMPLATE BEARING	
107-OS	STEMPLATE SEAL	
107-OT	STEMPLATE BEARING	
107-OU	STEMPLATE SEAL	
107-OV	STEMPLATE BEARING	
107-OW	STEMPLATE SEAL	
107-OX	STEMPLATE BEARING	
107-OY	STEMPLATE SEAL	
107-OZ	STEMPLATE BEARING	
107-PA	STEMPLATE SEAL	
107-PB	STEMPLATE BEARING	
107-PC	STEMPLATE SEAL	
107-PD	STEMPLATE BEARING	
107-PE	STEMPLATE SEAL	
107-PF	STEMPLATE BEARING	
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107-PJ	STEMPLATE BEARING	
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107-PQ	STEMPLATE SEAL	
107-PR	STEMPLATE BEARING	
107-PS	STEMPLATE SEAL	
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107-PV	STEMPLATE BEARING	
107-PW	STEMPLATE SEAL	
107-PX	STEMPLATE BEARING	
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107-RC	STEMPLATE SEAL	
107-RD	STEMPLATE BEARING	
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107-RN	STEMPLATE BEARING	
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107-RQ	STEMPLATE SEAL	
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107-RS	STEMPLATE SEAL	
107-RT	STEMPLATE BEARING	
107-RU	STEMPLATE SEAL	
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107-RW	STEMPLATE SEAL	
107-RX	STEMPLATE BEARING	
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107-SO	STEMPLATE SEAL	
107-SP	STEMPLATE BEARING	
107-SQ	STEMPLATE SEAL	
107-SR	STEMPLATE BEARING	
107-SS	STEMPLATE SEAL	
107-ST	STEMPLATE BEARING	
107-SU	STEMPLATE SEAL	
107-SV	STEMPLATE BEARING	
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107-SX	STEMPLATE BEARING	
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107-TC	STEMPLATE SEAL	
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107-TE	STEMPLATE SEAL	
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107-TG	STEMPLATE SEAL	
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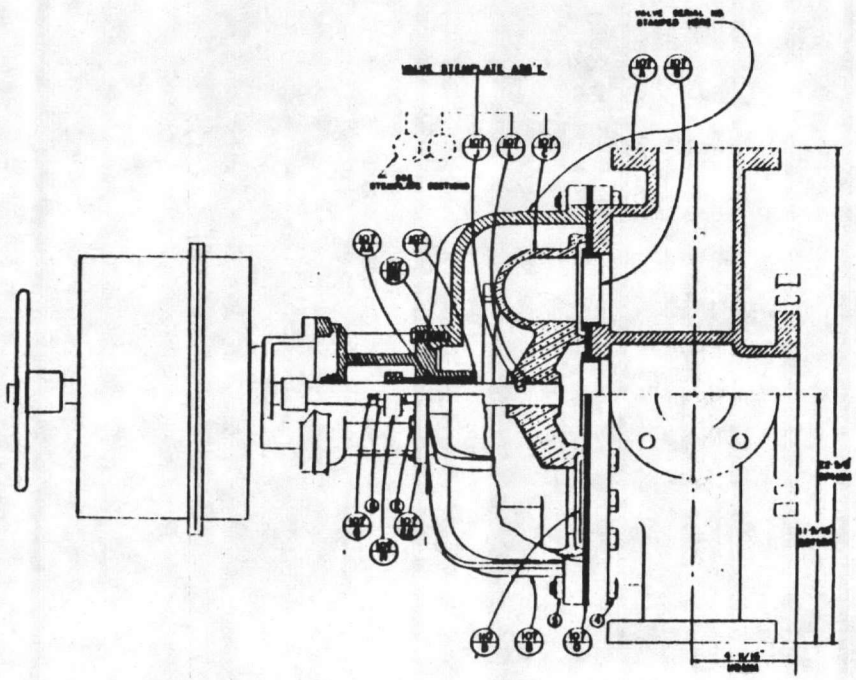
107-ZU	STEMPLATE SEAL	
107-ZV	STEMPLATE BEARING	
107-ZW	STEMPLATE SEAL	
107-ZX	STEMPLATE BEARING	
107-ZY	STEMPLATE SEAL	
107-ZZ	STEMPLATE BEARING	

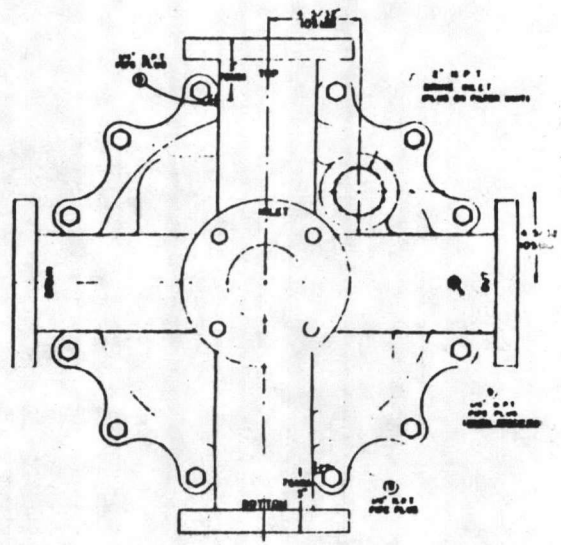
PARTS LIST

PART NO.	PART NAME	QTY.
107-B	RESTRICTOR FERRULE (PISTON)	
	CAP SCREW	
	BACK BOX	
	SEAT	
	SEAT	
	SET SCR	
	COTTER PIN	

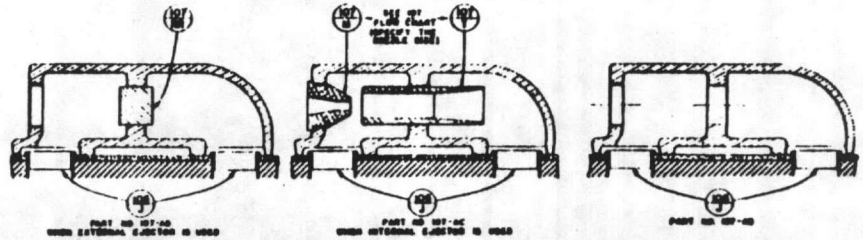
SOFTENER STEMPLATE ASS'Y (INTERNAL EJECTOR)

SOFTENER STEMPLATE ASS'Y (EXTERNAL EJECTOR)





FLANGE SIZE		BCD	BOLT DIA	NO. OF BOLTS
1"	in.	3.50	5/8	4
	mm	100	16	4
4"	in.	7.50	5/8	8
	mm	190	16	8



PART NO. 107-AD WHEN EXTERNAL EJECTOR IS USED

PART NO. 107-AC WHEN INTERNAL EJECTOR IS USED

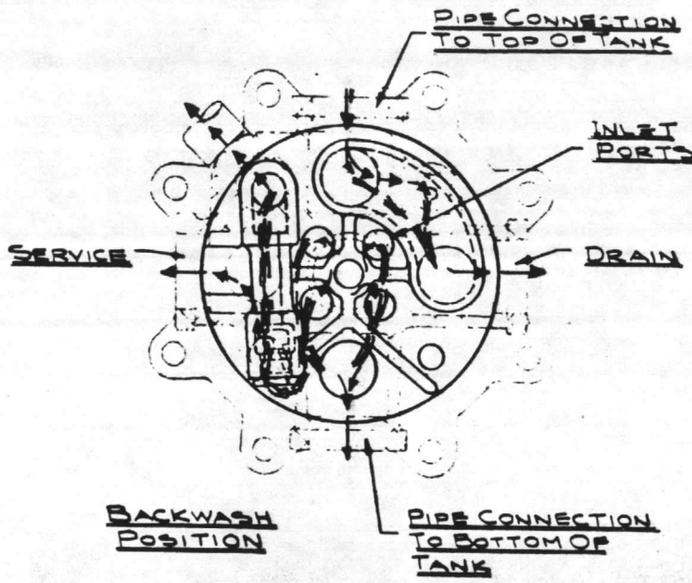
SOFTENER STEMPLATE SECTIONS

PART NO. 107-AD

FILTER STEMPLATE SECTION

5'-0"-0" SOLO VALVE SERIES 107

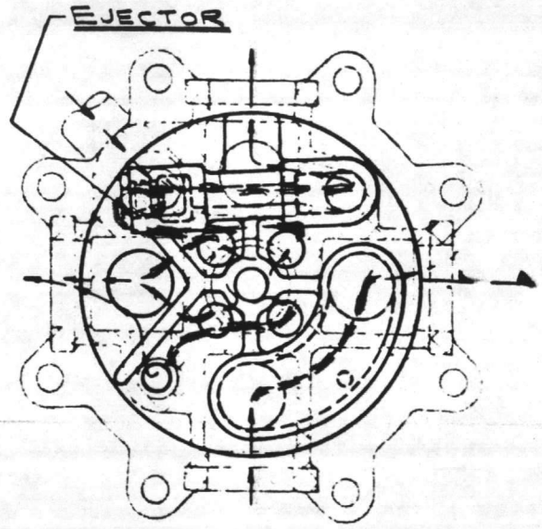
E-107-

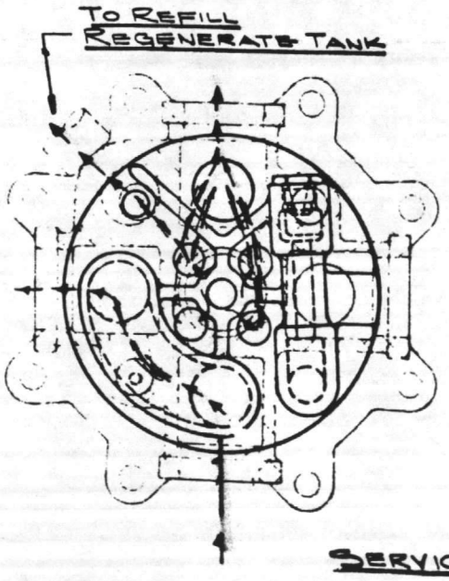


FLOW DIAGRAMS

Raw water enters the valves at the pipe connections in the rear center of the backplate and enters directly into the bonnet chamber through openings in the inner portion of the stemplate. It is then fed back into one of the internal backplate ports through the large circular opening in the outer portion of the stemplate (stemplate feedport) and thence to the treating tank. As the water returns from the treating tank it enters the backplate through the pipe connection, flows through an internal backplate port into the stemplate transfer, across the transfer back through another backplate port and leaves the valve through the proper piping connection.

The diagrams show the path of the water thru the Solo valve for each of the 3 stemplate positions - both 100 series (8 port) and 200 and 400 series (6 port).



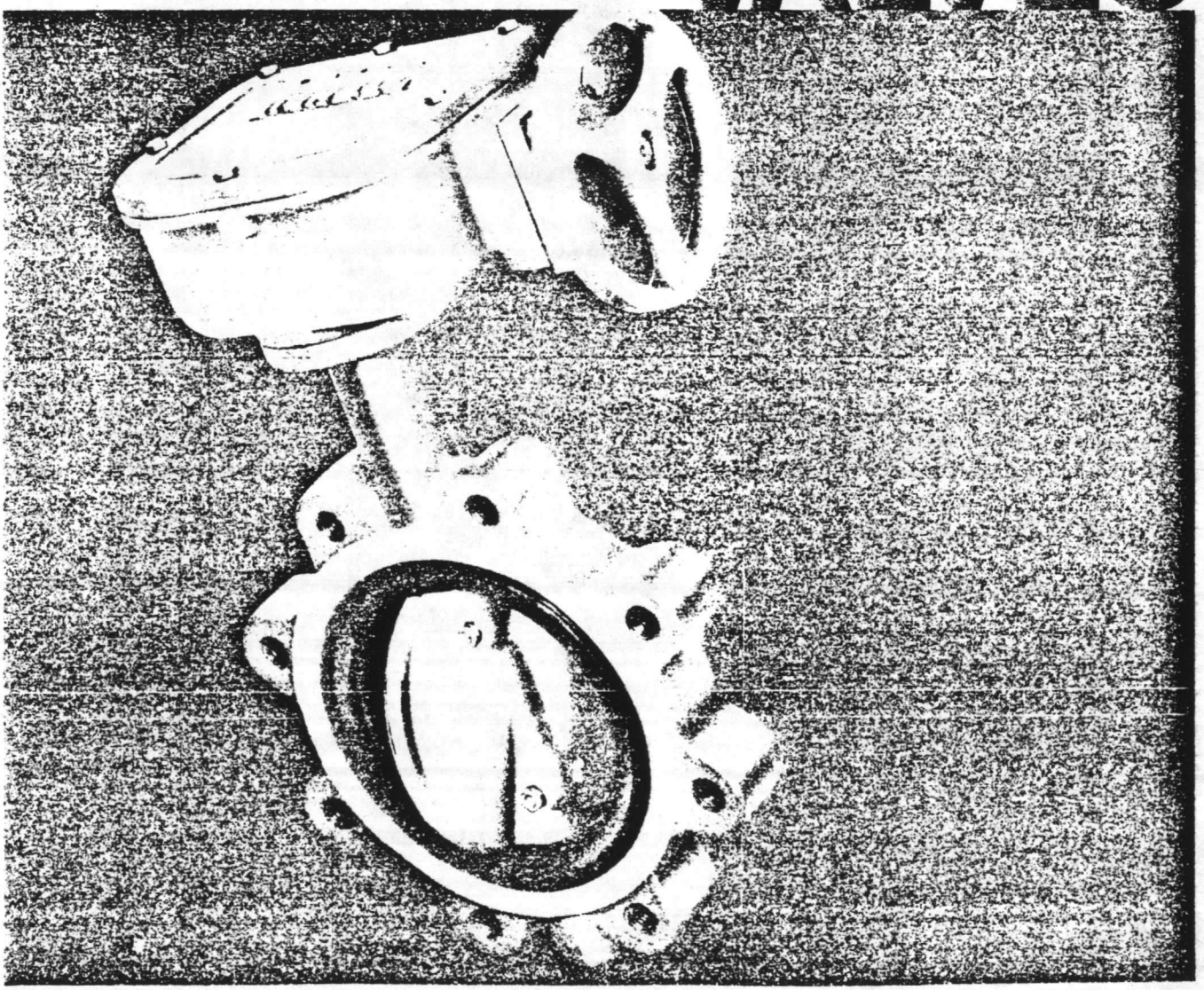


Legend

GREY	Backplate
GREEN	Flow thru Backplate
BLACK	Stemplate
RED	Flow thru Stemplate

BULLETIN 40.00-1
July, 1979

DeZURIK® RESILIENT SEATED BUTTERFLY VALVES



2"-20" electric motor actuators

ACTUATOR SPECIFICATIONS

Actuator Type
RCS Motor Actuators with brake.

Speed of Operations
Speeds

2"-4"	30 seconds (KMGM2 and KMGM3)
5"	30 seconds (KMGM3) 15 seconds (KMGM4) 30 seconds (KMGM5)
6"	15 seconds (KMGM4) 30 seconds (KMGM5 and KMGM6)
8"	30 seconds (KMGM6 and KMGM7)
10"	30 seconds (KMGM7)
12"	30 seconds (KMGM7) 26 seconds (KMGM8)
14"	26 seconds (KMGM8)
16"	26 seconds (KMGM8) 55 seconds (KMGM9)
18"-20"	55 seconds (KMGM9)

See chart below.

Motor Enclosure
NEMA 4 Watertight (Standard).
NEMA 7 available on request.

Motor Electrical Characteristics
Standard — 120 VAC 60/50 Hz, 1 phase a.c.

Optional — 220 VAC 60/50 Hz, 1 phase a.c. (MAR25, 50, 90, 100, 160, 250, 800 and 1600); 220/440 VAC, 3 phase a.c. (MAR100, 160, 250, 800 and 1600)

Manual Valve Operation
Motor back shaft provided for wrench operation. Safety interlock cap cuts motor power when removed.

Limit Switches
Two standard adjustable open and close limit switches are located within the motor unit.
15 amps, ⅓ hp, 125 or 250 VAC
5 amps, 120 VAC "L" (Lamp Load)
½ amp, 125 VDC
¼ amp, 250 VDC

Accessories
Position Indicating Switches
2 optional switches can be added.
Standard switches are SPDT.
Consult factory for DPDT and 3PDT switches or for more than two extra switches.
Extra switches furnished on same Cam as standard.
Auxiliary switches furnished on separate Cam.
Potentiometer
Furnished mounted in the limit switch case. Approximately 90° valve rotation from open to closed provides usable potentiometer output signal span of approximately 1,000 ohms, To order, add code "R" to actuator identification.
Breather and drain
For applications that are exposed to high humidity; breathers and drains are recommended for explosion-proof actuators.
Heater and Thermostat
For applications that are exposed to high humidity, or extreme low temperature, heaters and thermostats are recommended.
Extended Duty Motor
All standard units are rated for 25% duty cycle. When ordering extended duty units it is recommended that DeZURIK be consulted to determine the correct cycle time for particular applications.

Actuator Ordering
To order electric motor actuators, add the appropriate actuator model number from the sizing table below and the electric characteristics code as follows to the basic valve identification. Actuators can be mounted at 90° increments clockwise from standard. Specify non-standard mounting positions below the valve and actuator identification.

Electrical Characteristic Code:
A = 120 VAC 60/50 Hz, 1 phase a.c.
B = 220 VAC 60/50 Hz, 1 phase a.c.
C = 220/440 VAC, 3 phase a.c.

ORDERING EXAMPLE:
0600, FIG 632, W, B, RS16, 2, KMGM6, A.

VALVE SIZE	UNDERCUT DISC 25 PSI UNI-DIRECTIONAL SHUTOFF		
2"-5"	MAR25	(10)	KMGM2
6"	MAR50	(30)	KMGM3
8"	MAR100	(30)	KMGM5
10"	MAR160	(30)	KMGM6
12"-14"	MAR250	(30)	KMGM7
16"-20"	MAR800	(26)	KMGM8

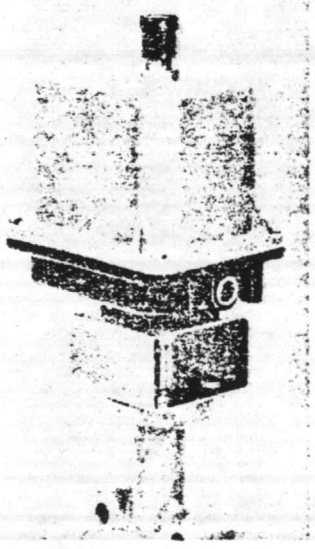


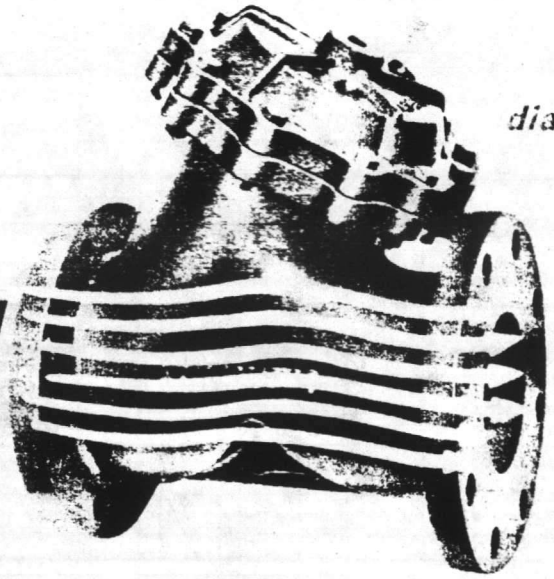
FIG 632 BUTTERFLY W/RCS MOTOR

VALVE SIZE	PRESSURE DROP, PSI						
	25	50	75	100	125	150	175
2"	KMGM2 MAR25 (10)						
2½"	KMGM2 MAR25 (10)					KMGM3 MAR50 (30)	
3"	KMGM2 MAR25 (10)			KMGM3 MAR50 (30)			
4"	KMGM2 MAR25 (10)		KMGM3 MAR50 (30)				
5"	KMGM3 MAR50 (30)	KMGM4 MAR90 (15)			KMGM5 MAR100 (30)		
6"	KMGM4 MAR90 (15)		KMGM5 MAR100 (30)			KMGM6 MAR160 (30)	
8"	KMGM6 MAR160 (30)		KMGM7 MAR250 (30)				
10"	KMGM7 MAR250 (30)						
12"	KMGM7 MAR250 (30)		KMGM8 MAR800 (26)				
14"	KMGM8 MAR800 (26)						
16"	KMGM8 MAR800 (26)		KMGM9 MAR1600 (55)				
18"	KMGM9 MAR1600 (55)						
20"	KMGM9 MAR1600 (55)						

NOTE. Number in parentheses indicates operating speeds for 90° rotation. (60 cycle motors only; 50 cycle motors increase in time by a factor of 1.2.)

AquaMatic®

diaphragm-operated valves



FULL FLOW THRU VALVE

- LOW PRESSURE LOSS THROUGH VALVE
- LARGE OPENING, HIGH LIFT DISC GIVES HIGH FLOW RATES
- POSITIVE CLOSING AND OPENING
- HYDRAULIC OR PNEUMATIC OPERATION
- DIAPHRAGM REPLACEABLE WITHOUT INTERRUPTION OF FLOW
- HANDLES LIQUIDS OR GASES
- ADAPTABLE TO MANY CONTROL DEVICES

An AquaMatic Y-pattern valve means **positive** control with Full Flow. Complete control is obtained with less bulk, less weight, and less complication than with many other forms or remote control for fluids. Seven series of valves, ranging from ¾ to 6 in. IPS, bracket the needs of the process man as well as the water conditioner for a positive means of remote control at less cost.

Purchasing

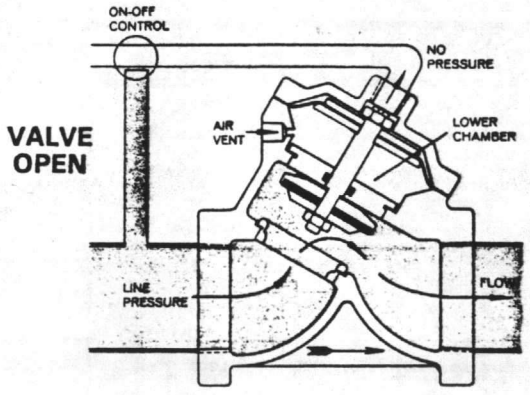
The Valve shall be of the Y-Pattern Design, Diaphragm Powered, Hydraulically operated and Pilot controlled. Valve shall have an upper and lower chamber for power closing and opening when required. Valve shall be completely Hydraulic (no springs) in operation.

Valve shall be equal and similar in all respects and operation to the diaphragm valves manufactured by AquaMatic, Inc., Rockford, Ill.

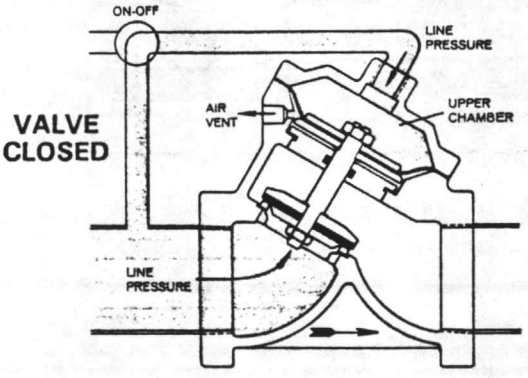
FURNISH THE FOLLOWING WHEN ORDERING: Size; fluid to be handled; maximum and minimum line pressure; maximum temperature; end connections required.

OPTIONAL MODELS AVAILABLE

Flow Limit Stops • Spring-Assist, Open • Spring Assist, Closed • Normally Closed.



Full Open Operation When closing pressure, in upper chamber, is relieved by venting the pilot line, the valve opens, positively, by line pressure on the disc.



Drip-Tight Closing Closure is obtained by directing line pressure or equivalent independent pressure into the upper chamber. This pressure on the large diaphragm area causes the valve disc to seal against the seat.

REPRESENTED BY

AquaMatic INC. 2412 GRANT AVENUE
ROCKFORD, ILLINOIS 61101 Area 815/964-9421
CABLE "AQUAMATIC" TELEX 257355

PRINTED IN U.S.A.

Bulletin 800H (11-77)

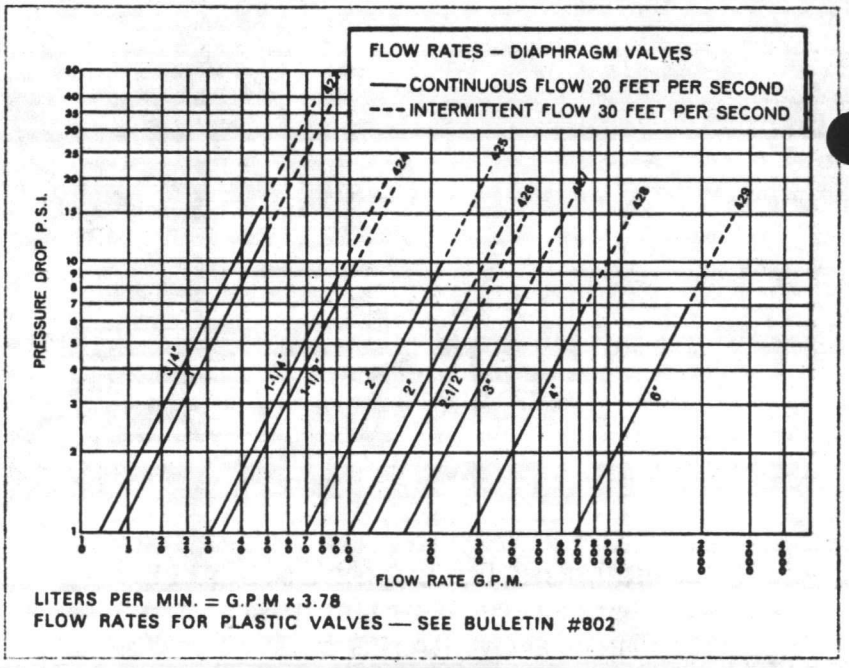
AquaMatic

diaphragm-operated valves

Y-pattern design, large seat opening and high-lift diaphragm produce excellent flow characteristics. There are no springs and related parts to consume space or restrict flow.

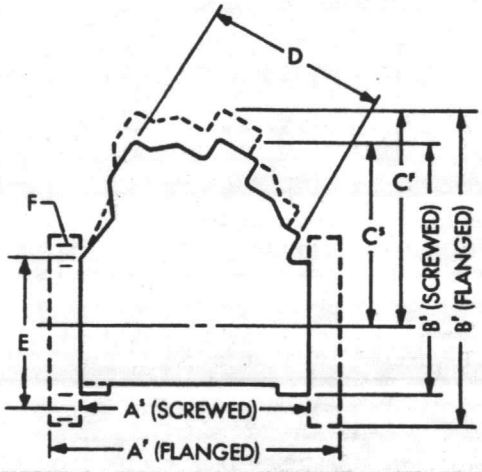
The diaphragm is shape-formed of Buna N on Nylon to assure long life. It can be replaced without stopping flow, and all parts can be serviced with the valve in line. Valves are available with cast iron or brass body and cap. Internal parts are stainless steel and brass. Maximum operating pressure: 125 psi (860 kPa); Minimum operating pressure: 7 psi (48 kPa); Maximum temperature: 300° F. (148° C).

For versatility of application, valves are available to be either opened or closed by pilot pressure.



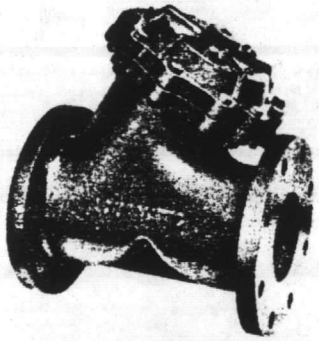
LITERS PER MIN. = G.P.M x 3.78
FLOW RATES FOR PLASTIC VALVES — SEE BULLETIN #802

DIMENSIONS



Size	Ends	Series		A^S	A^F	B^S	B^F	C^S	C^F	D	E	F
¾-1	SCRD	421	In.	3 1/16		4 1/4		3 1/4		2 3/4		
			mm.	94		108		82		70		
1¼-1½	SCRD	424	In.	4 3/4		5 3/8		4		3 1/2		
			mm.	120		136		101		89		
2	SCRD	425	In.	6.62		7.25		5.375		4.875		
			mm.	168		184		136		123		
2-2½	SCRD	426	In.	7 3/8		8		5 3/4		6 1/8		
			mm.	187		203		146		155		
3-S	SCRD	427-S	In.	9		9 3/4		6 3/4		7 1/4		
			mm.	228		247		171		184		
3-F	FLGD	427-F	In.		10 5/8		10 3/4		7	7 1/4	6	¾
			mm.		270		273		178	184	160	18
4-F	FLGD	428-F	In.		11 3/4		14 3/4		10	8 3/4	7 1/2	¾
			mm.		298		375		254	222	180	18
6-F	FLGD	429-F	In.		17		19		13 1/2	15 3/4	9 1/2	⅞
			mm.		431		482		343	402	240	20

B.S.P. threads optional on series 421 thru 427.
European flanges optional on series 427 thru 429.



SERIES 428F
4" FLANGED BODY

*For other materials consult factory.

SPECIFICATIONS

Sizes: ¾" — 3" Screwed
3" — 6" Flanged

Class: 125 Pound

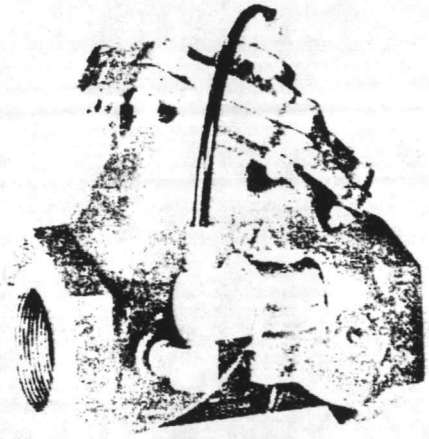
Pressure: 125 PSI recommended Working Pressure (860 kPa).

Temperature: Water-Air — Standard 32° F-150° F (0° C-65° C)
High Temperature 150° F-300° F(65° C-148° C)

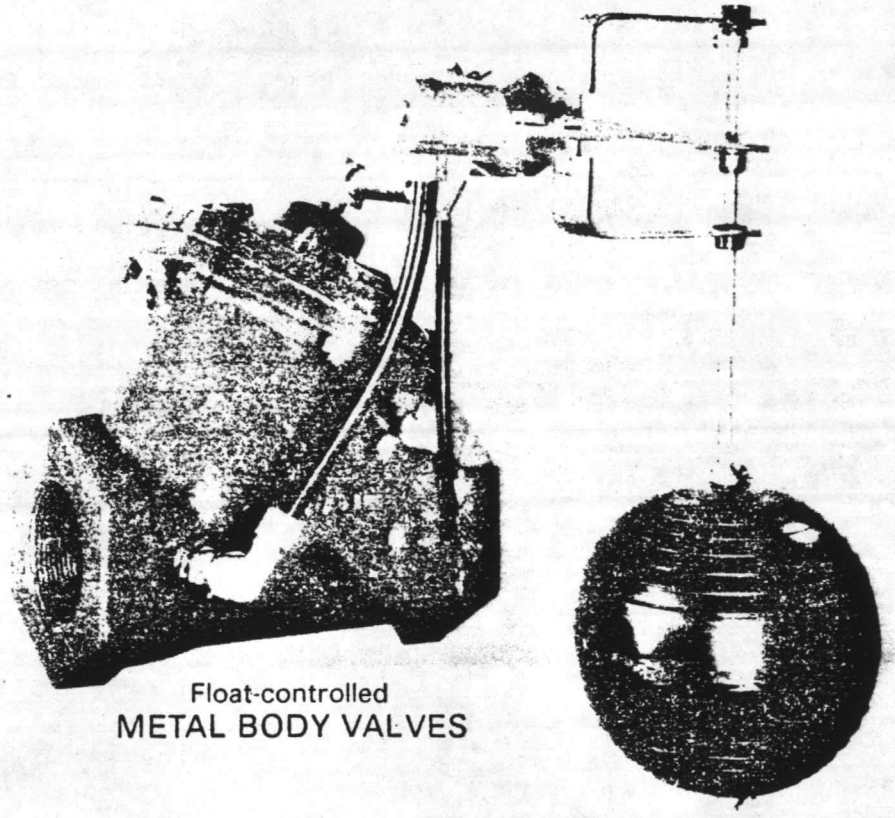
Materials: Body & Cap — Cast Iron or Bronze
Trim — Bronze with Stainless Steel Shaft
*Diaphragm — Standard Formed: Buna N/Nylon
High Temperature Formed: EPDM/Nomex
*Seals — Standard — High Temperature
Static: Buna N — EPDM
Dynamic: Buna N — EPDM
(Flurocarbon Coated)

AquaMatic

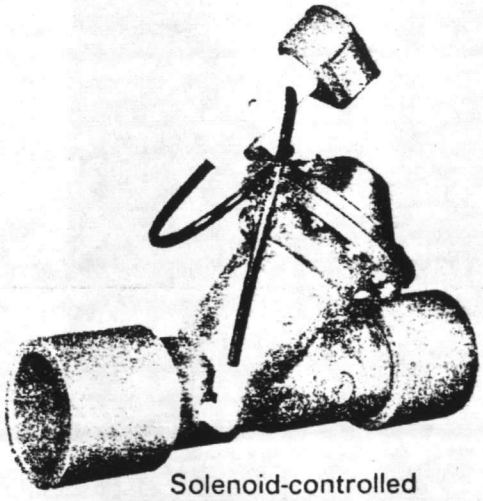
Solenoid and float-controlled diaphragm-operated valves



Solenoid-controlled
METAL BODY VALVES



Float-controlled
METAL BODY VALVES



Solenoid-controlled
PLASTIC BODY VALVES

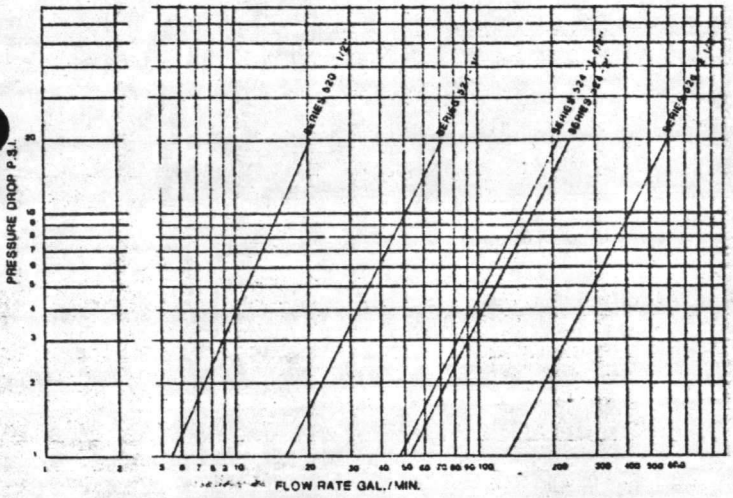
FULL FLOW THRU VALVE

MANY CONTROL OPTIONS
On-off pilot pressure opens and/or closes valve. Solenoid valves may be triggered manually or by liquid level, timer, flow meter, pressure or temperature. Float control may be used (either directly or remotely located) with metal body valves. With plastic valves, float control must be remotely located (cannot be mounted directly on valves).

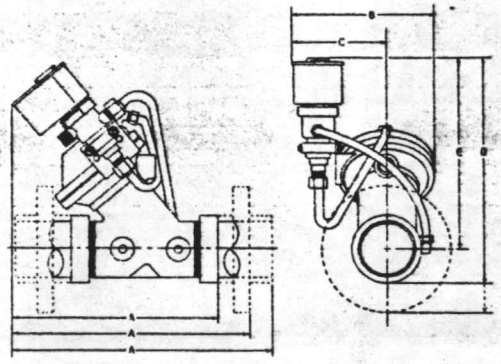
FOR PROCESS AND WATER CONDITIONING APPLICATIONS
AquaMatic Y-pattern valves give positive control with FULL FLOW. Complete control is obtained with less bulk, less weight, and less complication than with many other forms of remote control for fluids. Size range covers the needs of the process man as well as the water conditioner for a positive means of remote control at less cost.

FEATURES AND ADVANTAGES OF AQUAMATIC Y-PATTERN VALVES

- For gases or liquids
- Adaptable to many control devices including solenoid valve and float control
- Low pressure loss through valve
- Large opening, high lift disc gives high flow rates
- Positive opening; drip-tight closing
- Hydraulic or pneumatic operation
- Diaphragm replaceable without interruption of flow



SOLENOID-CONTROLLED



SERIES 4500

SIZE	DIM	A*	B	C	D	E
1/2	in	4.93	4.12	2.87	6.68	5.87
	mm	125	105	73	170	149
1	in	7.25	5.12	3.25	8.25	6.52
	mm	184	130	82.5	209.5	166
1-1/2	in	8.75	6.25	4.00	9.81	7.62
	mm	222	159	101	249	193.5
2	in	10.50	6.25	4.00	9.81	7.62
	mm	267	159	101	249	193.5
2	in	9.56	6.25	4.00	11.31	7.62
	mm	243	159	101	287	193.5
2-1/2	in	15.00	7.87	4.87	12.25	9.62
	mm	381	200	124	311	244
2-1/2	in	12.00	7.87	4.87	14.00	9.62
	mm	305	200	124	355	244
3	in	12.00	7.87	4.87	14.25	9.62
	mm	305	200	124	362	244

SOLENOID SPECIFICATIONS:

Standard ac voltages: 115, 230-50 or 60 Hz. Consult factory for other voltages.

Power Consumption: 9 watts ac. Volt amperes: 15.6 holding. 24.6 inrush.

Coil: Class "B" molded, continuous duty.

Enclosures: General-purpose NEMA 1 only.

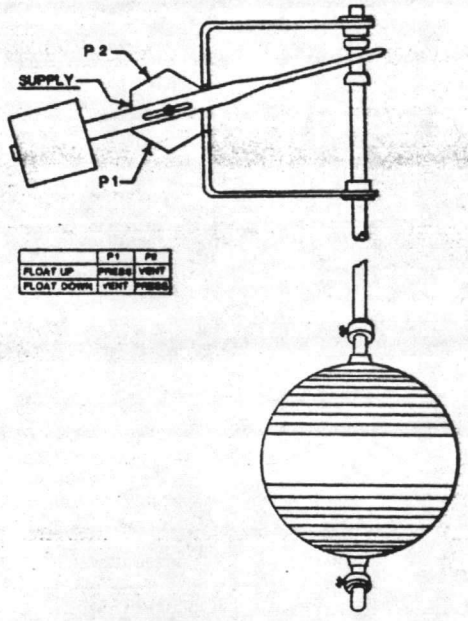
PLASTIC BODY

diaphragm-operated valves

Plastic valves handle de-ionized water as well as acids, caustic, coolants and harsh chemicals or gases that would rapidly corrode metal valves. Body and cap are molded of glass filled engineering thermoplastic. Diaphragm is Buna N on Nylon. All internal parts are made of corrosion resistant materials. The valve's resistance to damage remains unchanged from +32° to 150° F (0° to 65°C). Maximum working pressure rating is 125 psi (860 kPa).

REMOTE FLOAT CONTROL

Direct mounting of float control on plastic valves is *not recommended.* Remote float control is illustrated in drawing below. Float lever arm actuates the pilot.



Control pressures applied and relieved at level control ports P1 and P2, and in turn delivered to and from valve diaphragm chambers, allow optional power opening and/or closing of the diaphragm valve. This allows float action to open and/or close the diaphragm valve at high and low levels.

SIZES: 3/8" through 1-1/2"—Schedule 80 PVC threaded pipe or male socketweld fittings
2" Flange or male or female socketweld fittings
2-1/2" Flange or female socketweld fittings
3" Flange only

Aqua-Matic Solenoid-controlled and Float-controlled valves

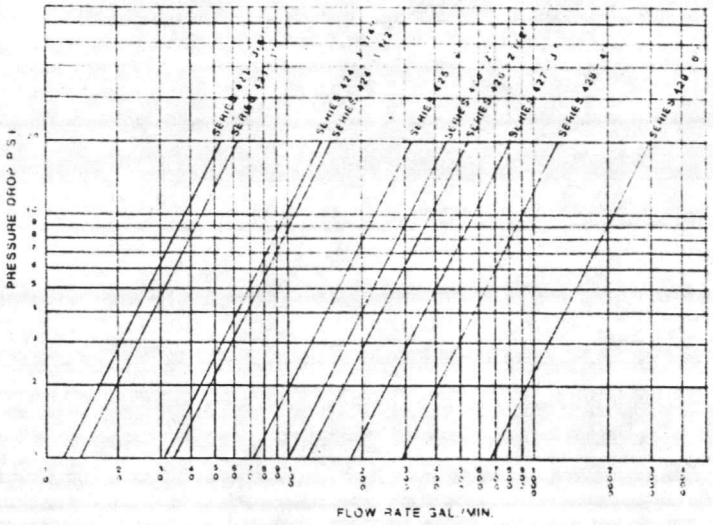
METAL BODY

diaphragm-operated valves

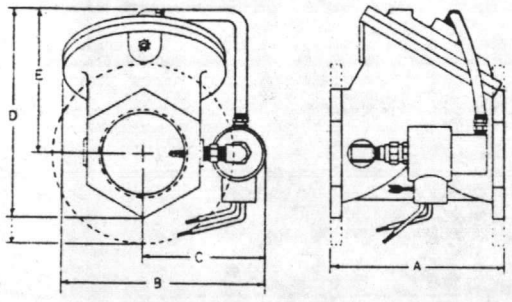
Y-pattern design, large seat opening and high-lift diaphragm produce excellent flow characteristics. There are no springs and related parts to consume space or restrict flow.

The diaphragm is shape-formed of Buna N on Nylon to assure long life. It can be replaced without stopping flow, and all parts can be serviced with the valve in-line. Valves are available with cast iron or brass body and cap. Internal parts are stainless steel and brass. Maximum operating pressure: 125 psi (860 kPa); Minimum operating pressure: 7 psi (48 kPa); Maximum temperature: 200°F (93°C).

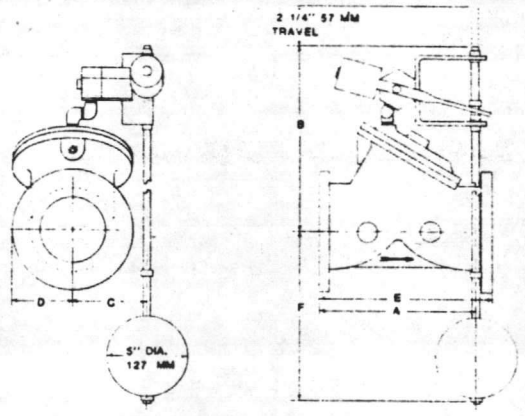
For versatility of application, valves are available to be either opened or closed by pilot pressure. When faster closing of the larger-size valves is required, an auxiliary pilot-line valve can be supplied.



