

Type N100, N100A, N110, & N120 Series Instruction Manual



WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, and/or fire causing property damage and personal injury or death.

Fisher equipment must be installed, operated, and maintained in accordance with federal, state, and local codes and Fisher instructions. The installation in most states must also comply with NFPA 58 or ANSI standard K61.1.

Only personnel trained in the proper procedures, codes, standards, and regulations of the LP-gas or Anhydrous Ammonia industries should install and service this equipment.

Introduction

Scope of Manual

This manual covers instructions for the Type N100, N100A, N110, and N120 Series Differential Bypass and Back Pressure Valves, shown in Figure 1.

Description

These valves are designed for use with propane, butane, and anhydrous ammonia at ambient temperatures. The valves can be used on other compressed gases, but the user should check with the factory to make sure the valve is suitable for the particular service.

A 1/4 NPT tapped and plugged boss on the inlet side of the body can be used to install a hydrostatic relief valve or a pressure gauge.

The N100, N100A, and N110 have internal sensing orifices so that no external sensing line is required.



Figure 1. Bypass and Back Pressure Valves

Type N100 & N100A Series Bypass Valve

These valves are designed for bypass applications on 2 through 4-inch size pumps. The throttling action of the valves allows only surplus pump discharge to be returned to the tank.

Type N110 Series Bypass Valve

These valves are designed for bypass applications on smaller pumps [5-40 gpm (18.9 -151 liters/min) propane] used on stationary tanks or delivery trucks.

Type N120 Series Back Pressure Valve

These valves are intended for use with smaller pumps on cylinder filling applications. When installed after the liquid meter, the N120 holds a differential back pressure on the meter to prevent vapor from forming within the meter. An external sensing line is required.

Table 1. Bypass Valves (For Large Pumps)

PUMP SIZE	TYPE NUMBER	BODY SIZE	DIFFERENTIAL PRESSURE SETTING, PSIG (bar)	DIFFERENTIAL PRESSURE RANGE, PSIG (bar)
2 in.	N100A-08-1	1 in. FNPT	50 (3,4)	25 to 75 (1,7 to 5,1)
	N100A-08-2		115 (7,9)	50 to 150 (3,4 to 10,3)
2-3 in.	N100A-10-1	1 1/4 in. FNPT	50 (3,4)	25 to 75 (1,7 to 5,1)
	N100A-10-2		115 (7,9)	50 to 150 (3,4 to 10,3)
	N100A-12-1	1 1/2 in. FNPT	50 (3,4)	25 to 75 (1,7 to 5,1)
			N100A-12-2	115 (7,9)
4 in.	N100-16-1	2 in. FNPT	50 (3,4)	25 to 75 (1,7 to 5,1)
	N100-16-2	2 in. FNPT	115 (7,9)	50 to 150 (3,4 to 10,3)
	N100-20-2	2 1/2 in. FNPT	50 (3,4)	25 to 75 (1,7 to 5,1)



Type N100, N100A, N110 & N120 Series

Table 2. Bypass Valves (For Small Pumps)

PUMPING CAPACITY, GPM (LITERS/MIN)	TYPE NUMBER	BODY SIZE	DIFFERENTIAL PRESSURE SETTING	DIFFERENTIAL PRESSURE RANGE
5 to 20 (18,9 to 75,7)	N110-06-1	3/4 in. FNPT	50 psig (3,4 bar)	25 to 75 psig (1,7 to 5,1 bar)
20 to 40 (75,7 to 151)	N110-08-1	1 in. FNPT		

Table 3. Back Pressure Valves

LIQUID METER SIZE	TYPE NUMBER	BODY SIZE	DIFFERENTIAL PRESSURE SETTING	DIFFERENTIAL PRESSURE RANGE
3/4 or 1 inch	N120-06-3	3/4 in. FNPT	12 psig (0,8 bar)	10 to 20 psig (0,7 to 1,4 bar)
	N120-08-3	1 in. FNPT		

Specifications

See tables 1, 2, and 3.

