

# SERVICE INSTRUCTIONS

## OILGEAR TYPE "VSM" FOUR-WAY CYLINDER PREFILL AND EXHAUST VALVES, SIZE 250 (10") AND LARGER.

### PURPOSE OF INSTRUCTIONS

These instructions are written to simplify your work when installing, operating and maintaining Oilgear type "VSM" cylinder prefill valves. Your acquaintance with the construction, principle of operation and characteristics of these units will help you attain satisfactory performance, reduce down-time and increase the units' life. Some units have been modified from those described in this bulletin and other changes may be made without notice.



Figure 1. Typical Large Size "VSM" Prefill and Exhaust Valve (89036R).

### REFERENCE MATERIAL

	Piping Information . . . . .	Bulletin 90011		
	Prefill & Control Specifications . . . . .	Bulletin 86000		
Early Operator Instructions			Modular "VSM" Operator Instructions	
Plain Type . . . . .	Bulletin 986320		Plain Type . . . . .	Bulletin 986321
Resistance Type . . . . .	Bulletin 986330		Resistance Type . . . . .	Bulletin 986331
Solenoid Operated 4-Way Valve Type . . . . .	Bulletin 986350		4-Way Valve Type . . . . .	Bulletin 986352

## I. PREPARATION AND INSTALLATION

### A. MOUNTING

Thoroughly clean all external valve surfaces and remove all thread protectors. Mount the unit on a flat 63 RMS min. finish surface being sure o'ring (2) is in it's counterbore at Port 1.

### B. PIPING AND FITTINGS

See referenced "Piping Information" bulletin and individual circuit diagram before connecting prefill to system.

Remove flanges if pipes are being welded or brazed to them. Use piping compounds or Teflon, tape sparingly on tubes being threaded into flanges. Secure tubes and flange bolts tightly to prevent air being drawn into the system.

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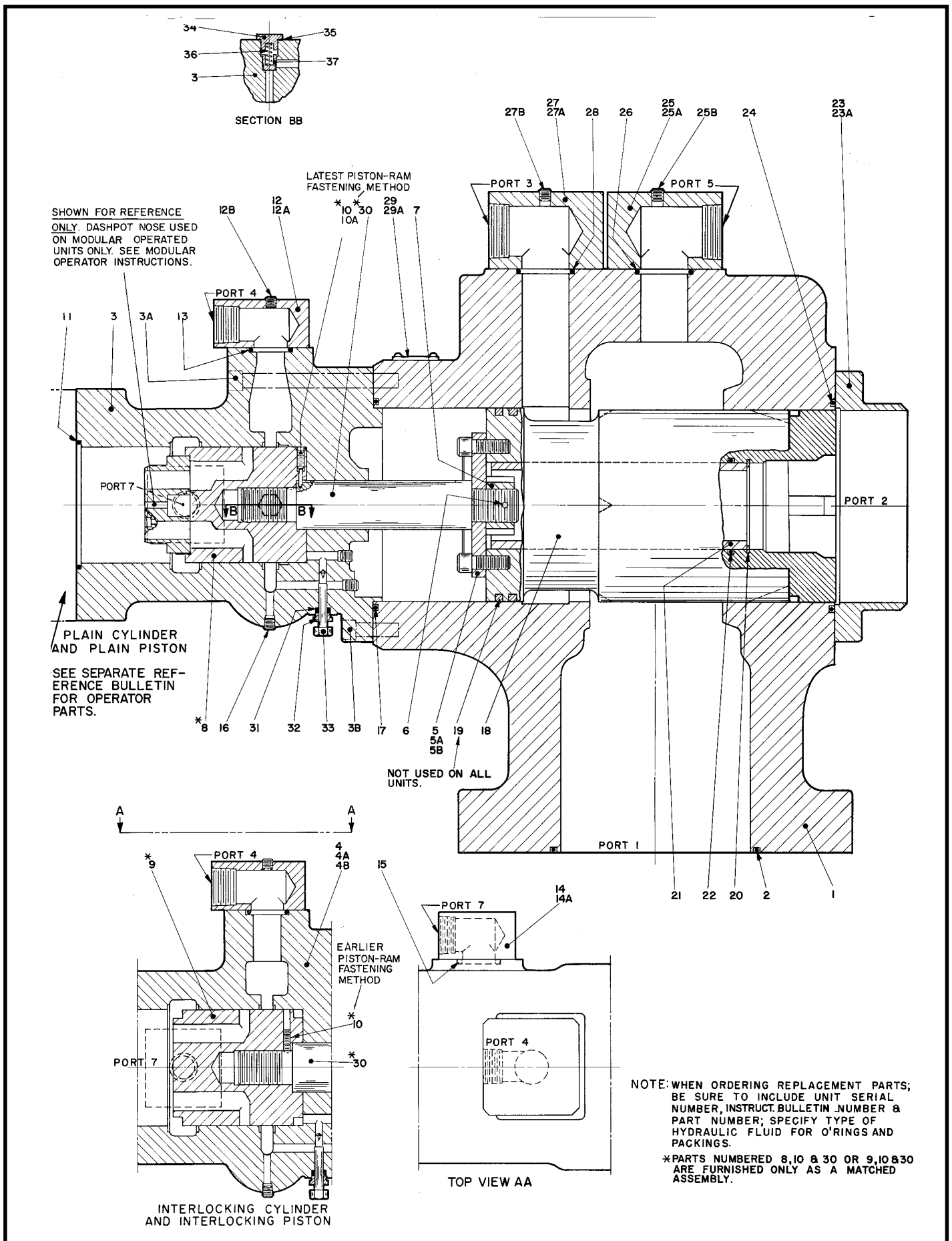