SOLENOID-CONTROLLED



FLOAT-CONTROLLED



SERIES 3500

	SIZE	DIM	A	B	C	D	E
SCREWED	3/4 & 1"	in	3.75	4.37	3.25	5.12	4.12
		mm	95	111	82.5	130	105
	1-1/4 & 1/2	in	4.75	5.00	3.50	6.00	5.00
		mm	121	127	89	152	127
	2	in	6.62	6.75	4.12	8.25	6.37
		mm	168	171	105	209	162
	2 & 2-1/2	in	7.37	7.25	4.25	9.00	6.75
		mm	187	184	108	229	171
	3"S	in	9.12	8.50	4.50	10.75	7.75
		mm	231	216	114	273	197
FLANGED	3"F	in	10.62	8.50	4.50	11.75	8.00
		mm	270	216	114	298	203
	4"F	in	11.75	10.75	6.47	15.75	11.00
		mm	298	273	164	400	279
	6"F	in	17.00	15.75	7.87	20.00	14.50
		mm	432	400	200	508	368

SERIES 3000

SIZE	DIM	A	B	C	D	E	F*
3/4"-1"	in	7.31	6.50	1.50	2.12	3.68	29
	mm	186	165	38	54	93	735
1-1/4"-1-1/2"	in	6.31	7.81	3.31	1.75	4.75	28
	mm	160	198	84	44	120	711
2"	in	6.00	8.37	3.87	2.25	6.62	27
	mm	152	212	98	57	168	686
2"-2-1/2"	in	7.68	9.56	4.06	3.06	7.37	26
	mm	195	243	103	77	187	660
3"S	in	8.87	10.56	4.75	3.62	9	25
	mm	225	268	120	92	228	635
3"F	in	9.25	10.56	4.75	3.62	10.62	25
	mm	235	268	120	92	270	635
4"F	in	9.81	13.81	5.37	4.37	11.75	22
	mm	249	350	136	111	298	659
6"F	in	10.94	16.94	8.81	7.25	17	37
	mm	278	430	223	184	432	940

SOLENOID SPECIFICATIONS:

Standard ac voltages: 115, 230-50 or 60 Hz. Consult factory for other voltages.

Power consumption: 9.4 watts ac. Volt amperes: 16 holding, 25 inrush.

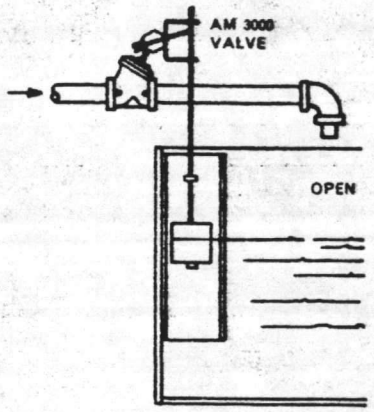
Coil: Class "B" molded, continuous duty. High temperature coils available on request.

Enclosures: General-purpose NEMA 1 normally supplied. Explosion-proof and water-tight (NEMA 4, 7 & 9) available.

*Float Rods are 18 inches (457mm) long sections. Valves up to 4" size are supplied with two sections. 6" valves are supplied with 3 sections.

B.S.P. threads available on valves up to 3" size. Bolt hole pattern on flanged valve per ASA standard, others available on request only.

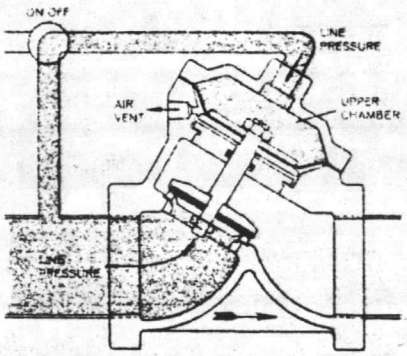
How pilot valve controls main valve



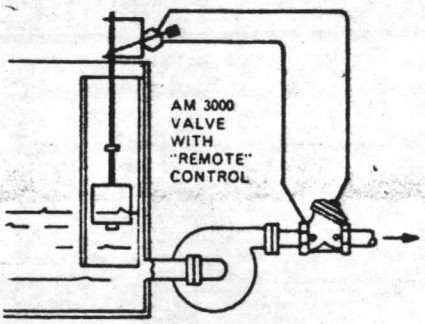
Reservoir Level: Prevent tank overflow and loss of pump suction. Valve opens and closes at readily adjustable "low" and "high" levels.

Low Pressure: By using independent source of pilot pressure to operate valve, low-pressure flows and/or heavy, viscous and contaminated liquids can be readily accommodated.

VALVE CLOSED

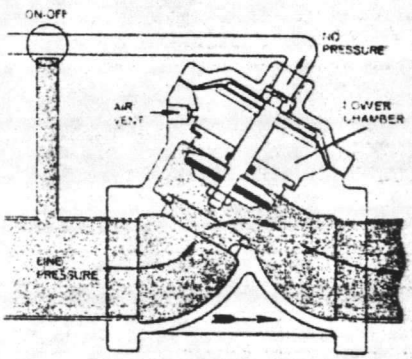


Drip-Tight Closing: Closure is obtained by directing line pressure or equivalent independent pressure into the upper chamber. This pressure on the large diaphragm area causes the valve disc to seal against the seat.

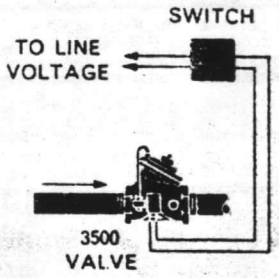


Pump Protection: Pre-set low level of float control prevents pump cavitation. Note that float control is remotely located from valve.

VALVE OPEN



Full Open Operation: When closing pressure, in upper chamber, is relieved by venting the pilot line, the valve opens, positively, by line pressure on the disc.



Switch Types: Solenoid valves can be controlled by simple "on-off" manual switch (either directly or remotely located), time clock, pressure switch, meter control, temperature sensor (thermostat, thermocouple, pyrometer) or level control using probe, mercury switch or float switch.

Purchasing specifications and information needed.

INFORMATION REQUIRED
(from purchasing department)

PLEASE FURNISH

1. Valve catalog number
2. Size and end type (screwed, flanged, socket weld)
3. Fluid to be handled
4. Maximum temperature
5. Maximum and minimum line pressure
6. Independent control pressure, if any
7. Energize to open, or to close
8. AM 3000/348LC: Float rod length
9. AM 3500/4500: Voltage ac or dc
10. NEMA rating

EXAMPLE: Float-Controlled Valve AM3000, 1-1/2" size screwed ends, standard float rod, to be used for controlling water at approximately 70°F and 30 to 60 psi pressure.

SPECIFICATIONS: (for engineering and purchasing)

The Valve shall be of the Y-Pattern Design, Diaphragm Powered, Hydraulically operated and Pilot controlled. Valve shall have an upper and lower chamber for power closing and opening when required. Valve shall be completely Hydraulic (no springs) in operation.

Valve shall be equal and similar in all respects and operation to the diaphragm valves manufactured by AquaMatic, Inc., Rockford, Ill.

Distributed by:

AquaMatic® Inc., 2412 Grant Avenue
Rockford, Illinois 61101 • Area 815/964-9421

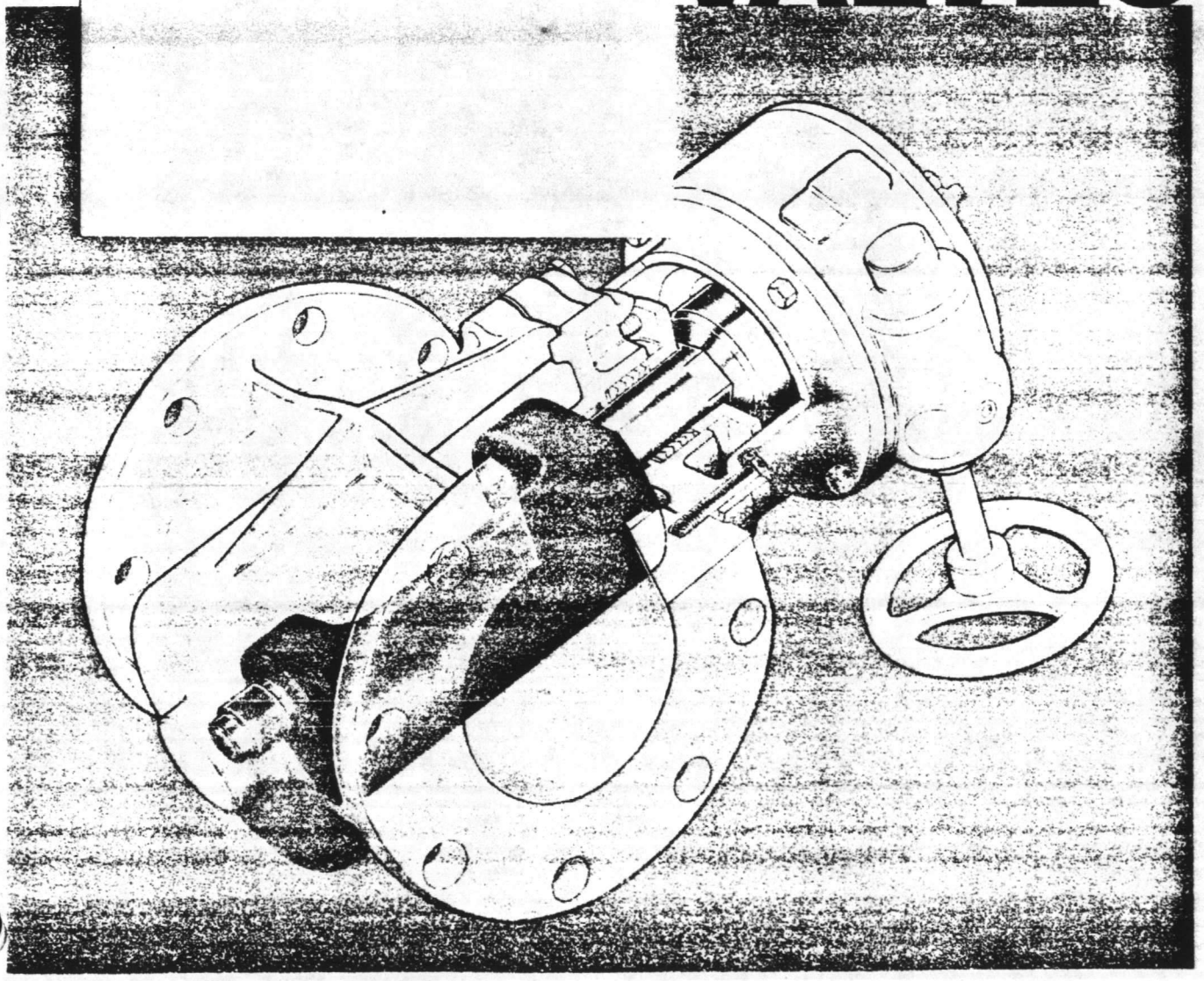
Printed in U.S.A.

Bulletin No. 806 (E-78)

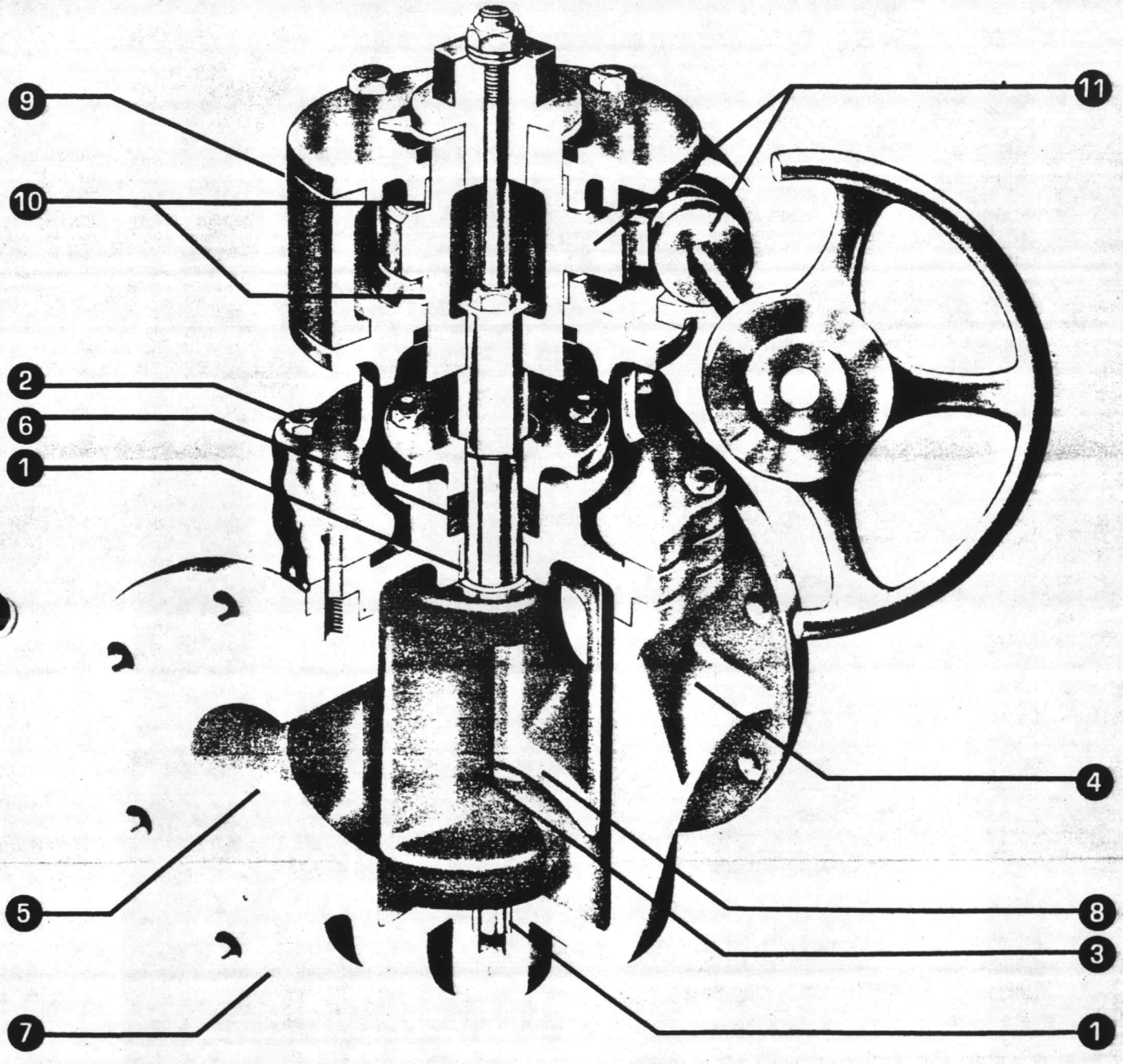
BULLETIN 12.00-1
JULY 1982

Fig 0400 Fig 118 F 1 RS16
Ang Valve w/ 344-400 lever

DeZURIK® SERIES 100 ECCENTRIC VALVES



design and construction



CONTENTS

Patented
United States 3,814,445

Rev. 1, October 1974 Rev. 2, July 1975 Rev. 3, June 1976 Rev. 4, August 1978

Eccentric valve design and DeZURIK quality construction combine to offer many performance features including:

1 CORROSION RESISTANT BEARINGS — Heavy duty bearings resist corrosion to prevent binding and assure lasting easy valve operation without lubrication. These rugged bearings are furnished as standard and at no extra charge in the bonnet and body of all valves. See page 10 for complete listing.

2 BOLTED BONNET — All valves have a rugged bolted bonnet for maximum strength. If maintenance is ever required, disassembly is easy.

3 RESILIENT PLUG FACINGS FOR DEAD-TIGHT SHUTOFF — All valves are available with a variety of resilient plug facings that provide dead-tight shutoff without the use of sealing lubricants. Even if small solids are trapped between the plug and seat, the resilient facing provides tight shutoff and prevents seat damage. All-metal plugs are also available for high temperature or throttling applications where dead-tight shutoff is not required.

4 WIDE CHOICE OF BODY MATERIALS — DeZURIK offers the most complete line of eccentric body materials to meet the requirements of a broad range of applications.

5 HIGH FLOW CAPACITY — Clean interior design and straight through flow allow high maximum flow capacity with minimum pressure drop. See page 6 for complete sizing data.

6 LONG-LIFE STEM SEAL — Multiple packing rings in 4"-54" valves (and up to 72" on application) provide a reliable seal that seldom, if ever, requires adjustment or replacement, even when the valve is operated continuously. As shown here, the packing and packing gland are accessible without disassembly of the valve.

7 CHOICE OF END STYLES — A complete choice of end styles includes screwed, flanged, mechanical joint, bell and Victaulic. See page 10 for a complete list of end styles.

8 CORROSION RESISTANT NICKEL SEAT — Welded-in nickel seats are standard in all 3"-72" cast iron valves, 3"-20" Ni-Resist valves, and in 2"-36" carbon steel valves. Unlike iron or nickel alloy iron seats, the thick welded nickel overlay provides excellent resistance to corrosion and damage and prolongs the life of resilient plug facings.

TIGHT SHUTOFF WITH PRESSURE IN EITHER DIRECTION—DeZURIK offers another first in eccentric valves. Improved resilient plug design provides drip-tight shutoff on wet service applications up to the full pressure rating of the valve with pressure in either direction. See page 7 for complete information.

WIDE SIZE RANGE—DeZURIK offers the broadest eccentric line with 26 standard sizes from ½" through 72". See page 10 for a complete listing.

LOW COST—Another DeZURIK plus is economy. You don't pay extra for features like corrosion resistant bearings and nickel seats. DeZURIK quality also means added performance that cuts maintenance costs.

MANUAL ACTUATORS

DeZURIK actuators also have quality and performance built-in as shown by these handwheel actuator features.

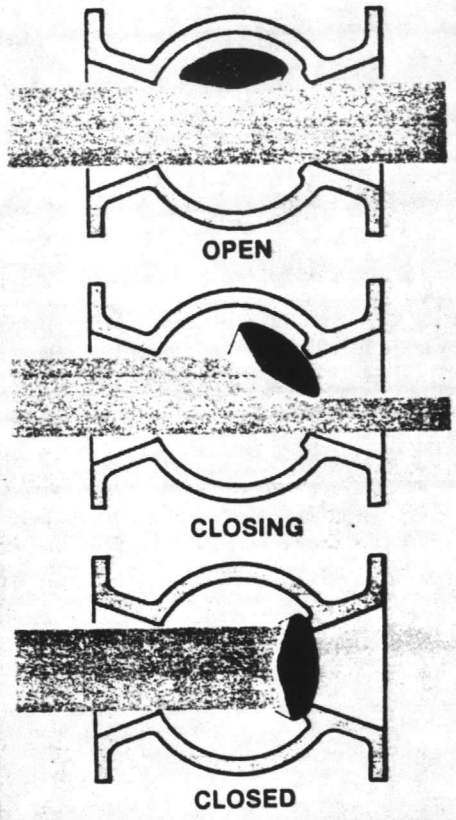
9 TOTALLY ENCLOSED — Enclosed and sealed construction protects moving parts from damage or corrosion. Continual lubrication is not required for operation ease.

10 CORROSION RESISTANT BEARINGS — Heavy duty, corrosion resistant actuator bearings provide lasting, easy valve operation and overall reliability.

11 HEAVY DUTY CONSTRUCTION — Rugged actuator castings, gears and shafts also add to reliability by assuring permanent alignment of moving parts for smooth, easy operation.

LOW COST—A wide range of actuator sizes (shown on page 15) assures you of the most economical actuator for your application.

Eccentric Action



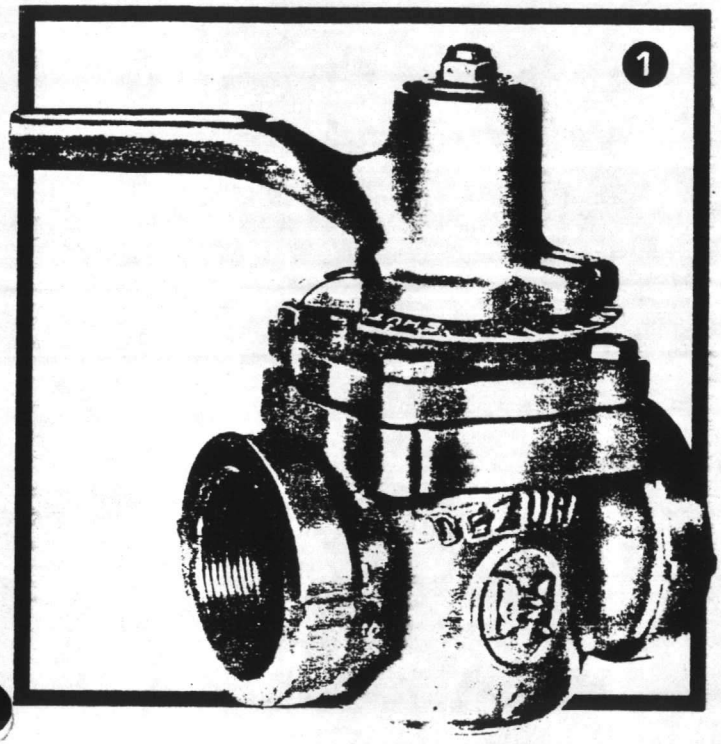
DeZURIK eccentric action and resilient plug facings assure lasting dead-tight shutoff. As the eccentric plug rotates 90 degrees from open to closed, it moves into a raised eccentric seat.

In the open positon, the segmented plug is out of the flow path. Flow is straight through, flow capacity is high.

As the plug closes, it moves toward the seat without scraping the seat or body walls so there is no plug binding or wear. Flow is still straight through making the throttling characteristic of this valve ideal for gasses, liquids and slurries.

In the closed position, the plug makes contact with the seat. When furnished with a resilient facing, the plug is pressed firmly into the seat for dead-tight shutoff. Eccentric plug and seat design assure lasting shutoff because the plug continues to be pressed against the seat until firm contact is made.

manual actuators
lever actuated ½"-8" valves



Valves from ½" through 8" can be furnished with lever actuators to provide the lowest cost valve control. A complete line of lever accessories, described here and on page 26, make these lever actuated valves even more versatile. However, handwheel or powered actuators are recommended on 6" and larger valves as well as on applications where pipeline velocities are high and where sudden valve closure may cause water hammer.

PRESSURE RATINGS

Direct shutoff pressure differentials for lever actuated valves must not exceed the limits shown below. Reverse shutoff differentials must not exceed 25 psi. If valves must seal higher reverse pressure, use handwheel actuators shown on pages 14 and 15.

VALVE SIZE	MAXIMUM SHUTOFF PRESSURE DIFFERENTIALS	
	Nitrile-Butadiene (Buna[Vee]) #6 Packing	Low Friction Nitrile—Butadiene (Buna Vee) #10 Packing
½"-3"	150 psi	— —
4"	125 psi	40 psi
5"-8"	100 psi	25 psi

1 ½"—3" VALVES

ADJUSTABLE MEMORY STOP — All ½"-3" lever actuated valves are furnished with an adjustable, open position memory stop as standard. With the stop ring adjusted to the desired open position, the valve can be closed and reopened to the same position. This feature makes the valve ideal for air conditioning balancing service. Valves with resilient seats provide double duty on this application by combining balancing and shutoff in a single valve.

NON-REMOVABLE LEVER FURNISHED — Standard ½"-3" valve design includes a bolted-on, non-removable lever as shown in photo number 1. Other lever styles, including removable levers are also available. See "ordering" below.

ORDERING

VALVE WITH STANDARD LEVER

Order as shown in following example:

EXAMPLE: 0200, FIG 118, S, 1, RS16, ALG.

VALVE WITH ANG 158 NUT

For use with FIG 159 Removable Lever and FIG 149 Chain Handle on ½"-3" valves. To order, add "ANG 158" to the valve identification number.

EXAMPLE: 0200, FIG 118, S, 1, RS16, ANG 158.

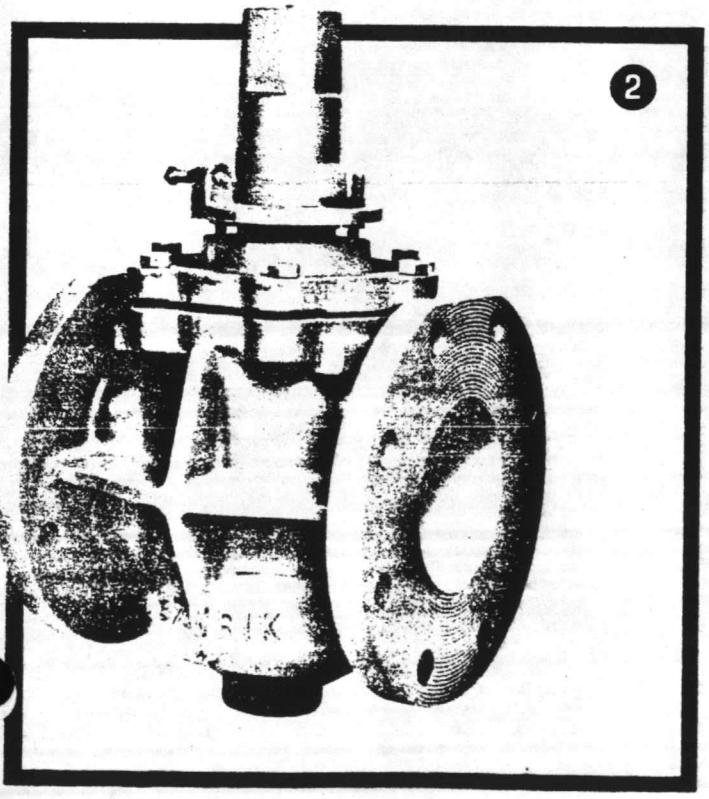


FIG 159 REMOVABLE LEVER
For ½"-3" valves equipped with a ANG 158 Nut. Order FIG 159 Levers as a separate item by specifying "FIG 159" and code below to indicate valve size.

CODE	VALVE SIZE
FIG 159, 103. =	½"-2"
FIG 159, 105. =	2½", 3"

EXAMPLE: FIG 159, 103.

FIG 149 CHAIN HANDLE
½"-3" valves for chain handle operation must be furnished with ANG 158 Actuating Nuts. Order FIG 149 Chain Handles as a separate item by specifying "FIG 149" followed by valve size code (0200 = 2", 0300 = 3", etc.).
EXAMPLE: FIG 149, 0200.

FIG 624, 101 Chain—For use with FIG 149 Chain Handle on ½"-3" valves. Order as a separate item by specifying "FIG 624, 101" and required length.
EXAMPLE: FIG 624, 101.
Chain: 10 feet long.

2 4"—8" VALVES

ADJUSTABLE MEMORY STOP—All 4"-8" lever actuated valves are furnished with an adjustable, open position memory stop as standard. Adjustment of the stop to the desired open position allows the valve to be closed and reopened to the same throttling position.

2" SQUARE ACTUATING NUT—All 4"-8" valves have a 2" square actuating nut to allow use of standard levers or wrenches. See FIG 344 or FIG 350.

ORDERING
VALVE FOR LEVER ACTUATION
Valves are furnished with 2" nut for lever actuation unless other actuators are specified. Levers must be ordered separately.
EXAMPLE: 0600, FIG 118, F, 6, RS16, ANG.

FIG 344 STANDARD LEVER
With 2" square socket for use with 4"-8" valves and for use with FIG 147 Extension shown on page 26. To order, specify "FIG 344" followed by valve size code (0400 = 4", 0600 = 6", etc.).
EXAMPLE: FIG 344, 0600.

FIG 350 FOLDING LEVER
Similar to FIG 344 lever above except lever folds. To order, specify "FIG 350" followed by valve size code (0400 = 4", 0600 = 6", etc.).
EXAMPLE: FIG 350, 0600.

FIG 149 CHAIN HANDLE
Order as a separate item by specifying "FIG 149" followed by valve size code (0400 = 4", 0600 = 6", etc.).
EXAMPLE: FIG 149, 0600.

FIG 624, 102 CHAIN
For use with FIG 149 Chain Handles for 4"-8" valves. To order, specify "FIG 149, 102" and required length.
EXAMPLE: FIG 624, 102.
Chain: 12 feet long.

ACCESSORIES-SPECIAL CONSTRUCTION

FIG 638 GAGE TAP
Upstream or downstream gage tap, ¼" NPT tap available in 4" and larger valves only. To order, add "FIG 638" and code shown below to valve identification.

CODE	TAP
FIG 638, 701. =	⅛" NPT Upstream
FIG 638, 702. =	⅛" NPT Downstream
FIG 638, 703. =	¼" NPT Upstream
FIG 638, 704. =	¼" NPT Downstream

EXAMPLE: 0200, FIG 118, S, 1, RS16, FIG 638, 701.

STAINLESS STEEL BOLTING FOR LEVER ACTUATED VALVES*
For buried service or corrosive atmospheres.
½"-3" Valves— Includes Stainless Steel Spring, Stud, Nut, Washer and Bonnet Bolts.
4"-8" Valves— Includes Stainless Steel Spring, Stud, Nut, Washer, Stop Screw and Nut and Bonnet Bolts.
To order, add description below valve identification.

*Note—use of stainless steel bolts on carbon steel, stainless steel and alloy ½"-8" valves reduces pressure rating to 200 psi.

materials and ordering

ORDERING—To order, give the complete valve and actuator identification by specifying the ordering code for each item as shown below. An ordering example is shown at the bottom of the page.

VALVE SIZE

Give size code as follows:

SIZE CODE	IN.	mm
0050 =	½	15
0075 =	¾	20
0100 =	1	25
0125 =	1¼	32
0150 =	1½	40
0200 =	2	50
0250 =	2½	65
0300 =	3	80
0400 =	4	100
0500 =	5	125
0600 =	6	150
0800 =	8	200
1000 =	10	250
1200 =	12	300
1400 =	14	350
1600 =	16	400
1800 =	18	450
2000 =	20	500
2400 =	24	600
2450 =	24	600
	100% Area	
3000 =	30	750
3050 =	30	750
	100% Area	
3600 =	36	900
3650 =	36	900
	100% Area	
4200 =	42	1100
4250 =	42	1100
	100% Area	
4850 =	48	1200
	100% Area	
5400 =	54	1400

Sizes to 72" on application

FIGURE NUMBER (MATERIAL)

Give "FIG" and number that follows. Note—Valves with all metal and hard rubber lined plugs do not provide drip-tight shutoff.

FIG NO.	BODY	PLUG	BEARINGS	SIZES
FIG 118 =	CAST IRON* Seats in 3"-54" are Nickel	Resilient	Stainless Steel in ½"-20" Bronze in 24"-36" Bronze and Stainless Steel in 42"-54"	½"-54"
FIG 119 =	CAST IRON* Seats in 3"-20" are Nickel	Ni-Resist. All Metal	Stainless Steel	½"-20"
FIG 120 =	BRONZE	Resilient	Stainless Steel	½"-20"
FIG 121 =	BRONZE	All Metal	Stainless Steel	½"-20"
FIG 122 =	ACID RESISTING BRONZE	Resilient	Stainless Steel	½"-20"
FIG 123 =	ACID RESISTING BRONZE	All Metal	Stainless Steel	½"-20"
FIG 124 =	NI-RESIST Seats in 3"-20" are Nickel	Resilient	Stainless Steel	½"-20"
FIG 125 =	NI-RESIST Seats in 3"-20" are Nickel	All Metal	Stainless Steel	½"-20"
FIG 126 =	ALUMINUM	Resilient	Stainless Steel	½"-20"
FIG 127 =	ALUMINUM	All Metal	Stainless Steel	½"-20"
FIG 128 =	CARBON STEEL Seats in 2"-36" are Nickel	Resilient	Stainless Steel	½"-36"
FIG 129 =	CARBON STEEL Seats in 2"-36" are Nickel	All Metal	Stainless Steel	½"-36"
FIG 130 =	STAINLESS STEEL	Resilient	Stainless Steel	½"-36"
FIG 131 =	STAINLESS STEEL	All Metal	Stainless Steel	½"-36"

All alloys, as listed below, are identified as "FIG 132" or "FIG 133". When ordering, give "FIG" with number and specify material.

FIG 132 =	ALLOY 20	Resilient	Alloy 20	½"-20"
FIG 133 =	ALLOY 20	All Metal	Alloy 20	½"-20"
FIG 132 =	MONEL	Resilient	Monel	½"-20"
FIG 133 =	MONEL	All Metal	Monel	½"-20"
FIG 132 =	PURE NICKEL	Resilient	Nickel	½"-20"
FIG 133 =	PURE NICKEL	All Metal	Nickel	½"-20"
FIG 132 =	ALLOY B	Resilient	Alloy B	½"-20"
FIG 133 =	ALLOY B	All Metal	Alloy B	½"-20"
FIG 132 =	ALLOY C	Resilient	Alloy C	½"-20"
FIG 133 =	ALLOY C	All Metal	Alloy C	½"-20"

FIG 198 =	SOFT RUBBER LINED CAST IRON	Resilient	Stainless Steel in 3"-20" Bronze in 24"-36" Bronze and Stainless Steel in 42"-54"	3"-54" Flanged Only

For abrasion resistance on applications to 180 degrees F. Flange faces and all internal surfaces except journal areas are covered with soft rubber. When ordering, specify RS16 plug facing on 3"-6" valves and RS17 on 8"-54" valves.

FIG 134 =	HARD RUBBER LINED CAST IRON	Hard Rubber	Hard Rubber	3"-20" Flanged Only

For corrosion resistance. Especially resistant to chlorine. Maximum temperature 180 degrees F. Flange faces and all internal surfaces are covered with hard natural rubber When ordering, specify RS53 hard rubber plug facing on all sizes. Note—Hard Rubber Lined Valves do not provide drip-tight shutoff. A soft rubber overlay can be furnished where drip-tight shutoff is required. Consult DeZURIK for recommendations

FIG 404 =	PLASTIC COATED CAST IRON	Resilient	Stainless Steel	3"-20" Flanged Only

Plastic coating of valve interior to improve the corrosion resistance for longer service life on applications where cast iron is suited. Plastic coating is not a substitute for corrosion resistant metals. Similar to FIG 118 except that all internal surfaces except resilient plug facings are coated with plastic. Coating on 3" valves is 3 mils (.003"). Coating on 4"-20" valves is 6 to 8 mils (.006 to .008").

*Conforms to American Water Works Association (AWWA) Standards C507-73 Sec. 5.1 and C504-74 Sec. 5.4 and American Society for Testing and Materials (ASTM) Standard A126 Class B.

END STYLE

End styles standard are shown on page 39.

Give end style code as shown.

Description below shows availability by material and size.

S = SCREWED

Cast Iron—½"-4"

Other Materials—½"-3"

Not available for hard or soft rubber lined or plastic coated valves.

F = FLANGED

Cast Iron—2"-72"

Other Materials—½" and larger

Hard rubber and soft rubber lined and plastic coated—3"-20"

B = BELL*

4"-20" Cast Iron only

V = VICTAULIC

1"-54" Cast Iron only

(Valve ends only-accessories not included)

M = MECHANICAL JOINT*

3"-48" Cast Iron only (Valve ends only-accessories not included)

*54"-72" Available on special application

G1 = DIN 10 or B.S. 4504/10 Flange Drilling

G2 = DIN 16 or B.S. 4504/16 Flange Drilling

GS = DIN Thd. (Parallel)

HD = B.S. D Flange Drilling

HE = B.S. E Flange Drilling

HS = B.S. Thd. (Taper)

J1 = JIS 10 Flange Drilling

JS = JIS Thd. (Taper)

KS = GAZ Thd.

0800 FIG 118 F

PACKING

Give packing code as shown below.

Packing descriptions describe use and general service conditions only. Temperatures shown may be further limited by plug or body material maximums.

½''-3'' VALVES

1 = NITRILE-BUTADIENE (Buna) FILLED PTFE U-RING SEAL
For use with all valves with resilient faced plugs except RS55 and RS48. Maximum temperature 180 degrees F.

2 = FLUORINATED HYDROCARBON (Viton) FILLED PTFE U-RING SEAL
For all valves with all-metal plugs and with RS48 and RS55. Maximum temperature is 450 degrees F. when used with all-metal and RS48 plugs. Maximum temperature is 250 degrees F. when used with RS55.

3 = SOLID PTFE
For use with FIG 134 valves. Also available on valves with all-metal plugs. Maximum temperature is 450 degrees F.

4 = GRAFOIL**
Concentric asbestos rings retained by stainless steel rings. Available on valves with all-metal plugs. For temperatures above 450 degrees F.

4''-54'' VALVES*

6 = NITRILE-BUTADIENE (Buna [VEE])
Standard on all valves except FIG 134 and 4''-8'' lever actuated valves for buried service. Maximum temperature 350 degrees F.

7 = PTFE (VEE)
For use with FIG 134 valves. Also available on all other valves. Maximum temperature is 450 degrees F.

8 = ASBESTOS BRAIDED
Available on all valves. For temperatures above 450 degrees F.

10 = LOW FRICTION NITRILE-BUTADIENE (Buna Vee)
For use in 4''-8'' lever actuated valves for buried service only.

***42''-54'' Valves available with No. 7 packing only.**

** Registered trademark of Union Carbide Corp.

RESILIENT PLUG FACINGS

To order, give "RS" and number as shown below unless the valve has an all-metal plug. (Resilient plug facings are required for drip-tight shutoff.)

The service descriptions below are general classifications only. For specific recommendations, see DeZURIK Bulletin 60.00-2 or contact DeZURIK.

½''-6'' VALVES

RS16 = CHLOROPRENE (Neoprene)—For alkaline applications to 180 degrees F. Also as the body and plug lining for 3''-6'' FIG 198 soft rubber lined valves.

RS26 = NITRILE-BUTADIENE (Hycar)—For chemical and dry applications to 180 degrees F.

RS24 = NITRILE-BUTADIENE (Hycar)—For petroleum applications to 180 degrees F.

RS55 = ISOBUTENE-ISOPRENE (High Temp)—For high temperature water to 250 degrees F.

RS48 = FLUORINATED HYDROCARBON (Viton)—For chemicals to 450 degrees F. PTFE packing (No. 3 or 7) required on applications above 350 degrees F.

RS47 = CHLORO-SULFONYL-POLYETHYLENE (Hypalon)—For oxidizing chemical service at temperatures to 200 degrees F.

RS53 = HARD NATURAL RUBBER—Lining compound for FIG 134 Hard Rubber Lined Valves. RS53 plug facings must be specified on all hard rubber lined valves from 3''-20''. Hard Rubber lined valves do not provide drip-tight shutoff. A soft rubber plug overlay can be furnished for certain applications where tight shutoff is required. Furnish service information for recommendations.

8'' AND LARGER VALVES

RS17 = CHLOROPRENE (Neoprene)— For alkaline applications to 180 degrees F. Also used as the body and plug lining on 8''-20'' FIG 198 Soft Rubber Lined Valves.

RS56 = ISOBUTENE-ISOPRENE (High Temp)—For high temperature water to 250 degrees F.

RS25 = NITRILE-BUTADIENE (Hycar)—For petroleum applications to 180 degrees F.

RS58 = FLUORINATED HYDROCARBON (Fluoroelastomer)—For high temperature chemicals to 450 degrees F. PTFE packing (No. 7) is required on applications above 350 degrees F.

RS46 = CHLORO-SULFONYL-POLYETHYLENE (Hypalon)—For oxidizing chemical service at temperatures to 200 degrees F.

RS53 = HARD NATURAL RUBBER—Lining compound for FIG 134 Hard Rubber Lined Valves. RS53 plug facings must be specified on all hard rubber lined valves from 3''-20''. Hard rubber lined valves do not provide drip-tight shutoff. A soft rubber plug overlay can be furnished for certain applications where tight shutoff is required. Furnish service information for recommendations.

ACTUATOR & ACCESSORIES

Order actuators as shown in actuator sections.

Lever—Pages 12 and 13

Handwheel, Chainwheel—Pages 14 and 15

Cylinders for ½''-3'' Valves—Pages 16 and 17.

Double Acting Cylinders for 4''-36'' Valves—Pages 18 and 19.

Hydraulic Cylinders for 4''-36'' Valves—Pages 18 and 19.

Spring-Return Cylinders for 4'' and larger Valves—Pages 20 and 21.

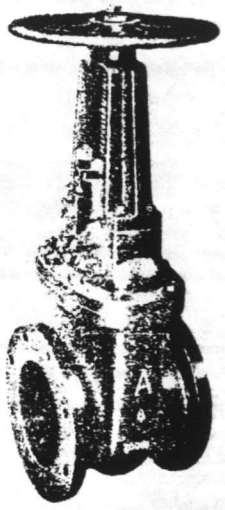
Electric Motors for 4''-54'' Valves— Pages 22 and 23.

Actuators for 42''-72'' Valves on application. Furnish service conditions and requirements.

Order accessories as shown in accessory sections. Manual remote operating accessories are shown on pages 26 and 27.

Accessories for cylinder actuators are shown on pages 28 and 29. Electric motor actuator accessories are shown in the electric motor actuator section on pages 22 and 23.

