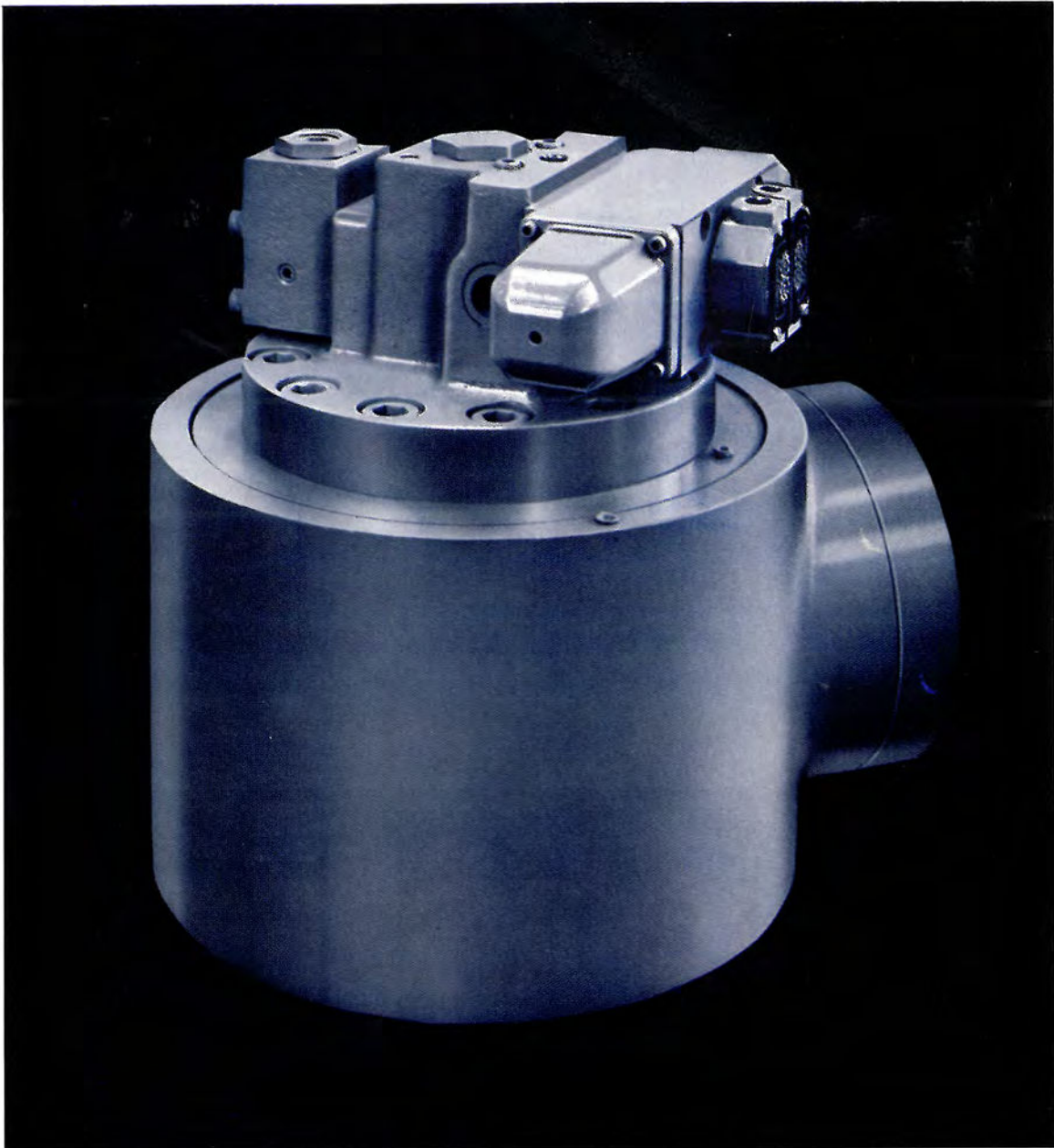


Oilgear

TYPE "VSA" CENTERFLO PREFILL UNITS



THE OILGEAR COMPANY

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Phone: (414) 327-1700

FEATURES AND BENEFITS IN BRIEF

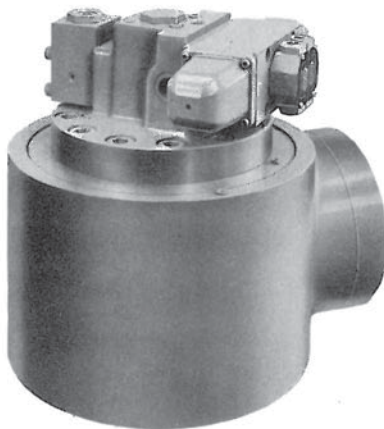


FIG. 1. Oilgear Type "VSA" Centerflo Prefill Unit with Optional Shroud.

Centerflo Prefill Units are used with hydraulic press circuits to gravity fill or exhaust main cylinders during rapid advance or return. The unit includes a port to connect pump to main cylinder during high tonnage pressing.

1. 5000 psi (350 bar) pressure rated.
2. Can be used with all normal hydraulic fluids.
3. For in-tank (w/o shroud) or external (w/shroud) mounting.
4. Four sizes (4", 6", 8", & 10") available.
5. Functional control modules available.
6. Special controls custom designed.
7. For either 2- or 3-way operation with built-in high pressure connection to cylinder.
8. Fast acting.
9. Dashpot cushioned operating cylinder.
10. Large openings minimize flow resistance and turbulence.
11. Pressure energized seals for very low (controlled) leakage at full pressure.
12. Flush mounted Port 1 for easy installation "in-tank," or on your cylinder or manifold block.
13. Flange type mounting.
14. Cylinder port includes pressure balanced sealing ring.
15. Can be mounted in any position.
16. Control, operator and main plunger easily removed for inspection w/o disturbing main body or shroud piping.

17. Shroud available with Flange for connection to tank.

Construction

See Figure 3. The Oilgear "VSA" Centerflo Prefill Unit basic assemblies are— 1) the prefill body, 2) an operator head containing, 3) an operator ram and 4) a control module. An optional low pressure shroud is also available. Shroud port connection for prefill line is oversized for minimum pressure drop.

The prefill body, has radially placed rectangular "gating" windows to allow flow between tank (port 2) and cylinder (port 1). When open, these windows provide a flow area equal to or larger than nominal port size. The shaped passages minimize flow resistance and turbulence. Captive O-rings prevent seal extrusion. Port 1 flange is flush for easy mounting in-tank, on your cylinder or manifold block with minimum machining on your part. Mounting holes in bottom flange of body allow use of short mounting bolts without distorting valve body.

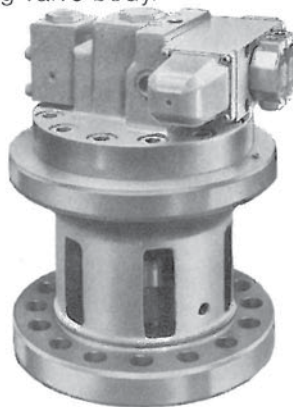


FIG. 2. Oilgear Type "VSA" Centerflo Prefill Unit w/integral Solenoid Control (54919R).

The radial pressure energized seal ring design increases service life and reduces high pressure leakage. With low pressure in the valve (during opening and closing) the metal seal rings are in the relaxed state and the clearance between them and the precision ground hollow main plunger is maximum as valve smoothly slides open or closed. When pressure is built up in the valve it acts on the outside diameter of the seals and compresses them to zero clearance. Leakage past the seals is very low and actually reduces as pressure increases. Operation is smooth—there are no seats for the large plunger to "bang home" on.

The operator head contains the operator ram and provides a mounting for the integral control modules which operate, through internal ports 4 and 6, to open and close the main plunger. This construction allows removal, (for inspection) of the control, operator ram and main plunger without necessitating removal of prefill body (or shroud) from tank and/or cylinder.

The precision ground operator ram, with automotive type piston rings, maintains a tight seal for positive shifting. Integral dashpot protects unit against mechanical shocks. Only control pilot fluid is dashpotted—resulting in more control than if the main plunger was dashpotted. Optional ram position telltails with integral micro switches are available.

The concept of integrating the high pressure supply port with the hollow operator ram and then telescoping it into the center of the main plunger reduces the mass of moving parts and overall height while providing convenient high pressure connection for 3-way operation. If 2-way function is desired, port 3 can be blocked.

Traverse Advance

See figure 3. Pressure at control port 4 retracts the operator ram and opens main plunger. Port 3 is blocked by operator ram. Tank port 2 is connected (without restriction) to cylinder port 1 allowing gravity pre-filling of cylinder.

Pressing

See figure 4. Pressure at control port 6 extends the operator ram into the dashpot, closes the main plunger thus blocking tank port 2. High pressure supply port 3 is connected through the hollow operator ram to cylinder port 1, providing for high pressure advance by pump volume and full tonnage pressing. Pressure also collapses sealing rings to prevent leakage. The connection of high pressure to the main cylinder (port 1) is of the cushioned bypass type to provide smooth operation.

Traverse Return

Following decompression (port 3 can be used), pressure at control port 4 will retract the operator ram, block high pressure port 3 and allow unrestricted exhaust from the cylinder port 1 to the tank port 2.

