

VARIFLO™ Pressure Atomizing Nozzles for good atomizing over a wide flow range



SPRAY CHARACTERISTICS

- Good atomization over a wider flow range.
- Wider spray angles at lower flow rates.
- Less subject to clogging.
- Less buildup of carbon and gum residue

HOW IT WORKS

The Delavan Variflo nozzle is a pressure atomizing nozzle which provides discharge rate variations without changing nozzles. This is accomplished by the bypass principle.

With constant inlet supply pressure and the bypass (return line) closed, the nozzle operates as a simplex atomizing nozzle. For a reduced discharge flow the bypass line is opened and part of the fuel is allowed to return to the tank. The advantage is reduced flow without deterioration of the spray quality.

The maximum to minimum discharge flow rate at constant supply pressure is referred to as the “turndown ratio”. The standard catalog nozzles have turndown ratios of approximately 5 to 1.

The key advantage of the Variflo over a simplex nozzle (like Delavan’s oil burner nozzles) is flexibility; larger turndown ratios with better atomization. With the Variflo nozzle, using a constant supply pressure, the discharge flow rate varies approximately as the square of the bypass pressure. This means that at minimum flows the atomization pressure is reduced approximately 34 percent. With the simplex nozzle the discharge flow rate varies as the square root of the supply pressure. This means that to obtain one-half of the design flow rate the supply pressure must be reduced by 1/4 of the original pressure. This pressure is too low for good atomization.

INSTALLATION

The Delavan Variflo nozzle may be:

1. Operated at a fixed discharge rate. The rates may be set by a valve to any flow rate in the nozzle’s range.

2. Adapted for 2-stage firing. This is helpful when a low-fire start is required.

3. Operated with complete modulation over the designed flow range (with proper equipment).

The fuel supply system for the Variflo nozzle is the same inlet pump and pressure control system as for a simplex nozzle. The only difference is that pump capacity must be at least 50 percent over the rated (maximum) flow rate of the nozzle.

For a **FIXED FIRING RATE**, with manual adjustment when required, hook up as shown in figure 1. Use a relief valve for the bypass system control.

For **2-STAGE FIRING**, the hookup is the same except a solenoid valve is added. (See inset, figure 1.) The bypass control valve in this hookup should be set for minimum flow with the solenoid normally open for low fire. High fire is obtained by closing the solenoid. The solenoid may be actuated by a timer or temperature or pressure sensing element.

For **COMPLETE MODULATION**, hook up as shown in figure 1 except use a modulating valve by temperature or pressure, through the proper modulating motor, linked to the combustion air supply.

Remove pressure gauges from the system after making adjustments. The pressure gauge provides an air cushion in the system which causes after-squirt and drooling.

Return the bypass line to the supply tank as shown in figure 1. The Variflo nozzle can, under some conditions, draw air into the bypass line through the discharge orifice even during operation. If the air were piped to the suction side of the pump, the pump could become air locked with a resulting pressure loss. Another advantage to returning the line to the tank is extended nozzle life because the nozzle will run cooler.