AMERICAN VALVE



Solid Wedge Disc Through 8"

Parallel Discs for 10" and 12"

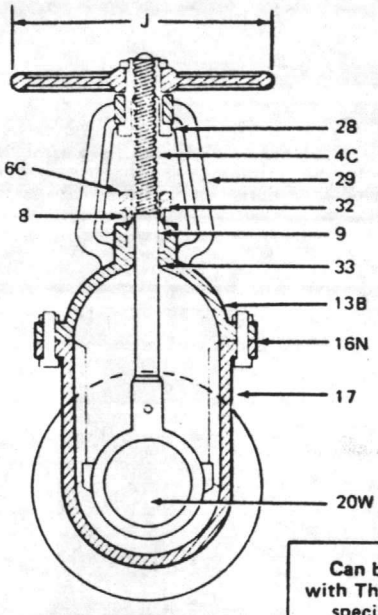
IRON BODY BRONZE MOUNTED GATE VALVES

UL Listed/FM Approved

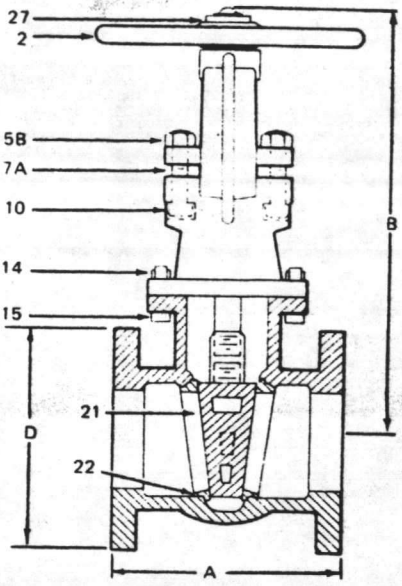
FIG. 37

RATING
125 lbs. WSP
200 lbs. WOG

- **Flanged Ends**
- **Outside Screw And Yoke**



Can be supplied with Threaded Ends; specify Fig. 36



LIST OF MATERIALS

ITEM	PART	MATERIAL	SPECIFICATION
2	Handwheel	Cast Iron	ASTM A-126
4C	Stem	Silicone Bronze	ASTM B-371
5B	Strap Adjustment Nut	Bronze	ASTM B-62
6C	Strap (Strap Bushing—Part #32 Attached)	Cast Iron	ASTM A-126
7A	OS & Y Stuffing Box Stud	Steel	ASTM A-307
8	Packing Gland	Bronze	ASTM B-62
9	Packing	Graphite Asbestos	
10	Stuffing Box Lock Nut	Steel	ASTM A-307
13B	Bonnet (Bonnet Bushing—Part #33 Attached)	Cast Iron	ASTM A-126
14	Bonnet Lock Nut	Steel	ASTM A-307

ITEM	PART	MATERIAL	SPECIFICATION
15	Bonnet Bolt	Steel	ASTM A-307
16N	Body Gasket	Asbestos	
17	Body	Cast Iron	ASTM A-126
20W	Disc	Cast Iron	ASTM A-126
21	Disc Ring	Bronze	ASTM B-62
22	Seat Ring	Bronze	ASTM B-62
27	Yoke Lock Nut	Bronze	ASTM B-62
28	OS & Y Yoke Nut	Bronze	ASTM B-62
29	Yoke (Arms)	Cast Iron	ASTM A-126
32	Strap Bushing (Attached to Strap—Part #6)	Bronze	ASTM B-62
33	Bonnet Bushing (Attached to Bonnet—Part #13B)	Bronze	ASTM B-62

DIMENSIONS

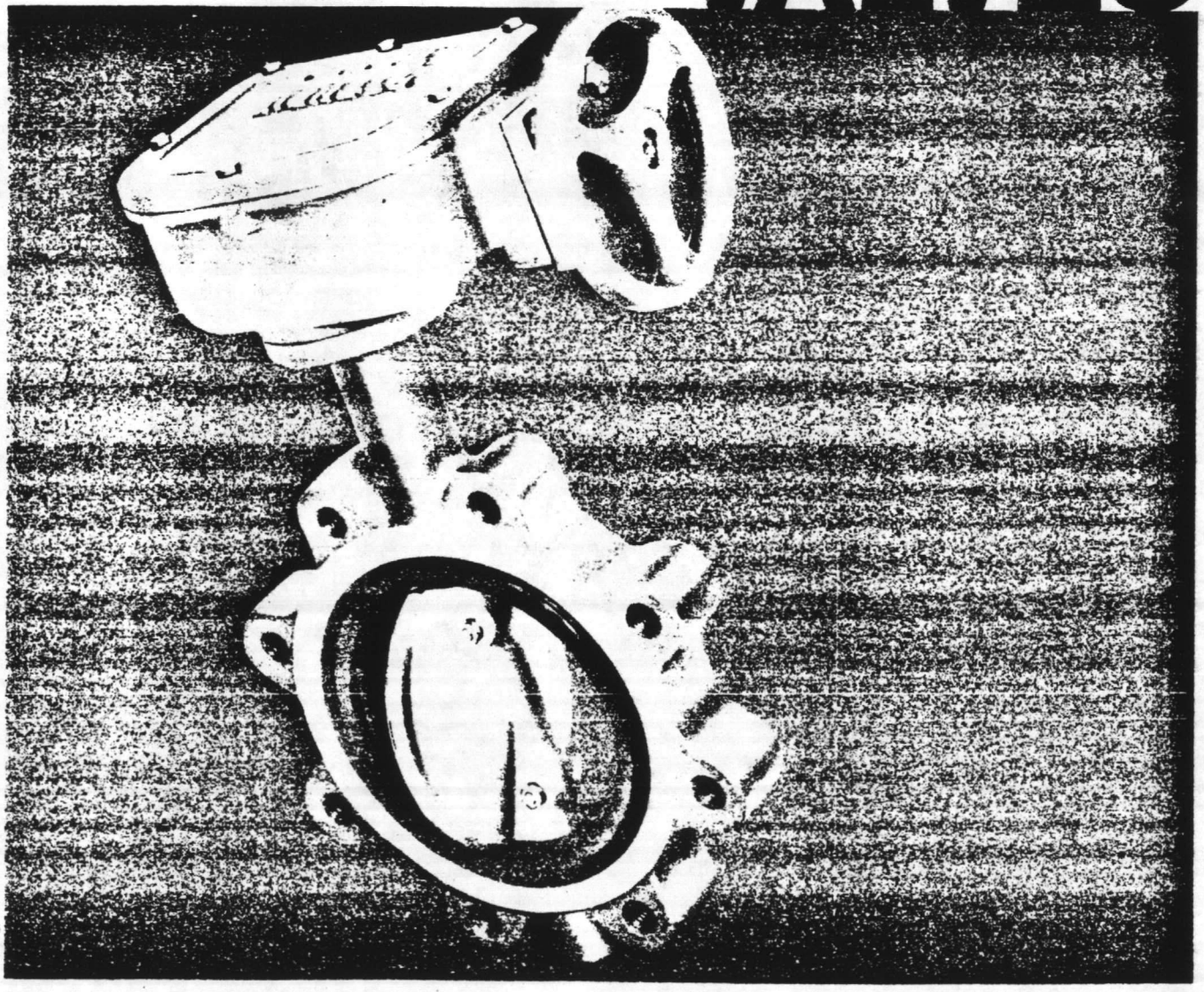
	SIZE		2 1/2	3	3 1/2	4	5	6	8	10	12
A	FACE TO FACE		7 1/2	8	8 1/2	9	10	10 1/2	11 1/2	13	14
B	CENTER OF PORT TO STEM TOP	OPEN	16 3/8	17 1/4	18 13/16	21 7/8	23 7/8	29 3/4	40	48 1/2	57 1/2
		CLOSED	13 1/2	14 1/8	14 9/16	17 1/2	18 1/4	23 7/8	31 1/2	37	45 1/2
D	OD OF FLANGED END		7	7 1/2	8 1/2	9	10	11	13 1/2	16	19
J	OD OF WHEEL		7 1/4	7 1/4	9 1/4	9 1/4	10 1/4	12 3/8	14 1/4	16 1/4	18 1/4
	APPROX WT. W/WHEEL (LBS)		39	52	69	90	122	154	300	472	684

0400 Fig 632 W B RS49, 1, KmGm2

BULLETIN 40.00-1
July, 1979

0200 Fig 632 W B RS49, 1 KmGm2

DeZURIK® RESILIENT SEATED BUTTERFLY VALVES



design and construction 2"-2

1. Solid, one-piece shaft Diameter of the stainless steel shaft meets the AWWA Class 75B standard. The shaft is in constant contact with the disc to provide maximum strength and rigidity. Ground and polished shaft finish minimizes bearing and seal wear.

2. Neck length allows 2" of pipeline insulation above mating flanges

3. One-piece body Wall thicknesses meet or exceed the ANSI Class 125 lb. standard for cast iron flanges and fittings. Body wall thickness also exceeds the AWWA Class 150B standard for butterfly valves.

4. Solid disc-to-shaft pinning Cylindrical 316 stainless steel tangential pins on 4" and larger valves have tapered flats that are drawn against flats on the shaft. Contact between the pins and shaft allows axial shaft expansion without disc damage. Pinning is solid. There are no upstream-downstream holes in the disc that can cause leakage or weaken the disc.

5. Corrosion resistant discs A variety of disc materials provides the required corrosion resistance at low cost. Included is a cast iron disc with an electroless nickel coating or a cast iron disc with a welded and machined nickel edge. The welded edge conforms to AWWA specification C504-74.

6. Shaft seals 3 shaft seals protect bearings from internal and external corrosion.

7. Corrosion resistant bearings 3 heavy duty, machined bearings assure lasting easy valve operation. These self-lubricating bearings are pressed into the body to support shaft loads, minimize shaft deflection, eliminate binding from corrosion and prolong seat life.

8. Unique seat design The exclusive DeZURIK double-seat design increases valve life by providing a built-in spare seat that can be changed in minutes without removing the valve from the line. Photo 8A below shows the valve closed with the disc on the first seating surface. After normal cycle life, the disc can be rotated 180° to the spare seat. Photo 8B shows the disc closed on the new seat, ready to provide a second life.

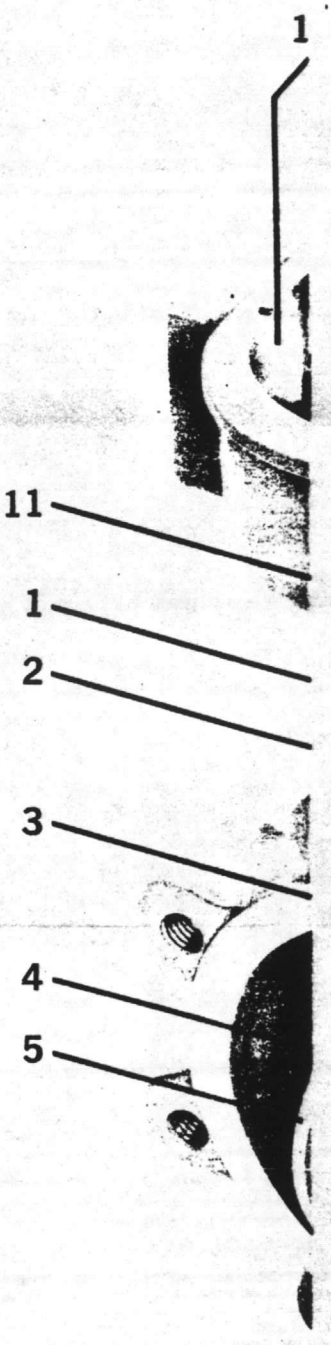
Full circle seating The shaft hole in the center of the seat and the off-set disc allow full 360° seating.

Provides full body lining The resilient seat acts as a body liner.

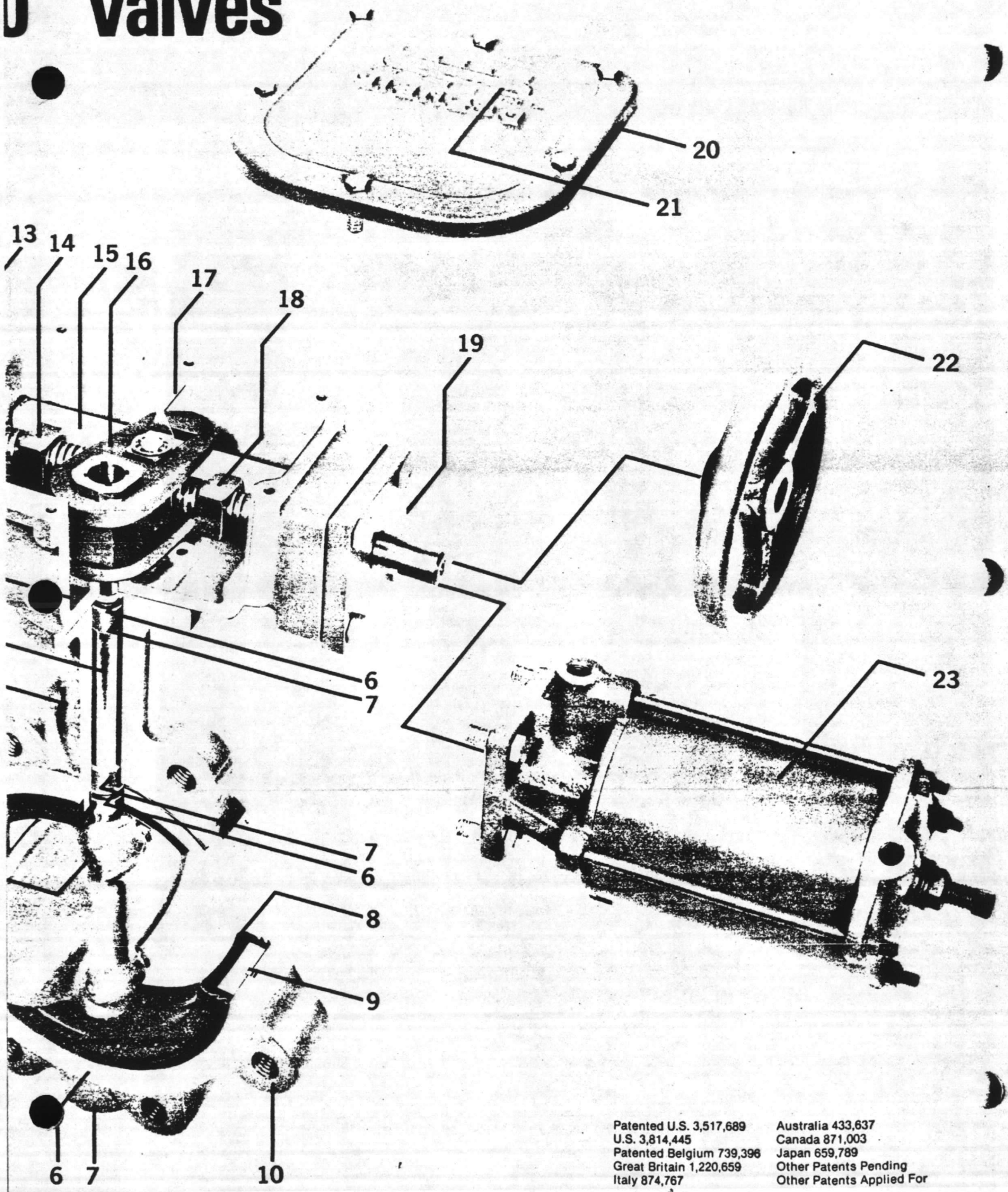
Reinforcing ring The resilient seat is bonded to a rigid reinforcing ring to prevent distortion or seat collapse. The ring is not bonded to the body and can be replaced in the field.

No flange gaskets required Pressure sensitive lips eliminate the need for flange gaskets. Bolting torque is not critical and does not affect disc seal or valve operation. Unnecessary strain from high bolting torque is eliminated.

Eccentric seat and disc Eccentric seat and disc minimize seat wear by reducing disc-to-seat interference.



D" valves



Patented U.S. 3,517,689
U.S. 3,814,445
Patented Belgium 739,396
Great Britain 1,220,659
Italy 874,767

Australia 433,637
Canada 871,003
Japan 659,789
Other Patents Pending
Other Patents Applied For

9. Seat retaining ring in lug body valves The seat in lug body valves is held in place by a metal seat retaining ring which is compresed into the seat or body before assembly. As the seat is slid into the body, a spring expands the ring to hold the seat in place. Retained seat design assures dead-tight shutoff to the full valve rating, even on isolation or dead end service. Downstream flanges are not required.

Thrust collar All 16" and larger valves have a non-adjustable thrust collar on the shaft to assure proper disc location and longer seat life. The collar is out of the flow path and is retained by the actuator.

10. Wafer or lug bodies For use with ANSI 125/150 flanges.

10A. Wafer (Flangeless) Minimizes weight for lower cost and ease of installation. Machined flange bolt guides on either side of the neck and lower bearing area center the body in the pipeline to simplify installation. 20" valves have 4 drilled and tapped lugs on each side of the body.

10B. Lug (Wafer face-to-face) For dead end or isolation service.

ACTUATORS

Unique DeZURIK modular actuators are designed to match valve requirements. Lever actuators are shown on page 12.

11. Universal actuator mounting Provides field interchangeability of all actuators. Actuators are bolted to the body and solidly keyed to the shaft. The woodruff key connection is designed to shear and prevent internal valve damage if subjected to excessive torque conditions.

12. Cast actuator housing A rugged cast iron housing protects actuator parts.

13. Actuator drive shaft Engages the nut incorporated in the valve drive arm (No. 16). The input end of the shaft is supported on 3 permanently lubricated bronze bearings. A sleeve bearing absorbs radial forces. Thrust bearings located on either side of a thrust collar on the drive shaft absorb axial shaft thrust. Shaft input is rotary on manual and electric motor actuators and linear on cylinder actuators. Double-lead threads reduce the number of turns required to operate manual valves.

14. Adjustable open position stop As the actuator drive shaft rotates, a threaded traveling nut moves along the shaft until it reaches the actuator housing. Contact between the nut and housing provides a positive memory stop that can be adjusted to any desired open position. The stop nut slides along a guide rail (No. 15) which prevents the nut from rotating on the input shaft. Removal of the guide rail allows easy adjustment of the stop.

15. Position stop guide rail

16. Actuator drive arm The heavy duty steel drive arm is keyed to the valve shaft. The threaded drive arm nut which engages the threaded actuator input drive shaft is supported on traveling hardened stainless steel bearings.

17. Position indicator needle Shows valve position through an indicator window (No. 21) in the actuator cover.

18. Adjustable closed position stop A threaded traveling nut allows closed position adjustment on manual actuators.

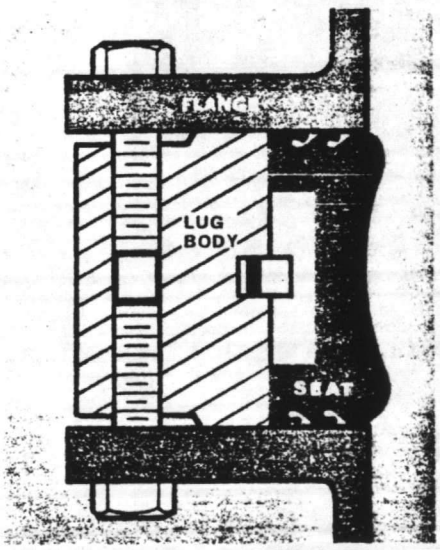
19. Shaft seals Weatherproof and buried construction actuators are furnished with seals on the input end of the actuator shaft and on the thrust plate of manual actuators.

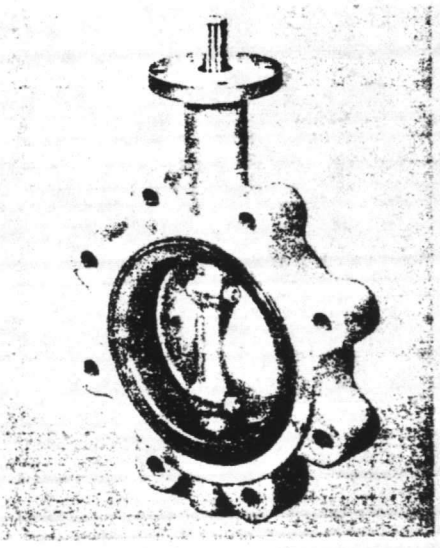
20. Choice of enclosures Manual actuators are available in enclosed, weatherproof and buried construction. Cylinder and electric motor actuators are all weatherproof as standard. Weatherproof actuators (shown here) and buried actuators include a cast actuator cover with sealing gasket plus shaft seals as described in No. 19. Buried actuators do not have the position indicator window (No. 21) and include a seal between the valve neck and actuator base.

21. Position indicator Valve position can be seen in a window furnished in both enclosed and weatherproof actuator covers.

22. Manual actuators Available inputs include crank, handwheel, chainwheel and 2" square nut.

23. Powered actuators Actuators for on-off and throttling control applications include: double-acting cylinders, positioning cylinders, diaphragm and electric motors.





materials and ordering

To order, give the complete valve and actuator identification by specifying the ordering code for each item as shown below. An ordering example is shown at the bottom of the page.

VALVE SIZE

Give size code as follows:

→ 0200 = 2"
0250 = 2½"
0300 = 3"
→ 0400 = 4"
0500 = 5"
0600 = 6"
0800 = 8"
1000 = 10"
1200 = 12"
1400 = 14"
1600 = 16"
1800 = 18"
2000 = 20"
2400 = 24"
3000 = 30"
3600 = 36"

FIGURE NUMBER (Body Material)

Give "FIG" followed by the number below to indicate body material:

→ **FIG 632** = CAST IRON
Sizes 2"-36"
Wafer or lug bodies

END STYLE

Give end style code as follows:

→ **W** = WAFER (Flangeless) Available in cast iron in sizes 2"-36"

L = LUG (Wafer face-to-face) Available in cast iron only in sizes 2"-36"

24"-36" lug valves have 2 drilled and tapped flanges

SHAFT SEAL

Give shaft seal code as shown below:

2"-20" VALVES

→ **B** = **NITRILE-BUTADIENE (Hycar)** For use with all seats except RS55, RS47 and RS66

C = **CHLORO-SULFONYL-POLYETHYLENE (Hypalon)** For use with RS47 seats only

D = **TERPOLYMER OF ETHYLENE PROPYLENE (Nordel)** For use with RS66 seats only

---

24"-36" VALVES

F = **NITRILE-BUTADIENE (Buna [Vee])** For use with all seats except RS58

E = **TFE (Vee)** Must be used with RS58 seat. Available with all other seats.

0600, FIG632, W, B,

RESILIENT SEAT

Give "RS" and number:

2"-20" VALVES

RS18 = NITRILE-BUTADIENE (Hycar) An odorless and tasteless compound for food service at temperatures to 180°F.

RS47 = CHLORO-SULFONYL-POLYETHYLENE (Hypalon) For oxidizing chemical service to 200°F.

RS49 = CARBOXYLIC-NITRILE-BUTADIENE (Hycar) A general service compound for non-alkaline applications to 180°F.

RS63 = NITRILE-BUTADIENE (Hycar) For petroleum applications to 180°F.

RS50 = CHLOROPRENE (Neoprene) General service compound for alkaline applications to 180°F.

RS66 = TERPOLYMER OF ETHYLENE PROPYLENE (Nordel) For high temperature water to 250°F.

RS78 = POLYURETHANE (Urethane)

24"-36" VALVES

RS16 = CHLOROPRENE (Neoprene) General service compound for alkaline applications to 180°F.

RS26 = NITRILE-BUTADIENE (Hycar) For petroleum applications to 180°F.

RS47 = CHLORO-SULFONYL-POLYETHYLENE (Hypalon) For oxidizing chemical service to 200°F.

RS54 = FLUORINATED HYDROCARBON (Fluoroelastomer) For high temperature chemicals to 300°F.

RS66 = TERPOLYMER OF ETHYLENE PROPYLENE (Nordel) For high temperature water to 250°F.

Recommendations above describe general service conditions only. For specific recommendations, see DeZURIK Rubber Recommendations List or contact the factory.

DISC, SHAFT AND BEARING MATERIAL

Give number 1 through 21 as shown below:

CODE	MATERIAL	SIZES
1	= Bronze disc, 416 stainless steel shaft, bronze bearings in 2"-20", reinforced TFE bearings in 24"-36"	2"-36"
2	= Cast iron disc with welded nickel edge, 416 stainless steel shaft, bronze bearings in 4"-20", reinforced TFE bearings in 24"-36"	4"-36"
3	= 316 stainless steel disc and shaft, TFE-coated stainless steel bearings	2"-20"
5	= Bronze disc, 316 stainless steel shaft, TFE-coated stainless steel bearings in 2"-20", reinforced TFE bearings in 24"-36"	2"-36"
6	= Cast iron disc with welded nickel edge, 316 stainless steel shaft, TFE-coated stainless steel bearings in 4"-20", reinforced TFE bearings in 24"-36"	4"-36"
8	= Bronze disc, 304 stainless steel shaft, reinforced TFE bearings	24"-36"
9	= Cast iron disc with welded nickel edge, 304 stainless steel shaft, reinforced TFE bearings	24"-36"
12*	= Cast iron disc with welded nickel edge, 416 stainless steel shaft, bronze bearings in 4"-20"	4"-20"
13*	= Bronze disc, 416 stainless steel shaft, bronze bearings in 2"-20"	2"-20"
14	= Electroless nickel coated cast iron disc, 416 stainless steel shaft, bronze bearings in 2"-20", reinforced TFE bearings in 24"-36"	2"-36"
15	= Electroless nickel coated cast iron disc, 316 stainless steel shaft, TFE-coated stainless steel bearings	2"-36"
16	= Electroless nickel coated cast iron disc, 304 stainless steel shaft, reinforced TFE bearings	24"-36"
17*	= Electroless nickel coated cast iron disc with 416 stainless steel shaft, bronze bearings in 2"-20"	2"-20"
18**	= Cast iron disc with welded nickel edge, 416 stainless steel shaft, bronze bearings	2"-16"
19**	= Bronze disc, 416 stainless steel shaft, bronze bearings	2"-16"
20**	= Electroless nickel coated cast iron disc, 416 stainless steel shaft, bronze bearings	2"-16"
21**	= 316 stainless steel disc and shaft, TFE-coated stainless steel bearings	2"-16"

*For 25 psig uni-directional shutoff. Contact factory for shutoff requirements up to 100 psig.

**For diaphragm actuators, 25 psig uni-directional shutoff.

ACTUATOR AND ACCESSORIES

All actuators must be ordered by adding the actuator number to the basic valve identification. Actuator descriptions and ordering information are shown in actuator sections.

Lever Actuators —Page 12

Rotary Manual Actuators —Pages 12 and 13

On-Off and Positioning Cylinder Actuators —Pages 14 and 15

Electric Motor Actuators —Pages 16 and 17

Diaphragm Actuators —Pages 18 and 19

Order accessories as shown in accessory sections.

Manual Accessories —Pages 20 and 21

Cylinder Accessories —Pages 22 and 23

RS49 2 KWG3C4

2"-20" electric motor actuators

ACTUATOR SPECIFICATIONS

Actuator Type
RCS Motor Actuators with brake.

Speed of Operations
Speeds

2"-4"	30 seconds (KMGM2 and KMGM3)
5"	30 seconds (KMGM3) 15 seconds (KMGM4) 30 seconds (KMGM5)
6"	15 seconds (KMGM4) 30 seconds (KMGM5 and KMGM6)
8"	30 seconds (KMGM6 and KMGM7)
10"	30 seconds (KMGM7)
12"	30 seconds (KMGM7) 26 seconds (KMGM8)
14"	26 seconds (KMGM8)
16"	26 seconds (KMGM8) 55 seconds (KMGM9)
18"-20"	55 seconds (KMGM9)

See chart below.

Motor Enclosure
NEMA 4 Watertight (Standard).
NEMA 7 available on request.

Motor Electrical Characteristics
Standard — 120 VAC 60/50 Hz, 1 phase a.c.

Optional — 220 VAC 60/50 Hz, 1 phase a.c. (MAR25, 50, 90, 100, 160, 250, 800 and 1600); 220/440 VAC, 3 phase a.c. (MAR100, 160, 250, 800 and 1600)

Manual Valve Operation
Motor back shaft provided for wrench operation. Safety interlock cap cuts motor power when removed.

Limit Switches
Two standard adjustable open and close limit switches are located within the motor unit.
15 amps, ⅓ hp, 125 or 250 VAC
5 amps, 120 VAC "L" (Lamp Load)
½ amp, 125 VDC
¼ amp, 250 VDC

Accessories
Position Indicating Switches
2 optional switches can be added.
Standard switches are SPDT.
Consult factory for DPDT and 3PDT switches or for more than two extra switches.
Extra switches furnished on same Cam as standard.
Auxiliary switches furnished on separate Cam.
Potentiometer
Furnished mounted in the limit switch case. Approximately 90° valve rotation from open to closed provides usable potentiometer output signal span of approximately 1,000 ohms, To order, add code "R" to actuator identification.
Breather and drain
For applications that are exposed to high humidity; breathers and drains are recommended for explosion-proof actuators.
Heater and Thermostat
For applications that are exposed to high humidity, or extreme low temperature. heaters and thermostats are recommended.
Extended Duty Motor
All standard units are rated for 25% duty cycle. When ordering extended duty units it is recommended that DeZURIK be consulted to determine the correct cycle time for particular applications.

Actuator Ordering
To order electric motor actuators, add the appropriate actuator model number from the sizing table below and the electric characteristics code as follows to the basic valve identification. Actuators can be mounted at 90° increments clockwise from standard. Specify non-standard mounting positions below the valve and actuator identification.

Electrical Characteristic Code:
A = 120 VAC 60/50 Hz, 1 phase a.c.
B = 220 VAC 60/50 Hz, 1 phase a.c.
C = 220/440 VAC, 3 phase a.c.

ORDERING EXAMPLE:
0600, FIG 632, W, B, RS16, 2, KMGM6, A.

UNDERCUT DISC			
VALVE SIZE	25 PSI UNI-DIRECTIONAL SHUTOFF		
2"-5"	MAR25	(10)	KMGM2
6"	MAR50	(30)	KMGM3
8"	MAR100	(30)	KMGM5
10"	MAR160	(30)	KMGM6
12"-14"	MAR250	(30)	KMGM7
16"-20"	MAR800	(26)	KMGM8

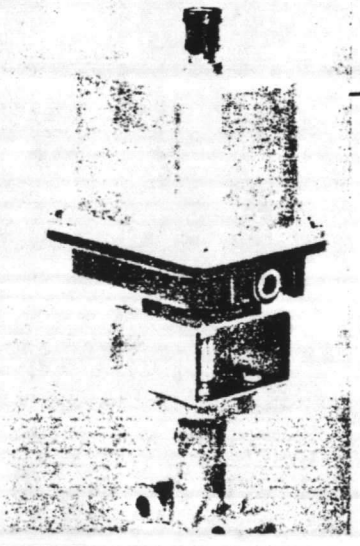


FIG 632 BUTTERFLY W/RCS MOTOR

VALVE SIZE	PRESSURE DROP, PSI						
	25	50	75	100	125	150	175
2	KMGM2 MAR25 (10)						
2½	KMGM2 MAR25 (10)					KMGM3 MAR50 (30)	
3	KMGM2 MAR25 (10)			KMGM3 MAR50 (30)			
4	KMGM2 MAR25 (10)		KMGM3 MAR50 (30)				
5	KMGM3 MAR50 (30)		KMGM4 MAR90 (15)		KMGM5 MAR100 (30)		
6	KMGM4 MAR90 (15)		KMGM5 MAR100 (30)			KMGM6 MAR160 (30)	
8	KMGM6 MAR160 (30)		KMGM7 MAR250 (30)				
10	KMGM7 MAR250 (30)						
12	KMGM7 MAR250 (30)		KMGM8 MAR800 (26)				
14	KMGM8 MAR800 (26)						
16	KMGM8 MAR800 (26)		KMGM9 MAR1600 (55)				
18	KMGM9 MAR1600 (55)						
20	KMGM9 MAR1600 (55)						

NOTE: Number in parentheses indicates operating speeds for 90° rotation. (60 cycle motors only; 50 cycle motors increase in time by a factor of 1.2.)

2"-20" manual actuators

LEVER ACTUATORS

10-Position Levers (Photo 1)

Positive latching A 10-position dial provides positive latching in open, closed and eight intermediate positions. Pointer indicates disc position. (Optional adjustable memory stop.)

Lock to prevent tampering A notch in the handle allows use of a standard padlock to prevent unauthorized valve operation.

Infinite-Position Levers* (Photo 2)

Adjustable throttling position Hand tightening of the threaded shaft against the dial plate holds the disc in any desired position. Graduated dial indicates disc position.

Adjustable Memory Stop All infinite-position levers have an adjustable memory stop to allow the valve to be closed and reopened to the same position. (Photo 3)

Ordering Levers
To order, add lever number to basic valve identification. Actuators can be mounted at 90° increments from standard. Black area indicates disc position. Lever size range is shown below. Handwheel actuators are recommended for valves above 6" and where water hammer may occur due to sudden valve closure.

*Patented U.S. 3,537,473

Number		Lever Style
KLG1	=	10-Position Lever (2"-12" valves only)
KLG2	=	Infinite-Position Lever (2"-10" valves only)

FIG 603, Memory Stop (Used with KLG1 only) An adjustable stop used to return valve to a preset open position after shutoff. A common application for this feature is air conditioning or heat exchanger balancing. Order FIG 603, 0200, R.

ROTARY MANUAL ACTUATORS

Enclosed construction Includes: stamped steel cover with position indicator window. (Photo 4)

Weatherproof construction Includes: cast iron cover with position indicator window and gasket; seals on the actuator input shaft and thrust plate. (Photo 5)

Buried construction Includes: cast iron cover with gasket; seals on the actuator input shaft and thrust plate; stainless steel bolts on actuator cover and on end cap; sealed connection between the valve neck flange and actuator base. (Photo 6)

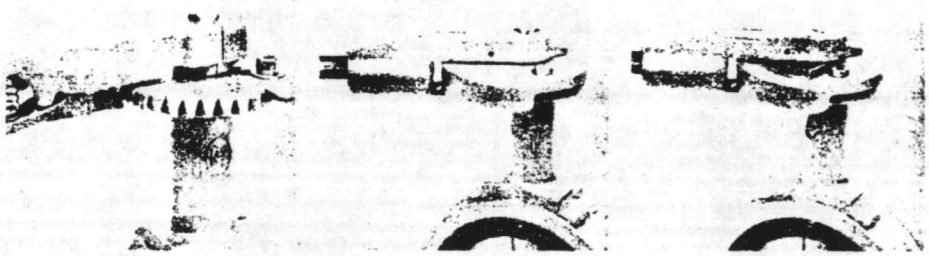
Actuator Input
Actuators are available with a variety of manual inputs as follows:
Crank (Photo 4)
Handwheel (Photo 5)
2" Square Nut (Photo 6)
Chainwheel

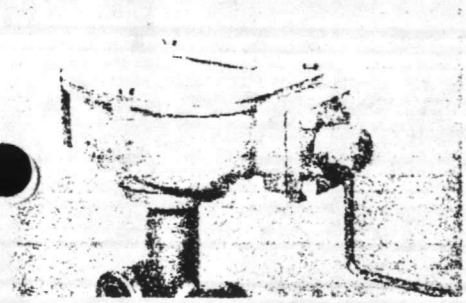
Ordering Rotary Manual Actuators
To order rotary manual actuators, add the appropriate actuator number from the table below to the basic valve identification. Actuators can be mounted at 90° increments from standard as shown on page 13. Black area indicates disc position. Specify non-standard mounting positions below the valve and actuator identification.

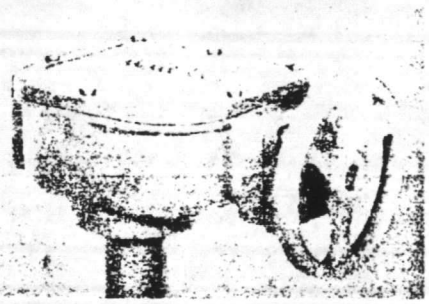
CONSTRUCTION	ACTUATOR INPUT	ACTUATOR NUMBER
ENCLOSED CRANK	2"-6"	KEG3L
	8"-14"	KEG5L
	16"-20"	KEG7L
HANDWHEEL	2"-6"	KEG3H8
	8"-14"	KEG5H12
	16"-20"	KEG7H16
CHAINWHEEL	2"-6"	KEG3W8
	8"-14"	KEG5W12
	16"-20"	KEG7W12
WEATHERPROOF CRANK	2"-6"	KWG3L
	8"-14"	KWG5L
	16"-20"	KWG7L
HANDWHEEL	2"-6"	KWG3H8
	8"-14"	KWG5H12
	16"-20"	KWG7H16
2" SQUARE NUT	2"-6"	KWG3N
	8"-14"	KWG5N
	16"-20"	KWG7N
WEATHERPROOF (BURIABLE)		
2" SQUARE NUT	2"-6"	KBG3N
	8"-14"	KBG5N
	16"-20"	KBG7N

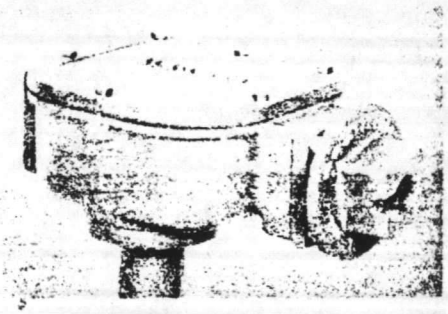
FIG 624, 102 Chain For use with chainwheel actuators above. Order as a separate item by giving "FIG 624, 102" with length below.

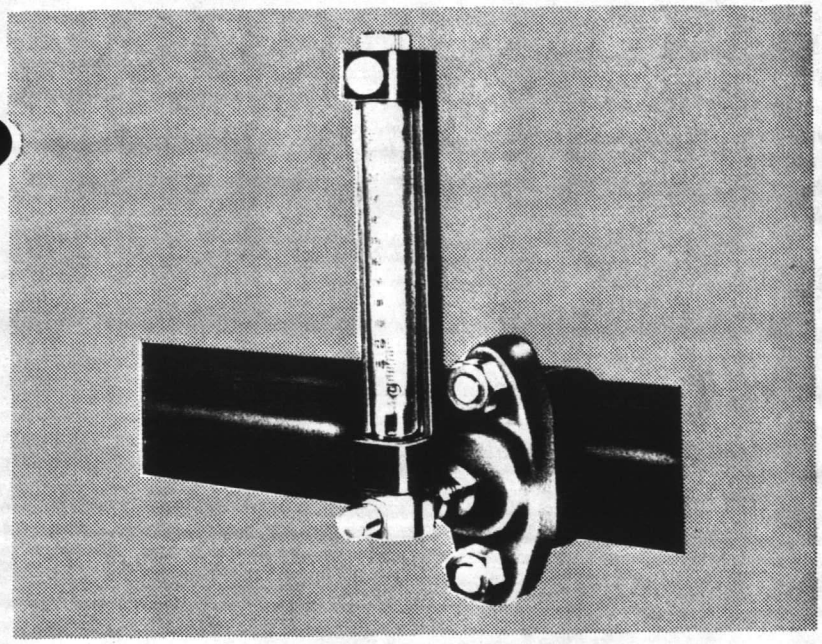
Galvanized Chainwheel and Guide
Same as chainwheel above except chainwheel and guide are galvanized.









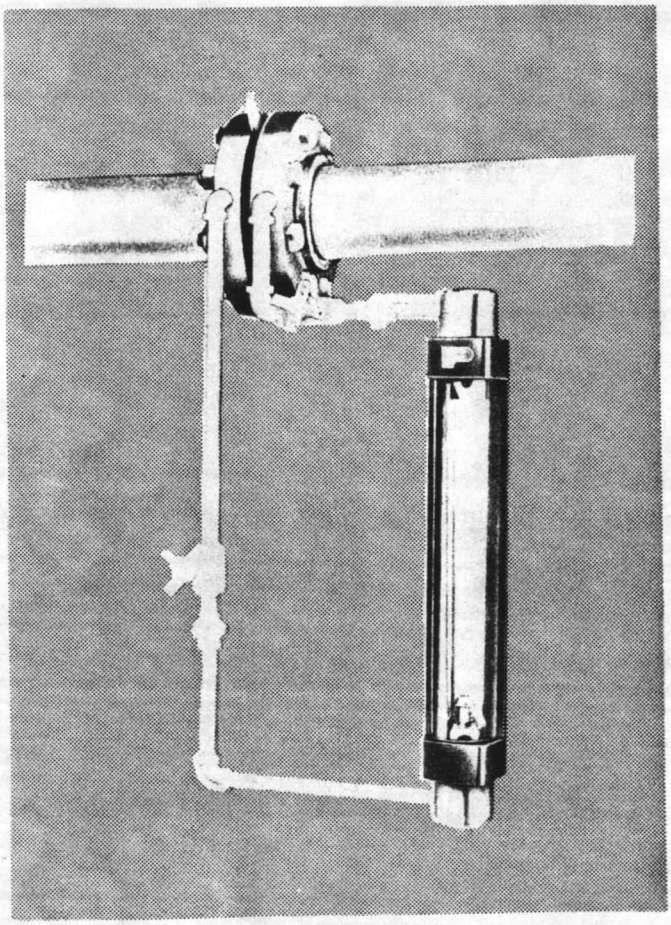


FILTER ACCESSORIES

WORLD-WIDE

a division of
Paddock of California

FLOW METER (Impact): 5811
This flow rate indicator is a combination impact tube and direct reading variable area flow meter. It can be easily and inexpensively mounted by means of a pipe saddle mounting fitting, directly in a steel or PVC pipe line running at any angle. To read the indicator simply push the button as indicated.

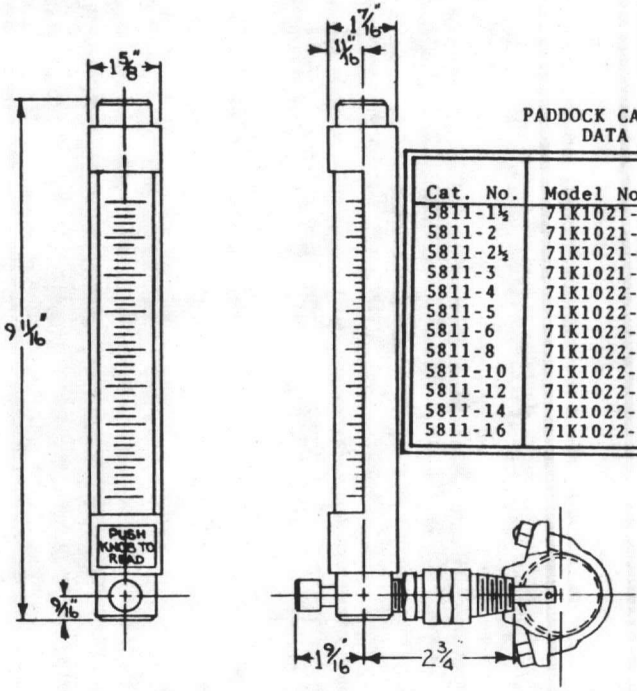


FLOW METER (Monometer): 5800
The Paddock Ori-Flowmeter is of the self purging by-pass kinetic monometer type. It provides linear indication of flow rate over a 10 to 1 flow range. It is connected to the main line by orifice taps. The meter measures by-pass flow. Accuracy of this unit is plus or minus 2%. Orifice flanges and stainless steel orifice plate must be ordered separately designating the IPS line from which flow is to be read.

Paddock Refinite

WATER TREATMENT

555 Paddock Parkway, Rock Hill, S.C. 29730

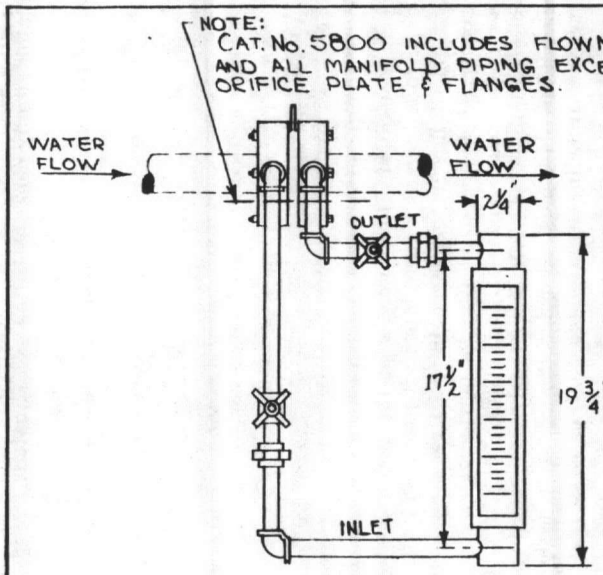


PADDOCK CAT. NO. 5811
DATA CHART

Cat. No.	Model No.	Pipe Size	GPM Flow Range
5811-1½	71K1021-A	1½"	8-80
5811-2	71K1021-A	2"	10-135
5811-2½	71K1021-A	2½"	15-195
5811-3	71K1021-A	3"	30-300
5811-4	71K1022-A	4"	40-520
5811-5	71K1022-A	5"	80-820
5811-6	71K1022-A	6"	100-1200
5811-8	71K1022-A	8"	200-2200
5811-10	71K1022-A	10"	300-3300
5811-12	71K1022-A	12"	500-4600
5811-14	71K1022-A	14"	500-5600
5811-16	71K1022-A	16"	600-7400

SPECIFICATIONS:
Flowmeter:
The indicator shall have a maximum indicated capacity of _____GPM of water in a _____inch diameter pipeline. The flow indicator shall be Paddock No._____. The indicator shall provide a minimum 10 to 1 operating range for all pipe sizes to which it shall apply. The indicator shall have a rated pressure of 100 PSI. The indicator shall be equipped with an integral shut-off valve so that the flow is indicated only when desired. The glass tubes and orifice shall be readily removable from the body for cleaning without dewatering the pipeline. The meter shall be constructed completely of metal with glass tubes and Teflon float stops. The flow rate indicator shall mount directly on the pipelines by means of a service clamp and shall not require the use of tapping or threading tools. Orifice plates and flanges are not required and the unit may be mounted in any existing line with the proper pipe saddle.

			Paddock REFINITE ROCK HILL, SOUTH CAROLINA 29730	SCALE: NONE
				DATE June, 1979
NO	DESCRIPTION	DATE	IMPACT TUBE VARIABLE AREA FLOWMETER	CAT. NO 5811
REVISIONS.				DWG NO B-226



PADDOCK CAT. NO. 5800
DATA CHART

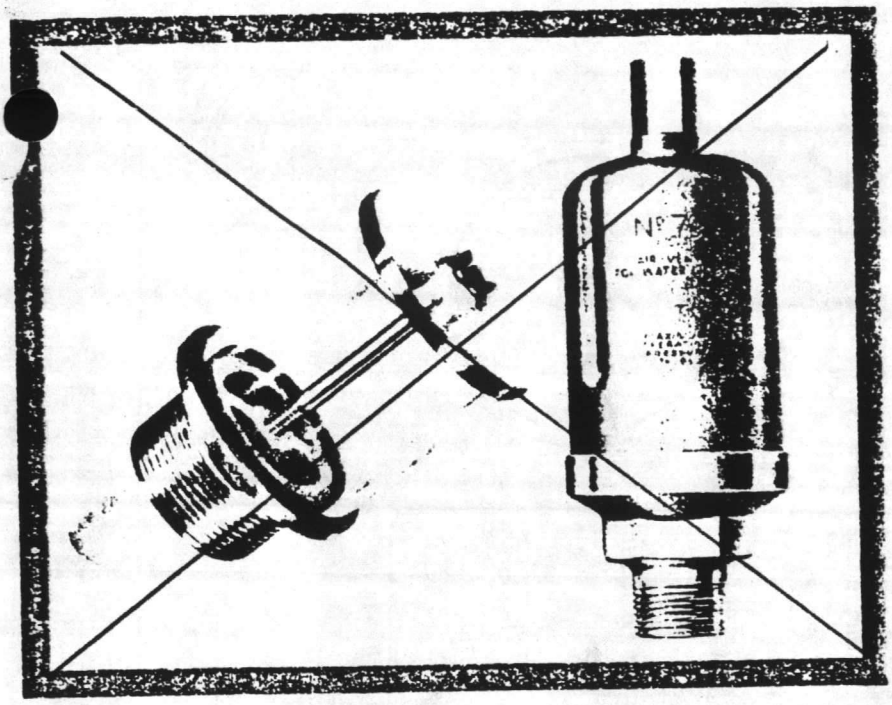
Orifice & Flange Cat. No.	Pipe Size
5802	2"
5803	3"
5804	4"
5805	5"
5806	6"
5808	8"
5810	10"

SPECIFICATIONS:
Flowmeter:
The flowmeter shall be a self-purging bypass or kinetic monometer type providing linear indication of flow rate over a ten to one flow range. The unit shall be piped to main line orifice taps with the bypass flow reading given as a function of main line flow. Ori-Flowrator seals may be readily converted from O ring to packing gland type with the provision that the entire tube, float assembly, etc. may be removed for cleaning and inspection with meter in line.