HOW THEY WORK

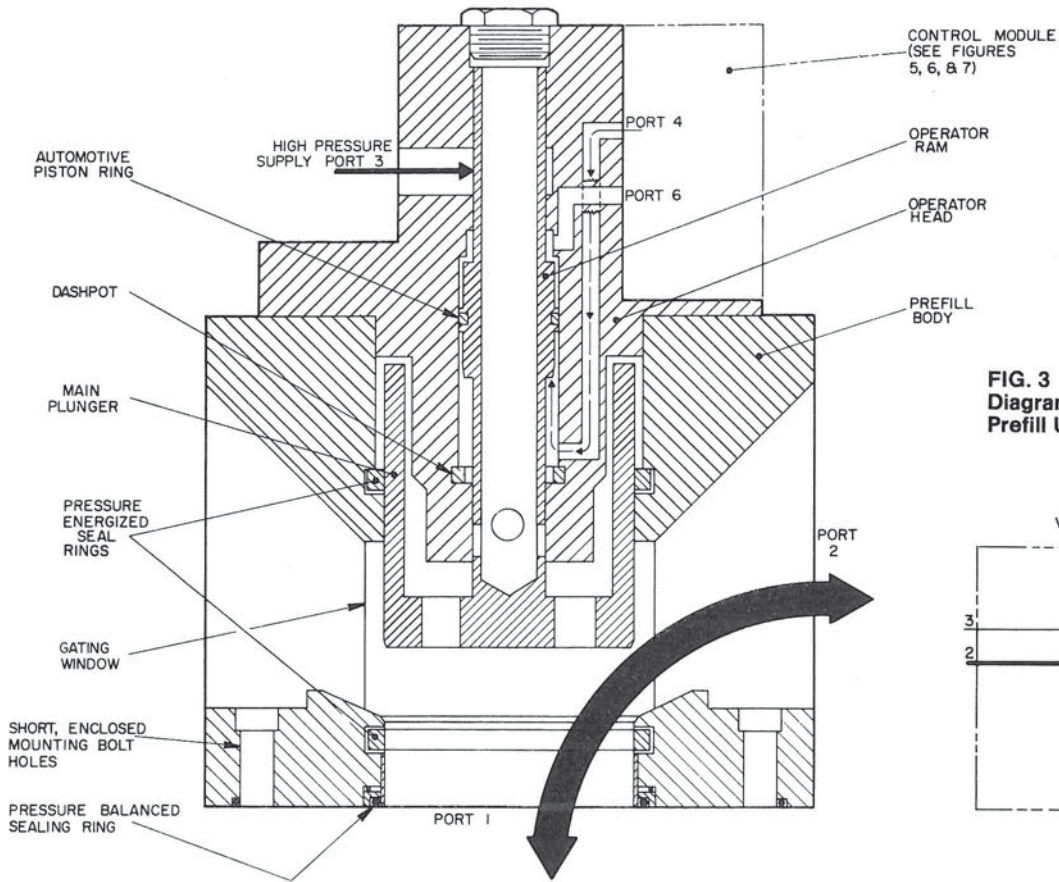


FIG. 3
Diagram of Oilgear "VSA"
Prefill Unit in OPEN position.

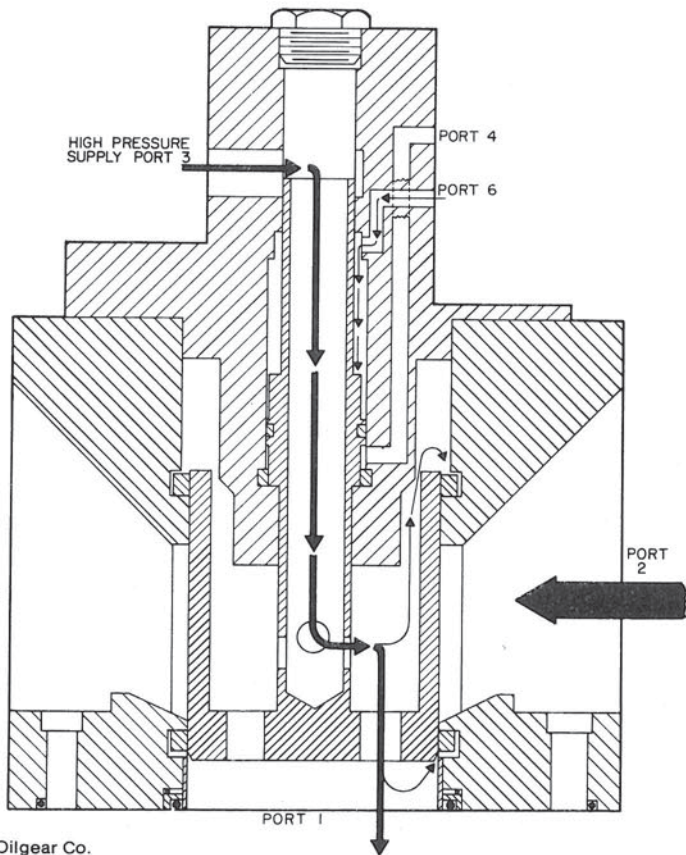
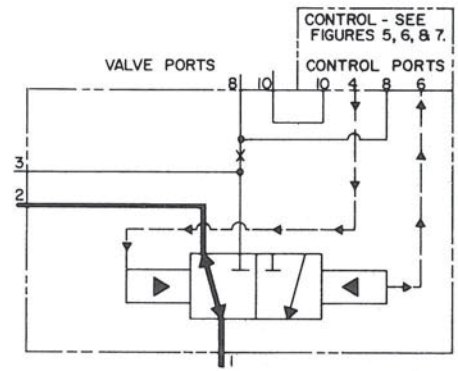
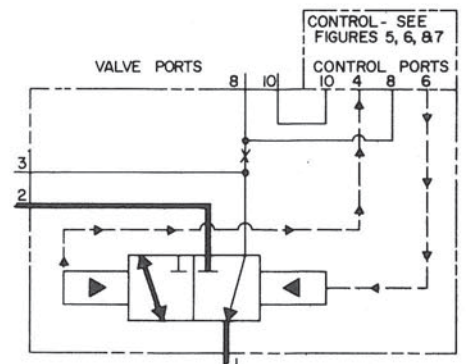


FIG. 4
Diagram of Oilgear "VSA"
Prefill Unit in CLOSED position.



CONTROL MODULES

Control Modules

Control modules become an integral part of Oilgear "VSA" Prefill Units. Functional controls are available for greater flexibility and optimum circuit design. Control modifications are available and special controls can be designed on request. The right control selection can greatly simplify your system.

Solenoid Control

A solenoid operated 4-way valve directs pilot volume and pressure (up to 5000 psi) to and from the operating ram to open and close the prefill as commanded by an electrical signal.

Resistance Control

Resistance control has a built-in resistance valve connected to port 6. When pressure builds up (at port 6) to an adjustable preset value (from 1250 to 5000 psi), the resistance valve opens, ports fluid to operating ram and closes the main plunger. When pressure at port 6 (and port 3) is reduced, pilot pressure applied to port 4 will open the valve. Opening rate is adjustable through the check/choke which meters fluid from the close end of operating ram back to port 6.

Plain Control

Pressure at port 6 closes the main prefill plunger and pressure at port 4 opens it.

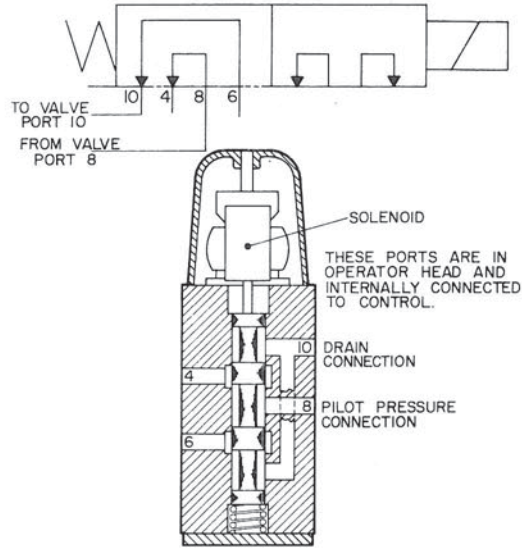


FIG. 5. Type "E" Solenoid Control.

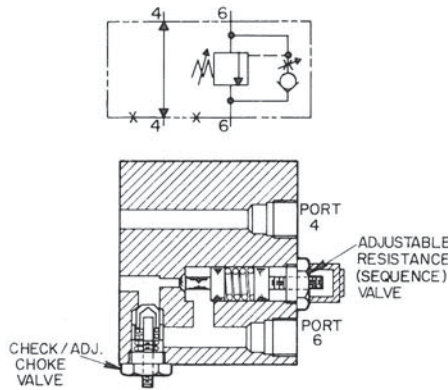


FIG. 6. Type "T" Resistance Control.

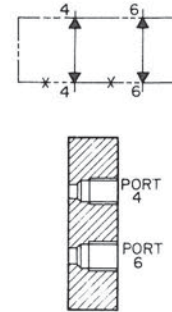


FIG. 7. Type "P" Plain Control.