Figure 2. Parts Drawing, Basic Size 250 and Larger Prefill Valves Without Operators DS-986308B (504676B).

## II. CONSTRUCTION

Refer to Figure 2. The principle parts of these prefill valves are an operator (see separate reference bulletin); a control cylinder (3 or 4) and a control piston (8 or 9) of either the standard or interlocking type; the prefill valve body (1) and the prefill valve plunger (18).

### III. PRINCIPLE OF OPERATION

See diagram in applicable referenced operator bulletin.

#### A. PREFILL VALVE WITH STANDARD CONTROL PISTON AND PORT 7 PLUGGED.

Pilot fluid at Port 4 acts on the annular area of the control piston and shifts control piston and prefill valve plunger from "closed" to "open" position at a constant speed determined by pilot volume or the prefill valve operator. So, Port 1 (ported to cylinder) and Port 2 (ported to the reservoir) are connected; Port 3 (ported to high pressure supply) is blocked. Some units are equipped with operators (see referenced bulletin) that include an adjustable dashpot to "cushion" stop the control piston.

Pilot fluid flowing through the operator and acting on the full area of the control piston shifts the prefill valve plunger from "open" to "closed" at a constant speed. As the prefill valve plunger blocks Port 2, grooves in the plunger open Port 1 to Port 3 and the control piston enters an adjustable dashpot to slow down movement of control piston (and prefill valve plunger) as it closes.

#### B. PREFILL VALVE WITH STANDARD CONTROL PISTON AND PORT 7 OPEN

Pilot fluid at Port 4 acts on the annular area of the control piston and shifts control piston and prefill valve plunger from "closed" to "open" position at a constant speed determined by the pilot volume. As the prefill valve plunger blocks Port 3 and the decompression slots in the prefill valve plunger open between Ports 1 and 2, the control piston blocks un-obstructive discharge thru Port 7 and decreases speed of prefill valve plunger to that set by the prefill valve operator. As decompression is completed, the control piston simultaneously opens flow out thru Port 7 again and prefill valve plunger speed increases to a speed determined by pilot volume. Before full opening is reached, the control piston seals Port 7 again and an operator, dashpot (in units so equipped) cushions the plunger stopping.