Performance shall be ± 2% of maximum bypass flow rate with a ten to one rangibility. Meter body shall be rigid extruded aluminum with all parts and fittings of corrosion resistant materials similar to Lucite, neoprene, Teflon, stainless steel, Delrin, and glass. Standard unit for pipeline mount is furnished with all manifold piping including a set of orifice flanges and stainless steel orifice plate. Flowmeter shall be Paddock No. _____.

			Paddock REFINITE ROCK HILL, SOUTH CAROLINA 29730	SCALE: NONE
				DATE June, 1979
NO	DESCRIPTION	DATE	KINETIC MONOMETER ORI-FLOWRATOR	CAT. NO 5800
REVISIONS				DWG. NO A-226

FILTER ACCESSORIES

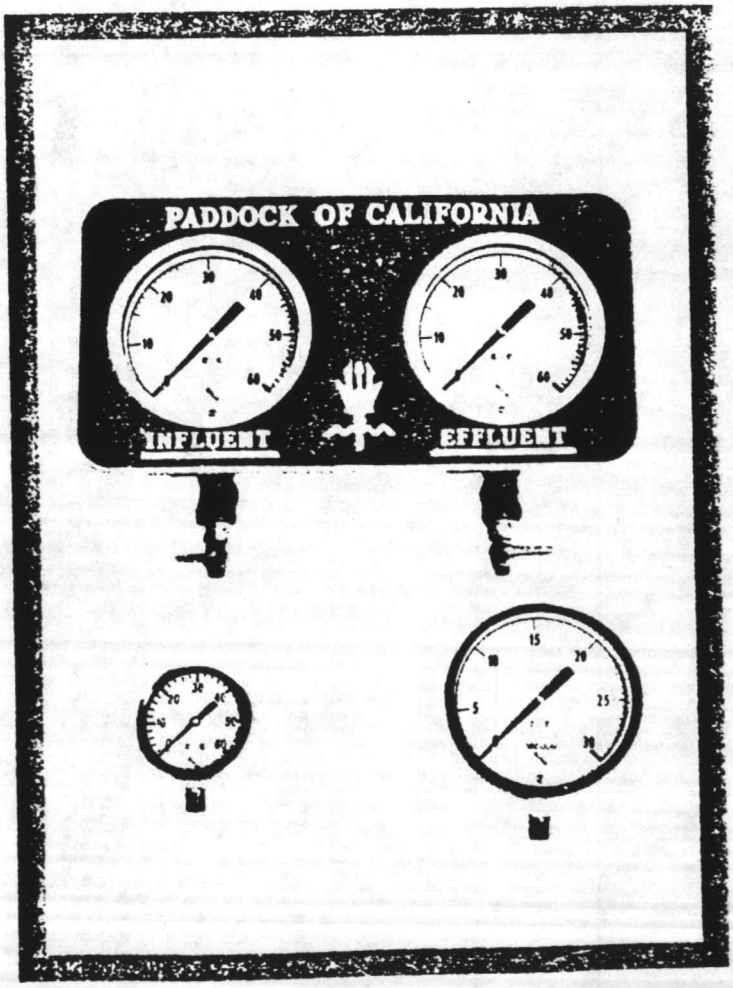


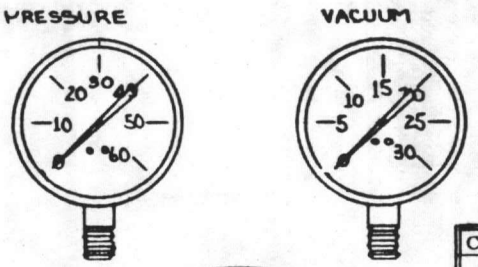
SIGHT GLASS: 5818 (1½") and 5819 (2")
The sight glass is installed in the backwash line to allow the operator to observe the clarity of the filter discharge water during backwashing. This permits the shortest possible backwash and conserves energy and water. Paddock's sight glass is constructed of chrome plated brass with a lucite viewing tube.

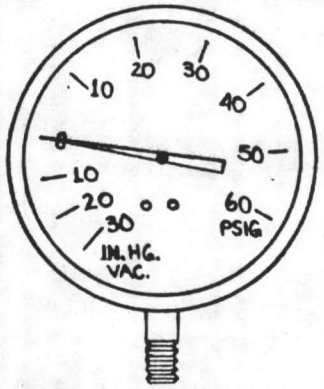
AIR RELIEF VALVE: 5866
Pressure filter tanks are provided with a means to automatically vent any entrapped air from the tank. The valve has a 3/4-inch male connection and is fabricated of brass. It contains a built-in check valve.

GAUGES: 5830, 5832, 5834, 5834-1, 5835
Paddock gauges are provided with easy to read faces in pressed steel cases with 1/4" IPS brass connectors. They are available in ranges from 0 to 60 lbs. per sq. in. pressure and from 0 to 30 in. of mercury vacuum in both 2 1/2" and 4 1/2" sizes and also in compound pressure-vacuum gauges.

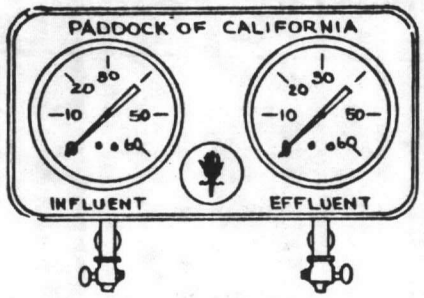
GAUGE PANEL: 5840
This cast aluminum panel mounted securely onto a holder is supplied with two 4 1/2" gauges designed to read the influent and effluent pressure readings on a filter. The panel comes complete with gauges, sample cocks and copper tubing.







PRESSURE & VACUUM



GAUGE PANEL

CAT. NO.	SIZE	PRESSURE	VACUUM
5830	2-1/2"	0 - 60	—
5832	4-1/2"	0 - 60	—
5834	2-1/2"	—	0 - 30
5834-1	2-1/2"	0 - 60	0 - 30
5835	4-1/2"	0 - 60	0 - 30

SPECIFICATIONS:

Gauges:

Gauges shall be _____ inches in diameter and shall have a glass-covered face reading directly in PSI from 0 to 60 (and/or in inches of mercury from 0 to 30). The case shall be pressed steel. The bourdon tube shall be trumpet brass soldered to the socket and tip. The brass movement shall be of the rotary gear design, mounted independent of the case.

A 1/4" IPS brass connection shall be provided for connection to tubing or directly into tapped holes provided in the system, Paddock No. _____.

A common gauge holder panel for two 4-1/2" diameter influent and effluent gauges shall be provided. It shall be cast aluminum and designed to connect to a pipe saddle. It shall be supplied with two 4-1/2" diameter gauges, Paddock No. 5832, sample cocks and connections for tubing, Paddock No. 5840.

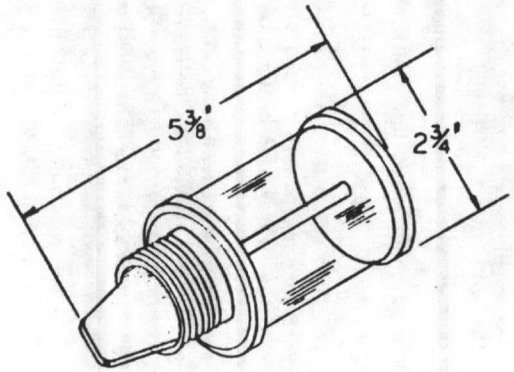
NO	DESCRIPTION	DATE
REVISIONS		

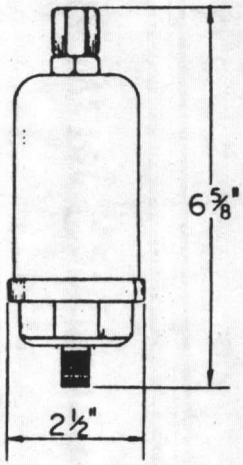
Paddock Refinite

Rock Hill, South Carolina 29730

FILTER GAUGES

SCALE	NONE
DATE	11-77
CAT NO	AS NOTED
DWG NO	B-225





SPECIFICATIONS:

Sight Glass:

There shall be a sight glass installed in the backwash line as shown on the drawings. The sight glass shall be installed in a manner to permit the operator to view the plant effluent during backwashing. The backwash sight glass shall be constructed of cast bronze, chrome plated ends with an acrylic body. The assembly shall be held together with a cnetral bolt. The sight glass shall have a _____ inch male IPS thread for attachment to the piping. Catalog No. _____.

SPECIFICATIONS:

Air Relief Valve:

Each filter tank shall be provided with a 3/4" bronze air relief valve. The air relief valve shall be threaded into a coupling in the top head of the tank. The air relief valve shall be so designed as to permit the connection of the discharge line. The valve shall be of the float type. Paddock Catalog No. 5866.

NO	DESCRIPTION	DATE
REVISIONS		

Paddock Refinite

Rock Hill, South Carolina 29730

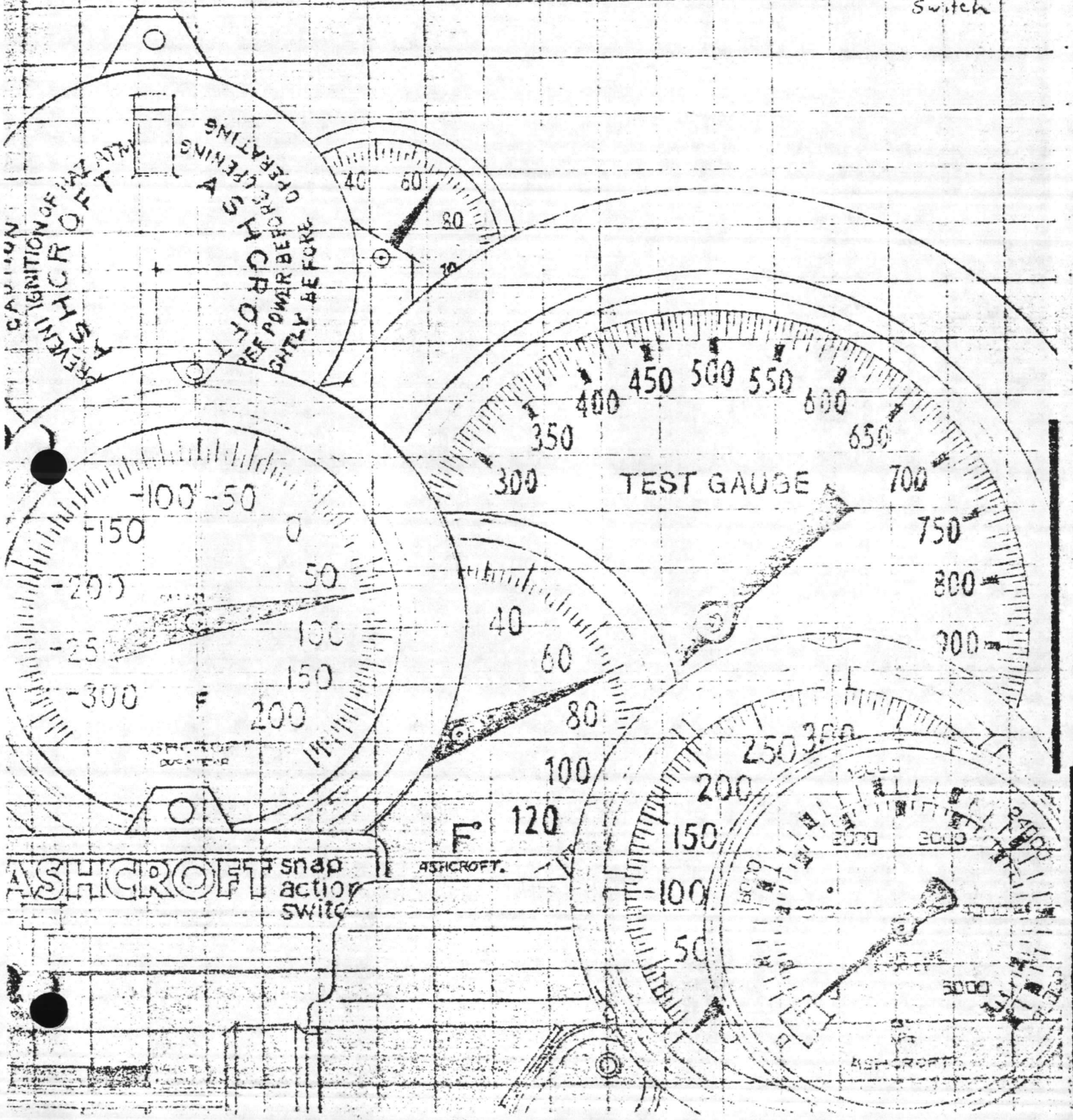
SIGHTGLASS AND AIR RELIEF VALVE

SCALE	NONE
DATE	11-77
CAT NO	AS NOTED
DWG NO	A-225

DIFFERENTIAL PRESSURE SWITCH.

Control Instruments

B 420 B Pressure Switch



How to Order Series "G" Pressure Switches

Series Code:	GP	Pressure
Enclosure Code:	NO	Skeleton
	N4	NEMA 4 (Watertight)
	N4S	NEMA 4X (Watertight, Corrosion Resistant)
Switch Order Code:(1)	G	General Purpose
	J	Hermetically Sealed Contacts
	GG	General Purpose (Dual SPDT)
	JJ	Hermetically Sealed (Dual SPDT)
Actuator Material Code:	B	Buna N
	V	Viton
	WS	Inconel 718/316 S.S.
Connection Code:(2)	25	¼" NPTF
	06	⅜" NPTM/¼" NPTF
Option Code:		Write X, followed by option selection
Range Code:		Choose from appropriate tables

GP N4S G WS 25 XNF 600 psi

NOTES:
(1) Additional switch elements available.
(2) Additional pressure connections available—consult factory.

How to Order Series C100, C200, B400, B700 Pressure Switches

Series Code:	Write "B4", "B7", "C1" or "C2", for Series B400, B700, C100 or C200
Switch Order Code:	Write the order code number of the switch element selected
Actuator Seal Code:	Write the code letter of the available diaphragm wanted,
Option Adder:	Write an "X" if any options are wanted
Option Code(s):	Write the code letters of all options wanted
Nominal Range:	Write the nominal range designation of the actuator wanted

B4 20 B X PK 600 psi

Series "G" Pressure Range Selection(1)

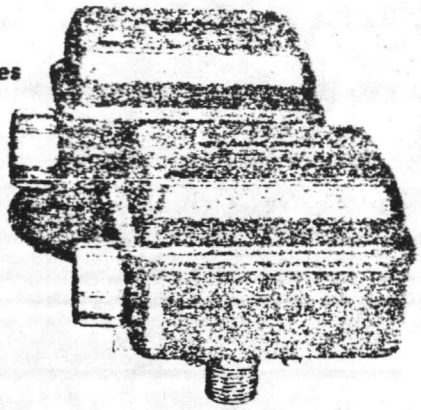
Adjustable Set Point Limits	Overpressure Ratings Proof psi	Burst psi	Approximate Deadband
1-10" H_2O	20	35	2.5" H_2O
3"-30 H_2O	20	35	3.0" H_2O
6-60" H_2O	20	35	4.0" H_2O
10-100" H_2O	20	35	6.0" H_2O
15-150" H_2O	20	35	10" H_2O
30" Hg vac	250	—	3.5" Hg vac
1.5-15 psi	500	1500	2.0 psi
3-30 psi	500	1500	3.0 psi
6-60 psi	500	1500	4.0 psi
10-100 psi	1000	3000	6.0 psi
20-200 psi	1000	3000	15 psi
40-400 psi	2400	3000	30 psi
60-600 psi	2400	3000	50 psi
100-1000 psi	12000	18000	100 psi
300-3000 psi	12000	18000	250 psi

NOTES
(1) With BUNA N diaphragm and Code "G" general purpose switch element.
Proof Pressure — The maximum intermittent pressure which may be applied without causing damage.
Burst Pressure — The pressure above which the pressure seal may rupture.

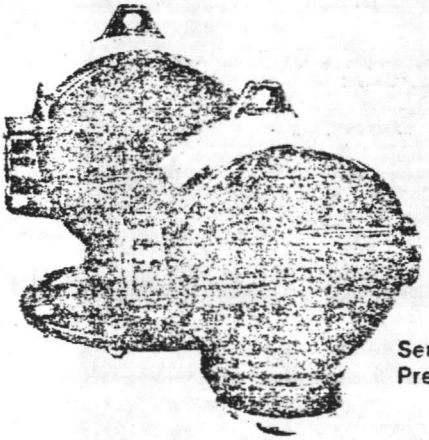
Series C100, C200, B400, B700 Pressure Range Selection

Series C100, C200 Adjustable Set Point Limits	Overpressure Ratings Proof psi	Burst psi
0.75-16.5 psi	500	900
1.5-33 psi	500	900
3-66 psi	1,000	1,500
5-110 psi	1,000	1,500
10-220 psi	1,800	2,500
20-440 psi	1,800	2,500
30-660 psi	1,800	2,500
Series B400, B700		
30" Hg Vac-0-16.5 psi	500	
30" Hg Vac-0-33 psi	500	
30" Hg Vac-0-66 psi	500	
0.5-11" H_2O	20	35
1.5-33" H_2O	20	35
3-66" H_2O	20	35
5-110" H_2O	20	35
7.5-165" H_2O	20	35
0.75-16.5 psi	500	1,500
1-22 psi	500	1,500
1.5-33 psi	500	1,500
3-66 psi	500	1,500
5-110 psi	1,000	1,500
10-220 psi	1,000	3,000
20-440 psi	2,400	3,000
30-660 psi	2,400	3,000
50-1100 psi	12,000	18,000
150-3300 psi	12,000	18,000

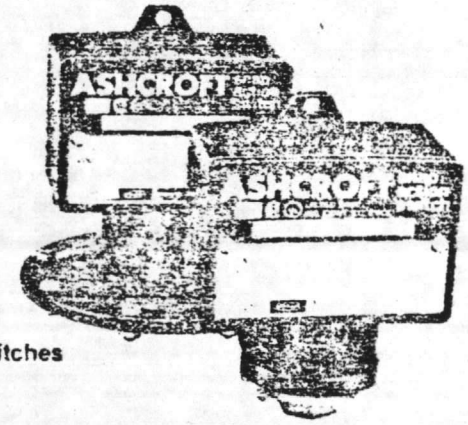
Snap Action Pressure Switches



Series "G"
Pressure Switches



Series B700
Pressure Switches



Series B400
Pressure Switches

Series C200
Pressure Switch

C100 Series
Pressure Switch

DESCRIPTION Ashcroft pressure switches are designed to handle pressures from vacuum to 3,000 psi, with proof pressure to 12,000 psi. They are available with a variety of diaphragm materials which offer compatibility with virtually any gas or liquid. Standard diaphragm materials are: Buna N, and Viton*.

OPERATION Ashcroft pressure switches use a diaphragm sealed piston actuator. As the pressure on the calibrated piston increases, the adjusted spring force is overcome and actuates a precision snap-action switch. The piston itself is sealed from the process by a diaphragm and "O" Ring.
Rugged moving parts and small motions give this actuator a high resistance to shock, vibration and high overpressure capability.
A welded stainless steel actuator is also available as an option for pressures from 15 psi to 600 psi.
In the lower pressure ranges from 10 inches of H_2O through 150 inches of H_2O, a diaphragm actuator, which is sensitive to small pressure changes, is used.

Series GP4 and GP4S
- meets requirements of NEMA 4 (GPN4) and NEMA 4, 4X and 13 (GPN4S)
- stainless steel or epoxy coated enclosures
- watertight, weather resistant and dust tight
- ease of installation and quick set point adjustment
- speedy wiring

Series B700
Explosion-proof switch enclosure
- meets requirements of NEMA Type 7 (NEC Class 1, Div. 1 and Div. 2, Groups B, C & D) and NEMA Type 9 (NEC Class II, Div. 1 and Div.2, Groups E, F & G).
- epoxy coated aluminum case and cover — threaded cover is "O" ring gasketed to achieve weathertight construction.
- screw terminals integral with switch element
- corrosive resistant stainless steel adjustment assembly

Series B400
Watertight/oiltight/dusttight switch enclosure
- meets requirements of NEMA Types 4 and 13
- epoxy coated aluminum case and cover — with captive cover screws and gasket

Series C200
- basic C100 switch with NEMA 1 enclosure
- enclosure can be added in the field
- wall or stem mounted
- steel bracket with rugged flame retardent plastic cover

Series C100
Basic construction
- for OEM use as stem-mounted component inside control panels, starter boxes or equipment enclosures

Screw terminals integral with switch element
Choice of switch elements
- fixed differential SPDT, automatic reset elements rated for standard or heavy duty AC or DC applications

Single knob set point adjustment
- calibrated scale for set-point indication

Choice of pressure actuators
- ranges from 15 to 600 psi
- optional diaphragms suitable for most liquids or gases
- lower housing of epoxy coated aluminum available in various pressure connections

*Product of DuPont

High Range Differential Pressure Actuator (3.0-15 to 60-500 psid) (Shown)

This actuator is designed to withstand vibration, high static and overpressure situations. The standard pressure connections are nickel-plated brass. A dual piston and cylinder mechanism is sealed from process fluids by diaphragm and O-rings. These are available in Viton, Buna N and Teflon. Service temperature above 150° F is not recommended. Optional stainless steel pressure connections are available (option XUD).

Low Range Pressure and Differential Pressure Actuator (IN H_2O Ranges) (Not Shown)

The low range actuator is the diaphragm type. The process connections, diaphragm, O-ring and housings are exposed to the process media and must be compatible with it. All hardware and the process connection are stainless steel, the housings are carbon steel. Diaphragms are available in Viton and Buna N. Service temperature above 150° F is not recommended. Optional stainless steel housings are available. (Option XTA)

Temperature Actuator

Ashcroft temperature switches operate on the vapor pressure principle: The vapor pressure produced is applied to a sensing element, which in turn actuates a switch. This is known as a SAMA Class II system. Various filling materials are used, including Propane, Butane, Freon 113, N. Propyl alcohol and Xylene. Since the system is limit filled, high overtemperature capability is possible. At high overtemperature the fluid is completely vaporized.

The interface between liquid and vapor is the point at which sensing occurs. This is the "sensitive" portion of the bulb. Bulb extensions and capillary are normally filled with vapor, and have little effect on the set point, regardless of ambient temperature variations; therefore, no ambient compensation is required. For best results, the bulb should be mounted within 60° of vertical to assure the liquid remains in the bulb.

Enclosure

Two Series are offered, Series 400, an epoxy coated aluminum enclosure and cover. The captive cover screws and gasket make this enclosure watertight, oiltight and dusttight to NEMA 4 and 13 Requirements. Series 700 is an epoxy coated aluminum enclosure and threaded "O" ring gasketed cover. This explosion-proof, weathertight enclosure meets requirements of NEMA Type 7 (NEC Class I, Div. 1 and Div. 2, Groups B, C & D) and NEMA Type 9 (NEC Class II, Div. 1 and Div. 2, Groups E, F & G).

Switch element

The electrical switches are Underwriters Laboratories (U.L.) listed snap-acting switches. They are available in many variations which make it compatible with most electrical loads. The application should be reviewed to verify the electrical ratings are suitable for the intended use. The table on page 3 lists pressure deadband and corresponding electrical ratings to help in selection. Dresser will test a switch with a customer's electrical load if there is a question of compatibility.

Series 400 and 700 Electrical Characteristics

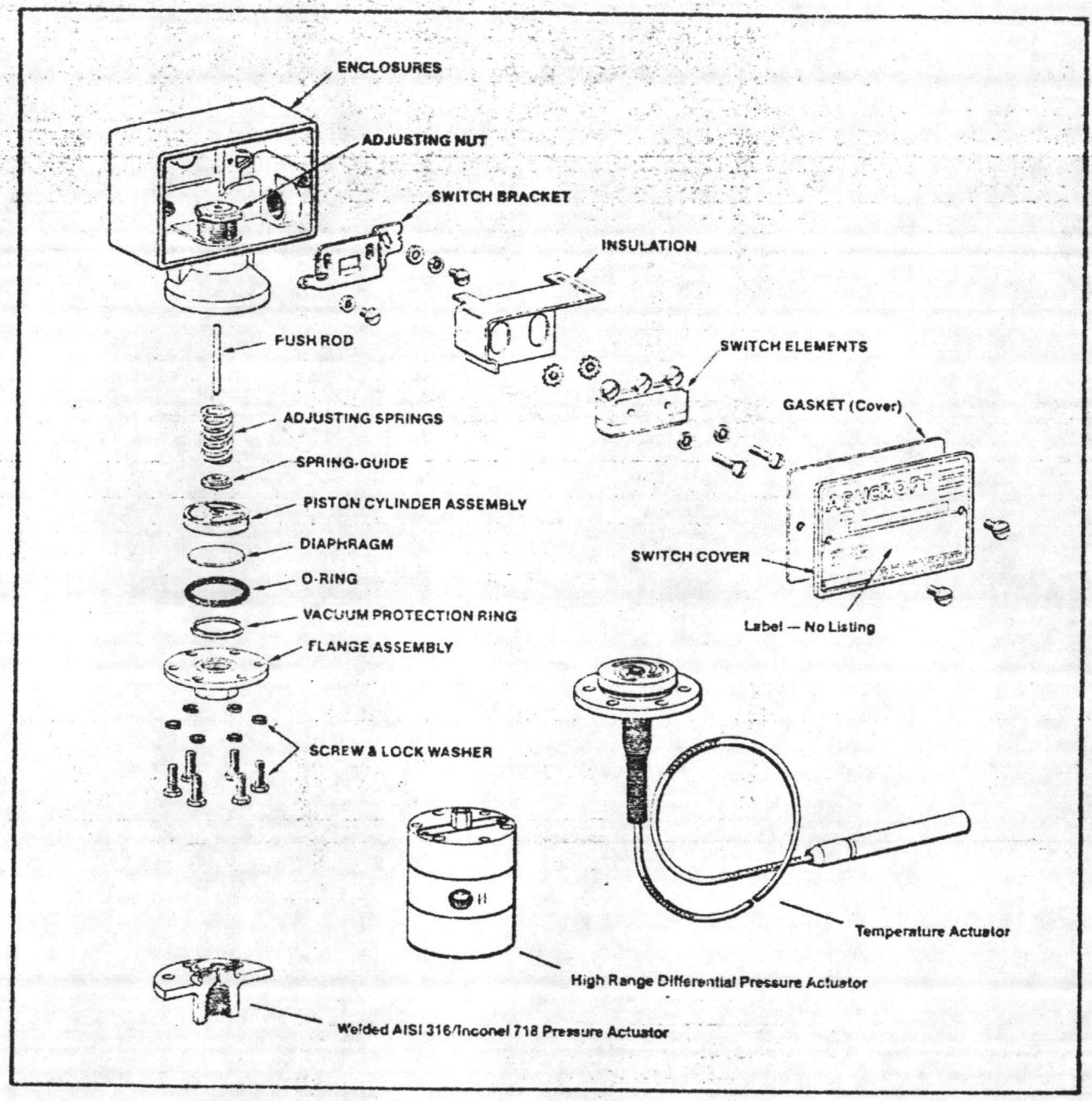
Order Code	Switch Elements UL/CSA Listed S.P.D.T.	
20	Narrow deadband AC	15A, 125/250 VAC
22	Hermetically sealed switch, narrow deadband	125/250 VAC, 5A Res. S.P.D.T.
23	Heavy duty AC	20A, 125/250 VAC
24	General purpose	15A, 125/250/480/VAC ½A, 125 VDC ¼A, 250 VDC
25	Heavy duty DC	10A, 125 VAC or DC, 1/8 HP, 125 VAC or DC
26	Sealed environment proof	15A, 125/250 VAC
27	High temp. 300° F	15A, 125/250 VAC
32	Hermetically sealed switch, general purpose	125/250 VAC, 3A Ind. (AC only) 28 VDC, 5A Res (AC and DC) S.P.D.T.
	Dual Switch Elements UL/CSA Listed D.P.D.T.	
61	Dual narrow deadband	15A, 125/250 VAC
62	Dual sealed environment proof	15A, 125/250 VAC
63	Dual high temp. 300° F	15A, 125/250 VAC
64	Dual general purpose	15A, 125/250/480/VAC ½A, 125 VDC ¼A, 250 VDC
67	Dual hermetically sealed switch, narrow deadband	125/250 VAC, 5A Res., 2 S.P.D.T.
68	Dual hermetically sealed switch, general purpose	125/250 VAC, 3A Ind. (AC only) 25 VDC, 5A Res. (AC and DC) S.P.D.T.

Switch Options

Code	Description	Pressure	Differential Pressure Hi	Differential Pressure Lo	Temperature
XMD	Metric Markings	•	•	•	•
XNF	Tagging Stainless Steel Wired	•	•	•	•
X06	Lower Housing Pressure Conn. ½" NPT Male, ¼" NPT Female 316 Stainless Steel	•			
XHX	High Proof Pressure, 100 PSI, in. H_2O Lower Housing	•		•	
XTA	316 Stainless Steel Lower Housing for in. H_2O Range	•		•	
XUD	316 Stainless Steel Pressure Connection		•		
XA1	Bronze Braided Armor For Copper Capillary				•
XA4	304 St. St. Spiral Interlock Armor For St. St. Capillary				•
XFS	FACTORY ADJUSTED[2] Setpoint	•	•	•	•

(1) Not available with high range D/P switches

(2) Advise Static or Working Pressure for Differential Switches



WARNING: All controls should be selected considering the media and ambient operating conditions. Improper application can be detrimental to the switch, cause failure and possibly personal injury or property damage.

The information in this catalog is offered as a guide to assist in making the proper selection of Ashcroft controls.

Additional information is available from Dresser Instrument Sales. Offices are listed on the back cover.

Actuator

The switch actuator is normally exposed to process fluid and must therefore be chemically compatible with it. The following may be used to help select actuator type:

Sealed Piston/Cylinder Pressure Actuator

This actuator consists of a calibrated piston and cylinder. Process pressure on the piston area causes it to overcome the adjustment spring force, and actuate a snap-action switch through the push rod. A diaphragm and O-ring seal the process media from this mechanism. These seals are available in Buna N® and Viton. The standard process connection is AISI 303 stainless steel

Welded AISI 316/Inconel 718 Pressure Actuator (Shown)

Suitable for use up to 600 psi, this actuator is a completely welded sealed unit. Built-in overpressure capability maintains the actuator integrity up to 2400 psi. Service temperatures above 300°F are not recommended.

WORLD—WIDE

Refinite

WATER CONDITIONING CO.

SOFTENERS

GENERAL CONTRACTOR

CWC, INC.

P. O. BOX 5579

JACKSONVILLE, FLORIDA 32207

QTY	SIZE	DESCRIPTION
2	60" Diameter 60" Vertical Straight Side Shell	Designed in accordance with Section VIII Div., I of the ASME Boiler and Pressure Vessel Code. Working Pressure - 100 psi Hydrostatic Test - 150

REFINITE WATER CONDITIONING DRAWING #RF-910-5

WORLD-WIDE Refinite WATER CONDITIONING CO.

Bulletin No. 522-81

ZEOLITE WATER SOFTENING

WHAT IS HARD WATER?

Water is called "hard" when it destroys soap, deposits soap curds on the fibers of materials washed in water, and when these substances in the water deposit gray rings of grease around bathtubs and lavatories, leave scale deposits in coils of water heaters, teakettles, pots, pans or any receptacle where water is boiled.

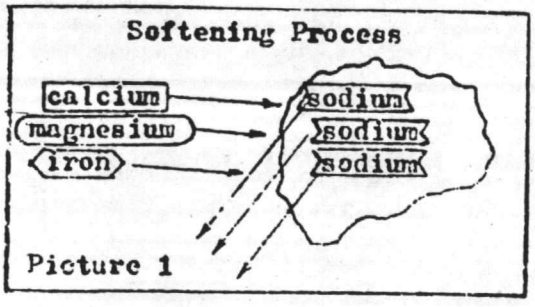
Hardness consists of the positively charged ions, called cations, calcium (Ca) and magnesium (Mg) in the water and is expressed as parts per million (ppm) or grains per gallon as calcium carbonate ($CaCO_3$). One grain per gallon = 17.1 parts per million. Iron (Fe) is also considered a form of hardness. The removal of these substances is accomplished by exchanging them for tasteless non-soap destroying substances within the zeolite mineral.

HOW ZEOLITE SOFTENS WATER

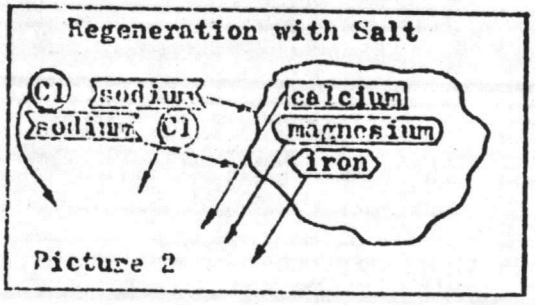
As hard water flows through a bed of zeolite the hardness, calcium (Ca) and magnesium (Mg), and the iron (Fe) dissolved in the water are absorbed by the zeolite. As this action takes place the zeolite gives up sodium (Na) in exchange for the hardness taken from the water (see picture 1).

Sodium (Na) is a harmless, non-soap destroying substance which allows the water to be employed more advantageously for all uses.

After the zeolite has exchanged all of its sodium for hardness it becomes exhausted and must be regenerated so that it can again remove hardness from the water. Common, ordinary, clean salt is used to form a brine for the purpose of rinsing the hardness from the zeolite and replacing the sodium. The salt brine is made up of sodium (Na) and chloride (Cl), is passed through the zeolite in a relatively concentrated form. This concentration reverses the softening action and forces sodium to displace the hardness and iron in the zeolite. The hardness and the iron then flows out to drain down the sewer with the chloride (see picture 2). When the brine has been completely rinsed out of the softener it will again deliver soft water.



Picture 1



Picture 2

Refinite P. O. BOX 11676, ROCK HILL, S. C. 29730, PHONE (803) 324-7600

A WATER SOFTENER CONSISTS OF:

SOFTENER TANK: The tank is cylindrical in shape with electrically welded seams, flanged and dished heads and constructed to withstand a working pressure of 100 psi. The tank has a top distributor to distribute water evenly over the zeolite bed and a bottom collector manifold to collect the water without allowing zeolite or gravel to pass into the service line. A bed of four or five layers of graded and washed gravel is placed over the bottom collector with the zeolite on top of the gravel.

BRINE TANK: This is an open topped cylindrical tank where the salt brine solution is prepared for introduction into the softener. The tank is usually large enough to accomodate salt for six to ten regenerations. The tank has a bottom collector, covered with a gravel bed, that connects to an ejector in the softener valve nest.

CONTROL VALVE NEST: This is an assembly of valves, piping, fittings, etc. which are used to direct the water in the desired direction for the particular operational sequence involved. The valves may be standard gate valves, multiport solo valves or hydraulically operated automatic valves.

ZEOLITE BED: This can be several types but is usually Refinite XR-30 which is a styrene type cation exchanger. The capacity varies with the amount of salt used for regeneration.

WATER TEST SET: A dropper soap test set is included to indicate whether the effluent water is soft or hard.

WATER METER: (Option at extra cost). The water meter is graduated in gallons and equipped with an electrical contact head so that a bell alarm may be sounded at the end of a service run.

Other optional equipment, available at extra cost are pressure gauges, sight glass for drain line and corrosion resistant interior lining for the tanks.

OPERATION OF MULTIPORT AUTOMATIC VALVE FOR SOFTENERS

General

The main control valve for the softeners is a Refinite/Aquamatic motorized multi-port valve. Associated with the multi-port valve are some auxiliary valves and the operation of the multi-port and auxiliary valves are controlled by the control panel. The method of operation of the multi-port valve and accessories is described in this pamplet.

The multi-port valve has three positions; service, backwash and regenerate. To describe the operation in detail assume that the valve is in position #1 Service.

Position #1 - Service

In this position, hard water enters through the 3" line through the 3" diaphragm operated valve to the back of the multi-port valve. In the multi-port valve, water flows to the top of the stemplate through the aperture that connects the pipe to the top of the softener down through the softening resin through to the bottom connection on the multi-port valve, through an aperture to the underside of the stemplate and out of the service outlet of the multi-port valve. The microswitch on the stemplate spindle is open and the motor is stopped in this position.

The amount of softened water between regenerations is monitored by an integrating meter on the soft water line for each softener. When the set amount has passed through this meter, a signal will be sent to the control panel indicating that the softener requires regeneration. The control panel will send a signal to the hard water inlet diaphragm operated valve, the solenoid will operate and the hard water inlet valve will close. A soft water outlet line check valve will prevent soft water entering the multi-port valve. A 3/8" solenoid pressure relief valve on the body of the multi-port valve will open relieving pressure in the valve. This solenoid is under the control of the control panel. With pressure relieved from the body of the multi-port valve, a signal from the control panel will be sent to the solenoid that lifts the stemplate off the backplate. When this has taken place, a second signal will be sent to the motor drive to rotate the stemplate. (Note that this signal overrides the 'open' contacts on the microswitch.) The motor, receiving power, rotates the stemplate and the stemplate moves to the backwash position. The backwash microswitch will open stopping the motor and preventing further movement of the stemplate. On a signal from the control panel, the solenoid will be released and the stemplate return spring will move the stemplate on to the backplate.

With the main valve indexed, the 3/8" solenoid valve on the body of the valve will be closed by a signal from the control panel, the hard water inlet valve will be opened, water will enter the multi-port valve

from the back flow above the stemplate will pass down through the bottom position aperture into the bottom of the tank, rise upward through the resin, out through the top of the underside of the stemplate and out through the drain line. A timer will commence running as soon as the hard water valve is open and at the end of the timed period, the hard water inlet valve will close and the 3/8" solenoid pressure relief valve on the multi-port valve body will open to release pressure. The valve will then move to position three regenerate.

Position #3 - Regenerate

In the regenerate position, the solenoid valve on the water supply to the injector will be opened by the control panel and also the solenoid valve on the brine line from the brine service tank to the injector will also be opened by the control panel. Brine will be transferred to the softener via the brine header and pass downwards through the resin out through the bottom of the tank to the underside of the stemplate and out through the drain port and drain lines. At the time of starting to regenerate with brine, a timer will commence running and the amount of brine put in will be controlled by this timer.

At the end of the brine injection period, the control panel will close the solenoid valve on the brine line to the injector, the water supply solenoid valve will remain open allowing water only to pass downwards through the resin out through the waste line thus rinsing the brine. This rinse period will also be timed and at the end of the rinse period, a signal will be sent to the control panel indicating that the rinse period has finished.

Return to Service Position

On receipt of the end of rinse signal from the timer, the control panel will open the pressure relief valve on the multi-port valve body and will index the valve round to the Service position as described before. Once in the Service position, the control panel will close the pressure relief solenoid, open the hard water inlet valve and the softener will be in the softening position delivering soft water through the service lines. Note that the index to service position has been stopped by the microswitch which is now open as described in the first paragraph.

Brine System

There are two brine tanks, one is a brine storage tank and one is a brine service tank. The injector derives its brine from the brine service tank. Between the brine storage tank and the brine service is a brine pump under the control of a level switch in the brine service tank. When brine is being drawn from the brine service tank, the switch will close, start the brine pump and maintain brine in the service tank. When the brine is at the correct level in the brine service tank, the pump will be stopped by the level switch and the system is ready for another regeneration.

Maintenance

Basically, there is no maintenance in the normal sense of the word on the multi-port valve other than keeping it clean; the gears are lubricated at Refinite's plant with a special long lasting grease. Approximately at three monthly intervals, the cover should be removed from the gear box and the gears checked for grease. Note that the amount of grease on the gears is very small and there is no attempt made to run the gears in heavy grease. The solenoid that lifts the stemplate will run hot and will vibrate when the valve is indexing. This is quite normal, the vibration is due to the pulsing AC voltage through the coil and magnet of the solenoid.

The solenoid is rated approximately 10 minute per operation and can thus easily stand the short period of indexing.

* * *

SOFTENER VALVES

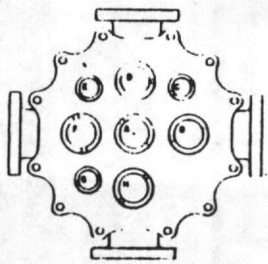
GENERAL CONTRACTOR

CWC, INC.