REPRESENTATIVE APPLICATIONS

"Press Applications Unlimited" is a phrase describing Oilgear "VSA" Prefill Valves. Common applications such as extruders, forging presses, forming presses, hot plate presses, molding and casting machines, compression molders, high speed shears are only a few of the modern industrial machine applications. Oilgear has been designing and building fluid power systems since 1921. Our application-engineers and representatives are ready to serve you and help solve your power transmission problems and engineer the best possible system for your application.

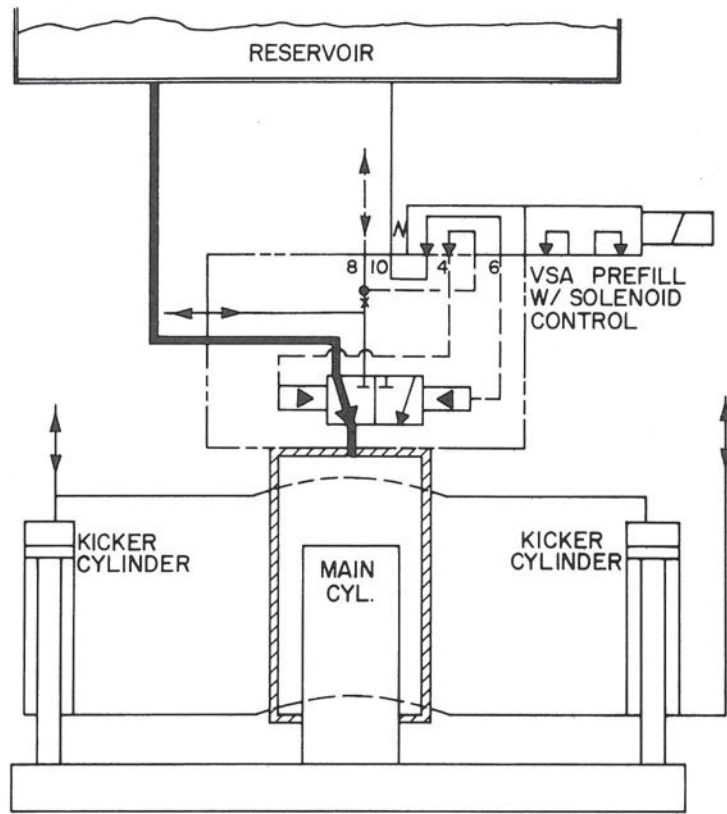


FIG. 8. Simplified press circuit with solenoid controlled "VSA" prefill and optional shroud.

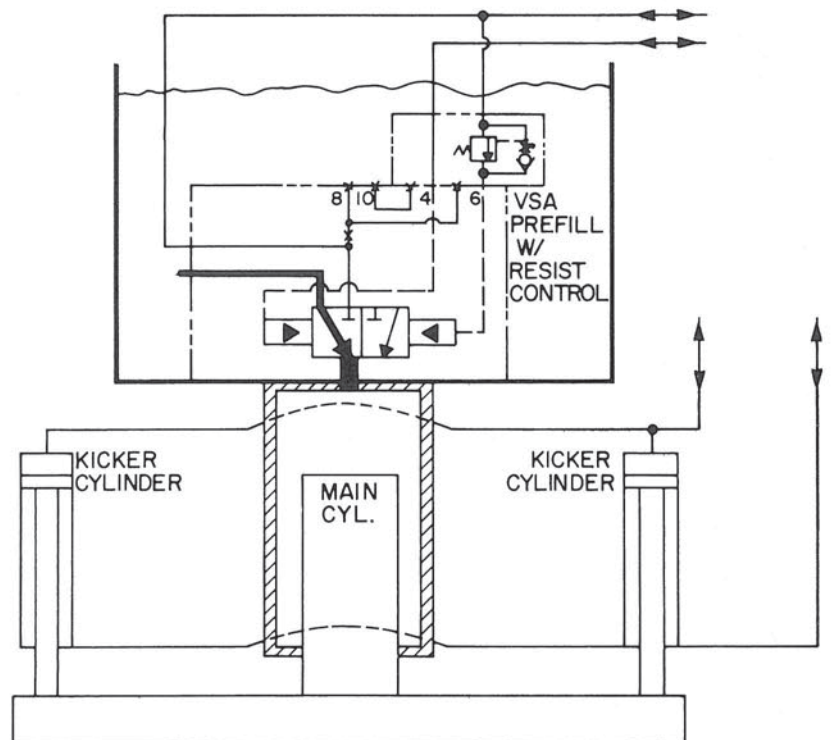


FIG. 9. Simplified press circuit with resistance controlled "VSA" prefill in-tank mounted.

REPRESENTATIVE APPLICATIONS (Cont.)

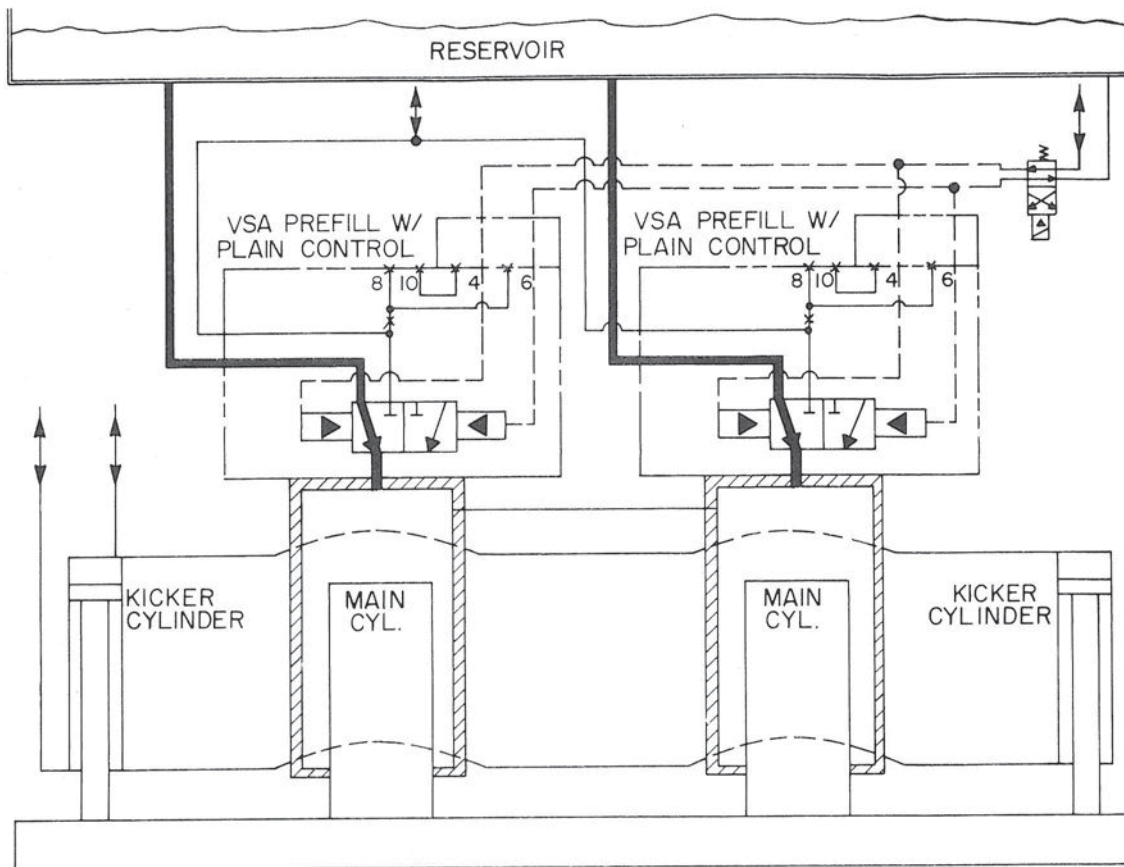


FIG. 10. Simplified press circuit with plain controlled "VSA" prefill valves and optional shrouds.

PERFORMANCE SPECIFICATIONS

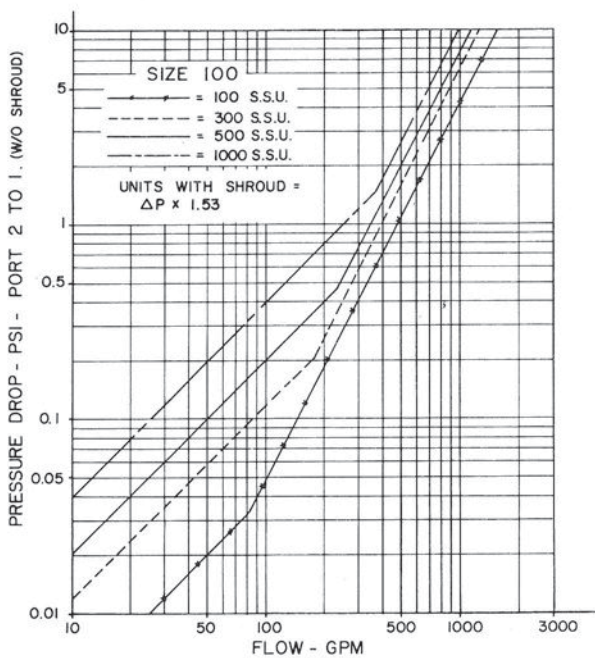


FIG. 11. Pressure Drop vs Flow, Port 2 to Port 1, Size 100 Prefill Unit.