Maximum working pressure: 400 psi (27,5 bar)

Temperature Range: -20 to 140°F (-29 to 60°C)

Installation



CAUTION

Make sure the flow is in the same direction as the arrow cast into the valve body.

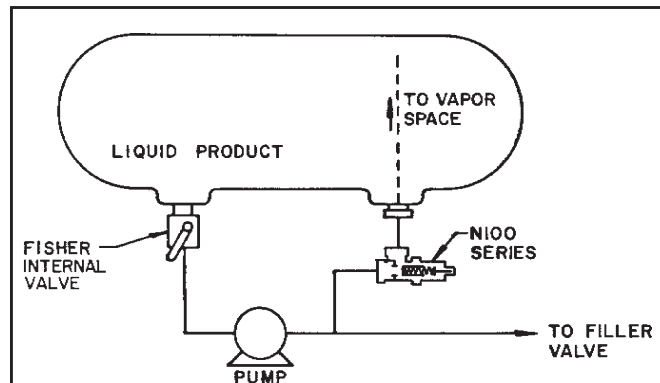


Figure 2. N100 Series Installation Schematic

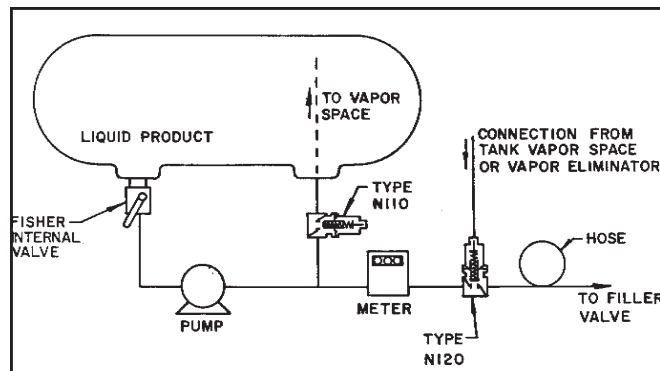


Figure 3. N110 & N120 Installation Schematic

Refer to Figures 2 and 3.

Piping to the valve should be kept as short as possible with a minimum number of pipe fittings. Remove any pipe scale or foreign material from the piping before installing the valves.

The valves can be installed in any position. Make certain that flow is in the same direction as the arrow cast on the body.

Use an appropriate pipe compound on the male pipeline threads. Pull the valve onto the pipe until hand tight and then wrench tighten it for approximately two additional turns. Larger size valves may require an additional amount of torque to obtain a leak free connection.

After installation, pressurize the piping and use a leak detect solution on all joints to check for leakage. If leakage is found retighten fittings until leaking stops.

Type N100, N100A and N110 Valves

The N100 and N100A (see Figure 2) and N110 (see Figure 3) valve outlet piping should be connected to the tank vapor space. An external sensing line is not required for these valves.

Type N120 Valve

The N120 (see Figure 3) valve outlet piping should be connected to the tank piping leading to the hose reel. A 1/4" FNPT connection in the closing cap connects the external sensing line to the tank vapor space or vapor eliminator.

Principle of Operation

Type N100, N100A & N110 Bypass Valves

Tank pressure registers through an orifice onto the spring case side of the inner valve (N100 or N100A) or diaphragm (N110). When pump pressure exceeds the tank pressure by the differential set point of the bypass valve, the inner valve lifts off the seat allowing flow through the valve back into the tank.

Type N120 Back Pressure Valve

Pressure from the tank or vapor eliminator loads the spring case through the external sensing line. When pressure downstream of the meter registering on the body side of the diaphragm exceeds the differential set point the inner valve lifts allowing flow to pass through the valve.

Maintenance



CAUTION

Due to normal wear or damage that may occur from external sources, Fisher equipment must be inspected and

maintained periodically. The frequency of inspection and replacement of equipment depends upon the severity of the service conditions or the requirements of local, state, federal regulations and Fisher instructions.

Do not use these valves if they leak, fail to work properly, have missing parts or have been damaged. A properly trained serviceman should make prompt repairs or replace the valve. Continued use without repair can create a hazardous or injurious situation.