P. O. BOX 5579

JACKSONVILLE, FLORIDA 32207

QTY	MANUFACTURER	SIZE
2	Multi-port Valves	3"
1	Aquamatic	3"
2	Hoffman	1"



PORT IDENTIFICATION

- A - INLET PORT
- B - DRAIN PORT
- C - BRINE TO TOP OF TANK PORT
- D - TOP OF TANK PORT
- E - BRINE INLET PORT
- F - OUTLET PORT
- G - BY-PASS PORT
- H - BOTTOM OF TANK PORT

PARTS LIST

PART NUMBER	PART NAME	NO. REQ.
107-A	BACKPLATE [illegible] FLANGE	1
	BACKPLATE [illegible] FLANGE	
107-B	BONNET	1
107-C	STEMPLATE	1
107-G	LARGE PORT FERRULE	[illegible]
107-H	STUFFING BOX GLAND	[illegible]
107-I	STUFFING BOX [illegible]	[illegible]
107-J	STEMPLATE PIN	[illegible]
107-L	STEM SHAFT	[illegible]
107-[illegible]	EJECTOR NOZZLE (SPECIFY [illegible])	[illegible]
107-O	BACKPLATE BASKET	[illegible]
107-Q	STUFFING BOX STUD	[illegible]
107-[illegible]	EJECTOR THROAT (SPECIFY [illegible])	[illegible]
107-V	STEMPLATE SPRING	[illegible]
107-AA	STEM SHAFT PACKING (1-SET)	[illegible]
107-[illegible]	[illegible] SUPPORT [illegible]	[illegible]
107-[illegible]	[illegible] SUPPORT	[illegible]
107-[illegible]	[illegible] PLUG	[illegible]

FILTER UNIT STEMPLATE ASS'Y
AVAILABLE AS AN ASSEMBLY ONLY

107-AB	107-C (1), 107-L (1), 107-J (1)	

PARTS LIST

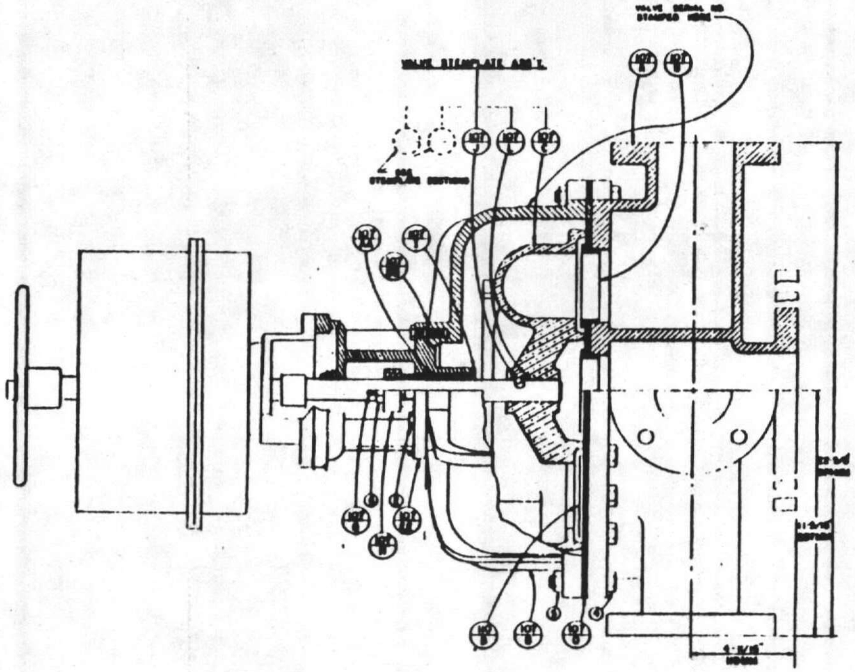
PART NUMBER	PART NAME	NO. REQ.
107-[illegible]	RESTRICTION FERRULE (SPECIFY)	1
	CAP SCREW HEX HD [illegible]	4
	CAP SCREW HEX HD [illegible]	[illegible]
	CAP SCREW HEX HD [illegible]	[illegible]
	MACH SCR HEX HD [illegible]	[illegible]
	NUT HEX HD [illegible]	[illegible]
	NUT HEX HD [illegible]	[illegible]
	SET SCR [illegible]	[illegible]
	COTTER PIN [illegible]	4
	PIPE PLUG [illegible] N.P.T.	[illegible]
	PIPE PLUG [illegible] N.P.T.	[illegible]

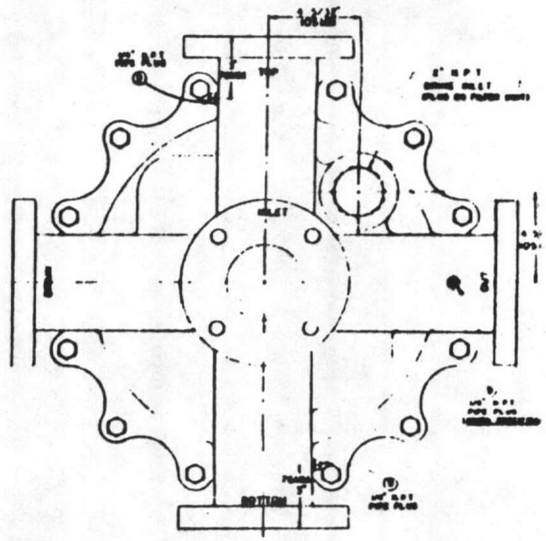
SOFTENER STEMPLATE ASS'Y (INTERNAL EJECTOR)
AVAILABLE AS AN ASSEMBLY ONLY

107-AC	107-AD (1), 107-M (1), 107-T (1)	1

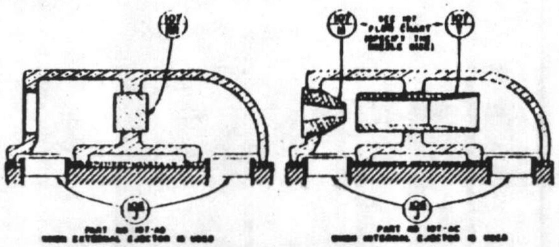
SOFTENER STEMPLATE ASS'Y (EXTERNAL EJECTOR)
AVAILABLE AS AN ASSEMBLY ONLY

107-AD	107-AD (1), 107-BB (1)	1

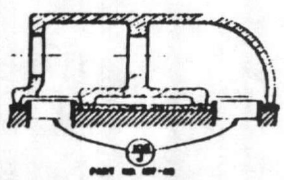




FLANGE SIZE		B.C.D.	BOLT DIA	NO. OF BOLTS
3"	[illegible]	6.00	5/8	4
	[illegible]	100	16	4
4"	[illegible]	7.50	5/8	8
	[illegible]	190	16	8



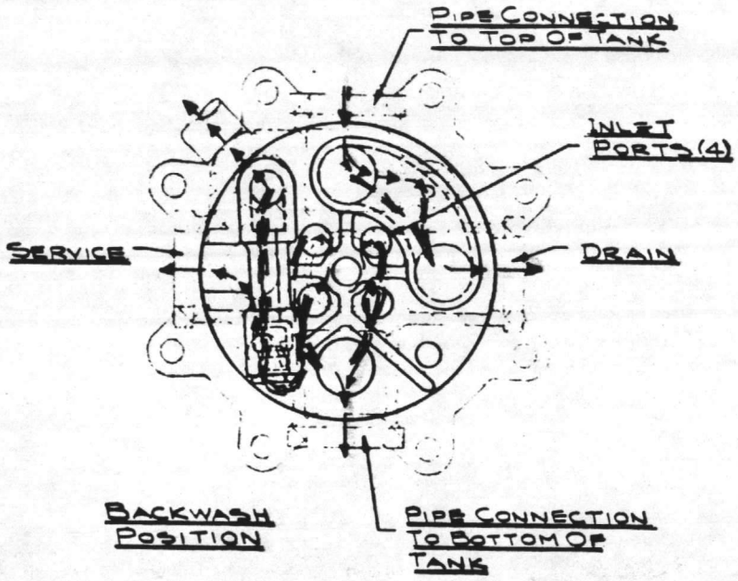
SOFTENER STEMPLATE SECTIONS



FILTER STEMPLATE SECTION

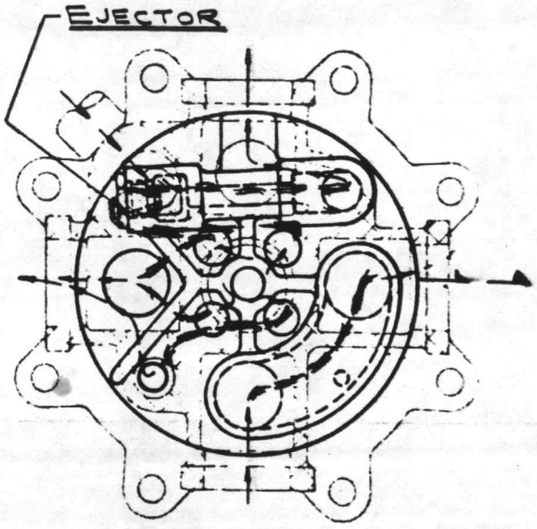
3"-4"-6"	
SOLO VALVE	
SERIES 107	
	E-107-[illegible]

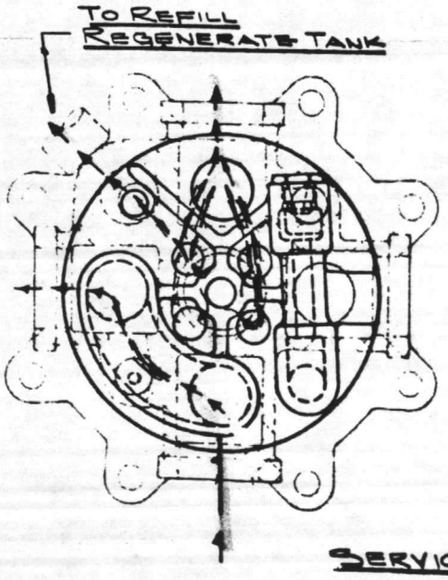
FLOW DIAGRAMS



Raw water enters the valves at the pipe connections in the rear center of the backplate and enters directly into the bonnet chamber through openings in the inner portion of the stemplate. It is then fed back into one of the internal backplate ports through the large circular opening in the outer portion of the stemplate (stemplate feedport) and thence to the treating tank. As the water returns from the treating tank it enters the backplate through the pipe connection, flows through an internal backplate port into the stemplate transfer, across the transfer back through another backplate port and leaves the valve through the proper piping connection.

The diagrams show the path of the water thru the Solo valve for each of the 3 stemplate positions - both 100 series (8 port) and 200 and 400 series (6 port).



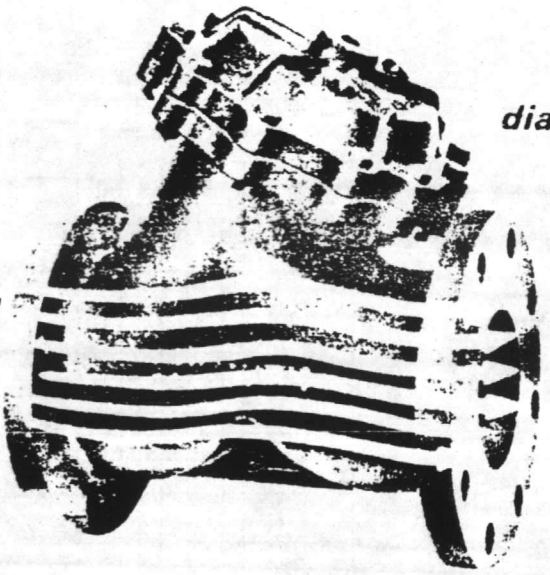


Legend

GREY	Backplate
GREEN	Flow thru Backplate
BLACK	Stemplate
RED	Flow thru Stemplate

AquaMatic®

diaphragm-operated valves



FULL FLOW THRU VALVE

- LOW PRESSURE LOSS THROUGH VALVE
- LARGE OPENING, HIGH LIFT DISC GIVES HIGH FLOW RATES
- POSITIVE CLOSING AND OPENING
- HYDRAULIC OR PNEUMATIC OPERATION
- DIAPHRAGM REPLACEABLE WITHOUT INTERRUPTION OF FLOW
- HANDLES LIQUIDS OR GASES
- ADAPTABLE TO MANY CONTROL DEVICES

An AquaMatic Y-pattern valve means **positive** control with Full Flow. Complete control is obtained with less bulk, less weight, and less complication than with many other forms or remote control for fluids. Seven series of valves, ranging from ¾ to 6 in. IPS, bracket the needs of the process man as well as the water conditioner for a positive means of remote control at less cost.

Purchasing

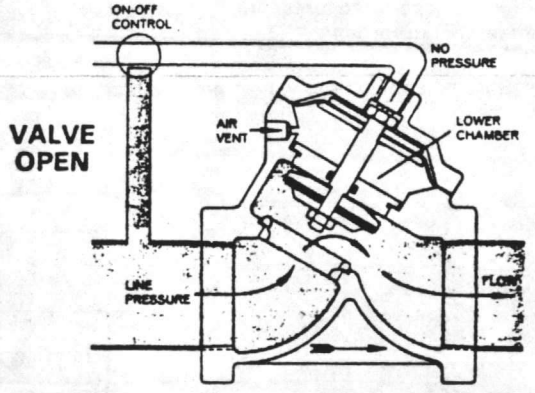
The Valve shall be of the Y-Pattern Design, Diaphragm Powered, Hydraulically operated and Pilot controlled. Valve shall have an upper and lower chamber for power closing and opening when required. Valve shall be completely Hydraulic (no springs) in operation.

Valve shall be equal and similar in all respects and operation to the diaphragm valves manufactured by AquaMatic, Inc., Rockford, Ill.

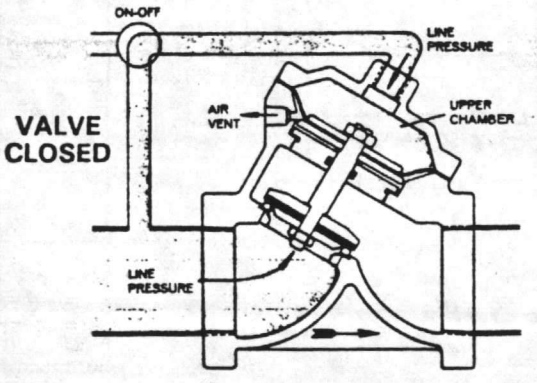
FURNISH THE FOLLOWING WHEN ORDERING: Size; fluid to be handled; maximum and minimum line pressure; maximum temperature; end connections required.

OPTIONAL MODELS AVAILABLE

Flow Limit Stops • Spring-Assist, Open • Spring Assist, Closed • Normally Closed.



Full Open Operation When closing pressure, in upper chamber, is relieved by venting the pilot line, the valve opens, positively, by line pressure on the disc.



Drip-Tight Closing Closure is obtained by directing line pressure or equivalent independent pressure into the upper chamber. This pressure on the large diaphragm area causes the valve disc to seal against the seat.

REPRESENTED BY

AquaMatic **INC. 2412 GRANT AVENUE**
ROCKFORD, ILLINOIS 61101 Area 815/964-9421
CABLE "AQUAMATIC" TELEX 257355

PRINTED IN U.S.A.

Bulletin 800H (11-77)

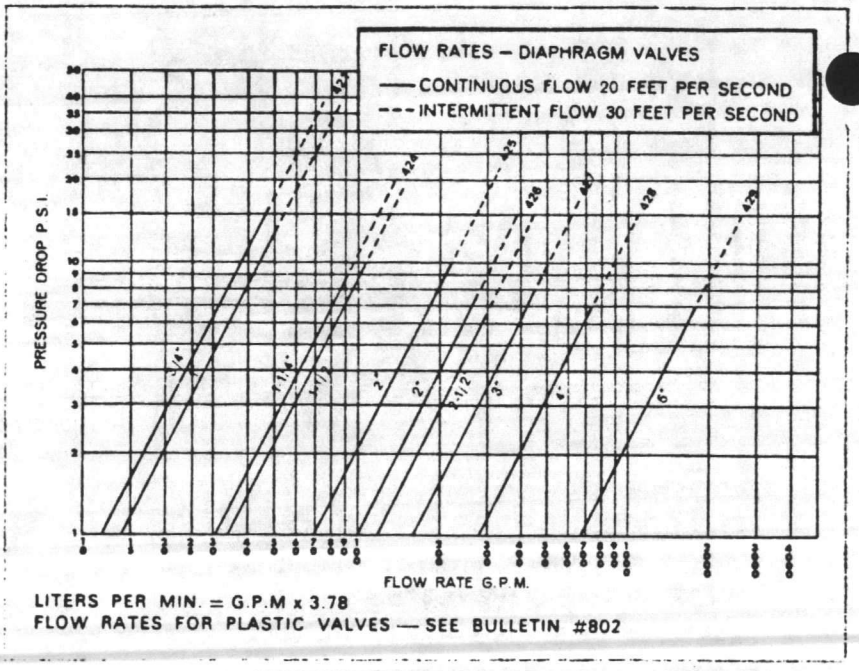
AquaMatic

diaphragm-operated valves

Y-pattern design, large seat opening and high-lift diaphragm produce excellent flow characteristics. There are no springs and related parts to consume space or restrict flow.

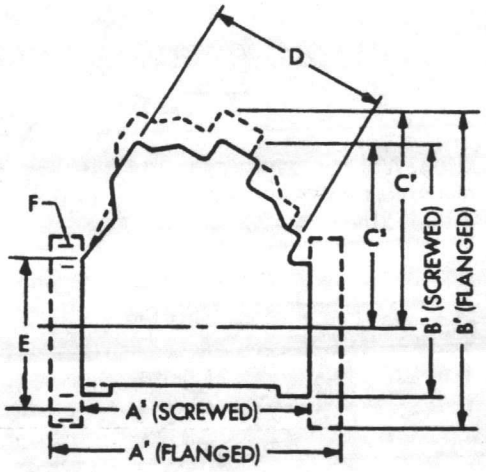
The diaphragm is shape-formed of Buna N on Nylon to assure long life. It can be replaced without stopping flow, and all parts can be serviced with the valve in line. Valves are available with cast iron or brass body and cap. Internal parts are stainless steel and brass. Maximum operating pressure: 125 psi (860 kPa); Minimum operating pressure: 7 psi (48 kPa); Maximum temperature: 300° F. (148° C).

For versatility of application, valves are available to be either opened or closed by pilot pressure.



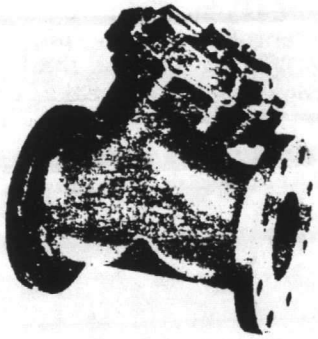
LITERS PER MIN. = G.P.M x 3.78
FLOW RATES FOR PLASTIC VALVES — SEE BULLETIN #802

DIMENSIONS



Size	Ends	Series		A^S	A^F	B^S	B^F	C^S	C^F	D	E	F
¾-1	SCRD	421	In.	3 1/16		4 1/4		3 1/4		2 3/4		
			mm.	94		108		82		70		
1¼-1½	SCRD	424	In.	4 3/4		5 3/8		4		3 1/2		
			mm.	120		136		101		89		
2	SCRD	425	In.	6.62		7.25		5.375		4.875		
			mm.	168		184		136		123		
2-2½	SCRD	426	In.	7 3/8		8		5 3/4		6 1/8		
			mm.	187		203		146		155		
3-S	SCRD	427-S	In.	9		9 3/4		6 3/4		7 1/4		
			mm.	228		247		171		184		
3-F	FLGD	427-F	In.		10 5/8		10 3/4		7	7 1/4	6	¾
			mm.		270		273		178	184	160	18
4-F	FLGD	428-F	In.		11 3/4		14 3/4		10	8 3/4	7 1/2	¾
			mm.		298		375		254	222	180	18
6-F	FLGD	429-F	In.		17		19		13 1/2	15 3/4	9 1/2	⅞
			mm.		431		482		343	402	240	20

B.S.P. threads optional on series 421 thru 427.
European flanges optional on series 427 thru 429.



SERIES 428F
4" FLANGED BODY

*For other materials consult factory.

SPECIFICATIONS

Sizes: ¾" — 3" Screwed
3" — 6" Flanged

Class: 125 Pound

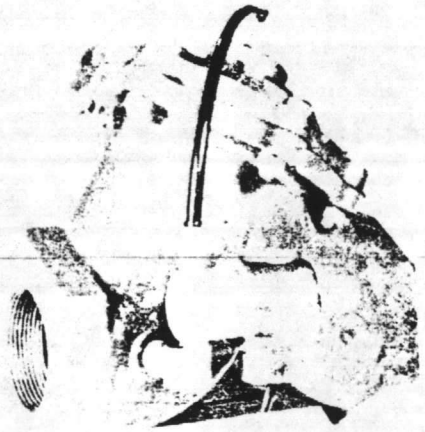
Pressure: 125 PSI recommended Working Pressure (860 kPa).

Temperature: Water-Air — Standard 32° F-150° F (0° C-65° C)
High Temperature 150° F-300° F(65° C-148° C)

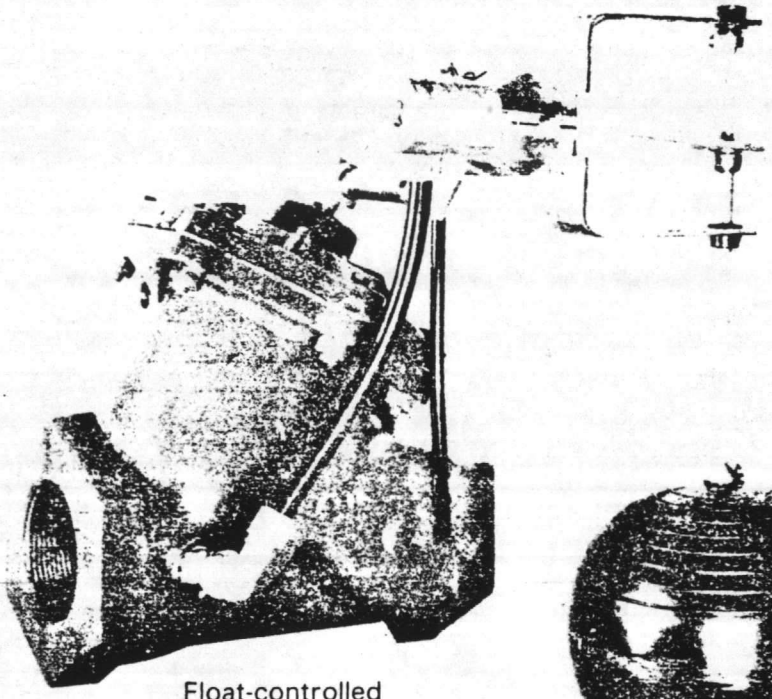
Materials: Body & Cap — Cast Iron or Bronze
Trim — Bronze with Stainless Steel Shaft
*Diaphragm — Standard Formed: Buna N/Nylon
High Temperature Formed: EPDM/Nomex
*Seals — Standard — High Temperature
Static: Buna N — EPDM
Dynamic: Buna N — EPDM
(Flurocarbon Coated)

AquaMatic

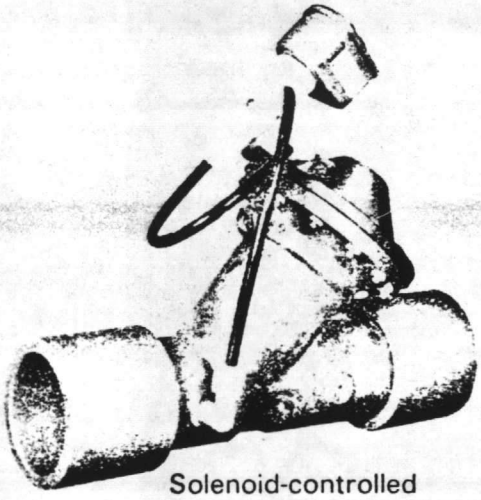
Solenoid and float-controlled diaphragm-operated valves



Solenoid-controlled
METAL BODY VALVES



Float-controlled
METAL BODY VALVES



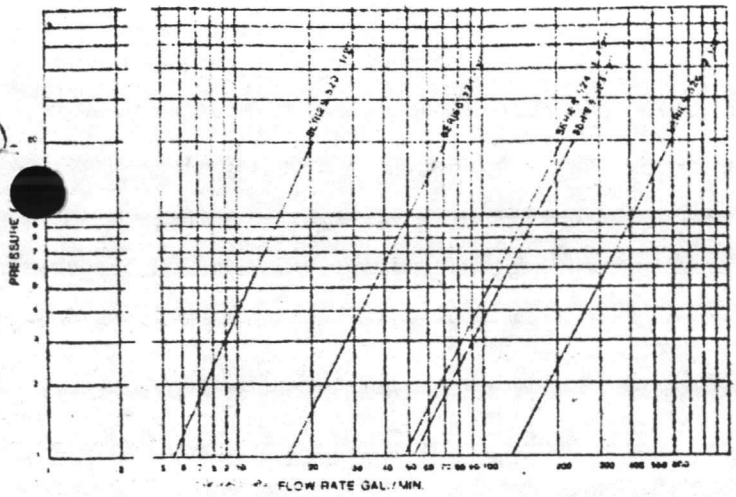
Solenoid-controlled
PLASTIC BODY VALVES

MANY CONTROL OPTIONS
On-off pilot pressure opens and/or closes valve. Solenoid valves may be triggered manually or by liquid level, timer, flow meter, pressure or temperature. Float control may be used (either directly or remotely located) with metal body valves. With plastic valves, float control must be remotely located (cannot be mounted directly on valves).

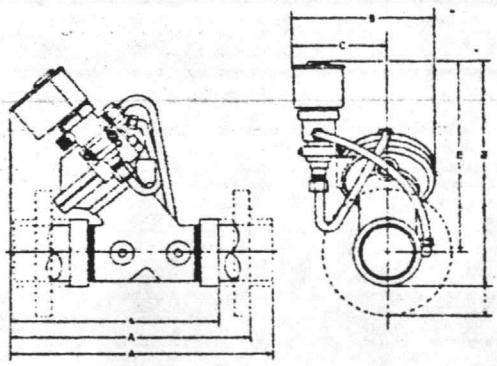
FOR PROCESS AND WATER CONDITIONING APPLICATIONS
AquaMatic Y-pattern valves give positive control with FULL FLOW. Complete control is obtained with less bulk, less weight, and less complication than with many other forms of remote control for fluids. Size range covers the needs of the process man as well as the water conditioner for a positive means of remote control at less cost.

FEATURES AND ADVANTAGES OF AQUAMATIC Y-PATTERN VALVES

- For gases or liquids
- Adaptable to many control devices including solenoid valve and float control
- Low pressure loss through valve
- Large opening, high lift disc gives high flow rates
- Positive opening; drip-tight closing
- Hydraulic or pneumatic operation
- Diaphragm replaceable without interruption of flow



SOLENOID-CONTROLLED



SERIES 4500

SIZE	DIM	A*	B	C	D	E
1/2	in	4.93	4.12	2.87	6.68	5.87
	mm	125	105	73	170	149
1	in	7.25	5.12	3.25	8.25	6.52
	mm	184	130	82.5	209.5	166
1-1/2	in	8.75	6.25	4.00	9.81	7.62
	mm	222	159	101	249	193.5
2	in	10.50	6.25	4.00	9.81	7.62
	mm	267	159	101	249	193.5
2	in	9.56	6.25	4.00	11.31	7.62
	mm	243	159	101	287	193.5
2-1/2	in	15.00	7.87	4.87	12.25	9.62
	mm	381	200	124	311	244
2-1/2	in	12.00	7.87	4.87	14.00	9.62
	mm	305	200	124	355	244
3	in	12.00	7.87	4.87	14.25	9.62
	mm	305	200	124	362	244

SOLENOID SPECIFICATIONS:
Standerd ac voltages: 115, 230-50 or 60 Hz. Consult factory for other voltages.
Power Consumption: 9 watts ac. Volt amperes: 15.6 holding, 24.6 inrush.
Coil: Class "B" molded, continuous duty.
Enclosures: General-purpose NEMA 1 only.

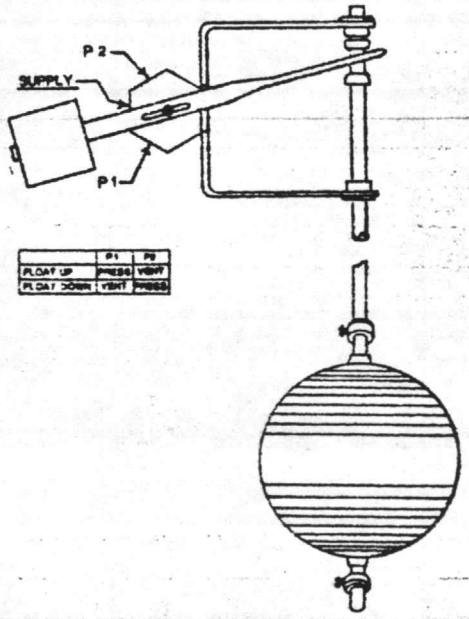
PLASTIC BODY

diaphragm-operated valves

Plastic valves handle de-ionized water as well as acids, caustic, coolants and harsh chemicals or gases that would rapidly corrode metal valves. Body and cap are molded of glass filled engineering thermoplastic. Diaphragm is Buna N on Nylon. All internal parts are made of corrosion resistant materials. The valve's resistance to damage remains unchanged from +32° to 150° F (0° to 65°C). Maximum working pressure rating is 125 psi (860 kPa).

REMOTE FLOAT CONTROL

Direct mounting of float control on plastic valves is *not recommended*. Remote float control is illustrated in drawing below. Float lever arm actuates the pilot.



Control pressures applied and relieved at level control ports P1 and P2, and in turn delivered to and from valve diaphragm chambers, allow optional power opening and/or closing of the diaphragm valve. This allows float action to open and/or close the diaphragm valve at high and low levels.

SIZES: 3/8" through 1-1/2"—Schedule 80 PVC threaded pipe or male socketweld fittings
2" Flange or male or female socketweld fittings
2-1/2" Flange or female socketweld fittings
3" Flange only

Aquamatic Solenoid-controlled and Float-controlled valves

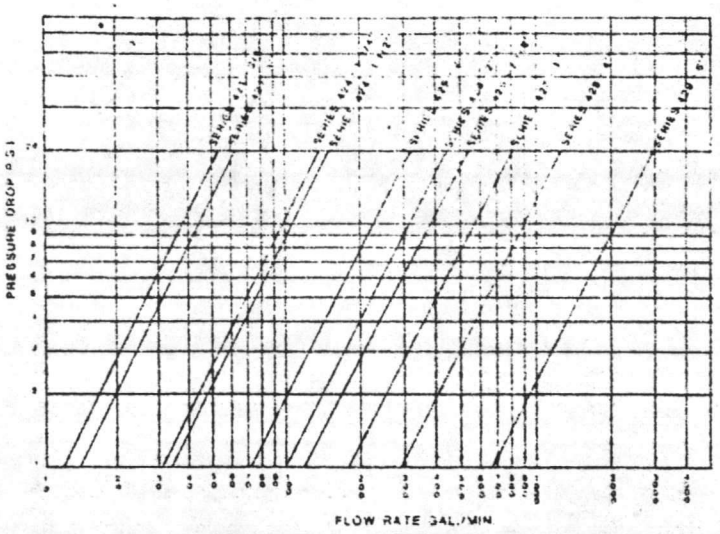
METAL BODY

diaphragm-operated valves

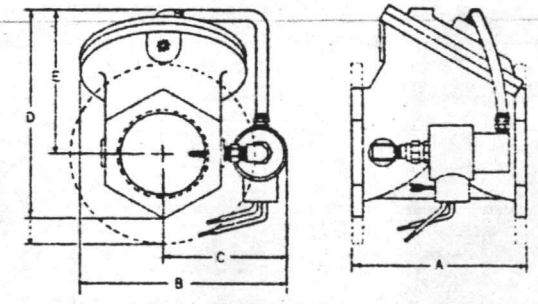
pattern design, large seat opening and high-lift aphragm produce excellent flow characteristics. There are no springs and related parts to consume space or restrict flow.

The diaphragm is shape-formed of Buna N on Nylon to assure long life. It can be replaced without stopping flow, and all parts can be serviced with the valve in-line. Valves are available with cast iron or brass body and cap. Internal parts are stainless steel and brass. Maximum operating pressure: 125 psi (860 kPa); Minimum operating pressure: 7 psi (48 kPa); Maximum temperature: 200°F (93°C).

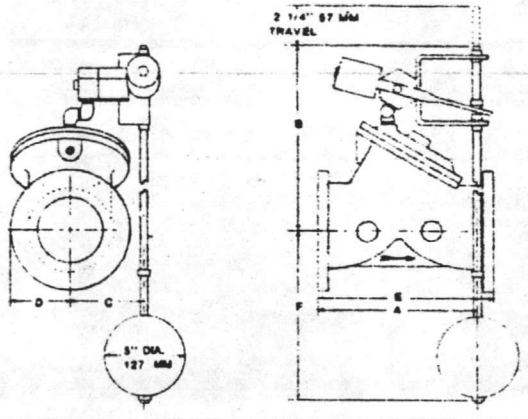
For versatility of application, valves are available to be either opened or closed by pilot pressure. When faster closing of the larger-size valves is required, an auxiliary pilot-line valve can be supplied.



SOLENOID-CONTROLLED



FLOAT-CONTROLLED



SERIES 3500

	SIZE	DIM	A	B	C	D	E
SCREWED	3/4 & 1"	in	3.75	4.37	3.25	5.12	4.12
		mm	95	111	82.5	130	105
	1-1/4 & 1/2	in	4.75	5.00	3.50	6.00	5.00
		mm	121	127	89	152	127
	2	in	6.62	6.75	4.12	8.25	6.37
		mm	168	171	105	209	162
	2 & 2-1/2	in	7.37	7.25	4.25	9.00	6.75
		mm	187	184	108	229	171
	3"S	in	9.12	8.50	4.50	10.75	7.75
		mm	231	216	114	273	197
FLANGED	3"F	in	10.62	8.50	4.50	11.75	8.00
		mm	270	216	114	298	203
	4"F	in	11.75	10.75	6.47	15.75	11.00
		mm	298	273	164	400	279
	6"F	in	17.00	15.75	7.87	20.00	14.50
		mm	432	400	200	508	368

SERIES 3000

SIZE	DIM	A	B	C	D	E	F*
3/4"-1"	in	7.31	6.50	1.50	2.12	3.68	29
	mm	186	165	38	54	93	735
1-1/4"-1-1/2"	in	6.31	7.81	3.31	1.75	4.75	28
	mm	160	198	84	44	120	711
2"	in	6.00	8.37	3.87	2.25	6.62	27
	mm	152	212	98	57	168	686
2"-2-1/2"	in	7.68	9.56	4.06	3.06	7.37	26
	mm	195	243	103	77	187	660
3"S	in	8.87	10.56	4.75	3.62	9	25
	mm	225	268	120	92	228	635
3"F	in	9.25	10.56	4.75	3.62	10.62	25
	mm	235	268	120	92	270	635
4"F	in	9.81	13.81	5.37	4.37	11.75	22
	mm	249	350	136	111	298	659
6"F	in	10.94	16.94	8.81	7.25	17	37
	mm	278	430	223	184	432	940

SOLENOID SPECIFICATIONS:

Standard ac voltages: 115, 230-50 or 60 Hz. Consult factory for other voltages.

Power consumption: 9.4 watts ac. Volt amperes: 16 holding, 25 inrush

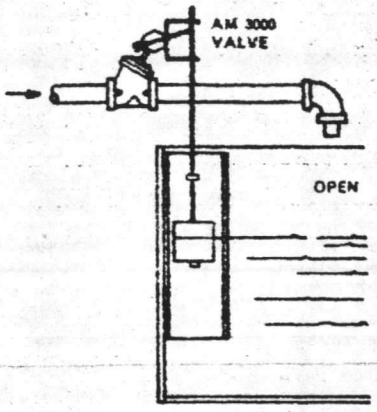
Coil: Class "B" molded, continuous duty. High temperature coils available on request.

Enclosures: General-purpose NEMA 1 normally supplied. Explosion-proof and water-tight (NEMA 4, 7 & 9) available.

*Float Rods are 18 inches (457mm) long sections. Valves up to 4" size are supplied with two sections. 6" valves are supplied with 3 sections.

B.S.P. threads available on valves up to 3" size. Bolt hole pattern on flanged valve per ASA standard, others available on request only.

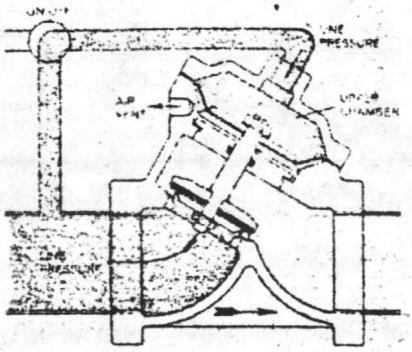
How pilot valve controls main valve



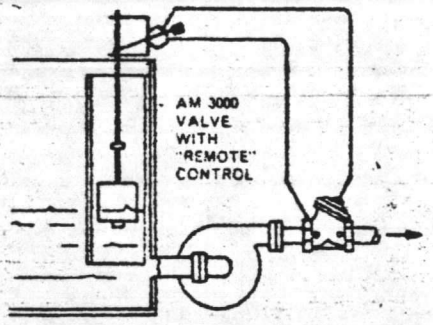
Reservoir Level: Prevent tank overflow and loss of pump suction. Valve opens and closes at readily adjustable "low" and "high" levels.

Low Pressure: By using independent source of pilot pressure to operate valve, low-pressure flows and/or heavy, viscous and contaminated liquids can be readily accommodated.

VALVE CLOSED

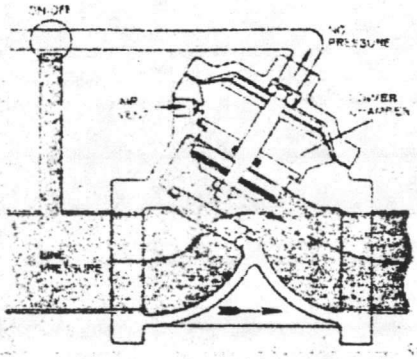


Drip-Tight Closing: Closure is obtained by directing line pressure or equivalent independent pressure into the upper chamber. This pressure on the large diaphragm area causes the valve disc to seal against the seat.

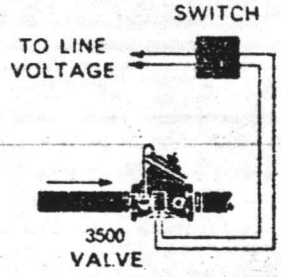


Pump Protection: Pre-set low level of float control prevents pump cavitation. Note that float control is remotely located from valve.

VALVE OPEN



Full Open Operation: When closing pressure, in upper chamber, is relieved by venting the pilot line, the valve opens, positively, by line pressure on the disc.



Switch Types: Solenoid valves can be controlled by simple "on-off" manual switch (either directly or remotely located), time clock, pressure switch, meter control, temperature sensor (thermostat, thermocouple, pyrometer) or level control using probe, mercury switch or float switch.

Purchasing specifications and information needed.

INFORMATION REQUIRED
(from purchasing department)

PLEASE FURNISH

1. Valve catalog number
2. Size and end type (screwed, flanged, socket weld)
3. Fluid to be handled
4. Maximum temperature
5. Maximum and minimum line pressure
6. Independent control pressure, if any
7. Energize to open, or to close
8. AM 3000/348LC: Float rod length
9. AM 3500/4500: Voltage ac or dc
10. NEMA rating

EXAMPLE: Float-Controlled Valve AM3000, 1-1/2" size screwed ends, standard float rod, to be used for controlling water at approximately 70°F and 30 to 60 psi pressure.

SPECIFICATIONS: (for engineering and purchasing)

The Valve shall be of the Y-Pattern Design, Diaphragm Powered, Hydraulically operated and Pilot controlled. Valve shall have an upper and lower chamber for power closing and opening when required. Valve shall be completely Hydraulic (no springs) in operation.

Valve shall be equal and similar in all respects and operation to the diaphragm valves manufactured by AquaMatic, Inc., Rockford, Ill.

Distributed by:

AquaMatic® Inc., 2412 Grant Avenue
Rockford, Illinois 61101 • Area 815/964-9421

Printed in U.S.A.

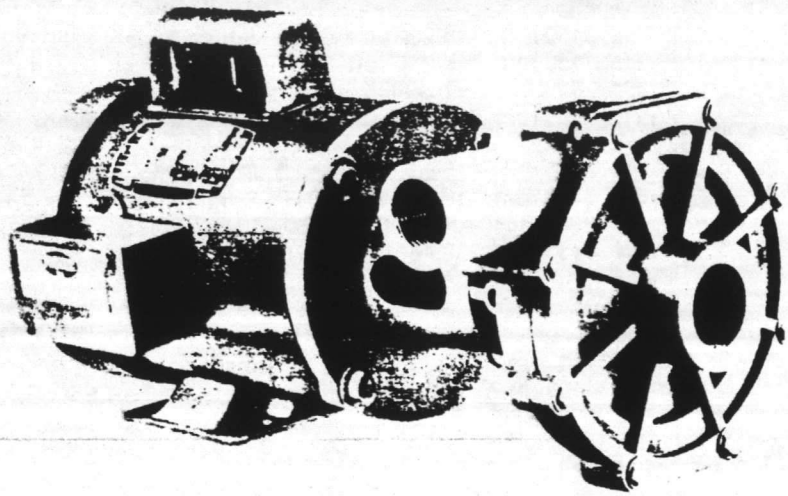
Bulletin No. 806 (E-78)

Flotec INC

CORROSION RESISTANT END SUCTION CENTRIFUGAL PUMPS

(Flows to 90 GPM • Heads to 70 ft.)

MODELS C5 C7 C8 "C" SERIES CENTRIFUGAL PUMPS



FOR: RECIRCULATION, TRANSFER, FILTRATION, SPRAYING, FILLING, PROCESSING IN: POLLUTION CONTROL, PLATING, ELECTRONICS, CHEMICAL PROCESSING, PHOTO PROCESSING

FEATURES

OPTIMUM CHEMICAL RESISTANCE — The C Series pumps are constructed of precision molded CPVC parts and provided with a wide variety of premium metal shafts as well as CPVC sleeved shafts for maximum resistance to aggressive chemicals at temperatures from 0-180°F.

WIDE VARIETY OF SHAFT MATERIALS — C Series pumps have 316 SS shafts as standard. Carpenter 20, Hastelloy C, Titanium and Stainless Steel sleeved in CPVC are available for increased corrosion resistance. Pumps with CPVC sleeved shafts eliminate all metal contact with product being pumped.

EXTENSIVE SEAL OPTIONS — Flotec C5, C7 and C8 pumps utilize John Crane Type 21 seals mounted in an outboard configuration so that only the seal faces and elastomers are in contact with the liquid being pumped. None of the metal seal components are in product contact. A large selection of seal faces — more than 20 combinations — is readily available.

WATER FLUSHED SEALS — Available on all three models. Recommended when handling abrasive solutions, high temperature solutions, when pump may be run dry inadvertently, or when operating against a shut-in discharge for short periods. A double mechanical seal is utilized for long lived, maintenance free operation.

MOTORS — These models are mounted to standard 56C frame motors which insures proper alignment of pump heads and motors. A large selection of motors is available, including: Totally Enclosed and Explosion Proof models. Special Chemical Duty Motors are available for highly corrosive atmospheres. For OEM applications, Open Drip Proof Motors and Air Motor drives are available.

ELASTOMERS — Viton is the standard elastomer for O'ring and seal components. Ethylene Propylene is also available.

PRIMING — Like most Centrifugals, Flotec C Series pumps must be primed. These models are best suited for flooded suction service; however, they may be used for applications where vertical suction lift is needed. Refer to Flotec Operating and Installation Instructions, (Form 221) for plumbing recommendations.

DRY RUNNING — Pumps are not to be run dry. Damage may result if pumps are operated without fluid or if improperly primed. In installations where the pump may run dry, a Corrosion Resistant Vacuum Switch, or a Water Jacketed Seal should be employed.

PERFORMANCE — These C Series pumps are designed for continuous duty under the most severe chemical conditions. Properly applied, they will provide efficient and long lived service with a minimum of maintenance.

PEDESTAL — A heavy duty, ball bearing pedestal is utilized for belt drive or to mount pump remotely from the motor. Two, single row, shielded bearings are protected with outboard lip seals to provide long, trouble free service.

TECHNICAL LITERATURE — Additional Flotec literature is available. The forms marked * below are packed with each pump.