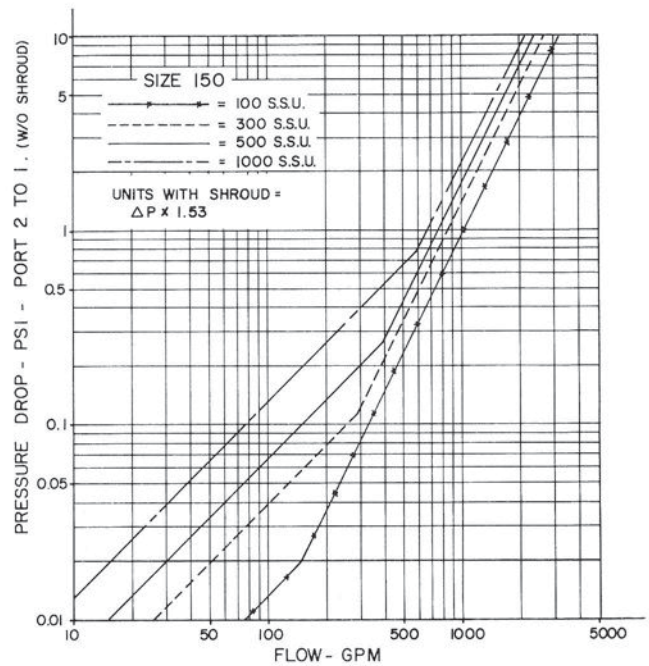


FIG. 12. Pressure Drop vs Flow, Port 2 to Port 1, Size 150 Prefill Unit.

PERFORMANCE SPECIFICATIONS (Cont.)

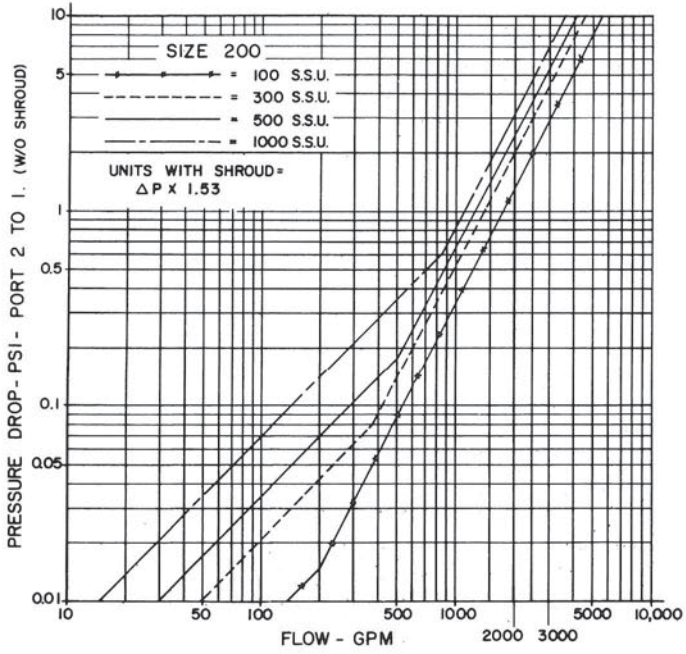


FIG. 13. Pressure Drop vs Flow, Port 2 to Port 1, Size 200 Prefill Unit.

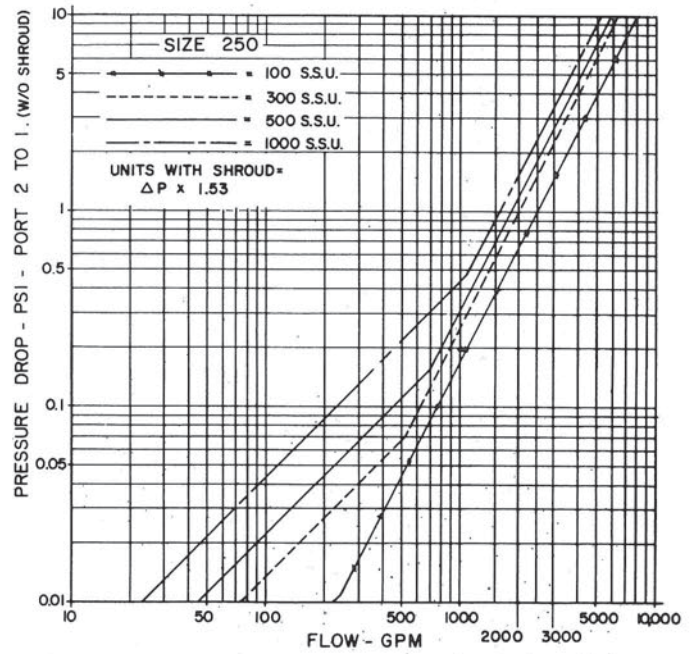


FIG. 14. Pressure Drop vs Flow, Port 2 to Port 1, Size 250 Prefill Unit.

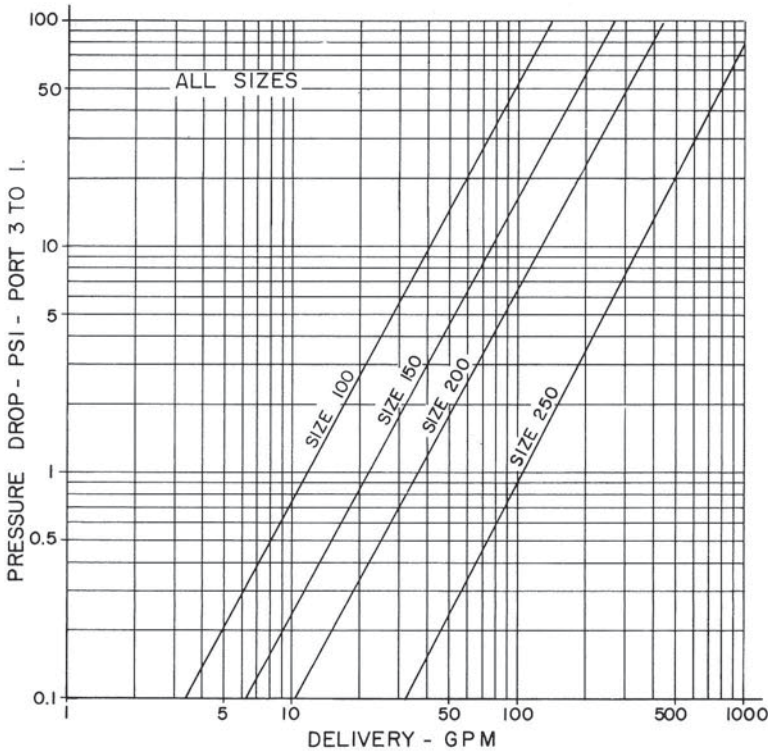


Fig. 15. Pressure Drop vs Flow, Port 3 to Port 1, all Prefill Valve Sizes. Performance typical of 300 SSU fluid. For other oil viscosities, ΔP corrected = $(\Delta P) (0.241) (SSU)^{.25}$. For fluids other than oil, $\Delta P = (\Delta P \text{ given}) (\text{Specific Gravity of Fluid}) \div 0.85$.

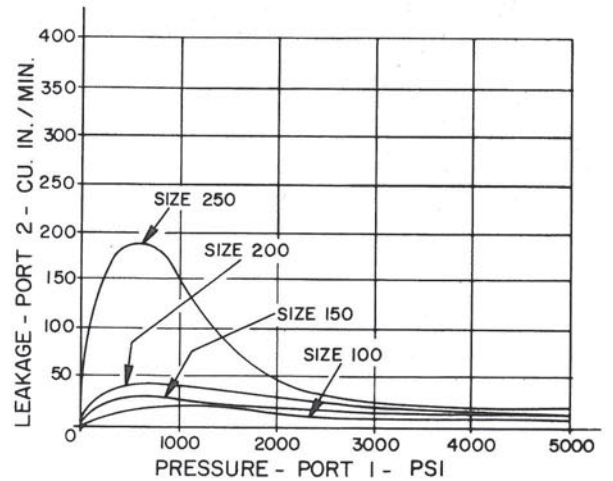


FIG. 16. Average Leakage (Port 1 to 2) vs Line Pressure, all Prefill Valve Sizes. Typical for 500 SSU fluid.

PERFORMANCE SPECIFICATIONS (Cont.)