Plunger movement from "open" to "closed" position is the same as described in the second paragraph of III-A. Circuit should be arranged so Port 7 does not allow bypassing of pilot fluid during closing cycle. If **three closing speeds** are desired, use a three-way valve to direct pilot fluid thru Port 7. In operation, pilot fluid flows thru unit operator to close main plunger at a fixed speed. When control piston permits pilot fluid to flow in thru Port 7, plunger speed is increased until dashpot decreases speed as described in second paragraph of III-A.

#### C. PREFILL VALVE WITH INTERLOCK CONTROL PISTON AND CYLINDER

The prefill valve plunger movement is the same as described in III-B except Ports 4 and 7 are connected when prefill valve is in "open" position. When valve is in "closed" position, Port 7 and operator are connected.

#### D. MORE "PRINCIPLE OF OPERATION"

See separate referenced bulletin on operator instructions for additional principle of operation description.

## IV. SPECIFICATIONS

See reference material and prefill valve operator material for "Pressure Drop vs. Flow" curves and other Specifications. See individual application circuit and/or installation drawings for exceptions.

### V. MALFUNCTIONS AND CAUSES

#### A. PLUNGER DOES NOT SHIFT PROPERLY

1. Dirt or foreign material causing plunger or control piston to stick.
2. Insufficient pilot fluid pressure.
3. Worn or broken piston rings.
4. Operator not functioning properly (see reference bulletin).

#### B. EXCESSIVE SLIP

1. Worn prefill valve plunger or broken piston rings.

### VI. TESTING AND ADJUSTING

See referenced prefill valve operator bulletins.

### VII. DISASSEMBLY

#### A. GENERAL

Refer to figure 2. It will be advantageous to tag similar parts (particularly screws, plugs and o'rings) during disassembly to be certain they don't become confused with similar parts and to ensure they will be returned to original location. Do not remove (locator) roll pins unless they are deformed or otherwise in need of replacement.

**WARNING: NEVER attempt to remove or install any component or assembly while system is running. Always shut-off power and release pressure from system before servicing or testing.**

#### B. PREPARATION

While disassembling or assembling unit, we recommend choosing an area where no traces of dust, sand or other abrasive particles, which can damage the valve and system, are in the air. We also recommend not working near welding, sand blasting, grinding benches and the likes. Place all parts on a CLEAN surface. To clean parts which have been disassembled, it is important to use CLEAN solvents. All tools and gages should be CLEAN prior to working with these units and new CLEAN threadless rags used to handle and dry parts.

Isolate the prefill valve from reservoir and press cylinder, or drain hydraulic fluid before disassembly.

#### CAUTION:

**Avoid allowing cylinder prefill plunger (18) movement beyond normal closed position or piston rings (19) will expand in Port 3 relief and lock plunger in body.**

**Refer to figure 2. Depending upon what part or parts are to be inspected, it may not be necessary to completely take apart all assemblies or disconnect piping.**

#### C. DISCONNECTING & DISMOUNTING

IF THE PREFILL VALVE CAN BE REMOVED FROM THE PRESS, disconnect all external piping, remove flanges (12, 14, 23, 25 and 27) and withdraw o'rings (13, 15, 24, 26 and 28). Remove valve body mounting bolts, lift and withdraw o'ring (2).

IF THE VALVE CAN NOT BE REMOVED FROM THE PRESS, disconnect piping from Ports 3, 4, 5 and 7 (if used), remove flanges (12, 14, 25 and 27) and withdraw o'rings (13, 15, 26 and 28).

## D. OPERATOR GROUP

Refer to the applicable operator instruction bulletin and remove the prefill valve operator assembly from the control cylinder (3) and withdraw o'ring (11).

## E. PREFILL VALVE

Remove screws (3A and 3B or 4A and 4B). Use a hoist for support and carefully separate control cylinder (3 or 4) from valve body (1). As control cylinder is separated laterally from valve body, the control piston assembly (8 or 9) will bring along the operating ram (30) and prefill valve plunger (18). The prefill plunger should be supported as it is removed. Remove o'ring (17).