Chemical Resistance Chart	Form 120
Seal Selection Guide	Form 125
Performance Curves	Form 218
Operating & Installation Instructions	*Form 221
Assembly/Disassembly Instructions	*Form 232
Parts Sheet & Dimensional Data	*Form 314

SPECIFICATIONS

MODEL NO.	SEAL	PORTS SIZE	DESCRIPTION
C5P8-1164V	Face	¾" x ½" IPT	⅓ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TENV
C5P8-1167V	Face		½ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, Expl. Proof
C5P8-1194V	Face		⅓ Hp, 2850/ 3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase, TENV
C5P8-1197V	Face		½ Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C5P8-3100V	Face		Ball Bearing — Pedestal Mount
C5P8-1464V	Waterflush	1¼" x 1" OD	⅓ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TENV
C5P8-1467V	Waterflush		½ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, Expl. Proof
C5P8-1494V	Waterflush		⅓ Hp, 2850/ 3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase TENV
C5P8-1497V	Waterflush		½ Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C5P8-3400V	Waterflush		Ball Bearing — Pedestal Mount
C7P8-1164V	Face	1" x ¾" IPT	1 Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TEFC
C7P8-1167V	Face		1 Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, Expl. Proof
C7P8-1194V	Face		1 Hp, 2850/3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase, TEFC
C7P8-1197V	Face		1 Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C7P8-3100V	Face		Ball Bearing — Pedestal Mount
C7P8-1464V	Waterflush	1½"x1¼" OD	1 Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TEFC
C7P8-1467V	Waterflush		1 Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, Expl. Proof
C7P8-1494V	Waterflush		1 Hp, 2850/3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase, TEFC
C7P8-1497V	Waterflush		1 Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C7P8-3400V	Waterflush		Ball Bearing — Pedestal Mount
C8P8-1164V	Face	1¼" x 1" IPT	1½ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TEFC
C8P8-1194V	Face		1½ Hp, 2850/ 3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase, TEFC
C8P8-1197V	Face		2 Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C8P8-3100V	Face		Ball Bearing — Pedestal Mount
C8P8-1464V	Waterflush	1¾"x1½" OD	1½ Hp, 3450 rpm, 115/230 volt, 60 Hz, Single Phase, TEFC
C8P8-1494V	Waterflush		1½ Hp, 2850/ 3450 rpm, 208/230/460 volt, 50/60 Hz, 3 Phase, TEFC
C8P8-1497V	Waterflush		2 Hp, 3450 rpm, 230/460 volt, 60 Hz, 3 Phase, Expl. Proof
C8P8-3400V	Waterflush		Ball Bearing — Pedestal Mount

OPTIONS

CHEMICAL DUTY MOTORS: Special Chemical Duty Motors are available. These special motors include: Corrosion-resistant cast iron endshields, base (except on fractionals) and conduit box (split type except on fractionals) with tapped conduit lead hole; Chromate primer on all these cast iron parts; Neoprene gaskets between conduit box and frame and under cover; External flinger on shaft protects against moisture or dust entering into bearings; Condensate drain holes (plugged) at lowest part of motor; Chemical resistant fan; Air gap surfaces of rotor and stator epoxy coated for complete corrosion protection; Double-sealed, vacuum degassed, prelubricated ball bearings with extra supply of moisture resisting grease in cavity adjacent to the bearings; Non-hygroscopic superior Class A insulation; Stainless steel (18-8) shaft; Stainless steel nameplate and fastening pins; Sealer in rabbet fits and gaskets on thru bolts; All hardware heavily plated to resist corrosion; Motor exterior painted with epoxy enamel over chromate primer.

To order C Series Pump with Chemical Duty Motor, add Suffix CD to model number, e.g., C5P8-1194VCD. Refer to Price Sheet, Form 115D, for Chemical Duty Unit pricing.

SHAFT — Standard shaft material is 316 Stainless Steel. Optional shaft materials of Carpenter 20, Titanium, Hastelloy C, and 316SS sleeved in CPVC (for non-metallic shaft) are available. To order Hastelloy C add Suffix C to model number. For Carpenter 20 add Suffix A. For CPVC add Suffix S. For Titanium add Suffix T. For example: C5P8-1164V becomes C5P8-1164SV for Sleeved Shaft.

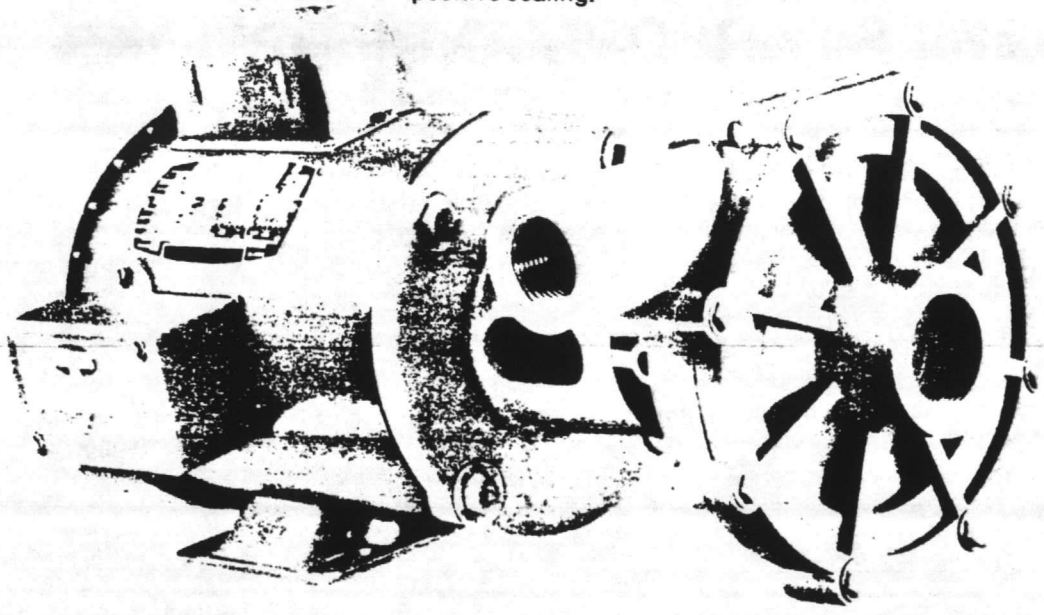
SEALS — Standard seals are John Crane Type 21 with Carbon/Ceramic seal faces and Viton elastomers. A wide variety of seal face options are available. See Flotec Chemical Resistance Chart (Form 120) and Seal Selection Guide (Form 125).

C SERIES DESIGN FEATURES

1. MOTORS — Flotec C Series pump motors are standard with oversized, heavy duty bearings and are designed for continuous duty service. Single phase units incorporate Automatic Thermal Overload Protection. Three phase, Totally Enclosed Motors are standard with 208/230/460 volt, 50/60 Hz electrics. These pumps are available with a choice of Totally Enclosed Motors, Explosion Proof Motors or special Chemical Duty Motors for service in corrosive areas. See Page 2 for special features of Chemical Duty Motors. Other motors including Air Motors available on special order.

2. PORTS — Inlet and discharge ports on models C5, C7 and C8 are standard internal pipe thread. The outside dimensions of the ports are also standard pipe size so flanges or union couplings may be attached by solvent welding for simplified plumbing connections.

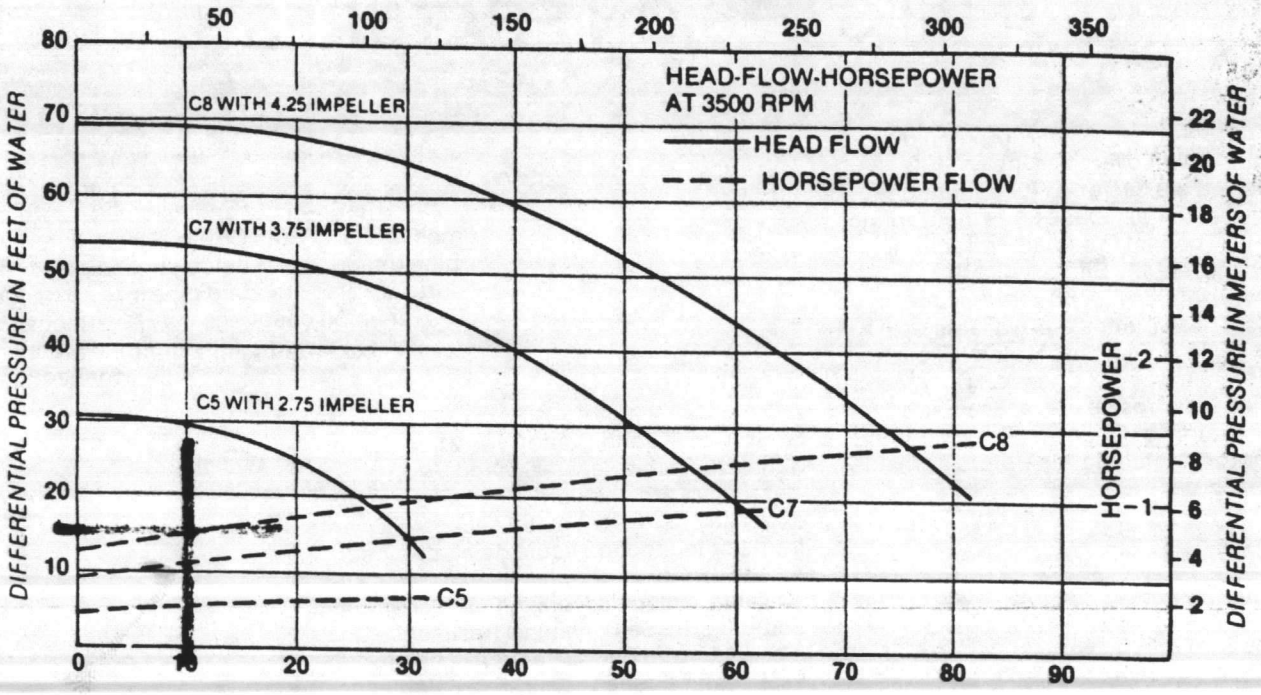
3. SEALS — John Crane Type 21 seals with Carbon/Ceramic seal faces and Viton elastomers are standard. Seals are installed externally to prevent metal seal components from contacting the liquid being pumped. A wide variety of optional seal materials is available, including: Teflon, Pink Ceramic and Carpenter 20. See Chemical Resistance Chart (Form 120) and Seal Selection Guide (Form 125). Water flushed seals are available for applications where possibility of dry running, high temperatures, or pumping of abrasive or crystalline solutions exists. Designed for maintenance free, continuous duty service, the water flushed seal utilizes a double mechanical seal to insure long life and positive sealing.



4. SHAFTS — Standard shafts are precision machined from 316 Stainless Steel. For more corrosive applications, Carpenter 20, CPVC, Titanium and Hastelloy C shafts are available. Pumps equipped with a CPVC sleeved shaft have no metal in contact with the solution being pumped and virtually provides an all CPVC pump.

5. CONSTRUCTION — Models C5, C7 and C8 are modular in design and adapt to standard 56C frame motors without modification to the motor. These models are provided with motors of a specific horsepower. Motors with other than the standard horsepower may be easily substituted. When pumping liquids with high specific gravity, higher horsepower motors are available. For high pressure — low flow applications, a less costly, lower horsepower motor may be used. See Page 4 of this brochure for Head-Flow and Power-Flow Performance Curves for power requirements.

HEAD-FLOW CURVES



Performance Data is based on water at 3450 RPM. Pumps are non-overloading on specific gravity of 1.0 Refer to Curve for horsepower requirement on higher specific gravities. NOTE: 3 Phase Units standard 208/230/460 Volt, 50/60 Hz. When operating on 50 Hz. motor speed is 2850 RPM, pump capacity and pressure capability is reduced. Contact Flotec for Performance Data when requiring 50 Hz service.

C SERIES PERFORMANCE OPTIONS

IMPELLER DIAMETERS — Standard impeller diameters are:

C5 models — 2.75" C7 models — 3.75" C8 models — 4.25"

To order different than standard impeller, add a suffix to the model number indicating impeller diameter required. For example, to order a model C5P8-1164V with a 2½" diameter impeller, the model number would read C5P8-1164V(25). Impellers are available in 2.5, 2.75, 3.0, 3.25, 3.5, 3.75, 4.0 and 4.25 inch diameters. For performance curves for each impeller diameter in each C Series model, see Form 218.

MOTORS — Motors are NEMA C face, 56 frame and the standard horsepowers are:

C5 models — ⅓ Hp C7 models — 1 Hp C8 models — 1½ Hp

Two horsepower motors are available in 56 frame, NEMA C face. Determine horsepower required from performance curves above (or see Form 218) and refer to Parts List (Form 314) for part numbers and ordering procedures.

DISTRIBUTED BY:

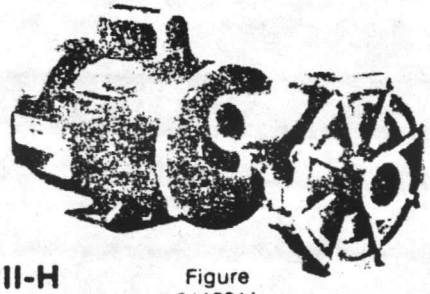
Flotec INC

MANUFACTURERS OF PUMPS AND FLUID HANDLING DEVICES.

14510 SOUTH CARMENITA ROAD,
NORWALK, CALIFORNIA 90650
(213) 921-1495

Flotec pumps are available in other sizes, styles & materials of construction.
Viton® is the registered trade name of E. I. Du Pont de Nemours & Company

Close Coupled Chemical Pumps



Figure
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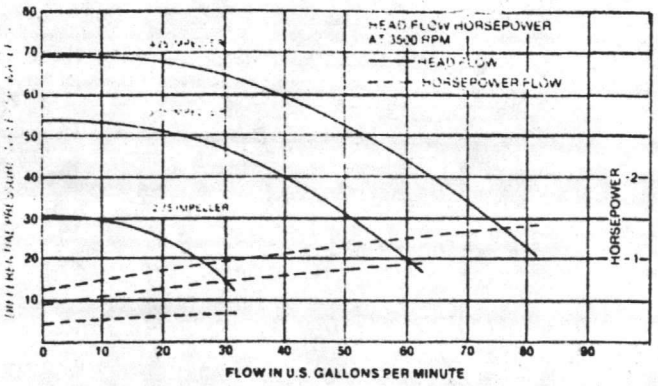


Figure
8133911

Table III-H

Motors
These models are mounted to standard 56C frame motors which insures proper alignment of pump heads and motors—3500 RPM.

Fig. No.	Size Code	Imp. Dia.	Motor HP	Elec. Current	Type Motor	Inlet FPT	Outlet FPT	Dimensions in Inches Length	Width	Height	Weight
8082211	011	2.75	1/3	1/60/115-230	TENV	3/4	1/2	16	8-5/8	6	35
8092211	011	2.75	1/3	3/60/230-460	TENV	3/4	1/2	16	8-5/8	6	35
8102211	012	2.75	1/2	1 or 3 Phase	Expl. Proof	3/4	1/2	16	8-5/8	6	40
8082211	014	3.75	1	1/60/115-230	TEFC	1	3/4	18	8-5/8	6	40
8092211	014	3.75	1	3/60/230-460	TEFC	1	3/4	18	8-5/8	6	40
8102211	014	3.75	1	1 or 3 Phase	Expl. Proof	1	3/4	18	8-5/8	6	45
8082211	015	4.25	1-1/2	1/60/115-230	TEFC	1-1/4	1	19	8-5/8	6	45
8092211	015	4.25	1-1/2	3/60/230-460	TEFC	1-1/4	1	19	8-5/8	6	45
8102211	016	4.25	2	1 or 3 Phase	Expl. Proof	1-1/4	1	19	8-5/8	6	50

Pumps are constructed of precision molded CPVC parts and provided with CPVC sleeved shafts for maximum resistance to aggressive chemicals at temperatures from 0-180° F.

Pumps utilize John Crane Type 21 seals mounted in an outboard configuration so that only the seal faces and elastomers are in contact with the liquid being pumped.

Water Flushed Seals. Available on all models.

A 2 HP motor will handle any performance left of cross hatched area—3 HP motor in cross hatched area and 5 hp motor any performance to the right of cross hatched area.

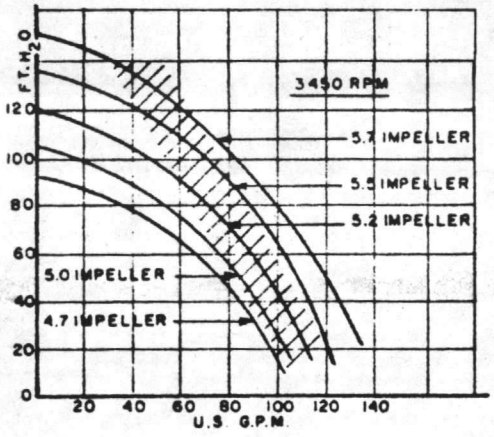


Figure
812 to 813

Fig. No.	Size Code	Imp. Dia.	Motor HP	Elec. Current	Type Motor	Inlet FPT	Outlet	Dimensions in Inches Length	Width	Height	Weight
8123911	016	5.0	2	3/60/230-460	TEFC	1-1/4	1	18-1/2	9-1/2	9	70
	017	5.2	3	3/60/230-460	TEFC	1-1/4	1	19-5/8	9-1/2	9	75
	018	5.5	5	3/60/230-460	TEFC	1-1/4	1	21-1/2	9-1/2	9	90

Explosion proof motors available—all sizes

Standard Construction

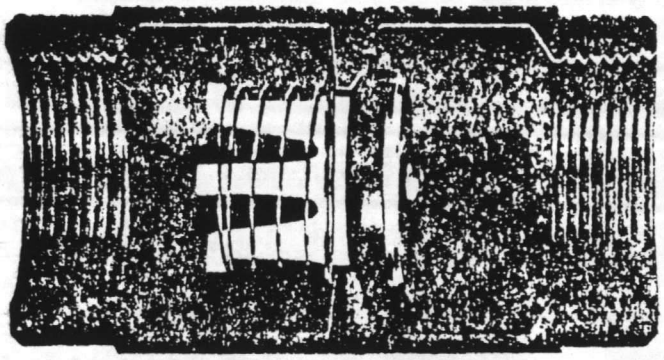
Body and End Cover—Polypropylene (subsurface glass reinforcement).
Impeller—CPVC (hi-temp.) closed design.
Shaft—316 SS.
Seal—Carbon ceramic with 316 SS.
O-Ring—Viton.

Options

Shaft—Caprenter 20—Figure 8123611.
Seal Elements Hastelloy C—Figure 8123811.
Titanium—Figure 8123711.
Water Flush Seal—Figure 8143911.

FLOMATIC LINE CHECK VALVES

Bronze line check valves — Model 80



Size	Enters Pipe Size	Wgt. per Dozen
½"	1¼"	4 lbs.
¾"	1½"	8½ lbs.
1"	2"	14 lbs.
1¼"	2½"	19 lbs.
1½"	3"	30 lbs.
2"	3½"	37 lbs.
2½"*	4"	6½ lbs. ea.
3"*	5"	13 lbs. ea.
4"*	6"	24½ lbs. ea.

*Furnished with bronze guide

Bronze line check valves with one drilled and tapped hole — Model 80A

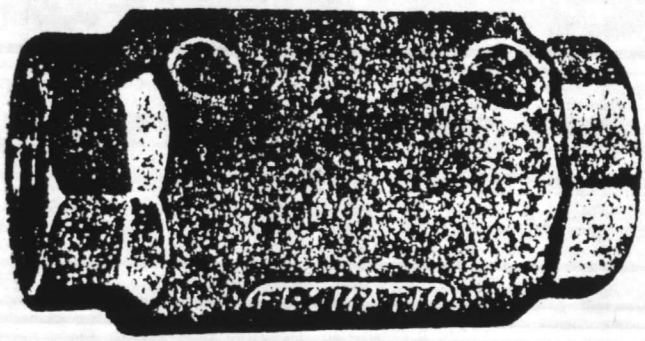
for submersible pump applications. ⅛" pipe tap, inlet side.

Size	Wgt. per Dozen
¾"	8½ lbs.
1"	13½ lbs.
1¼"	18½ lbs.
1½"	30 lbs.
2"	37 lbs.
2½"*	6½ lbs. ea.
3"*	13 lbs. ea.
4"*	24½ lbs. ea.

*Furnished with bronze guide

Bronze line check valves with two drilled and tapped holes — Model 80B

for submersible pump applications. ⅛" pipe tap on inlet side,
¼" pipe tap on outlet side.



Size	Wgt. per Dozen
¾"	8½ lbs.
1"	12 lbs.
1¼"	18 lbs.
1½"	30 lbs.
2"	37 lbs.
2½"*	6½ lbs. ea.
3"*	13 lbs. ea.
4"*	24½ lbs. ea.

BRINE TANK

1 GENERAL INFORMATION

RESIN INFORMATION FOR RAVEN TANKS

Centrifugally-Cast FRP● Chop/Hoop Filament Wound FRP● Rotationally Molded Polyethylene

FDA APPROVED RESIN

FDA-approved resins are recommended for the storage of potable water. Raven provides these resins in both polyethylene and fiberglass, and are available upon request. High density, natural white color, in polyethylene. Premium resin, natural color, in fiberglass.

RAVEN'S LIMITED WARRANTY

Raven Industries, Inc. warrants its tanks to be free from defective materials and workmanship for a period of one year from date of shipment, and will, at its discretion, repair or replace any tank found to be defective. Liability is limited to repair or replacement, and does not cover indirect or consequential costs of damage caused by mishandling or chemical attack.

FIBERGLASS REINFORCED PLASTIC (FRP) RESINS

STANDARD RESIN — (Isophthalic polyester). Has excellent structural properties and chemical resistance. Good performance can be expected with a majority of corrosive materials commonly used in industry. See Corrosion Guide for specific chemicals.

PREMIUM RESIN — (Vinylester). Has increased corrosion resistance with certain aggressive chemicals. Recommended in strong alkaline applications. Good structural properties. Meets FDA regulation 121.2576 for food handling requirements, including potable water. See Corrosion Guide for specific chemicals.

OTHERS RESINS AVAILABLE include **bisphenol polyester,** which also has increased corrosion resistance and is FDA approved for potable water and food handling; **orthophthalic polyester,** used for chemically non-demanding service; and **chlorendic polyester,** a fire-retardant resin with good structural properties.

CONSTRUCTION NOTE ON PREMIUM RESIN TANKS . . .

All 60", 72", 90", 10' and 12' diameter premium resin FRP tanks are constructed with a nominal 100 mil premium resin inner liner; the balance of the wall laminate being constructed of standard, isophthalic polyester resin. All-premium resin tanks in these larger diameters are available upon request. FRP premium resin tanks from 23" thru 48" in diameter have wall laminates constructed entirely of premium resin.

POLYETHYLENE RESINS

LINEAR LOW DENSITY — Suited for most industrial applications with good corrosion resistance and exceptional rigidity. A premium grade low density (0.935) resin having broad molding latitude and designed to provide a combination of outstanding environmental stress crack resistance and rigidity. The melt index of this resin has been optimized to give good moldability, stress crack resistance and low temperature impact strength. And ultra-violet stabilizer has been incorporated to give improved weatherability.

OTHER RESINS AVAILABLE include **high density** (0.94 to 0.95) which produces a very rigid product and is also FDA approved for food handling and potable water storage. UV inhibitors are added for protection against sunlight.

UV INHIBITORS

All polyethylene resins used by Raven are compounded with ultraviolet inhibitors. Raven tanks molded out of black polyethylene offer additional UV resistance in outdoor applications.

FIBERGLASS TANK COLORS

YELLOW
Standard sidewall color for horizontal tanks.

AQUA
Standard sidewall color for Type B, C, D and E tanks.

WHITE
Standard color for tank end sections and covers.

NATURAL
Non-pigmented walls and end sections are standard for all premium resin tanks and all 90", 10' and 12' diameter tanks.

OPTIONAL COLORS
Available on quantity orders include BLUE, RED, GREEN and GRAY.

POLYETHYLENE TANK COLORS

NATURAL WHITE
Standard.

OPTIONAL COLORS
Available on quantity orders include YELLOW, GREEN, BLUE, RED and BLACK.

RESINS

The resins used shall be Raven approved chemical resistant isophthalic polyester 7240 series or an approved equal. Vinyl ester and bisphenol polyester resins shall be used for appropriate applications. A maximum of 3%, of Cab-O-Sil or other approved thixotropic agent may be added for viscosity control.

GLASS REINFORCEMENT

The glass reinforcement used shall be commercial grade Type "E" glass fiber and have a polyester compatible coupling agent.

CONSTRUCTION

Construction of the wall laminate shall be glass mat/resin lay-up or chopped glass/resin spray-up. The resin to glass ratio shall be from 75/25 to 67/33. The outside shall be mold surface with a 10-15 mil layer isophthalic resin or gel coat in contact with the mold. The inside surface is coated with 7 to 10 mils of resin to produce a smooth corrosion-resistant surface.

APPEARANCE

The appearance shall be free of visual defects as commercially practicable. All surfaces shall be resin rich without pin holes, air bubbles, or unreinforced areas. All cut edges shall be sealed with the same polyester resin.

FABRICATION METHOD

The end section or sections shall be produced in a separate mold using the wet spray-up method. The wall section shall be centrifugally molded using the wet spray-up or mat lay-up method. The prefabricated end sections shall be joined with the wall section during the centrifugal molding process. Joints shall have the same resin glass reinforcement as the wall laminate and all joints shall be equal to or stronger than the components being joined.

FITTINGS

The fittings used shall be a bonded in-place type; or a mechanical type that features an expanding grommet seal.

SUGGESTED SPECIFICATIONS Centrifugally Cast Raven FRP Tanks

All centrifugally cast fiberglass reinforced plastic tanks shall be a composite of resin and non-continuous glass fiber.

Manufacturer shall maintain a continuous quality control program and shall upon request furnish the engineer with certified test reports.

Fiberglass tanks shall be manufactured by Raven Industries, Inc.: Sioux Falls, South Dakota; Albertville, Alabama and/or Washington Court House, Ohio.

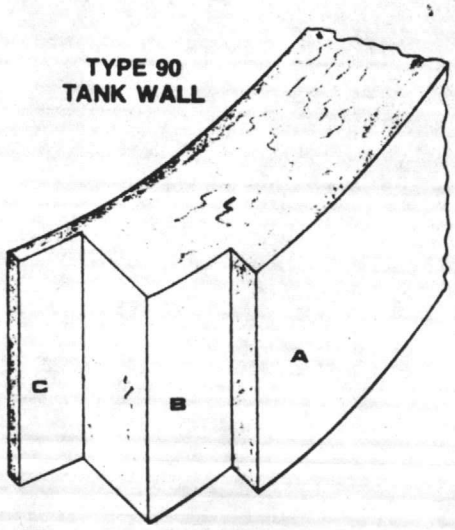
PROPERTIES (minimum)

Tensile strength (PSI)	14,000 ASTM D638-71A
Tensile modulus (PSI)	800,000 ASTM D638-71A
Comprehensive strength (PSI)	18,000 ASTM D695-69
Coefficient of thermal expansion (in./in./°f x 10^{-6})	12 ASTM D696-70
Flexural modulus (PSI)	600,000 ASTM D790-71
Density (lbs./$in.^3$)	.049 ASTM D792-66
Flexural strength (PSI)	19,000 ASTM D790-71

Procedure used in determining the properties listed shall be in accordance with applicable ASTM Standards, Part 27, using the method designated above. Test samples shall be of type, preparation and conform to the requirements of ASTM test method.

CONSTRUCTION NOTES ON TYPE 90 TANKS

Centrifugally cast Type 90 vertical tank walls increase in thickness by steps toward the bottom as the tank volume increases. This increased wall thickness is designed to match tank wall thickness to the expected load. See page 17 for Tapered Wall Dimension Charts.



A. Smooth exterior mold surface 10-15 mil.

B. Resin impregnated chopped "E" glass to design thickness.

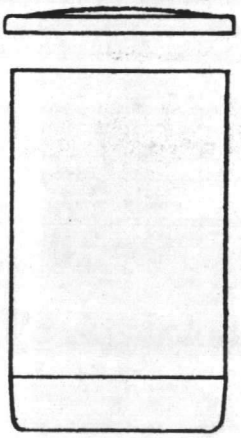
C. 7-10 mil smooth corrosion resistant inner surface.

FOR INFORMATION ON THE FABRICATION OF RAVEN CHOP/HOOP FILAMENT WOUND FRP TANKS, SEE PAGES 18 & 19.

FIBERGLASS TANKS

Centrifugally Cast TYPE B FLAT BOTTOM- OPEN TOP FRP TANKS

58-3,000 Gallon Capacities Dia. 23" thru 72"



FOR . . .

- FRP fittings & accessories - see Section 4.
- PVC/Nylon fittings - see Section 5
- Vertical FRP tanks to 6,000 gal. capacity - see p. 16; to 21,000 gal. capacity - see pp. 18-19.
- Mix tanks (FRP) to 1,000 gal. capacity - see pp. 14-15.
- Resin information - see p. 4 & Corrosion Guide, pp. 6-8
- Limited **Warranty** - see p. 4
- Pricing information - contact Raven or the Raven factory representative nearest you.

NOTE:

*Available from Sioux Falls, S.D. only.

**Available from Sioux Falls, S.D. & Albertville, Ala. only.

When ordering, specify either standard or premium resin. See resin information on p. 4 & Corrosion Guide, pp. 6-8.

Part No.	Capacity (Gals.)	Dia. X Ht. (in inches)	Approx. Wall Thickness	Approx. Boxed Wt./Lbs.
B1332*	58	23 x 36	1/8"	28
B1392*	68	23 x 42	1/8"	31
B1452*	78	23 x 48	1/8"	34
B500C*		23	Cover	
B500F*		23	Floating Cover	
B2332	68	24 x 36	1/8"	30
B2392	79	24 x 42	1/8"	33
B2452	91	24 x 48	1/8"	36
B2512	103	24 x 54	1/8"	40
B2582	114	24 x 60	1/8"	44
B2813	152	24 x 79	5/32"	54
B501C		24	Cover	
B501F		24	Floating Cover	
B3333	100	30 x 36	5/32"	45
B3393	116	30 x 42	5/32"	51
B3463	133	30 x 48	5/32"	56
B3523	150	30 x 54	5/32"	62
B3583	167	30 x 60	5/32"	68
B3673	192	30 x 69	5/32"	75
B502C		30	Cover	
B502F		30	Floating Cover	
B4333	119	32 x 36	5/32"	53
B4463	160	32 x 48	5/32"	64
B4523	180	32 x 54	5/32"	70
B4583	200	32 x 60	5/32"	76
B4703	241	32 x 72	5/32"	88
B4813	267	32 x 79	5/32"	95
B503C		32	Cover	
B503F		32	Floating Cover	
B5323	167	38 x 36	5/32"	74
B5443	225	38 x 48	5/32"	85
B5503	254	38 x 54	5/32"	93
B5623	312	38 x 66	5/32"	111
B5683	341	38 x 72	5/32"	120
B5803	381	38 x 79	5/32"	130
B504C		38	Cover	
B504F		38	Floating Cover	
B6363*	203	42 x 36	5/32"	86
B6483*	274	42 x 48	5/32"	100
B6553*	310	42 x 54	5/32"	109
B6613*	345	42 x 60	5/32"	118
B6733*	416	42 x 72	5/32"	136
B6843*	457	42 x 79	5/32"	146
B505C*		42	Cover	
B505F*		42	Floating Cover	
B7323	265	48 x 36	5/32"	112
B7443	357	48 x 48	5/32"	132
B7593	449	48 x 60	5/32"	154
B7693	541	48 x 72	5/32"	176
B7863	628	48 x 84	5/32"	195
B7983	720	48 x 96	5/32"	216
B7B03	812	48 x 108	5/32"	236
B7C23	904	48 x 120	5/32"	255
B7C83	950	48 x 126	5/32"	268
B506C		48	Cover	
B506F		48	Floating Cover	
B8524	530	60 x 48	7/32"	219
B8644	670	60 x 60	7/32"	245
B8804	810	60 x 72	7/32"	272
B8924	955	60 x 84	7/32"	298
B8A44	1090	60 x 96	7/32"	324
B8C84	1380	60 x 120	7/32"	377
B8D84	1500	60 x 130	7/32"	399
B8G44**	1770	60 x 152	7/32"	452
B507C		60	Cover	
B507F		60	Floating Cover	
BF564*	1000	72 x 61	7/32"	300
BF894*	1500	72 x 90	7/32"	378
BFB84*	2000	72 x 119	7/32"	447
BFF54*	2500	72 x 148	7/32"	536
BFJ44*	3000	72 x 177	7/32"	628
B508C*		72	Cover	
B508F*		72	Floating Cover	

LEGEND: NR: Not Recommended
NT: Not Tested

Material	% Concentration	Maximum Service Temperature in Degrees F. Fiberglass Laminate Std.	Fiberglass Laminate Prem.	Polyethylene	Fittings PVC	Fittings Nylon	Grommets & O-Rings Nitrile	Grommets & O-Rings Viton/ Fluorel	Grommets & O-Rings EPDM
Photographic solutions	All	170**	210**	140	140	NT	80	104	NT
Phthalic acid	All	170	210	NT	NT	NT	140	140	NT
Picric (alcoholic) acid	10	80	210	NR	140	NT	68	68	68
Potassium bicarbonate	10	150	180	140	140	75	140	140	140
Potassium carbonate	10	NR	150	140	140	75	140	140	140
Potassium carbonate	25	NR	100	140	140	75	140	140	140
Potassium carbonate	50	NR	80	140	140	75	140	140	140
Potassium chloride	All	170	210	140	140	75	212	212	212
Potassium dichromate	All	170	210	140	140	NT	NR	68	140
Potassium ferricyanide	All	170	210	140	140	75	140	212	NT
Potassium hydroxide	10	NR	150	140	140	75	68	NT	212
Potassium hydroxide	25	NR	150	140	140	NR	68	NT	140
Potassium nitrate	All	170	210	140	140	NT	140	140	NT
Potassium permanganate	All	80	210	140	72	NR	NR	104	NT
Potassium persulfate	All	80	210	NT	140	NT	NR	212	NT
Potassium sulfate	All	170	210	140	140	75	140	140	140
Selenious acid	All	NT	210	70	72	NT	NT	NT	NT
Silver nitrate	All	170	210	140	140	NT	176	176	212
Sodium acetate	All	170	210	140	140	NR	NT	NT	NT
Sodium bicarbonate	10	150	180	140	140	75	140	140	140
Sodium bisulfate	All	170	210	140	140	75	NR	140	140
Sodium carbonate	10	NR	150	140	140	NR	140	140	140
Sodium carbonate	25	NR	150	140	140	75	140	140	140
Sodium carbonate	32	NR	150	140	140	75	140	140	140
Sodium chlorate	50	NR	210	140	140	NT	NR	212	140
Sodium chloride	All	170	210	140	140	75	212	212	212
Sodium cyanide.	All	170	210	140	140	NT	140	NT	140
Sodium ferricyanide	All	170	210	140	140	NT	NT	NT	NT
Sodium hydroxide	5	NR	210*	140	140	75	140	104	212
Sodium hydroxide	10	NR	180*	140	140	75	140	104	212
Sodium hydroxide	25	NR	210*	140	140	NT	140	104	212
Sodium hydroxide	50	NR	210*	140	140	NT	NR	NR	140
Sodium hypochlorite	5 1/4	NR	150**	140	140	NT	NR	68	140
Sodium hypochlorite	10	NR	180**	140	140	NT	NR	68	68
Sodium hypochlorite	15	NR	180**	140	140	NT	NR	68	68
Sodium nitrate	All	170	210	140	140	75	140	140	140
Sodium nitrite	All	170	210	NT	140	NT	NR	140	NT
Sodium silicate	All	NR	210	NT	NT	NT	140	140	140
Sodium sulfate	All	170	210	140	140	75	140	140	140
Sodium sulfide	All	80	210	140	140	75	140	212	140
Sodium sulfite	All	80	210	140	140	NT	140	NT	140
Stannic chloride	All	170	210	140	140	NR	212	NT	140
Stannous chloride	All	170	210	140	140	NR	NT	NT	NT
Stearic acid	All	170	210	140	140	75	140	140	68
Sulfonated detergents	100	80	150	NR	NT	75	NT	NT	NT
Sulfuric acid	25	160	210	140	140	NR	104	140	104
Sulfuric acid	50	80	210	140	140	NR	NR	68	NR
Sulfuric acid	70	NR	170	70	140	NR	NR	68	NR
Tannic acid	All	170	210	140	140	NT	68	140	68
Tartaric acid	All	170	210	140	140	NT	68	NT	140
Tetrachloroethylene	100	NR	80	NT	NR	NT	NR	NR	NR
Trichloroacetic acid	50	80	210	NT	NT	NT	140	NR	NT
Trisodium phosphate	All	NR	210	140	140	75	NT	NT	NT
Toluene	100	80	80	NR	NR	75	68	NR	NR
Urea-ammonium nitrate fertilizer mixture	100	100	100	70	140	75	140	140	NT
Water (Distilled)	All	170**	210	140	140	212	212	212	212
Water (Demineralized)	All	140**	210	140	140	212	212	212	212
Water (Deionized)	All	140**	210	140	140	212	212	212	212
Xylene	100	80	80	NR	NR	NT	68	NR	NR
Zinc chloride	All	170	210	140	140	NR	140	212	212
Zinc sulfate	All	170	210	140	140	NT	212	212	212
8-8-8 Fertilizer	100	120	100	70	140	75	104	104	104

THIS TABLE IS SUPPLIED AS A GUIDE AND DOES NOT IMPLY A GUARANTEE.

*Synthetic veil required.

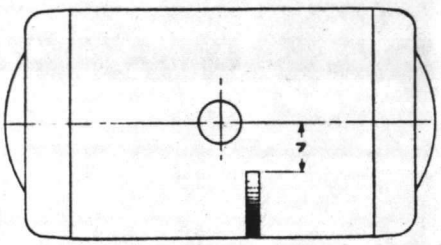
**Due to variable service life, factory should be contacted for recommendations.

GALLONAGE TAPES		
FRP Tank Dia.	Gal. Range	Part No.
Cataloged 23" thru 72"	To Tank Capacity	5056R
90" Vertical	0- 2,000	5264I
90" Vertical	0- 4,000	5265I
90" Vertical	0- 6,000	5266I
10' Vertical	0- 3,500	5350I
10' Vertical	0- 7,500	5351I
10' Vertical	0-12,000	5352I
10' Vertical	0-15,000	5354I
12' Vertical	0- 5,000	5355I
12' Vertical	0-10,000	5356I
12' Vertical	0-15,500	5357I
12' Vertical	0-21,000	5358I

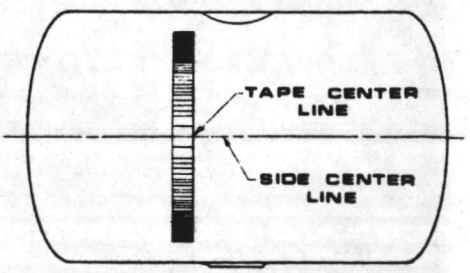
GALLONAGE TAPES

TAPES OFFERED & DESCRIPTION

- For cataloged vertical and horizontal FRP tanks 23" thru 72" in diameter . . . black lettering on white, adhesive-backed tape with Mylar overlay. For 23" thru 60" diameter tanks, tapes are marked in gallons. Tapes for 72" diameter tanks are marked in gallons and liters.
- For 90", 10' and 12' diameter vertical tanks . . . black lettering on 11 1/2" wide clear vinyl which is adhesive backed and overlayed with Mylar for chemical resistance. Tapes for 90" diameter vertical tanks are marked in 200 gallon and 500 liter increments. Tapes for 10' and 12' diameter tanks marked in 500 gallon and 2000 liter increments.



- For horizontal FRP tanks, the top of the gallonage tape is placed 7" below top center line of the tank.

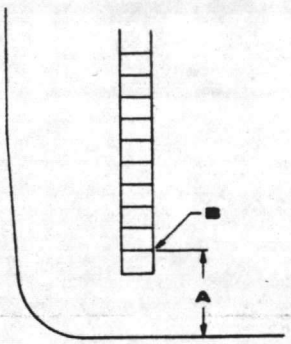


For horizontal polyethylene tanks, the center line mark on the tape is placed on side center line (mold parting line) of tank. (Exception: for 23" diameter tanks, follow instruction for FRP horizontal.)

GALLONAGE TAPE PLACEMENTS

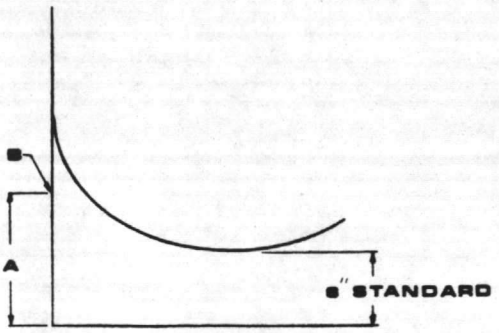
FLAT BOTTOM FRP TANKS

Tank. Dia.	Ht. from Floor (A)	Gals. (B) (Mark on tape)
23"	6-3/4"	10
24"	5-1/2"	10
30"	7-1/2"	10
32"	3-1/4"	10
38"	4-5/8"	20
42"	7-5/8"	40
48"	6"	40
60"	4"	50
72"	17-3/4"	300



DISHED BOTTOM FRP TANKS W/6" CLEARANCE

Tank Dia.	Ht. from Floor (A)	Gals. (B) (Mark on Tape)
23"	14"	10
24"	13"	10
30"	12-1/2"	10
32"	11-1/4"	10
38"	13-5/8"	20
42"	15-5/8"	40
48"	15"	40
60"	15"	50
72"	34"	300



NOTE: 72" dished bottom and mix tanks (pp. 14-15) have 12" clearance.

SALT SPECIFICATIONS

1. The salt used for regeneration may be either Pure Rock Salt or Kiln Dried Evaporated Salt. It should be clean, white and air dry, containing no visible foreign matter. It should be not less than 99.00% Sodium Chloride and the impurities in it should not exceed the following values:

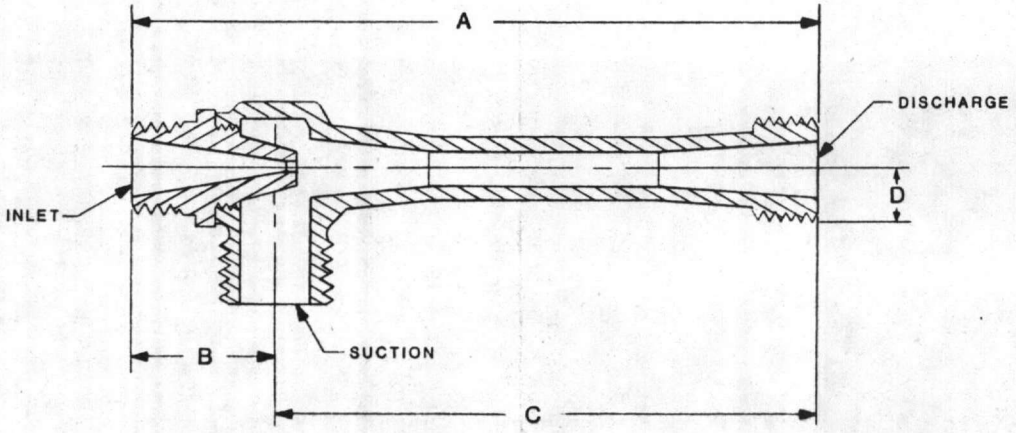
Calcium	- Not more than 0.2%
Magnesium	- Not more than 0.1%
Silica	- Not more than 0.5%

2. When 100 grams of the salt are dissolved in 500 ml of distilled water at 60° F, the insoluble matter should not exceed 0.5 grams.

3. The salt should not contain any large lumps or any fine material. Large lumps do not dissolved properly and fine material causes the salt to cake. For these reasons the following limits are placed upon the grain size of the salt.

   Salt should all pass a 1/2" screen with not more than 5% passing through a 40-mesh U.S. Standard Screen and not more than 1% passing through 50-mesh U. S. Standard Screen.

DO NOT SCALE - REMOVE ALL BURRS



NOTE: #1 THESE EJECTORS CAN HANDLE LIQUID BEARING PAPTICUATE MATTER. THE DIMENSIONS SHOWN ARE MAXIMUM PARTICLE SIZE THAT CAN BE PASSED THROUGH EACH EJECTOR.

NOTE: #2 A- DRAW FACTOR WITHA 5 FT. (1.52 METER) SUCTION LIFT AND A 5 FT. OF WATER DISCHARGE HEAD.

B- DRAW FACTOR WITH A 10 FT. (3 METER) SUCTION LIFT AND A 10 FT. OF WATER DISCHARGE HEAD.

TO OBTAIN DRAW RATE, MULTIPLY NOZZLE FLOW RATE BY APPROPRIATE DRAW FACTOR AND SPECIFIC GRAVITY OF MEDIA.