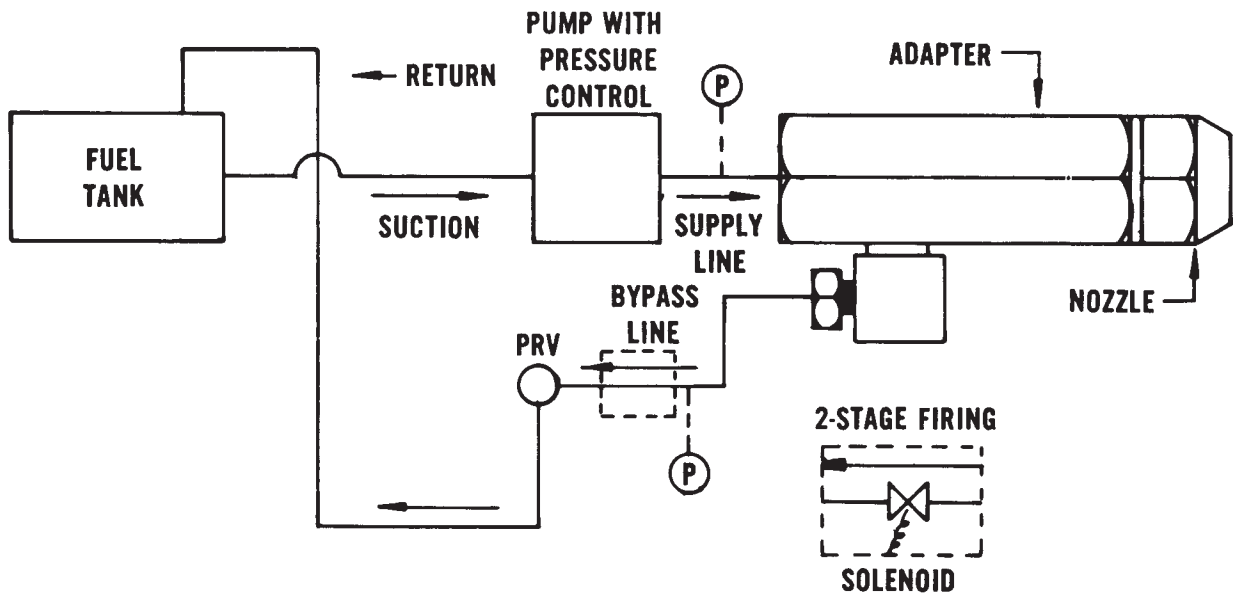
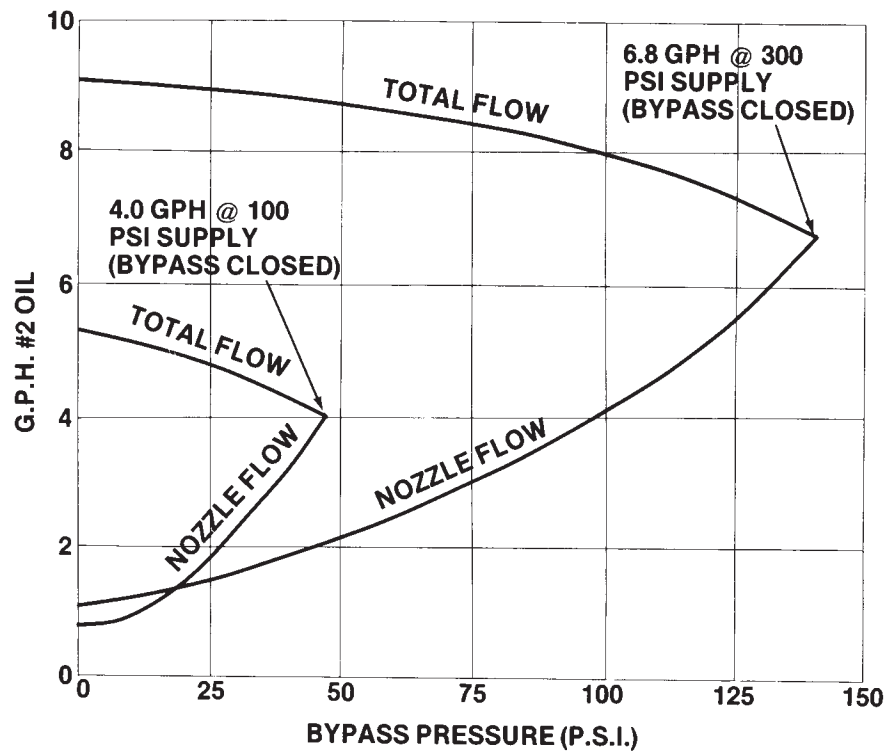
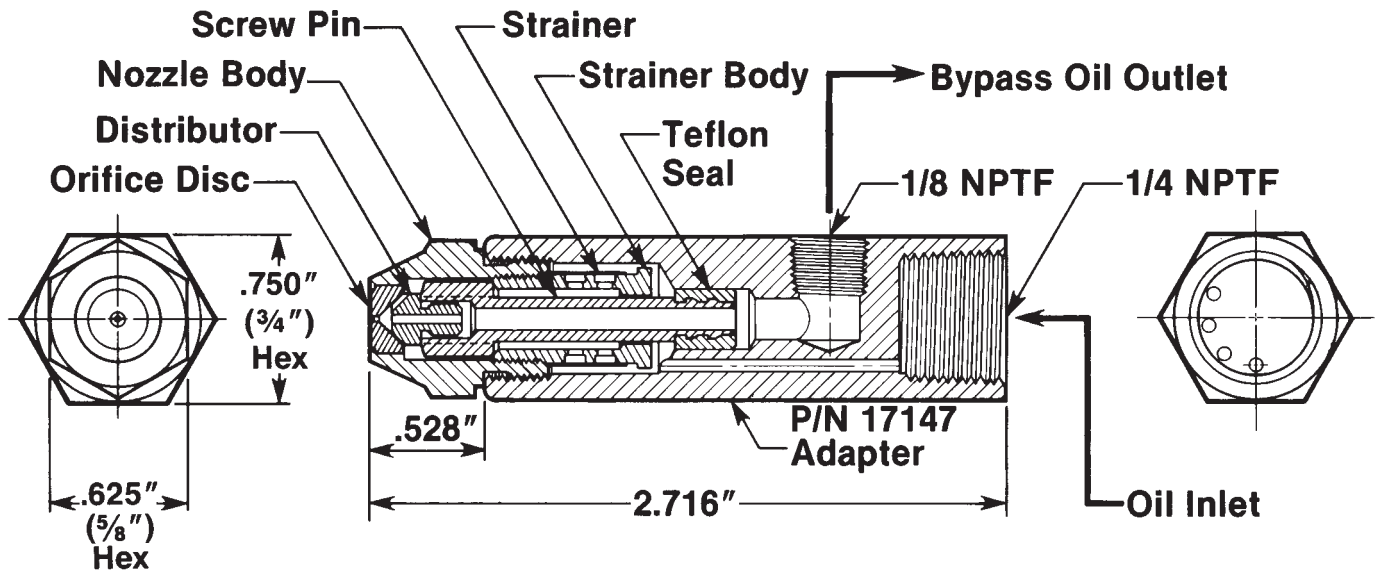