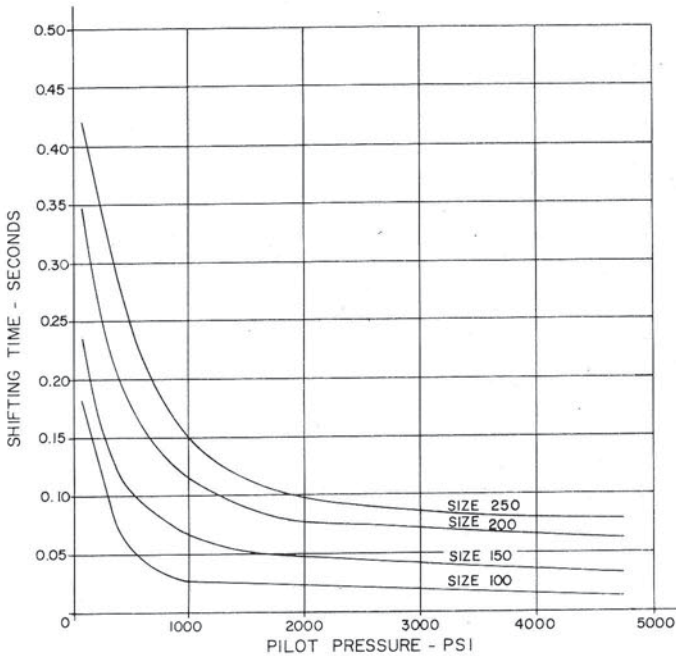


FIG. 17. Shift Time vs Control Pressure, Performance Typical for solenoid control, with accumulator at control pressure supply inlet, and for fluids up to 1000 SSU. See chart for pilot volume requirements.

Velocity vs Flow (in gpm)

Feet/Sec.	PREFILL SIZE			
	100	150	200	250
2	78.0	176.0	314	488
4	157.0	353.0	627	978
6	236	530	941	1470
8	314	705	1252	1956
10	393	882	1567	2448
12	471	1057	1878	2934
14	550	1235	2193	3426
16	629	1412	2508	3918
18	707	1587	2819	4404

Maximum pressure (port 3 to 1) _____ 5000 psi

Maximum shroud pressure (port 2) _____ 20 psi

Control Specifications

SIZE	100	150	200	250
Stroke, inches	1.81	2.56	3.25	3.875
Pilot Area, inches ²	1.18	2.02	3.09	3.14
Volume open to close, inches ³	2.13	5.19	10.05	12.18
Pilot pressure, psi				
max.	5000	5000	5000	5000
min.	80	80	80	100

Conversions

PSI ÷ 14.5 = bar Inches² × 645.16 = mm²
 GPM × 3.79 = liters Inches³ × 16.39 = milliliters
 Inches × 25.4 = mm Feet/sec. × 0.305 = m/sec.

GUIDE TO SIZING PREFILL VALVES

1. Refer to figures 18, or 19, or 20. Determine head "H" (in feet) between ram and level of fluid in reservoir.
2. Knowing maximum expected flow through prefill and "H," determine approximate valve size from figure 21. As an example, 2000 gpm and an "H" of -2.0 feet requires a size 250 valve at the recommended velocity for this head "H."
3. Check the valve size selection by determining pressure in cylinder during prefill per the following:

$$P_{abs} = P_{atm} + P_H - P_V - P_L$$

Where: -

See figures 18 or 19 or 20

$$P_H = \text{Pressure due to head} = 0.37 \text{ psi/ft} \times \text{"H"}$$

(assuming a fluid specific gravity of 0.87)

Altitude in ft.	P _{atm} in PSIA
0	14.7
2000	13.6
4000	12.7
5000	12.2
6000	11.8
8000	10.9
10000	10.1
12000	9.3

IN TANK MOUNTED P_L DOES NOT APPLY.

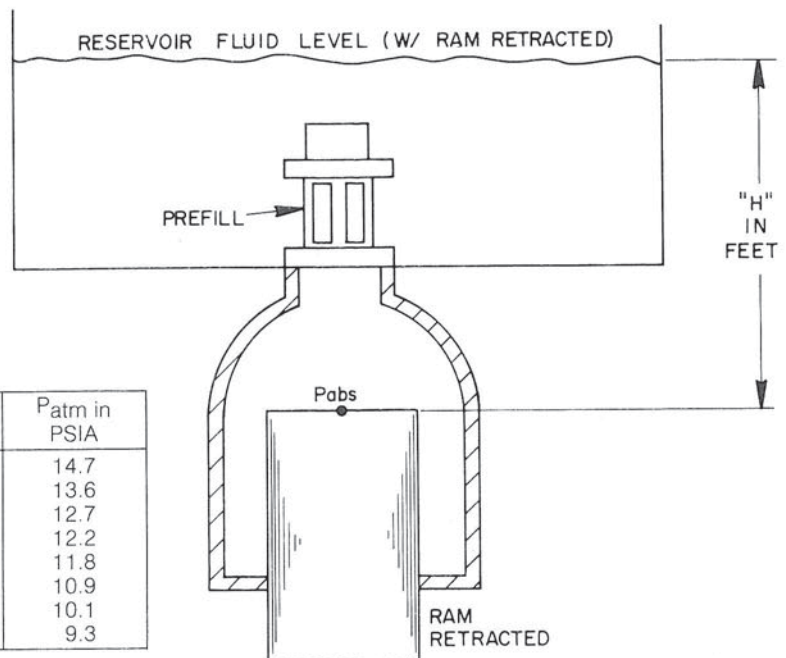


FIG. 18. Prefill installed in reservoir and directly connected to cylinder.

GUIDE TO SIZING PREFILL VALVES (Cont.)

See figures 11 thru 14

P_V = Pressure drop through prefill valve

See figures 19 and 20 with reference to 22 thru 25

P_L = Pressure drop due to line loss and elbows

4. For typical prefill service a " P_{abs} " of 11.5 or greater is suitable.

For special installation or assistance in valve selection, consult your Oilgear Representative.

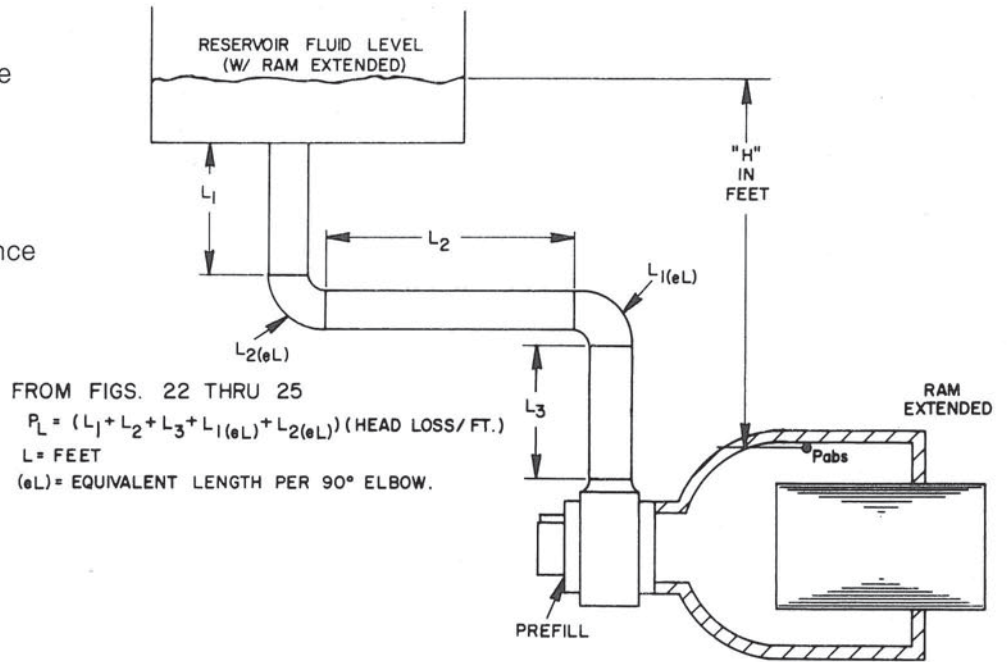


FIG. 19. Prefill mounted on cylinder and connected to bottom of reservoir.

FROM FIGS. 22 THRU 25

$$P_L = (L_1 + L_2 + L_1(eL)) \text{ (HEAD LOSS / FT.)}$$

L = FEET

(eL) = EQUIVALENT LENGTH OF PIPE PER 90° ELBOW

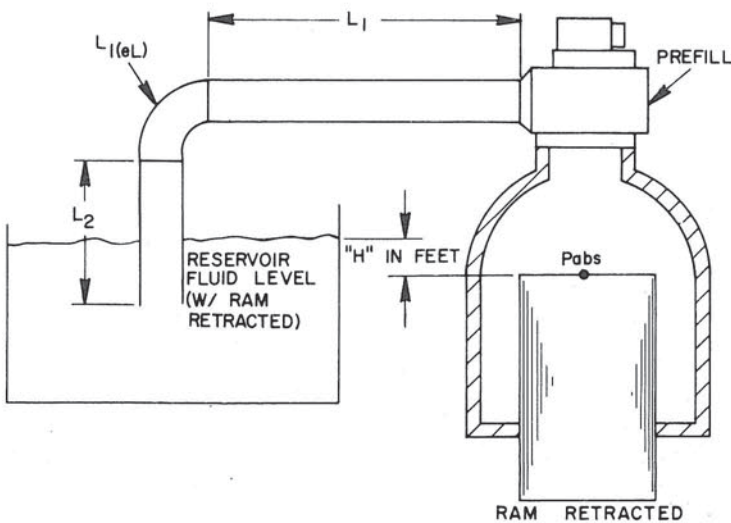


FIG. 20. Prefill mounted on cylinder and connected to top of reservoir.