OLD NO. / NEW NO.	PIPE SIZE ALL PORTS N.P.T. INLET	SUCTION	DISCHARGE	DIMENSIONS A IN. / MM.	B IN. / MM.	C IN. / MM.	D IN. / MM.	CLEARANCE IN. / MM.
62A 3/4" LL	3/8"	3/4"	3/4"	5.87 / 149	2.0 / 50.8	3.87 / 98.3	1.5 / 38.1	.192 / 4.87
63A 1" LL	1/2"	1"	1"	7.12 / 180	2.25 / 57.1	4.87 / 124	1.75 / 44.4	.247 / 6.27
64A 1-1/4" LL	3/4"	1-1/4"	1-1/4"	9.0 / 228	2.5 / 63.5	6.5 / 165	2.25 / 57.15	.330 / 8.38
65A 1-1/2" LL	1"	1-1/2"	1-1/2"	11.0 / 280	2.75 / 69.8	8.25 / 209	2.5 / 63.5	.421 / 10.7
66A 2" LL	1-1/4"	2"	2"	14.37 / 365	3.12 / 79.24	11.25 / 285	3.0 / 76.2	.567 / 14.4
67A 2-1/2" LL	1-1/2"	2-1/2"	2-1/2"	18.12 / 460	3.50 / 89	14.62 / 371	4.21 / 104.6	.750 / 19
68A 3" LL	2"	3"	3"	23.87 / 606	4.0 / 101.6	19.87 / 504	5.0 / 127	1.025 / 26.03

SEE NOTE 1

SERIES NO.	NOZZLE FLOW RATE GAL/MIN / LIT/MIN — INLET PRESSURE PSIG/kPa 30 / 206	40 / 275	50 / 344	60 / 413	70 / 482	80 / 551	90 / 620
62A 3/4" LL	2.7 / 10.2	3.12 / 11.8	3.53 / 13.3	3.74 / 14.1	4.16 / 15.7	4.36 / 16.5	4.78 / 18.06
63A 1" LL	4.47 / 16.8	5.16 / 19.5	5.84 / 22.07	6.2 / 23.4	6.8 / 25.7	7.22 / 27.3	7.9 / 29.8
64A 1-1/4" LL	7.97 / 30.1	9.2 / 34.7	10.4 / 39.3	11.03 / 41.7	12.2 / 46.1	12,8 / 48.3	14.0 / 53
65A 1-1/2" LL	13.0 / 49.1	15.0 / 56.7	17.0 / 64.2	18.0 / 68	20.0 / 75.6	21.0 / 79.4	23.0 / 87.0
66A 2" LL	23.6 / 89.2	27.3 / 103	30.1 / 113	32.7 / 123.6	36.4 / 137.6	38.2 / 144.3	41.8 / 158
67A 2-1/2" LL	41.2 / 155	47.5 / 180	54 / 204	57 / 215	63.4 / 239	66.5 / 251	72.9 / 275
68A 3" LL	77 / 291	88.8 / 335	100 / 378	106 / 400	118 / 446	124 / 468	136 / 514
DRAW FACTOR A	1.38	1.86	2.05	2.22	2.0	1.9	1.74
DRAW FACTOR B	–	.8	1.23	1.61	1.75	1.71	1.5

SEE NOTE 2

ALL BRONZE CONSTRUCTION

AquaMatic INC. ROCKFORD, ILLINOIS

EXTERNAL EJECTOR

DWN. BY JN | DATE 10-15-76 | DWG. NO. A-10903-P

PRINTED IN USA

SHEET NO. 719C

REPLACES DRAWING DATED 1-23-74

SODIUM CHLORIDE BRINE TABLE

Salometer Degrees 60° F.	Specific Gravity 60° F.	Baume Degrees 60° F.	Per Cent Sodium Chloride By Wt.	Wt. of 1 Gallon of Brine Lbs.	Pounds per Gallon of Brine NaCl	Pounds per Gallon of Brine Water	Wt. of 1 Cu. Ft. of Brine Lbs.	Pounds per Cu. Ft. of Brine NaCl	Pounds per Cu. Ft. of Brine Water	Freezing* Point °C.	Freezing* Point °F.
0	1.000	0.0	0.000	8.33	0.00	8.33	62.30	0.00	62.30	0.0	+32.0
2	1.004	0.6	0.528	8.36	0.04	8.32	62.55	0.33	62.22	-0.3	+31.5
4	1.007	1.0	1.056	8.30	0.09	8.30	62.74	0.66	62.08	-0.5	+31.1
6	1.011	1.6	1.584	8.42	0.13	8.29	62.99	1.00	61.99	-0.8	+30.5
8	1.015	2.1	2.112	8.45	0.18	8.27	63.23	1.34	61.89	-1.1	+30.0
10	1.019	2.7	2.640	8.49	0.22	8.27	63.48	1.68	61.80	-1.5	+29.3
12	1.023	3.3	3.167	8.52	0.27	8.25	63.73	2.02	61.71	-1.8	+28.8
14	1.026	3.7	3.695	8.55	0.32	8.23	63.92	2.36	61.56	-2.1	+28.2
16	1.030	4.2	4.223	8.58	0.36	8.22	64.17	2.71	61.46	-2.4	+27.6
18	1.034	4.8	4.751	8.61	0.41	8.20	64.42	3.06	61.36	-2.8	+27.0
20	1.038	5.3	5.279	8.64	0.46	8.18	64.67	3.41	61.26	-3.1	+26.4
22	1.042	5.8	5.807	8.68	0.50	8.18	64.92	3.77	61.15	-3.5	+25.7
24	1.046	6.4	6.335	8.71	0.55	8.16	65.17	4.13	61.04	-3.8	+25.1
26	1.050	6.9	6.863	8.74	0.60	8.14	65.41	4.49	60.92	-4.2	+24.4
28	1.054	7.4	7.391	8.78	0.65	8.13	65.66	4.85	60.81	-4.6	+23.7
30	1.058	7.9	7.919	8.81	0.70	8.11	65.91	5.22	60.69	-5.0	+23.0
32	1.062	8.5	8.446	8.84	0.75	8.09	66.16	5.59	60.57	-5.4	+22.3
34	1.066	9.0	8.974	8.88	0.80	8.08	66.41	5.96	60.45	-5.8	+21.6
36	1.070	9.5	9.502	8.91	0.85	8.06	66.66	6.33	60.33	-6.2	+20.8
38	1.074	10.0	10.030	8.94	0.90	8.04	66.91	6.71	60.20	-6.6	+20.2
40	1.078	10.5	10.558	8.98	0.95	8.03	67.16	7.09	60.07	-7.0	+19.4
42	1.082	11.0	11.086	9.01	1.00	8.01	67.41	7.47	59.94	-7.4	+18.7
44	1.086	11.5	11.614	9.04	1.05	7.99	67.66	7.86	59.80	-7.8	+17.9
46	1.090	12.0	12.142	9.08	1.10	7.98	67.91	8.25	59.66	-8.3	+17.0
48	1.094	12.5	12.670	9.11	1.15	7.96	68.16	8.64	59.52	-8.8	+16.2
50	1.098	12.9	13.198	9.14	1.21	7.93	68.40	9.03	59.37	-9.2	+15.4
52	1.102	13.4	13.725	9.18	1.26	7.92	68.65	9.42	59.23	-9.7	+14.5
54	1.106	13.9	14.253	9.21	1.31	7.90	68.90	9.82	59.08	-10.2	+13.7
56	1.110	14.4	14.781	9.24	1.37	7.87	69.15	10.22	58.93	-10.7	+12.8
58	1.114	14.8	15.309	9.28	1.42	7.86	69.40	10.63	58.77	-11.2	+11.8
60	1.118	15.3	15.837	9.31	1.48	7.83	69.65	11.03	58.62	-11.7	+10.9
62	1.122	15.8	16.365	9.34	1.53	7.81	69.90	11.44	58.46	-12.3	+ 9.9
64	1.126	16.2	16.893	9.38	1.58	7.80	70.15	11.85	58.30	-12.8	+ 8.9
66	1.130	16.7	17.421	9.41	1.64	7.77	70.40	12.26	58.14	-13.3	+ 8.0
68	1.135	17.2	17.949	9.45	1.70	7.75	70.71	12.69	58.02	-14.0	+ 6.8
70	1.139	17.7	18.477	9.49	1.75	7.74	70.96	13.11	57.85	-14.6	+ 5.7
72	1.143	18.1	19.004	9.52	1.81	7.71	71.21	13.53	57.68	-15.2	+ 4.6
74	1.147	18.6	19.532	9.55	1.87	7.68	71.46	13.96	57.50	-15.8	+ 3.5
76	1.152	19.1	20.060	9.59	1.93	7.66	71.77	14.40	57.37	-16.5	+ 2.2
78	1.156	19.6	20.588	9.63	1.98	7.65	72.02	14.83	57.19	-17.2	+ 1.0
80	1.160	20.0	21.116	9.66	2.04	7.62	72.27	15.26	57.01	-17.9	- 0.3
82	1.164	20.4	21.644	9.69	2.10	7.59	72.52	15.70	56.82	-18.7	- 1.6
84	1.168	21.0	22.172	9.74	2.16	7.58	72.83	16.15	56.68	-19.3	- 2.8
86	1.172	21.4	22.700	9.77	2.22	7.55	73.08	16.59	56.49	-20.1	- 4.1
88	1.177	21.9	23.228	9.81	2.28	7.53	73.39	17.05	56.34	-21.0	- 5.8
**88.3	1.178	22.0	23.300	9.82	2.29	7.53	73.43	17.12	56.31	-21.1	- 6.0**
90	1.182	22.3	23.756	9.84	2.34	7.50	73.64	17.49	56.15	-18.4	- 1.1
92	1.186	22.7	24.283	9.88	2.40	7.48	73.89	17.94	55.95	-15.1	- 4.8
94	1.191	23.3	24.811	9.92	2.46	7.46	74.20	18.41	55.79	-11.6	-11.1
96	1.195	23.7	25.339	9.95	2.52	7.43	74.45	18.87	55.58	- 7.8	-18.0
98	1.200	24.2	25.867	9.99	2.59	7.40	74.76	19.34	55.42	- 3.6	-25.5
99.6	1.203	24.5	26.285	10.02	2.63	7.39	74.95	19.70	55.25	+0.2	-32.2†
100	1.204	24.6	26.395	10.03	2.65	7.38	75.01	19.80	55.21	———	⊙

*Temperatures at which freezing begins. Ice forms, brine concentrates, and freezing point lowers to eutectic.

**Eutectic point. For brines stronger than eutectic, the temperatures shown are the saturation temperatures for sodium chloride dihydrate. Brines stronger than eutectic deposit excess sodium chloride as dihydrate when cooled, and freeze at eutectic.

† Transition temperature from anhydrous salt to dihydrate.

⊙ Saturated sodium chloride brine at 60° F. (15.6° C.).

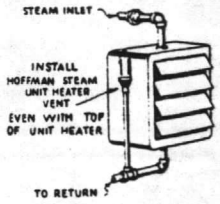
HOFFMAN VENTING VALVES

HOFFMAN SPECIALTY ITT
1700 West Tenth St · Indianapolis, Indiana 46222
A Unit of International Telephone and Telegraph Corporation

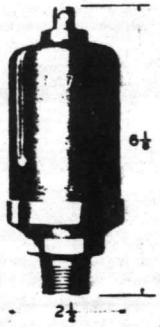
special steam vents

No. 74 STEAM UNIT HEATER AIR VALVE

Float-type vent with single non-adjustable port especially designed for use with Steam Unit Heaters. Vents air, when present, with rising, dropping, or steady pressure.

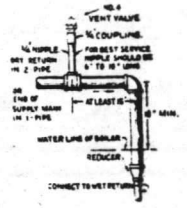


Size Conn.: ½" female x ¾" male straight shank
Operating Press.: up to 35 PSI
Max. Press.: 35 PSI

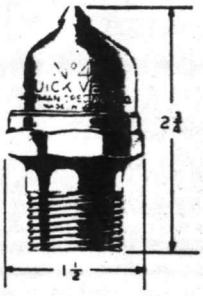


No. 4 QUICK VALVE

Thermostatic air vent for steam systems and process equipment. Operates on temperature changes only; does not close against water. Quick vent must be installed on a nipple 6" to 10" above horizontal return, which must be at least 18" above the boiler water line.



Size Conn.: ½" Female x ¾" male
Max. Oper. Press.: 25 PSI

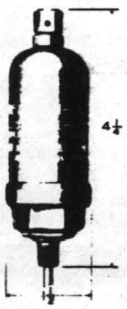


water vents

No. 790 WATER VALVE

Especially designed for removing air from convectors, baseboard, and wall radiation. Safety drain connection at the top for discharging moisture entrained in the vented air. Fitting and ferrule for 3/16" OD tubing. Telescopic Siphon Tube.

Size Conn.: ⅛" straight shank
Max. Oper. Press.: 30 PSI



No. 791 WATER VALVE

Designed for convectors and small mains. Safety drain connection at top for discharging moisture entrained in the vented air. Fitting and ferrule for 3/16" OD tubing. Telescopic Siphon Tube.

Size Conn.: ¼" straight shank
Max. Oper. Press.: 50 PSI

No. 500 AIR VALVE

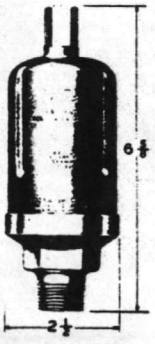
A disc-type vent, with built-in Check Valve, designed for venting systems either manually or automatically. Discs can be replaced without draining the system.

Size Conn.: ⅛" straight shank
Max. Water Press.: 50 PSI

No. 79 WATER MAIN VENT VALVE

Designed for use on hot or cold water mains and process applications. Tapped at top for ⅛" I.P.S. safety drain connection for discharging moisture entrained in the vented air. Built-in Check Valve.

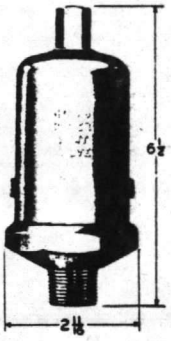
Size Conn.: ½" female x ¾" male straight shank
Max. Oper. Press.: 75 PSI —will withstand hydrostatic pressures of 200 PSI



No. 78 WATER MAIN VENT VALVE

Designed for use on high pressure hot or cold water mains and process applications. Cast brass body. Safety drain connection for discharging moisture entrained in the vented air. Tapped at top for ⅛" I.P.S. Built-in Check Valve.

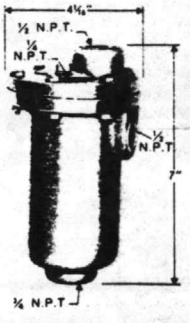
Size Conn.: ¾" straight shank
Max. Oper. Press.: 150 PSI —will withstand hydrostatic pressures of 450 PSI



No. 792 HIGH PRESSURE WATER VENT

Designed for releasing air from hot or cold water mains, hydronic heating and chilling systems storage and processing tanks filters, centrifugal pumps. Cast iron body and cover, stainless steel interior.

Max. Oper. Press.: 250 PSIG
Max. Temp.: 300 F
Hy. Press.: to 350 PSIG



miscellaneous

No. 550 AIR CHAMBER

Primarily designed for use on convectors which are not provided with built-in air chambers or air collection fittings. It is all brass construction and provided with a drain tube. Ideal for use with the No. 500 Air Vent. ¼" Straight shank connection tapped at the top for ⅛" connection. Volume is 6 cubic inches.

Max. Water Press.: 100 PSI
Max. Steam Press.: 25 PSI

No. 3 STEAM AIR LINE VALVE

A thermostatic air vent designed for use on Air Line or Paul Systems. Thermostat only—No float.

Size Conn.: Inlet ⅛", outlet ¼" I.P.S.
Max. Operating Press.: 25 PSI to vacuum

No. 62 VACUUM BREAKER

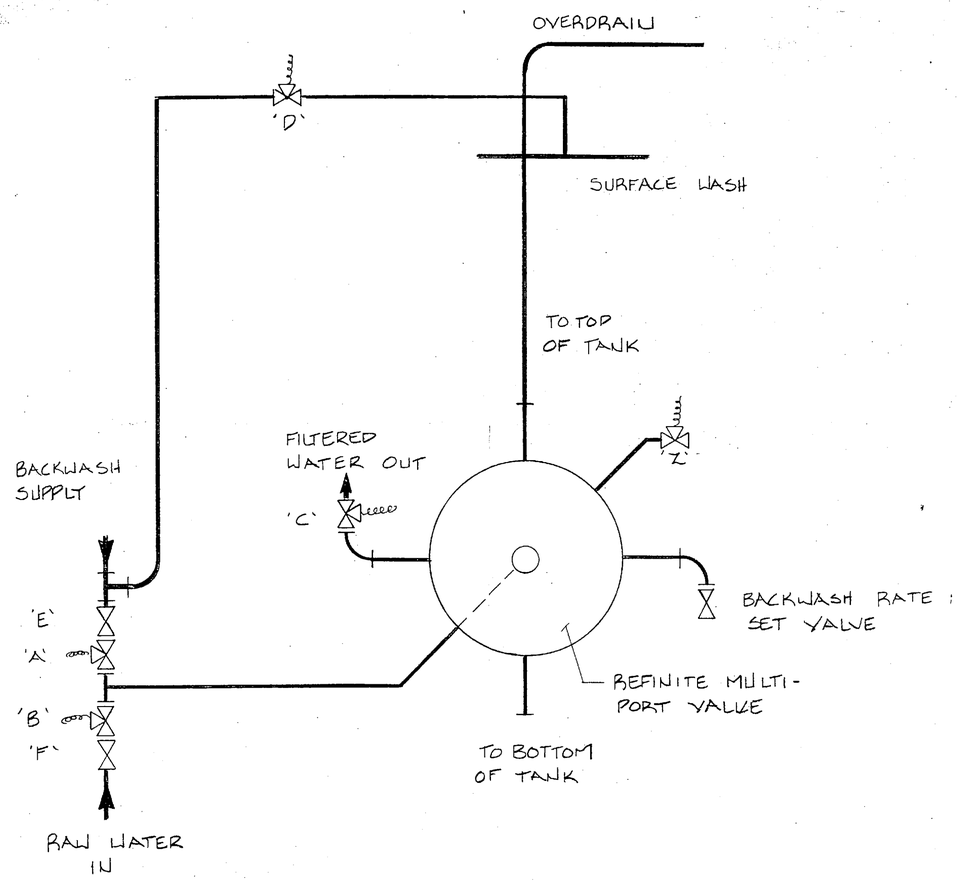
Designed for use on closed vessels and piping systems to control induced vacuum within safe limits. Adjustable from ¼" to 20" (mercury) vacuum.

Size Conn.: ¾" straight shank
Max. Operating Press.: 150 PSI

No. 793 DRAIN VALVE

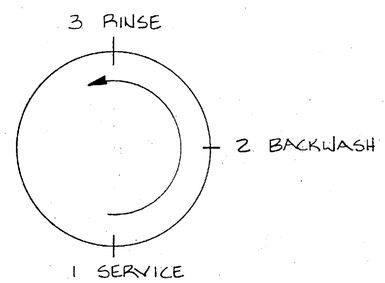
To remove water automatically from compressed air tanks, air separators, drip points and after coolers with minimum air loss. Cast iron body and cover, stainless steel interior.

Max. Press.: 250 PSIG
Cold Water: 100 F Max. temp.
Hy. Press.: to 350 PSIG



SIGNAL #

1) VALVE 'A' "BACKWASH SUPPLY" CLOSED
   VALVE 'B' "RAW WATER INLET" CLOSED
   VALVE 'C' "FILTERED WATER OUT" CLOSED
2) SOLENOID VALVE 'Z' OPEN
3) INDEX TO BACKWASH POSITION
4) PRESS RELEASE VALVE 'Z' CLOSES
5) BACKWASH TIMER STARTS
   SURFACE WASH VALVE 'D' OPENS
   SURFACE WASH TIMER STARTS
   SURFACE WASH TIMER STOPS
   SURFACE WASH VALVE 'D' CLOSES
   BACKWASH TIMER STOPS
   BACKWASH VALVE 'A' CLOSES
6) VALVE 'Z' OPENS
7) INDEX TO RINSE POSITION
8) VALVE 'Z' CLOSES, VALVE 'F' OPENS, TIMER STARTS, TIMER STOPS, VALVE 'F' CLOSES, VALVE 'Z' OPENS
9) INDEX TO SERVICE POSITION
10) VALVE 'Z' CLOSES, VALVE F OPENS, VALVE 'C' OPENS



JOB #578

Refinite Water Conditioning

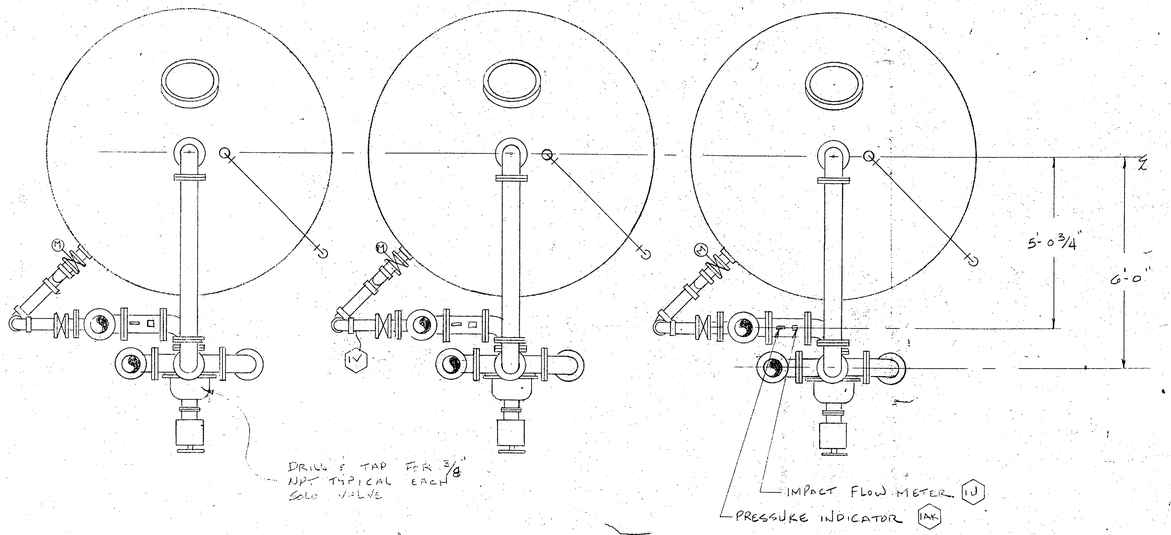
ROCK HILL, SOUTH CAROLINA 29730

WORLD WIDE

FILTER OPERATING DIAGRAM	DRAWN BY: Kathy
	DATE: 8-11-83
CAMP LEJEUNE, N.C.	DRAWING NO.: RF-910-18

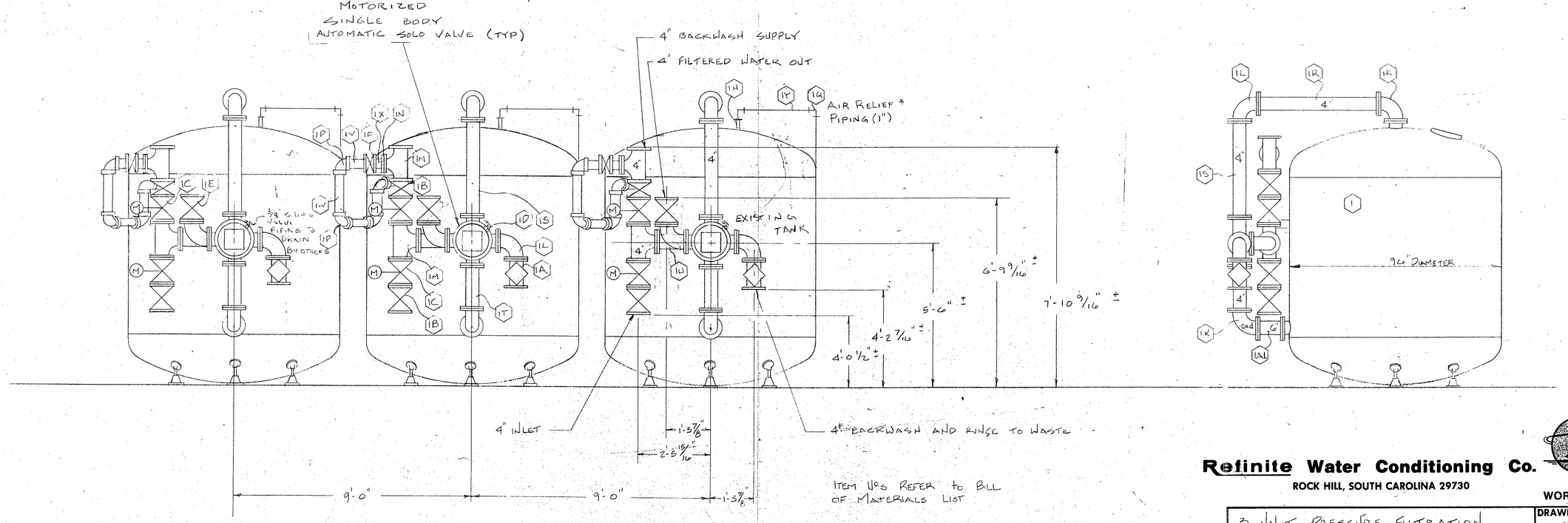
P.O. BOX 11676 | (803)-324-1111 | 555 PADDOCK PARKWAY

BRUNING 40-21 50731



NOTES

1) ALL PIPE TO BE SEAMLESS SCH. 40 A 53 GR B
2) ALL PIPE FITTINGS AND VALVES TO BE FACTORY PIPED AS MUCH AS PRACTICAL
3) ALL DIMENSIONS FROM FLOOR HAVE TOLERENCE OF ± 1"
4) RNC TO SUPPLY A DIFFERENTIAL PRESSURE SWITCH TO BE INSTALLED BY OTHERS.



ITEM Nos REFER to BILL OF MATERIALS LIST

NO	REVISION	DATE	BY
1	REV. SURFACE WASH PIPING. ADD 3/4" IPS TAP ON SOLO VALVES	8-23-83	KAE

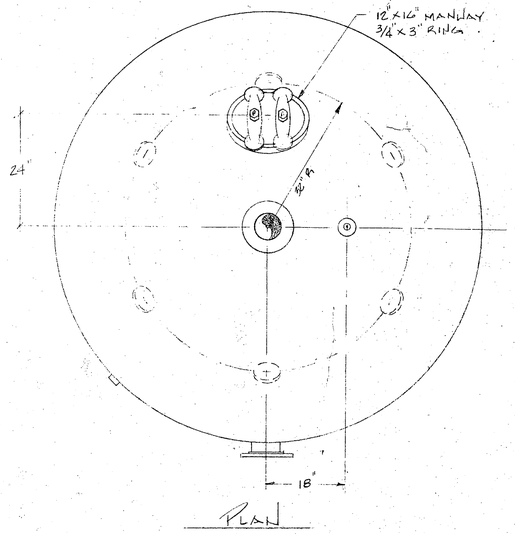
Refinite Water Conditioning Co.
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

3 UNIT PRESSURE FILTRATION SYSTEM WITH AUTO. SOLO VALVE

CAMP LEJEUNE, N.C.

DRAWN BY	DATE	DRAWING NO.
CEC	3-30-83	RF 910-1F

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY



PLAN

NOTE:

1) THE FILTER TANK DESIGN IS IN ACCORDANCE WITH SECTION VIII, DIVISION I OF THE ASME BOILER & PRESSURE VESSEL CODE.
2) THE FILTER TANK WILL BEAR THE ASME CERTIFICATION STAMP. NATIONAL BOARD REGISTRATION.
3) THE FILTER TANK WILL BE CONSTRUCTED OF MATERIALS COVERED BY THE REQUIREMENTS OF SPECIFICATION ASTM-A-20-80.
4) DESIGN PRESSURE - 100 PSIG. HYDROSTATIC TEST PRESSURE - 150 PSIG.
5) TANK SHELL WILL BE 1/2" SA 36
6) TANK HEADS WILL BE 3/4" SA516-70 ASME FLANGED & DISHED WITH A 1 1/2" SIDE FLANGE.
7) ALL FLANGES WILL BE 150# STEEL SLIP-ON.
8) EXTERIOR WILL BE SANDBLASTED TO SSPC-SP6 COMMERCIAL BLAST CLEANING AND PRIMED WITH A RED OXIDE PRIMER PRIOR TO SHIPPMENT.
9) INTERIOR WILL BE THOROUGHY CLEANED PRIOR TO SHIPMENT.
10) ALL PIPE TO BE SCH. 40 SEAMLESS. A-53 GR. B
11) ALL SUBMERGED ARC WELDING WIRE TO MEET SPECIFICATION A-5.17
12) ALL OTHER WELDING ELECTRODES TO MEET SPECIFICATION A5.5-E7018.
13) ALL COUPLINGS TO BE 3000# FORGED STEEL
14) ALL DIMENSIONS GIVEN FROM FLOOR HAVE TOLERENCE OF ± 1"

MEDIA SCHEDULE (PER TANK)

DEPTH	SIZE	MATERIAL	U.C.	CU. FT
24"	.45-.55MM	FILTER SAND	1.7 ≥ U.C. ≥ 1.2	109
4"	1/4-#10	SUPPORT GRAVEL	—	17
4"	1/2-1/4	SUPPORT GRAVEL	—	17
4"	3/4-1/2	SUPPORT GRAVEL	—	17
4"	1 1/2-3/4	SUPPORT GRAVEL	—	17

ELEVATION

SECTION

MATERIAL	SPECIFICATION
SHELL	SA 36
HEADS	SA 516-70
FLANGES	ASTM A-105
MANWAY RINGS	SA 106 B
PIPE	SA 53 B
COUPLINGS	ASTM A 181

2 TANKS REQ'D

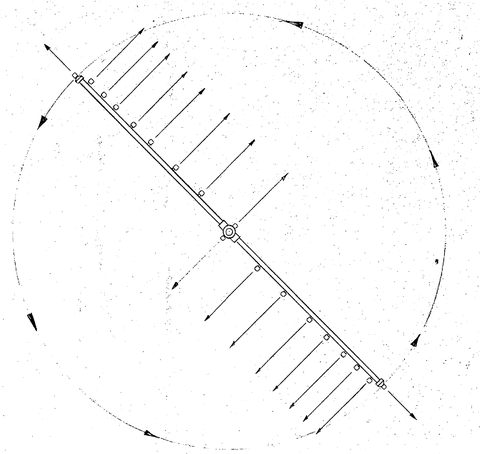
Refinite Water Conditioning
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

ASME CODE & LABELED PRESSURE FILTER	DRAWN BY C²
	DATE 12-4-92
CAMP LE JEUNE, N.C.	DRAWING NO. RF-910-1A

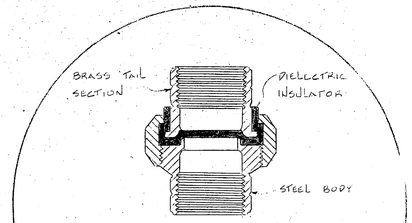
P.O. BOX 11676 | (803)-324-1111 | 555 PADDOCK PARKWAY

Rev. 1 Revised [illegible] J.S 7-7-93

BRUNING 50731

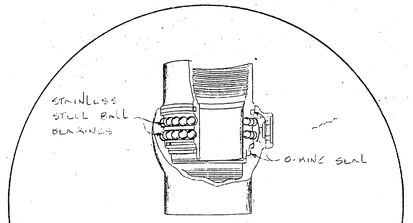


STRAIGHT LINE SURFACE AGITATOR
ROTATION



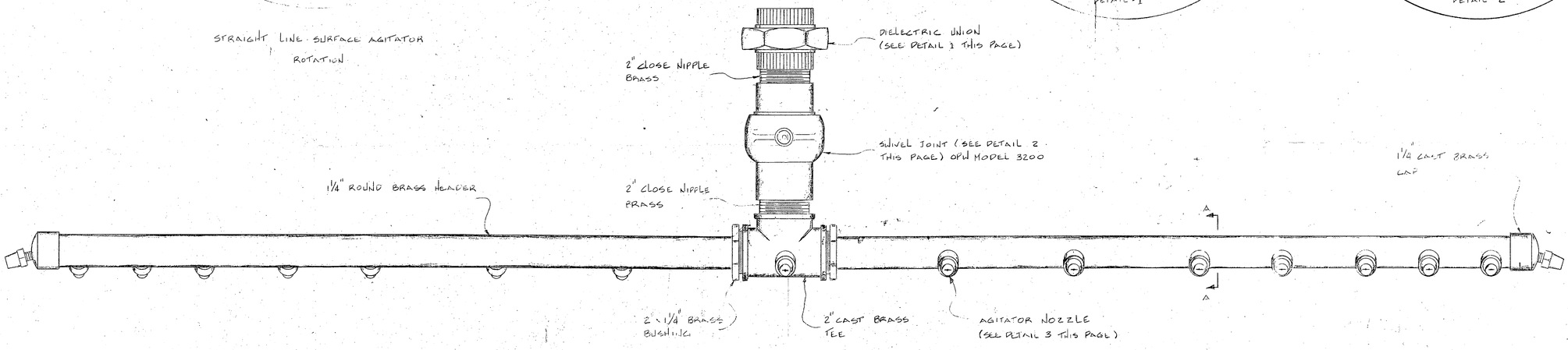
CROSS SECTION
DIELECTRIC UNION
PREVENTS ELECTROLYTIC CORROSION

DETAIL - 1

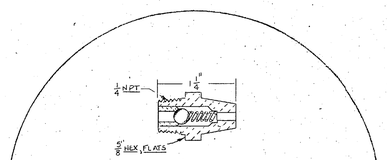


SWIVEL JOINT
PERMANENTLY LUBRICATED
STAINLESS STEEL BALL BEARINGS
FOR SWIMMING SERVICE

DETAIL - 2



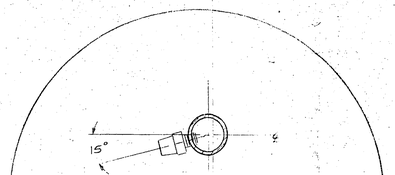
NOTE - NOZZLE QUANTITY WILL VARY



AGITATOR NOZZLE DETAIL

ALL AGITATOR NOZZLES ARE OF RED BRASS CONSTRUCTION INCORPARATING AN INTERNAL SPRING LOADED BALL CHECK VALVE TO PREVENT BACKFLOW

DETAIL 3



SECTION A-A

WORLD-WIDE
Paddock Refinite
WATER TREATMENT
a division of Paddock of California

603" 578

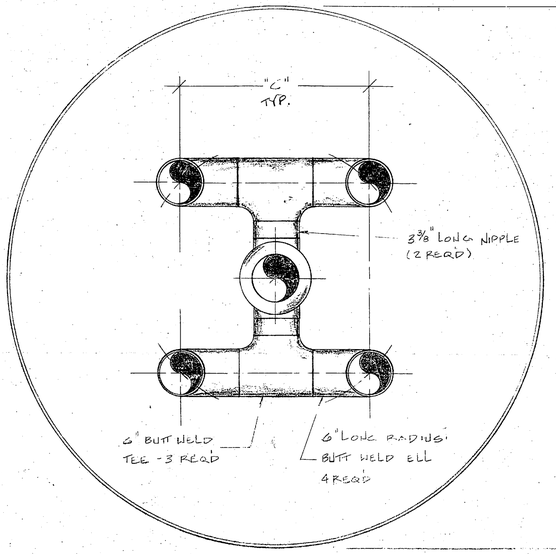
SURFACE WASH ASSEMBLY	DRAWN BY CEC
	DATE 2-2-68
	REVISIONS
CAMP LEJEUNE, N.C.	DRAWING NO. RS - 2

REV.	BY	DATE
REDRAWN	CE	8-2-68

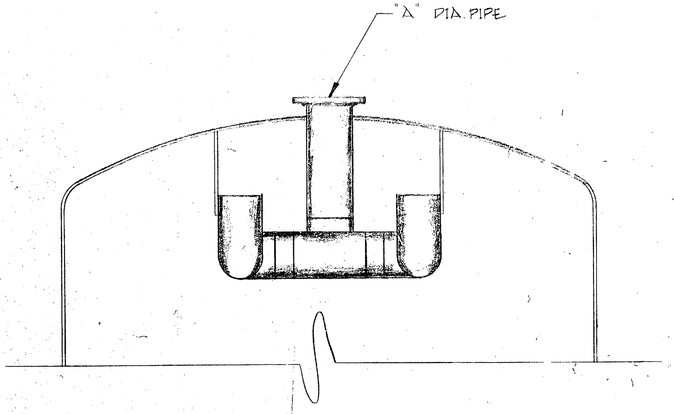
Paddock-Refinite P.O. BOX 511 ROCK HILL, S.C. 29730

NOTES 1) ALL FITTINGS TO BE STD WT BUTT WELD STEEL
2) ALL PIPE TO BE SCH 40 SEAMLESS A-53 GR. B
3) ALL WELDS TO BE CONTINUOUS FULL PENETRATION

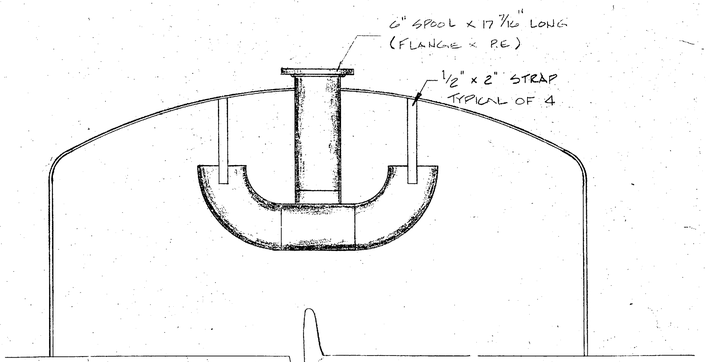
SYMBOL	SIZE
"A"	6" DIA.
"B"	96" DIA.
"C"	29¼



PLAN VEIW



SIDE VEIW



ELEVATION

2 COMPLETE ASSYS REQD

Paddock

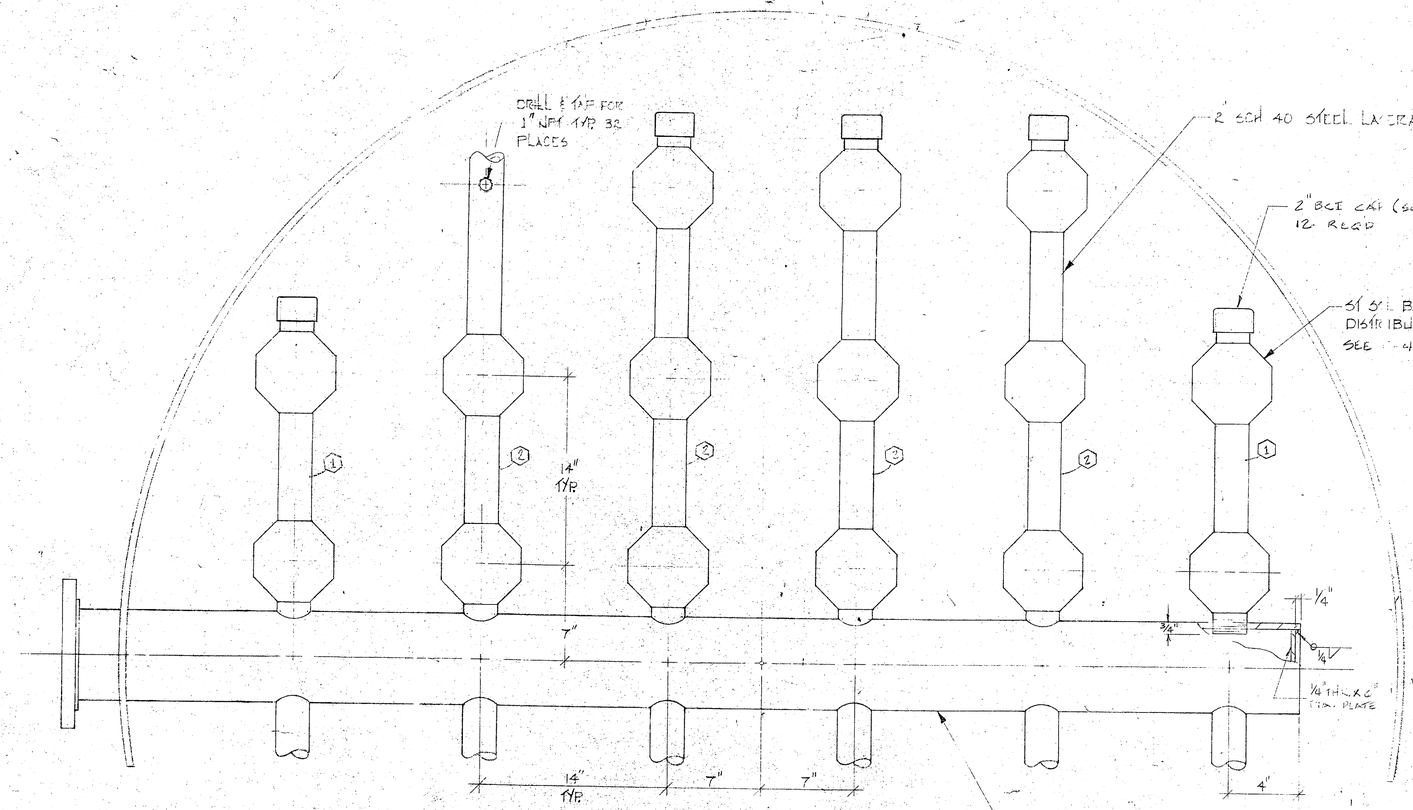
JOB # 578

U-FLOW OVERDRAIN (FILTER)

Drawn By: E.D. Swindell
Date: 10-22-80
Scale: U.N.F.
Dwg. No.: F-910-3

REVISIONS | BY | DATE

P.O. BOX 527 ROCK HILL, S.C.