To separate the control cylinder from the plunger, remove lock wire (5B) and screws (5A) and plunger can be pulled away. Tap out roll pin (6), remove lock nut (7) and connecting plate (5). Withdraw the control piston (8 or 9) and operating ram (30) from the control cylinder.

**WARNING: Do not remove control piston (8 or 9) from ram.**

Do not remove retaining ring (20), prefill plunger tube (21) and o'ring (22) unless necessary. If piston rings (19) are used, they can be removed from plunger.

To check dashpot choke needle, remove locknut (32), packing (31) and choke needle (33). To inspect dashpot check valve, remove cap (34), gasket (35) and withdraw spring (36) and disc (37).

## VIII. INSPECTION

Clean all parts thoroughly, inspect and replace any part showing signs of undue wear. Be sure o'rings are free from nicks, cuts, hardening, cracking or deterioration. NOTE: parts number (3, 8, 10, 10A and 30) or (4, 9, 10, 10A and 30) are furnished only as matched assemblies.

Wash all parts thoroughly prior to assembly.

**WARNING - Always wear safety goggles when using solvents or compressed air. Failure to wear goggles could result in serious personal injury.**

## IX. ASSEMBLY

### A. PREFILL VALVE

Install check valve disc (37), spring (36), gasket (35) and cap (34). Insert packing (31) and turn locknut (32) and choke needle (33) into control cylinder.

### CAUTION:

**If valve is equipped with a modular operator, see appropriate referenced bulletin for assembly of dashpot nose (and tell tale if used) to control piston.**

Carefully insert control piston and operating ram assembly (8, 10, 10A and 30) or (9, 10, 10A and 30) into the control cylinder (3 or 4). Install connector plate (5) on ram (30) and secure with lock nut (7) so there is a 0.003" clearance between locknut and connector plate. Secure locknut with roll pin (6).

If piston rings (19) are used, install them on prefill plunger. If removed, replace o'ring (22), prefill plunger tube (21) and lock in place with retaining ring (20). Secure prefill valve plunger (18) to connector plate (5) with screws (5A) and lock wire (5B). Insert o'ring (17) in prefill body groove. Carefully lift cylinder and prefill plunger assembly and guide prefill valve plunger (18) into its bore. **Be careful not to insert too far, or piston rings (19) will expand in Port 3 relief and lock plunger in body.** Secure the control cylinder (3 or 4) to prefill body (1) with screws (3A and 3B) or (4A and 4B).

## B. PREFILL OPERATOR

Install o'ring (11) in control cylinder. See reference material for applicable information on operator. See applicable operator reference for operator mounting.

## C. MOUNTING AND CONNECTING

If the unit was removed from the press, insert o'ring (2) and secure unit to its mounting. Install all o'rings (13, 15, 24, 26 and 28), flanges (12, 14, 23, 25 and 27) and connect piping to all ports.

**SEE SECTION "I. PREPARATION and INSTALLATION".**

## NOTES:

## X. PARTS LIST

Parts used in this assembly are per Oilgear specifications. Use Oilgear parts to ensure compatibility with assembly requirements. When ordering replacement parts, be sure to include prefill type designation, serial number, bulletin number and item number. To ensure seal and packing compatibility, specify type of hydraulic fluid used.

ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
1	Body, Prefill Valve	18	Plunger, Prefill Valve
2**	Seal, O'ring	19	Ring, Piston
3*	Cylinder, Standard Control	20	Ring, Retaining
3A	Screw, S.H.C.	21	Tube, Prefill Plunger
3B	Screw, S.H.C.	22**	Seal, O'ring
4*	Cylinder, Interlock Control	23	Flange, Port 2 Welding
5	Plate, Connector	23A	Screw, S.H.C.
5A	Screw, S.H.C.	24**	Seal, O'ring
5B	Wire, Lock	25	Flange, Port 5
6	Pin, Roll	25A	Screw, S.H.C.
7	Nut, Lock	25B	Plug, Pipe
8*	Piston, Standard Control	26**	Seal, O'ring
9*	Piston, Interlock Control	27	Flange, Port 3
10*	Screw, Set	27A	Screw, S.H.C.
10A*	Pin, Dowel (not used on early units)	27B	Plug, Pipe
11	Seal, O'ring	28**	Seal, O'ring
12	Flange, Port 4	29	Plate, Name
12A	Screw, S.H.C.	29A	Screw, Drive
12B	Plug, Pipe	30	Ram, Operating
13**	Seal, O'ring	31**	Packing, Choke Screw
14	Flange, Port 7	32	Nut, Lock
14A	Screw, S.H.C.	33	Needle, Choke
15**	Seal, O'ring	34	Cap, Check Valve
16	Plug, Pipe	35**	Gasket, Check Valve
17**	Seal, O'ring	36	Spring, Check Valve
		37	Disk, Check Valve

\* Parts numbered 3, 8, 10, 10A & 30 or 4, 9, 10, 10A & 30 are furnished only as a matched assembly.

\*\* Parts are included in Oilgear "Type A" Seal Kit.

### O'RING SIZES

#### Cross Section x O.D. Duro +5

ITEM NO.	PREFILL VALVE SIZE			
	250 (10")	300 (12")	350 (14")	400 (16")
2	1/4 x 11 90	1/4 x 13 90	1/4 x 15 90	1/4 x 17-1/2 90
11	1/4 x 6-1/2 90	1/4 x 6-1/2 90	1/4 x 6-1/2 90	1/4 x 6-1/2 90
13	3/16 x 2-1/4 90	3/16 x 3 90	3/16 x 3 90	3/16 x 3 90
15	3/16 x 2-1/4 90	3/16 x 3 90	3/16 x 3 90	3/16 x 3 90
17	1/4 x 11 90	1/4 x 13 90	1/4 x 15 90	1/4 x 17-1/2 90
22	3/16 x 4-7/8 90	3/16 x 4-7/8 90	3/16 x 4-7/8 90	3/16 x 6-1/2 90

## XI. AFTER SALES SERVICES

Oilgear builds products that last. However, it is the nature of this type of machinery to require proper maintenance regardless of the care that goes into its manufacture. Oilgear has several service programs to help you.

### “STAY-ON-STREAM” SERVICE:

By signing up for Oilgear’s “Stay-On-Stream” program you can prepare for problems before they happen. Certain field tests such as fluid testing, slip testing and electronic profile recording comparisons can be performed by our field service people or your own trained personnel. These tests can indicate problems before they become “down-time” difficulties.

### SERVICE SCHOOLS:

Oilgear holds schools to train your maintenance personal. A “general” hydraulic or electronic school is conducted in our Milwaukee plant on a regular basis. “Custom” schools, specifically addressing your particular hydraulic and electrohydraulic equipment can be conducted in your plant.

## SPARE PARTS AVAILABILITY:

Prepare for future needs by stocking Oilgear original factory parts. Having the correct parts and necessary skills “in-plant” enables you to minimize down-time. Oilgear has developed parts kits to cover likely future needs. Oilgear field service technicians also stand ready to assist your maintenance people in troubleshooting and repairing equipment.

## OILGEAR EXCHANGE SERVICE

Standard replacement pumps and motors are available to users of Oilgear equipment where comparable units will be returned in exchange. When standard replacements must be modified to replace units which are special, shipment will depend on availability of parts, assembly and test time necessary.

To obtain this service, place an order for an exchange unit and provide the serial number and type designation. The replacement unit will be shipped F.O.B. our factory, Milwaukee, Wisconsin. User retains the replacement and returns the worn unit prepaid to The Oilgear Company for reconditioning and test. When the unit is reconditioned and stocked, the user is billed the cost of reconditioning or a flat rate exchange price if one has been applied to that particular type of unit.



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