FIGURE 1. INSTALLATION SCHEMATIC



TYPICAL CURVE @ 100 & 300 PSI SUPPLY
(5 to 1 turn down — 5/8" hex size)



Variflo Nozzle Assembly P/N 33769

- (see chart for dash no. corresponding to flow & spray angle desired)
VARIFLO NOZZLE CAPACITY CHART

Dash No.	Spray Angle	Bypass Closed Calibrated Nozzle Flow-GPH	100 PSI Supply		300 PSI Supply
			Bypass Open		Bypass Closed
			Total Flow -GPH (Ref.)	Nozzle Flow -GPH (Ref.)	Nozzle Flow -GPH (Ref.)
- 1 - 2	45° 60°	.75	1.02	.20	1.27
- 3 - 4	45° 60°	1.00	1.30	.22	1.60
- 5 - 6 - 7	45° 60° 80°	1.50	1.90	.30	2.30
- 8 - 9 -10	45° 60° 80°	2.00	2.60	.38	3.30
-11 -12 -13	45° 60° 80°	2.50	3.40	.49	4.00
-14 -15 -16 -17	30° 45° 60° 80°	3.00	4.00	.57	5.00
-18 -19 -20 -21	30° 45° 60° 80°	3.50	4.60	.67	6.00
-22 -23 -24 -25	30° 45° 60° 80°	4.00	5.20	.78	6.80
-26 -27 -28 -29	30° 45° 60° 80°	4.50	6.00	.85	7.50
-30 -31 -32 -33	30° 45° 60° 80°	5.00	6.6	.97	8.60
-34 -35 -36 -37	30° 45° 60° 80°	5.50	7.40	1.02	9.10
-38 -39 -40 -41	30° 45° 60° 80°	6.00	8.00	1.17	9.90

Dash No.	Spray Angle	Bypass Closed Calibrated Nozzle Flow-GPH	100 PSI Supply		300 PSI Supply
			Bypass Open		Bypass Closed
			Total Flow -GPH (Ref.)	Nozzle Flow -GPH (Ref.)	Nozzle Flow -GPH (Ref.)
-42 -43 -44 -45	30° 45° 60° 80°	6.50	8.50	1.25	10.75
-46 -47 -48 -49	30° 45° 60° 80°	7.00	8.90	1.35	11.80
-50 -51 -52 -53	30° 45° 60° 80°	7.50	9.90	1.41	12.50
-54 -55 -56 -57	30° 45° 60° 80°	8.00	10.60	1.56	13.5
-58 -59 -60 -61	30° 45° 60° 80°	9.00	11.50	1.72	15.00
-62 -63 -64 -65	30° 45° 60° 80°	9.50	12.80	1.78	15.90
-66 -67 -68 -69	30° 45° 60° 80°	10.00	13.40	1.92	16.70
-70 -71 -72 -73	30° 45° 60° 80°	12.00	15.90	2.26	20.80
-74 -75 -76 -77	30° 45° 60° 80°	14.00	19.00	2.75	23.50
-78 -79 -80	45° 60° 80°	16.00	21.00	3.10	27.00
-81 -82 -83	45° 60° 80°	18.00	24.00	3.40	31.20
-84 -85 -86	45° 60° 80°	20.00	26.50	3.70	33.80
-87 -88 -89	45° 60° 80°	22.00	28.70	4.10	36.80
-90 -91 -92	45° 60° 80°	24.00	31.50	4.65	41.00
-93 -94 -95	60° 80° 90°	28.00	36.00	5.22	48.50
-96 -97 -98	60° 80° 90°	30.00	38.50	5.80	51.50
-99 -100 -101	60° 80° 90°	35.00	46.40	6.70	59.60
-102 -103	60° 80°	40.00	50.00	10.70	68.00
-104 -105	60° 80°	45.00	58.00	9.70	75.50
-106 -107	60° 80°	50.00	62.00	13.90	84.50