LATERAL CHART		
NO.	LENGTH	QTY
2	37½" TBE.	8
1	23½" TBE	4

TOTAL FILTER AREA = 50 SQ. FT.
TOTAL ORIFICE AREA = .174 SQ. FT.
TOTAL ORIFICE AREA = .3% FILTER AREA

2 COMPLETE ASSY'S REQ'D

REV 1 ADD 102 15/16 DIM. 12-2-97

Refinite Water Conditioning
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

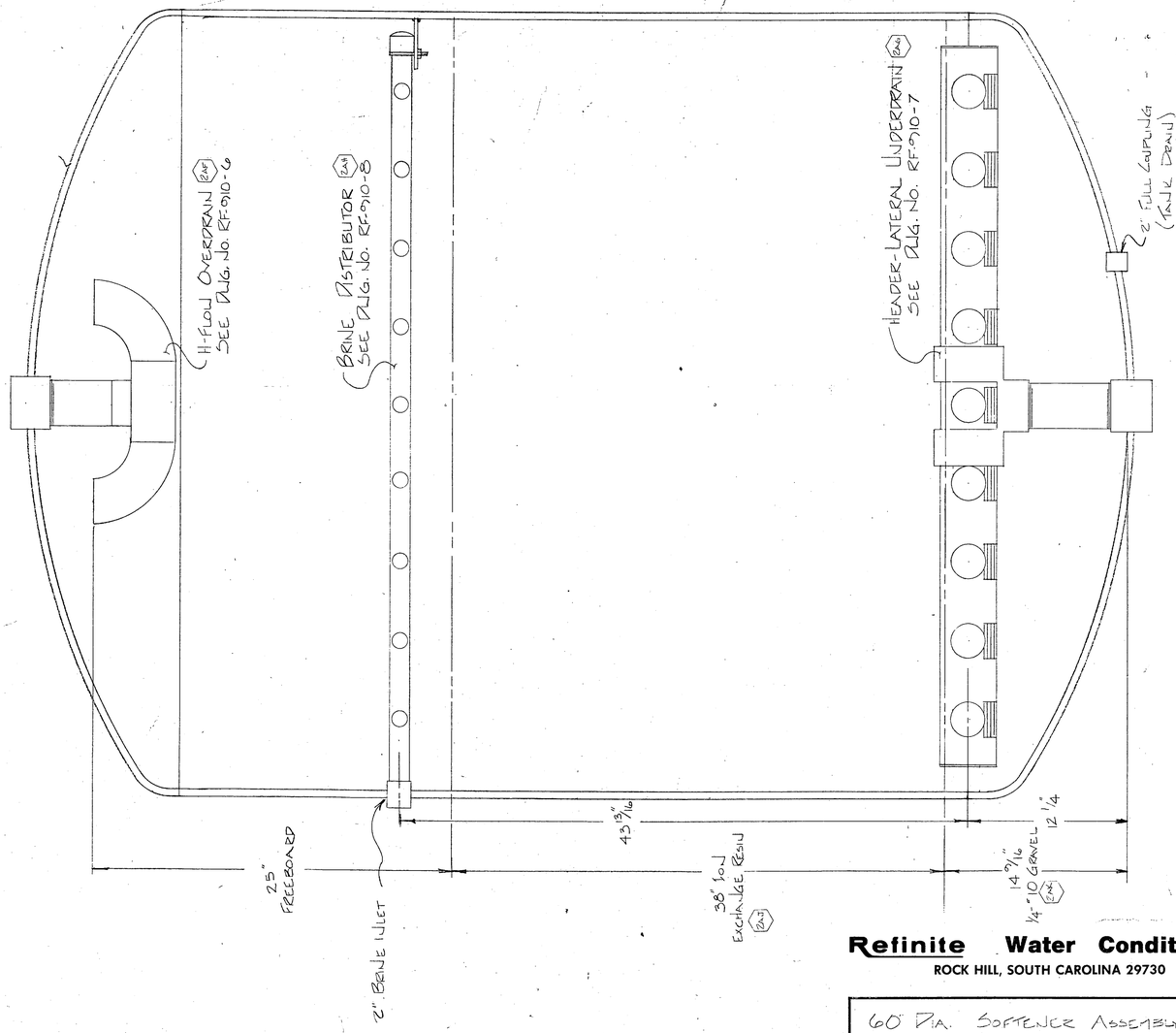
UNDERDRAIN SYSTEM
FOR 96" DIA. FILTER

CAMP LEJEUNE N.C.

DRAWN BY	DATE	DRAWING NO.
J.K. ANDERSON	8-4-97	RF 910-4

P.O. BOX 11676 | (803)-324-1111 | 515 PADDOCK PARKWAY

BRUNING 40-21.15/0731



Refinite Water Conditioning

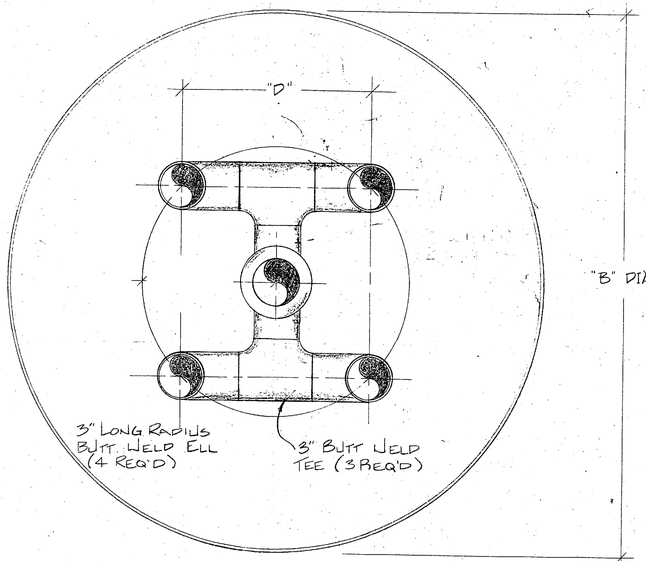
ROCK HILL, SOUTH CAROLINA 29730

WORLD WIDE

60" DIA. SOFTENER ASSEMBLY	DRAWN BY: KATHY
	DATE: 1-5-82
CAMP LEJEUNE, N.C.	DRAWING NO.: RF-910-5A

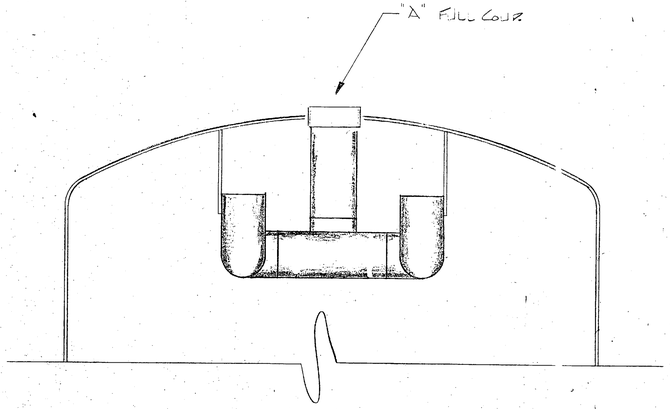
P.O. BOX 11676 | (803)-324-1111 | 555 PADDOCK PARKWAY

BRUNING 40-21 50731

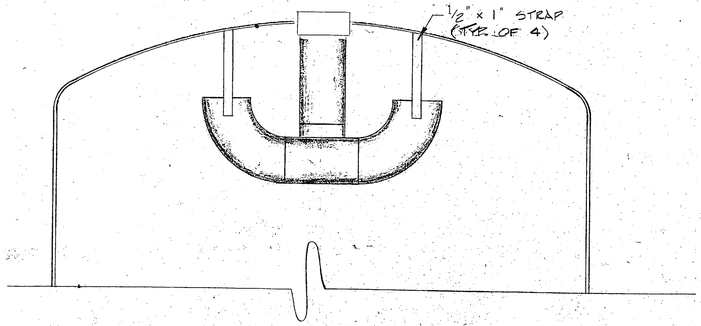


PLAN VIEW

SYMBOL	SIZE
"A"	3" DIA.
"B"	60" DIA.
"D"	15 3/4"



SIDE VIEW



ELEVATION

2 COMPLETE ASSYS REQ'D

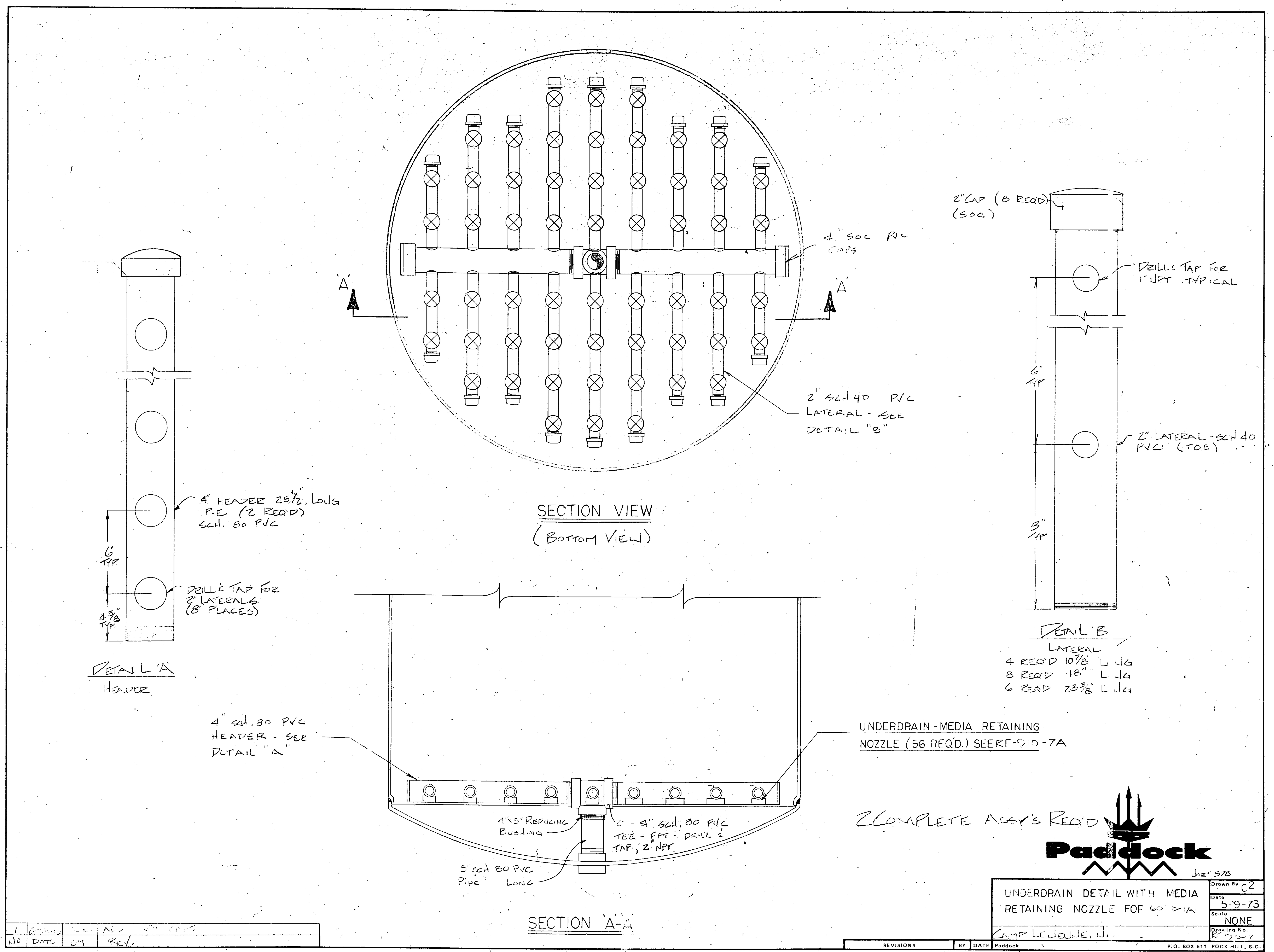
Job# 578

(SOFTENER)
H-FLOW OVERDRAIN
CAMP LEJEUNE, N.C.

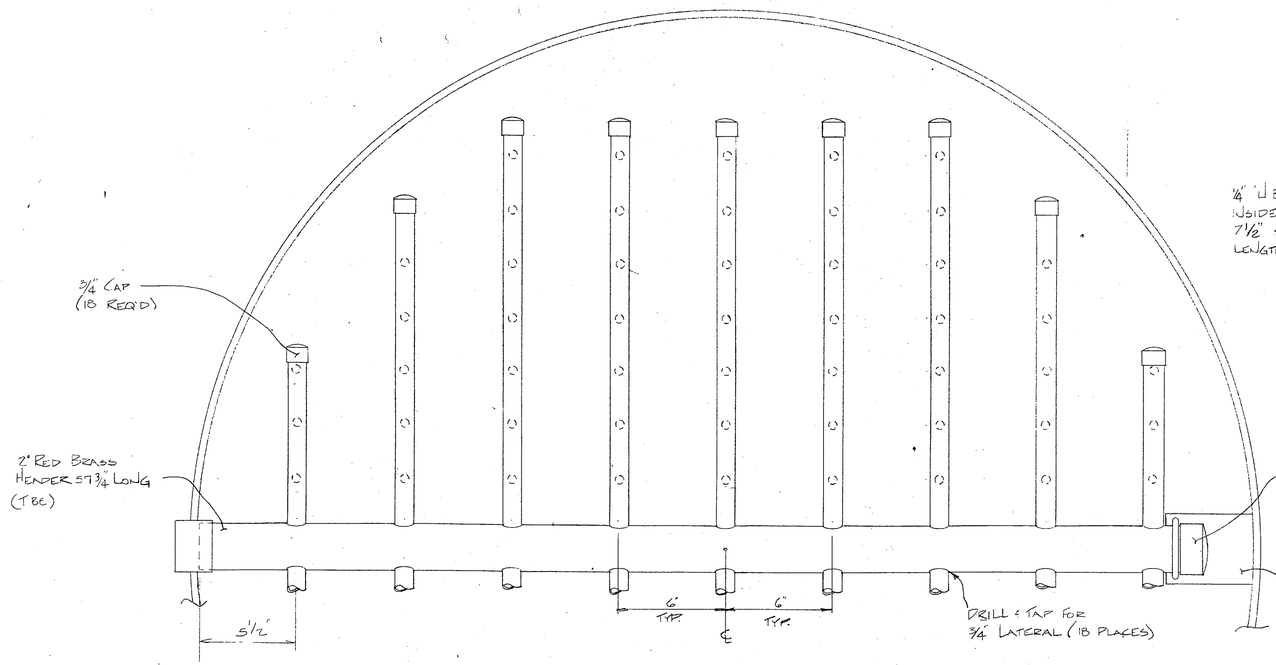
Drawn By C.L. McMILLIN
Date 10-22-80
Scale NONE
Drawing No. RF-510-6

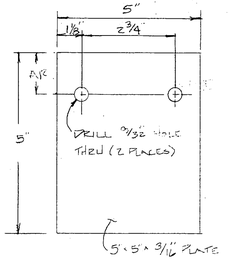
REVISIONS | BY | DATE

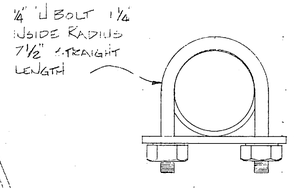
P.O. BOX 511 ROCK HILL, S.C.



SECTION VIEW
(BOTTOM VIEW)
'A'
'A'
4" SOC PVC CAPS
2" SCH 40 PVC LATERAL - SEE DETAIL "B"
4" HEADER 25½" LONG P.E. (2 REQ'D) SCH. 80 PVC
6" TYP.
DRILL & TAP FOR 2" LATERALS (8 PLACES)
4⅝" TYP.
DETAIL 'A'
HEADER
2" CAP (18 REQ'D) (SOC)
DRILL & TAP FOR 1" NPT TYPICAL
6" TYP
2" LATERAL - SCH 40 PVC (TOE)
3" TYP
DETAIL 'B'
LATERAL
4 REQ'D 10⅞" LONG
8 REQ'D 18" LONG
6 REQ'D 23⅜" LONG
4" SCH. 80 PVC HEADER - SEE DETAIL "A"
UNDERDRAIN - MEDIA RETAINING NOZZLE (56 REQ'D.) SEE RF-210-7A
4"x3" REDUCING BUSHING
4" SCH. 80 PVC TEE - FPT - DRILL & TAP, 2" NPT
3' SCH 80 PVC PIPE LONG
SECTION 'A-A'
2 COMPLETE ASSY'S REQ'D
Paddock
UNDERDRAIN DETAIL WITH MEDIA RETAINING NOZZLE FOR 60" DIA
CAMP LEJEUNE, N.C.
Drawn By CZ
Date 5-9-73
Scale NONE
Drawing No.
1 | 6-30 | ADD 4" CAPS
NO | DATE | BY | REV.
REVISIONS | BY | DATE
Paddock P.O. BOX 511 ROCK HILL, S.C.







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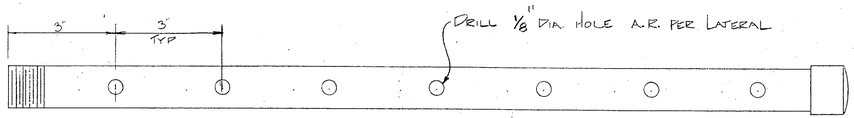


3/4" LATERALS (RED BRASS)
10 REQ'D 2 1/2" LONG (TBE)
4 REQ'D 17" LONG (TBE)
4 REQ'D 11" LONG (TBE)

ALL PIPE & FITTINGS TO BE RED BRASS

2 COMPLETE ASSY'S REQ'D

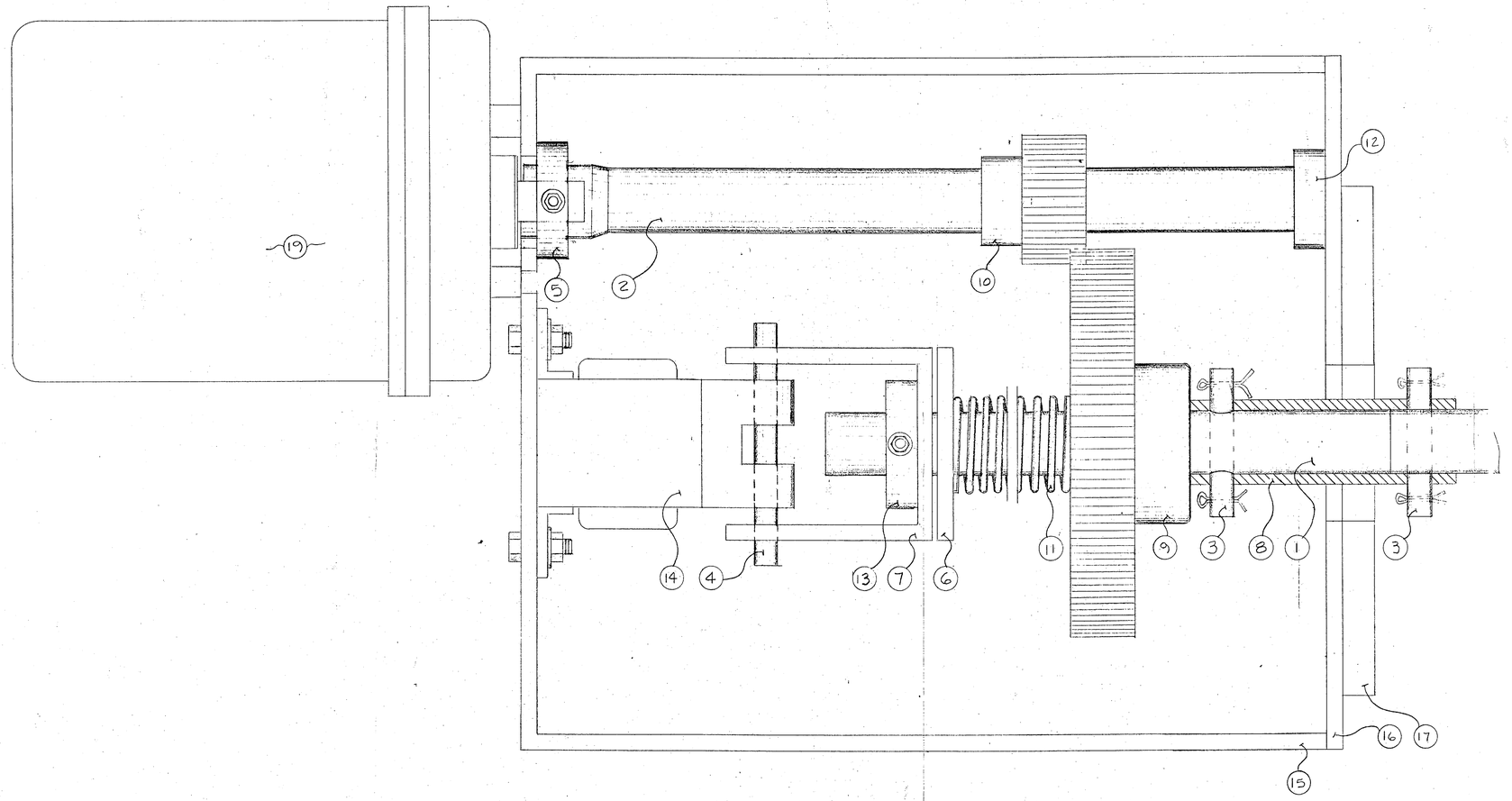
Refinite Water Conditioning
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

3" = 1'-0" | J.E. 578

BRINE DISTRIBUTION HEADER FOR 60" DIA. SOFTENERS	DRAWN BY: Karl
	DATE: 12-30-51
CAMP LEJEUNE, N.C.	DRAWING NO.: RT-910-B

P.O. BOX 11676 | (803)-324-1111 | 555 PADDOCK PARKWAY

BRUNING 40-21 50731



Parts List

1	STEMPLATE DRIVE SHAFT	RF-910-16A
2	MOTOR DRIVE SHAFT	RF-910-16A
3	SHAFT PIN (3/8)	RF-910-16A
4	LIFT PIN	RF-910-16A
5	POSITIONING RING	RF-910-16A
6	SPRING RETAINER	RF-910-16A
7	LIFTING LUG	RF-910-16A
8	SHAFT COLLAR	RF-910-16A
9	6" GEAR	
10	2" GEAR	
11	SPRING	
12	BEARING HOUSING	RF-910-16A
13	SHAFT COLLAR	
14	SOLENOID	
15	COVER PLATE	RF-910-16
16	COVER BOTTOM	RF-910-16
17	EXISTING VALVE BRACKET	
19	ACTUATOR	
20	SIDE PLATE	RF-910-16

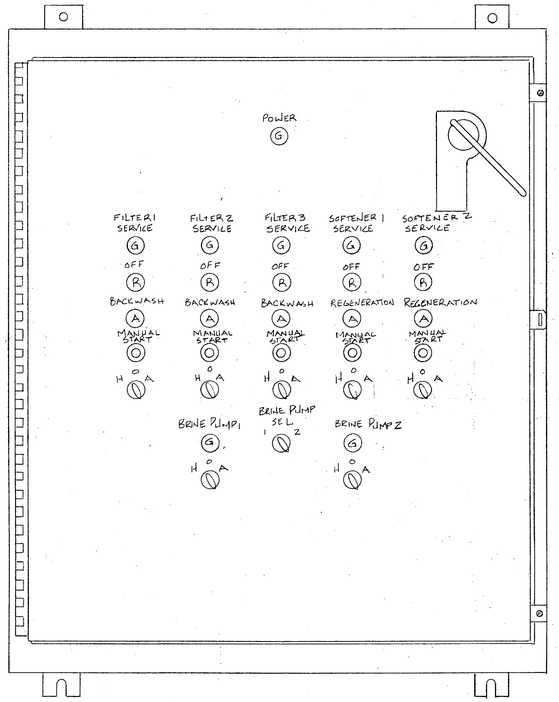
W.O.# 578
JOB# 578

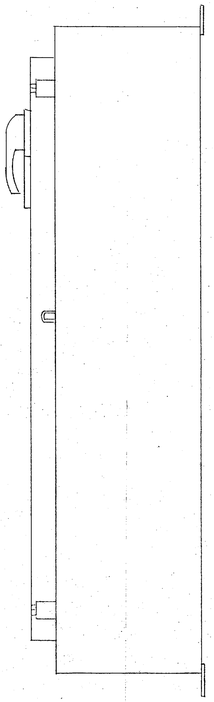
Refinite Water Conditioning Co.
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

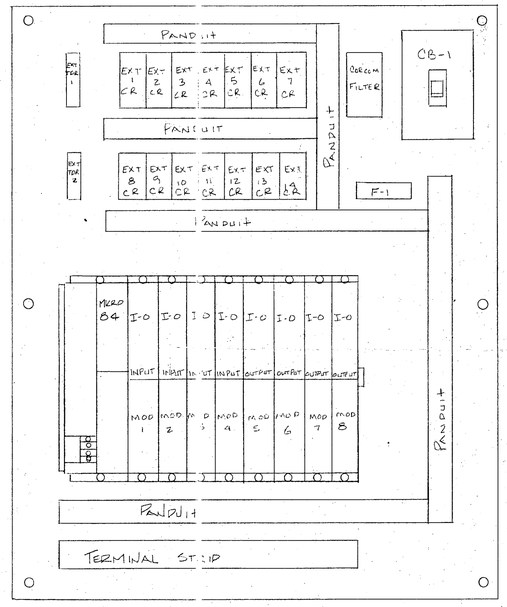
AUTO. VALVE INDEXER
CAMP LEJEUNE, N.C.

DRAWN BY
DATE 6-25-73
DRAWING NO. RF-910-15

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY



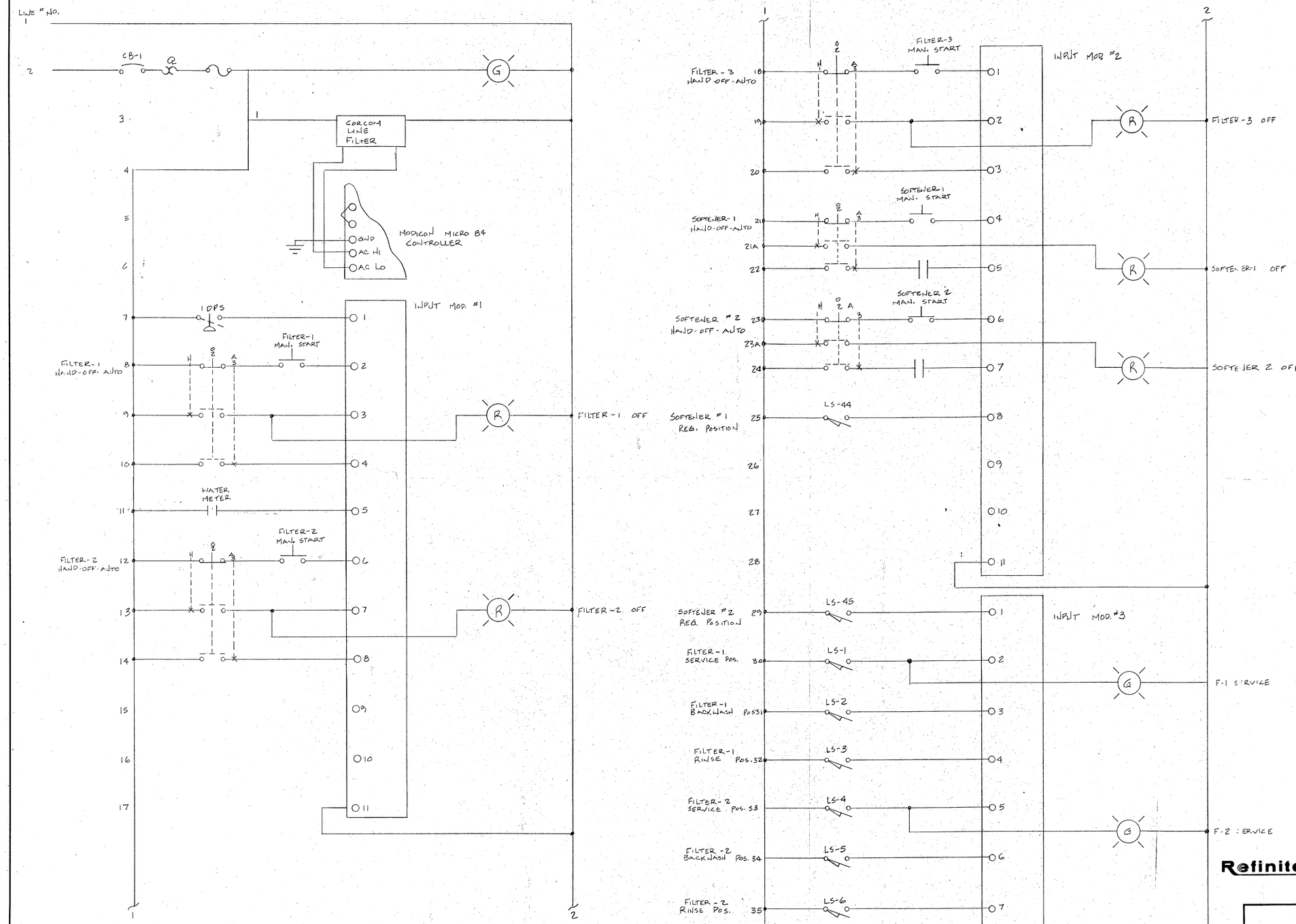




Refinite Water Conditioning Co.
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

ENCLOSURE & SUB PANEL LAY-OUT	DRAWN BY R8
	DATE 7-25-83
CAMP LEJEUNE, N.C.	DRAWING NO. RF-910-26

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY



SHEET 1 OF 4

Refinite Water Conditioning Co.

ROCK HILL, SOUTH CAROLINA 29730

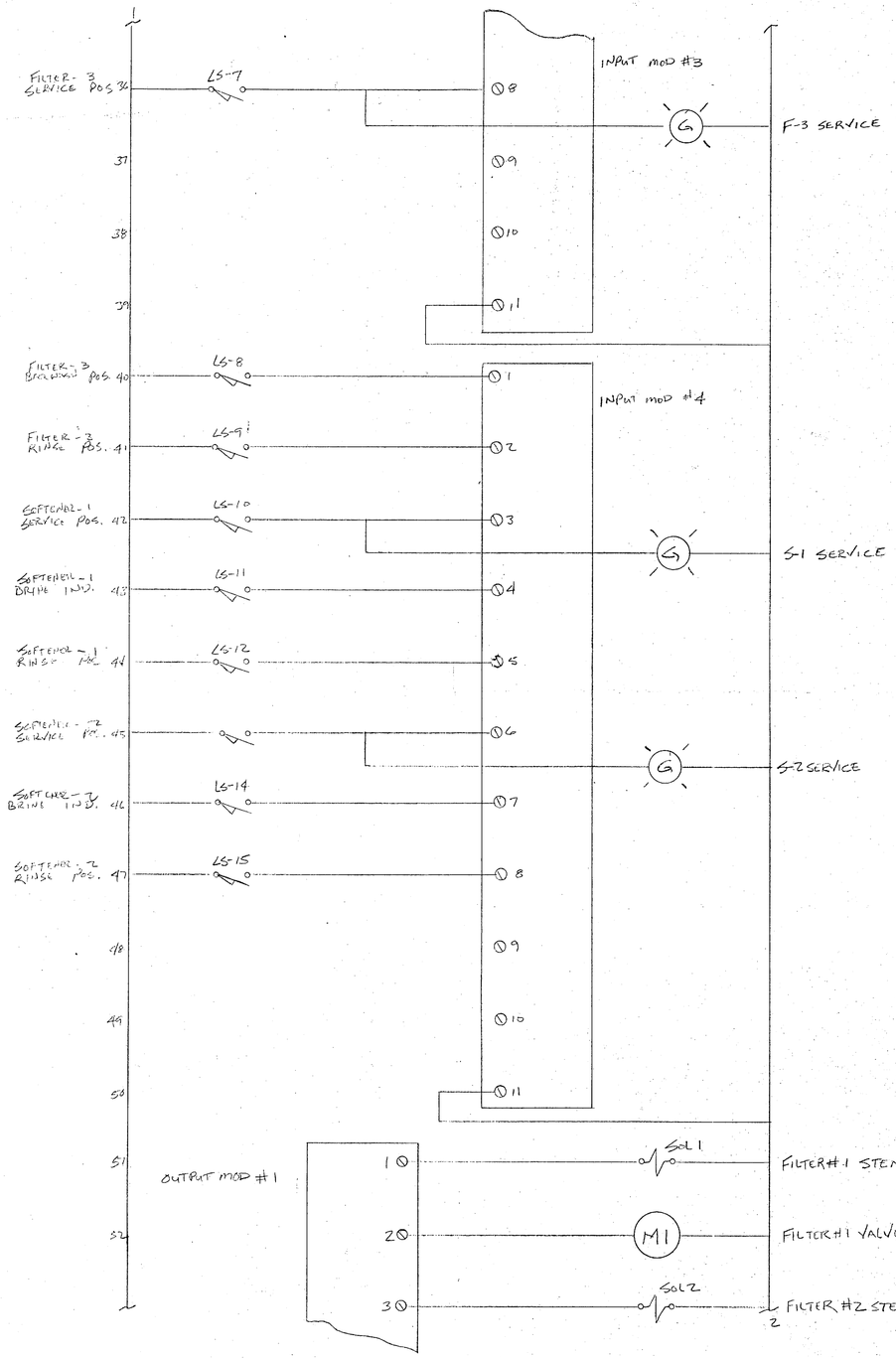
WORLD WIDE

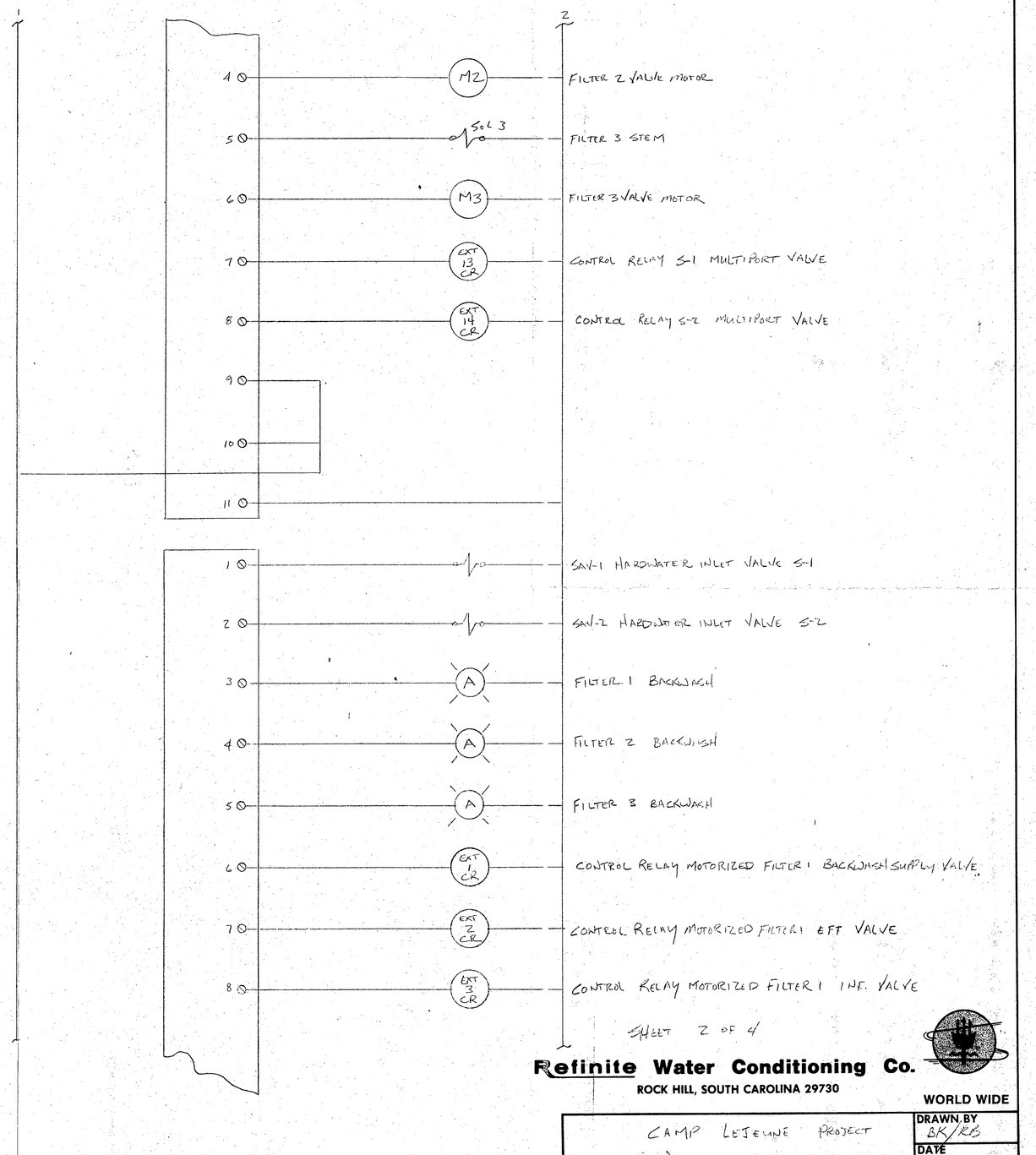
WIRING DIAGRAM

CAMP LEJEUNE, N.C

DRAWN BY	BK/RB
DATE	7-22-83
DRAWING NO.	RF-910-27

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY





SHEET 2 OF 4

Refinite Water Conditioning Co.

ROCK HILL, SOUTH CAROLINA 29730

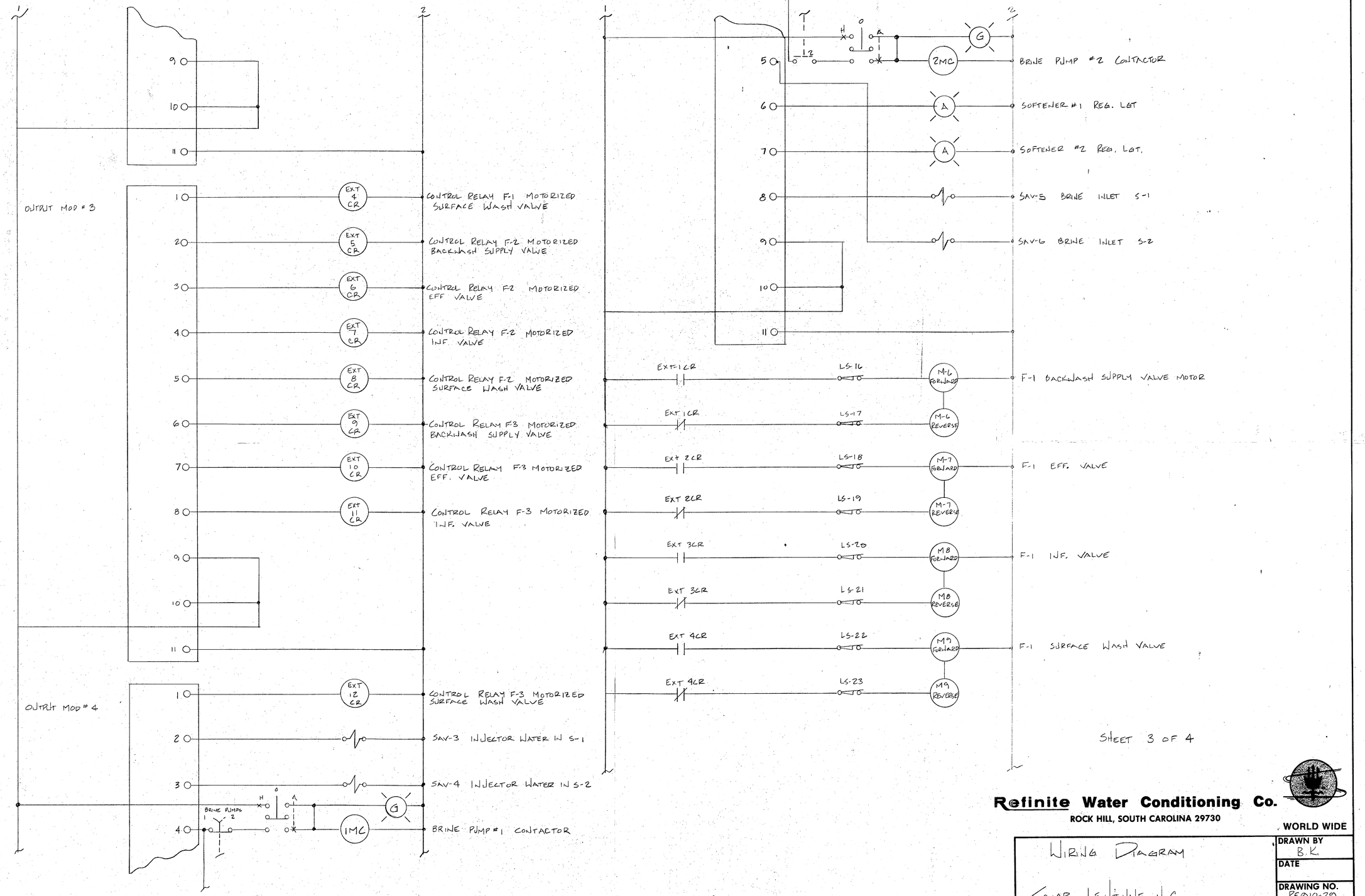
WORLD WIDE

CAMP LEJEUNE PROJECT

WIRING DIAGRAM

DRAWN BY	BK/RB
DATE	7-22-83
DRAWING NO.	RF 910-28

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY



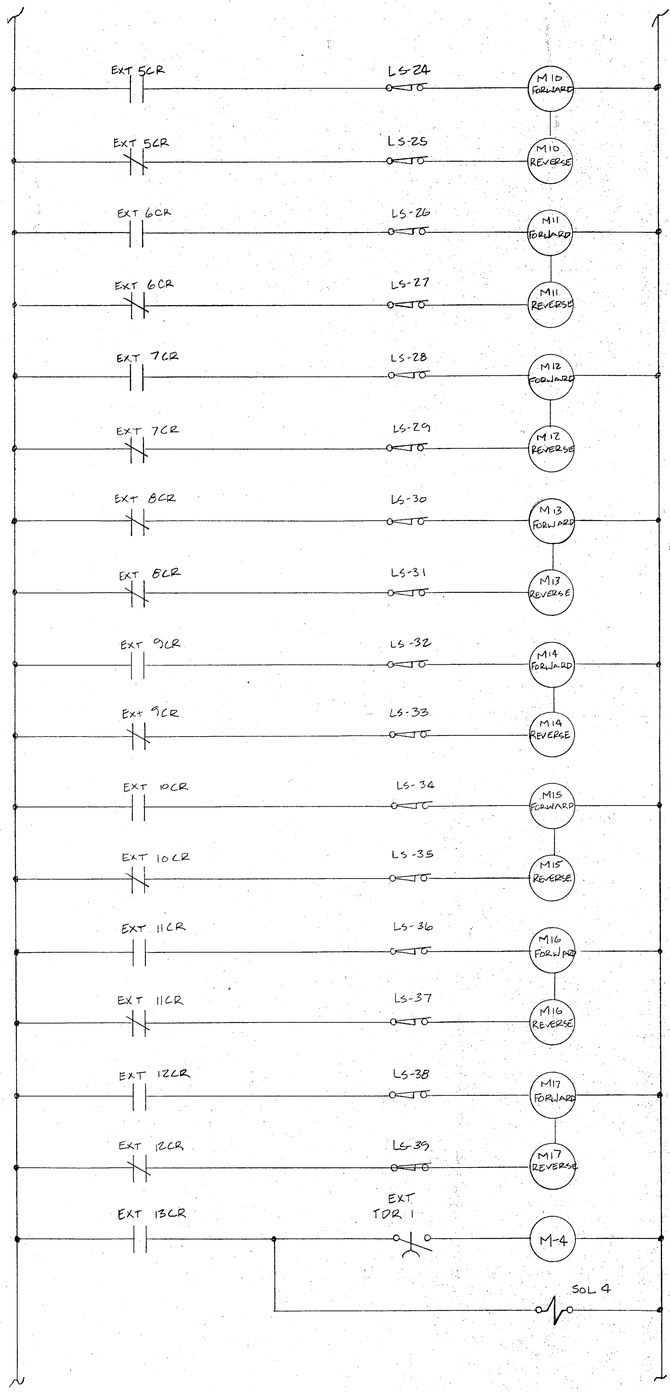
SHEET 3 OF 4

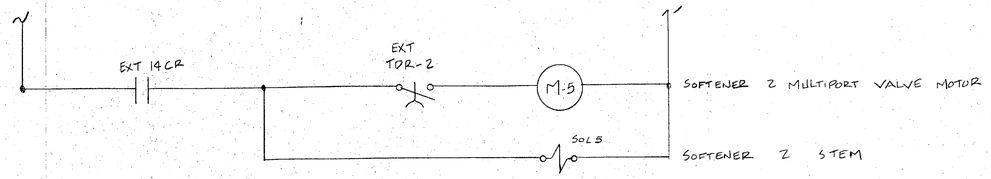
Refinite Water Conditioning Co.
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

WIRING DIAGRAM
CAMP LEJEUNE, N.C.

DRAWN BY: B.K.
DATE:
DRAWING NO.: RF.010-29

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY





Refinite Water Conditioning Co.
ROCK HILL, SOUTH CAROLINA 29730
WORLD WIDE

WIRING DIAGRAM

CAMP LEJEUNE, N.C

DRAWN BY: BK
DATE:
DRAWING NO.: RF-910-30

P.O. BOX 11676 | (803)-324-7600 | 555 PADDOCK PARKWAY

Refinite
P.O. Box 11676
Rock Hill, South Carolina 29730
803-324-7600