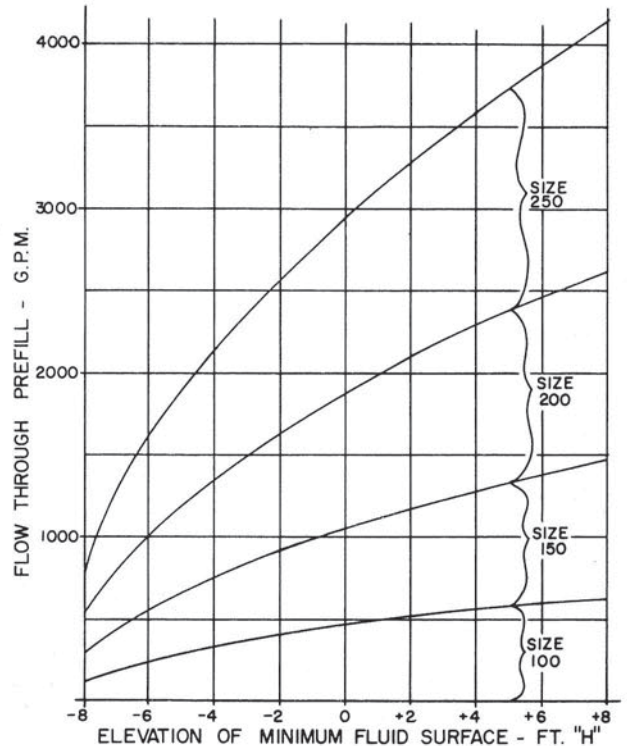


FIG. 21. Flow vs Head, all Prefill Sizes.

GUIDE TO SIZING PREFILL VALVES (Cont.)

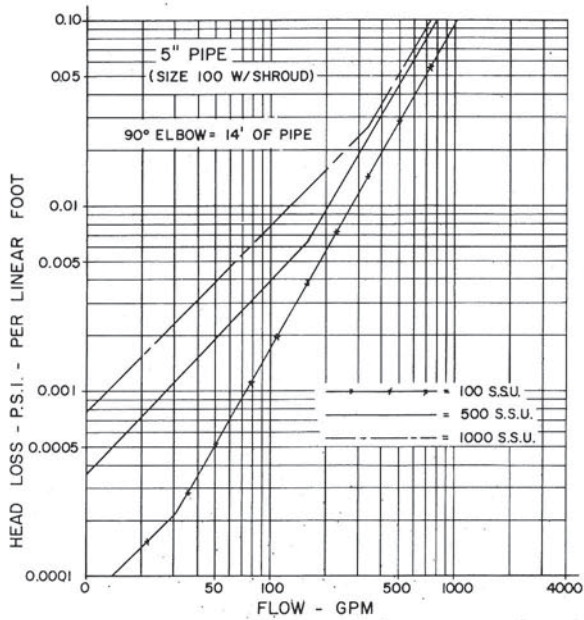


FIG. 22. Line Head Loss vs Flow, for 5" Pipe (size 100 prefill shroud connection).

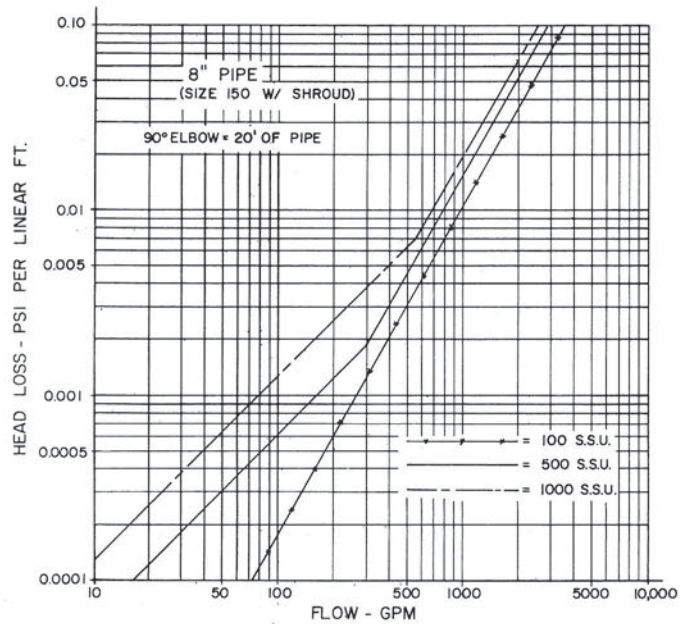


FIG. 23. Line Head Loss vs Flow, for 8" Pipe (size 150 prefill shroud connection).

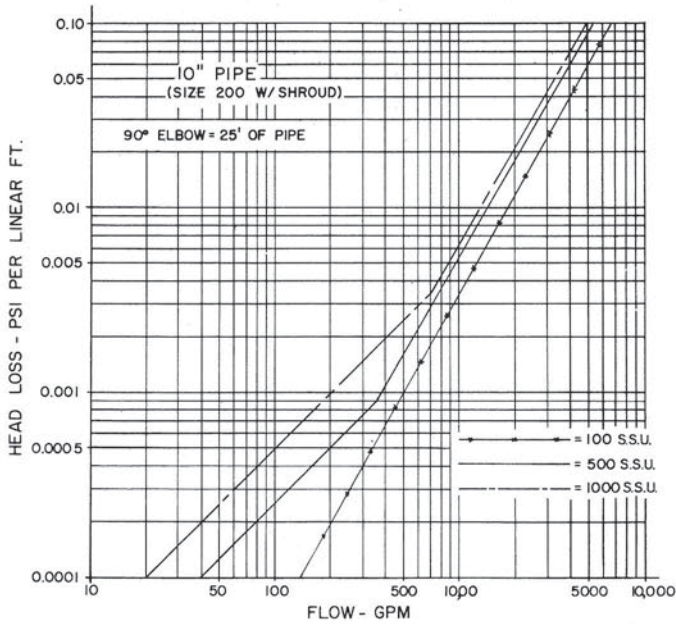


FIG. 24. Line Head Loss vs Flow, for 10" Pipe (size 200 prefill shroud connection).

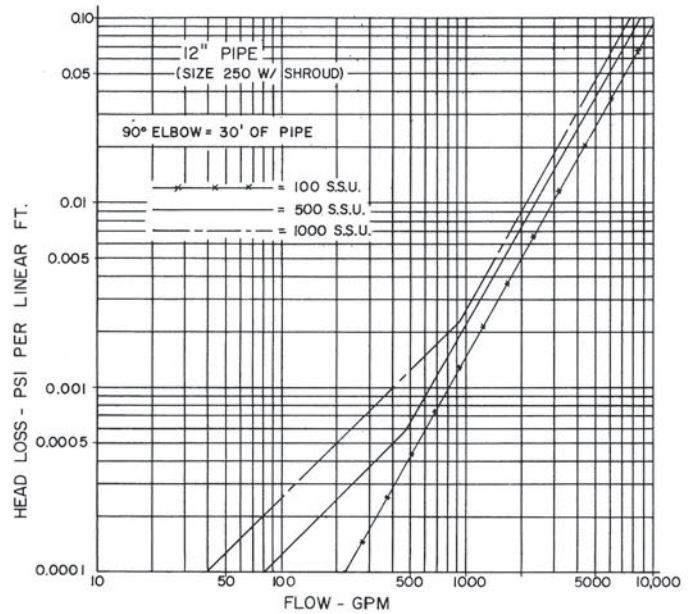


FIG. 25. Line Head Loss vs Flow, for 12" Pipe (size 250 prefill shroud connection).