NOTE: 30° & 90° nozzles listed above available on special order only.

Other flow rates and spray angles available on special order.

Nozzles are calibrated for flow and spray angle at 100 PSI on #2 oil. Spray angles at 300 PSI will be somewhat narrower than spray angle at 100 PSI. As bypass is opened, spray angle will increase (up to 15° wider) both at 100 PSI and 300 PSI supply.

ORDERING INSTRUCTIONS

WHEN ORDERING VARIFLO NOZZLES, be sure to include both part number and description. Specify P/N 33769 – (see nozzle capacity chart for dash number corresponding to flow and spray angle desired). Order adapter separately (specify P/N 17147).

Dimensions and Adapter Information

Nozzle Body Size	Dimensions (Inches)			Adapter P/N	Adapter Threads Npt		Seal P/N
	Overall Length	Adapter Hex	Seal Surface to Nozzle Face	(Includes Seal)	Return Port	Supply Inlet	(Teflon)
5/8" Hex	2.72	0.75	0.528	17147 Brass	1/8	¼	247
13/16" Hex	2.81	0.813	0.620	30298 Brass	1/8	¼	337
1-1/4" Hex	3.67	1.25	0.800	31437 Mild Steel	¼	3/8	1733

13/16" Variflo Nozzle Assembly

P/N 30630 Standard brass body with stainless steel metering set, 4 to 1 turndown ratio.

P/N 30631 Brass body with hardened stainless steel metering set, 4 to 1 turndown ratio.

P/N 30632 Brass body with threaded screw pin, 4 to 1 turndown ratio.

P/N 30633 All stainless steel components, 4 to 1 turndown ratio.

P/N 30687 All stainless steel components with threaded screw pin, 4 to 1 turndown ratio.

Max Capacity in GPH			Standard Spray Angle at Maximum Flows (widens slightly at lower flows)					
@150 PSI inlet pressure Using #2 fuel oil	@300 PSI inlet pressure Using #2 fuel oil Rated Flow	@300 PSI using #5 Fuel Oil preheated to 100 SSU	30°	45°	60°	70°	80°	90°
14.2	20	Approx same as for #2 fuel oil	-1	-2	-3	-4	-5	-6
17.7	25		-7	-8	-9	-10	-11	-12
21.2	30		-13	-14	-15	-16	-17	-18
Recommended 300 PSI next Column	35		-19	-20	-21	-22	-23	
	37.5		-51	-52	-53	-54	-55	
	40		-24	-25	-26	-27	-28	
	45		-29	-30	-31	-32	-33	
	50		-34	-35	-36	-37	-38	
	55			-56	-57	-58	-59	
	60			-39	-40	-41	-42	
	65			-60	-61	-62	-63	
70		-43	-44	-45	-46			
80		-47	-48	-49	-50			

1-1/4" Variflo Nozzle Assembly

P/N 30637 Standard stainless steel, 4 to 1 turndown ratio.

P/N 30649 All stainless steel with threaded screw pin, 4 to 1 turndown ratio.

P/N 30689 All stainless steel with hardened metering set, 4 to 1 turndown ratio.

P/N 30690 All stainless steel with hardened metering set and threaded screw pin, 4 to 1 turndown ratio.

@150 PSI inlet pressure Using #2 fuel oil	@300 PSI inlet pressure Using #2 fuel oil Rated Flow	@300 PSI using #5 Fuel Oil preheated to 100 SSU	Standard Spray Angle at Maximum Flows (widens slightly at lower flows)			
			60°	70°	80°	90°
Recommended 300 PSI next Column	80	Approx same as for #2 fuel oil	-1	-2	-3	-4
	90		-5	-6	-7	-8
	100		-9	-10	-11	-12
	125		-13	-14	-15	-16
	150		-17	-18	-19	-20
	165					-21