SIZE 100 "VSA" PREFILL UNIT INSTALLATION

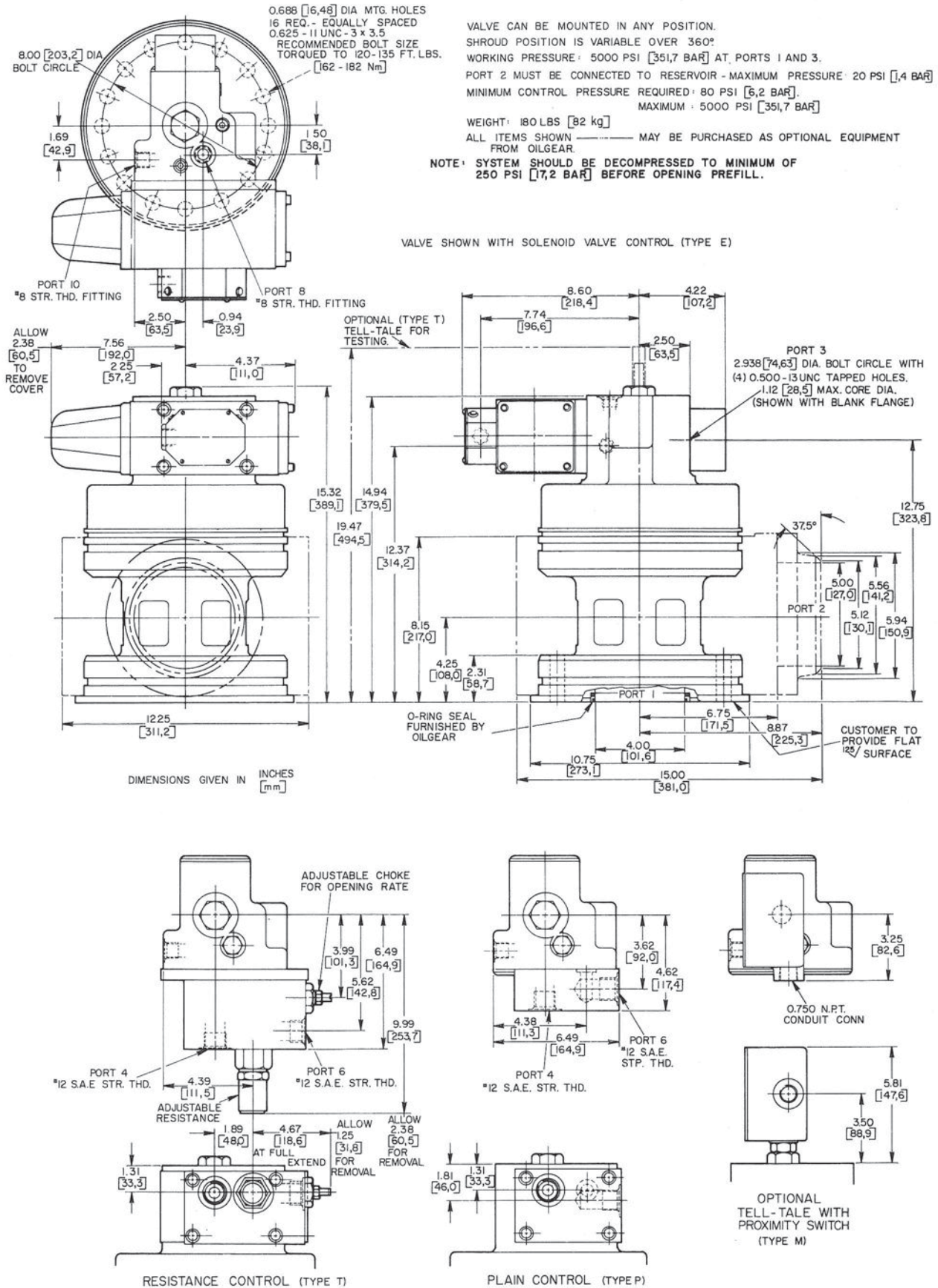


FIG. 26. Size 100 "VSA" Prefill Unit Installation (DS-86500-1D).

SIZE 150 "VSA" PREFILL UNIT INSTALLATION

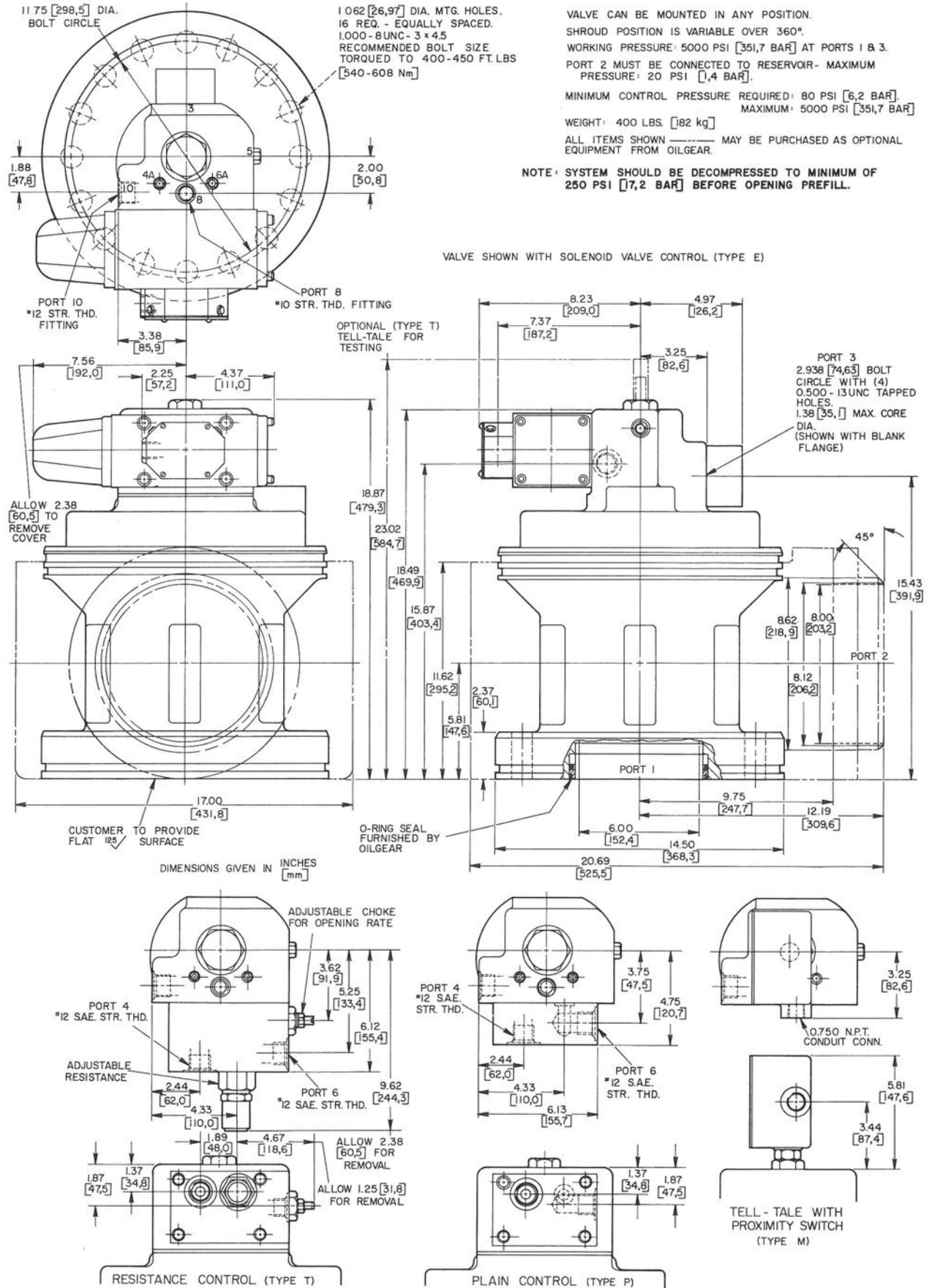


FIG. 27. Size 150 "VSA" Prefill Unit Installation (DS-86500-2D).

SIZE 200 "VSA" PREFILL UNIT INSTALLATION

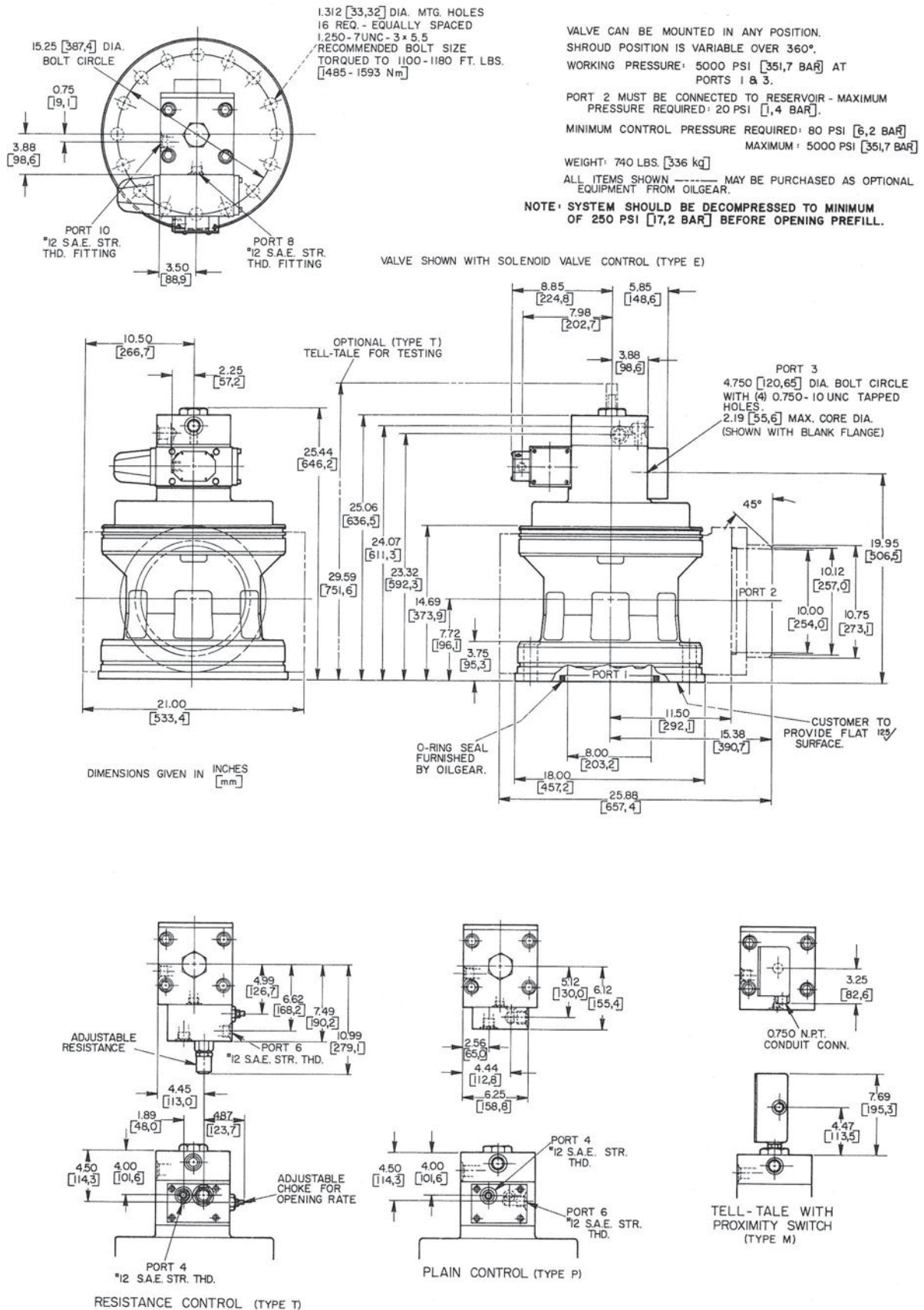
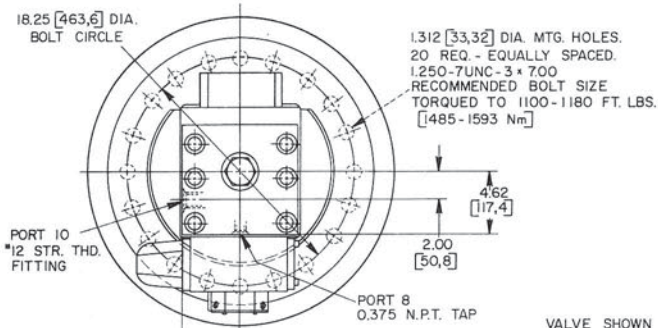


FIG. 28. Size 200 "VSA" Prefill Unit Installation (DS-86500-3D).

SIZE 250 "VSA" PREFILL UNIT INSTALLATION



VALVE CAN BE MOUNTED IN ANY POSITION. SHROUD POSITION IS VARIABLE OVER 360°.

WORKING PRESSURE: 5000 PSI [351,7 BAR] AT PORTS 1 & 3.
PORT 2 MUST BE CONNECTED TO RESERVOIR - MAXIMUM PRESSURE: 20 PSI [1,4 BAR].

MINIMUM CONTROL PRESSURE REQUIRED: 80 PSI [5,2 BAR]
MAXIMUM: 5000 PSI [351,7 BAR]

WEIGHT: 2265 LBS [1028 kg]

ALL ITEMS SHOWN _____ MAY BE PURCHASED AS OPTIONAL EQUIPMENT FROM OILGEAR

NOTE: SYSTEM SHOULD BE DECOMPRESSED TO MINIMUM OF 250 PSI [17,2 BAR] BEFORE OPENING PREFILL.

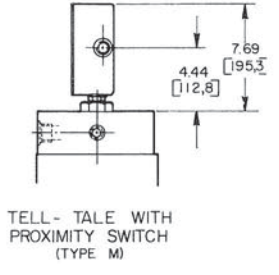
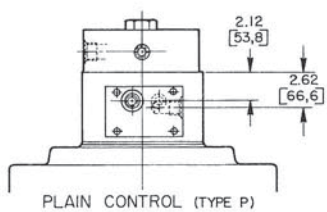
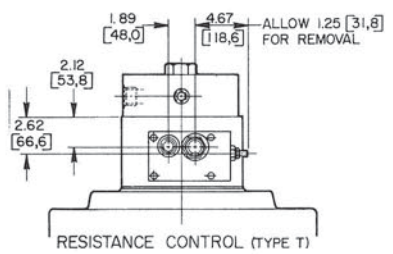
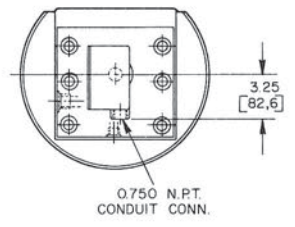
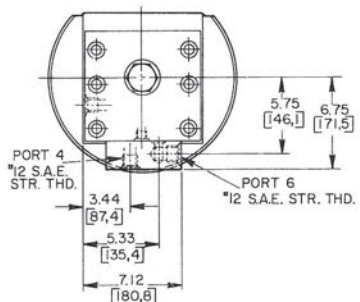
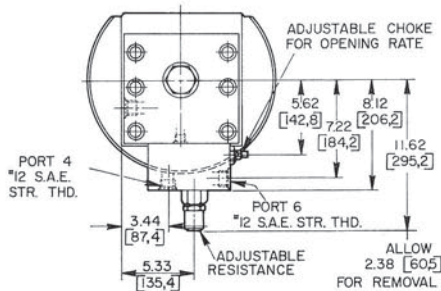
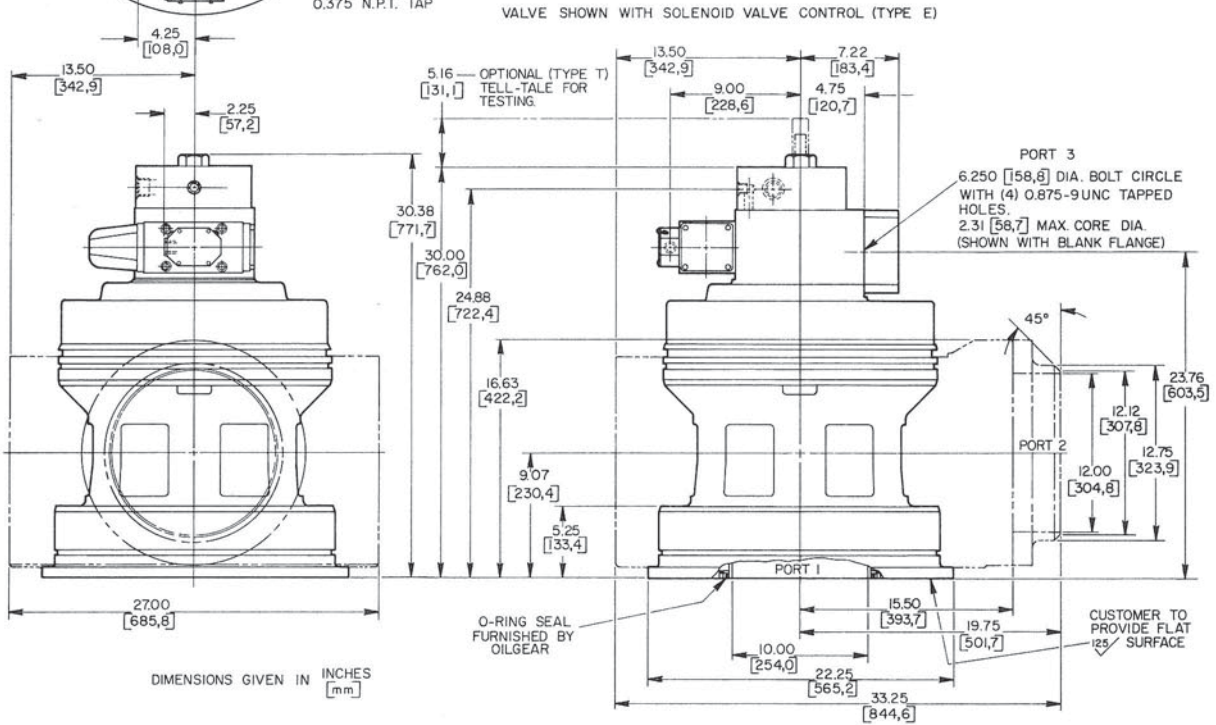


FIG. 29. Size 250 "VSA" Prefill Unit Installation (DS-86500-4D).

HOW TO ORDER

Block Number	1	2	3	4	5	-	6	7	8	-	9	-	10	11
Example	V	S	A	E	N	-	S	3	N	-	200	-	13	W

1 = Unit

V = Valve

2 = Basic Type

S = Prefill

3 = Style

A = Centerflo

4 = Control Module

E = Solenoid

P = Plain

T = Resistance

5 = Style Modification

M = Telltail w/Proximity Switch

N = None

T = Telltail (for test purpose only, not installed by Oilgear)

6 = Plunger Function

S = Prefill

7 = Plunger Style

3 = Three-way

8 = Plunger Modification

N = None

9 = Valve Size

100 = 4" nominal

150 = 6" nominal

200 = 8" nominal

250 = 10" nominal

10 = Port 3 Flange

B = Blank (standard)

S = Specify in writing for anything other than blank

(See Bulletin 89910 for other flanges available.)

11 = Enclosure

C = Without shroud

W = With shroud and shroud flange

For seal and paint compatibility, specify type of hydraulic fluid to be used.

Special and modified valves are also available—consult your Oilgear Representative.

Changes in the equipment described in this bulletin may be made without notice.

For further information, details, etc., contact your Oilgear Representative.

Oilgear

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