Use only replacement parts from Fisher Controls.

Periodically inspect and verify the differential set point of the valves.

Adjustment

Each unit is factory set for the standard differential pressure or which was specified on the order. Settings can be adjusted with the ranges specified in tables 1, 2 or 3. Remove the closing cap and turn the adjusting screw clockwise (into the spring case) to increase the differential setting or counterclockwise (out of the spring case) to decrease the setting.

Use a pressure gauge on the outlet of the valve to monitor the change in the differential pressure setting.

Disassembly and Repair



WARNING

Release inlet and outlet pressure before starting repair or disassembly. Failure to do so could result in personal injury.

Note: Numbers in brackets [] refer to the key number in the parts list.

Type N100 and N100A Disassembly

Refer to Figure 4:

1. Remove the 4 screws [13] and lock washers [19] and remove the spring case [2] from the body.
2. Replace the O-rings [11 & 15] and the Capseal [16]. Coat the new parts with Dow Corning silicone grease or the equivalent reinstalling.
3. O-ring [15] fit around the outer diameter of the Capseal [16]. Do not bend the Capseal excessively during reassembly in the body.

4. Replace the Inner Valve [8] and Washer [14] if needed. Grease the outside of the inner valve and gently insert it into and through the Capseal as far as it will go. A slight twisting motion of the inner valve may help in reassembly.



CAUTION

Proper valve operation requires that the registration hole in the inner valve must face towards the outlet and not be filled with grease.

5. O-ring [12] can be replaced by removing the adjusting screw assembly [4] from the spring case.
6. After reassembly, pressure test for leakage and readjust the set point.

Type N110 Disassembly

Refer to Figure 5:

1. Unscrew the Union Ring [11] and remove the spring case [7] from the body.
2. To replace the diaphragm, remove the diaphragm assembly that includes the valve plug [3].
3. Unscrew the nut [6] and remove the diaphragm head [5]. Replace the diaphragm and reassemble.
4. O-ring [10] can be replaced by removing the adjusting screw assembly [9] from the spring case. Coat the new part with Dow Corning silicone grease or the equivalent before reinstalling.
5. Check the Valve Plug seat [3]. Replace if it is badly scarred or damaged. **Make sure that the 2 registration passages are open.**



CAUTION

Proper valve operation requires that the registration hole in the inner valve must face towards the outlet and not be filled with grease.

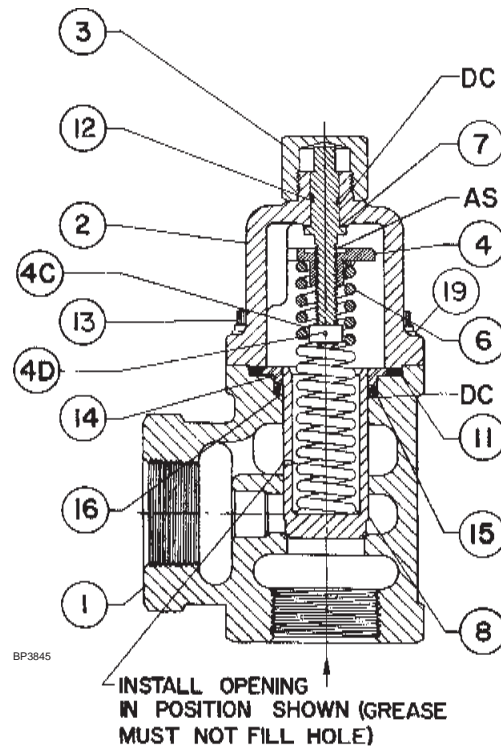
6. Replace the Valve Guide Orifice [2] if the seat is badly damaged. A special tool is required to replace the valve guide orifice.
7. After reassembly, pressure test for leakage and readjust the set point.

Type N120 Disassembly

Refer to Figure 6:

NOTE: Coat all new O-rings with Dow Corning silicone grease or the equivalent before reinstalling.

Type N100, N100A, N110 & N120 Series

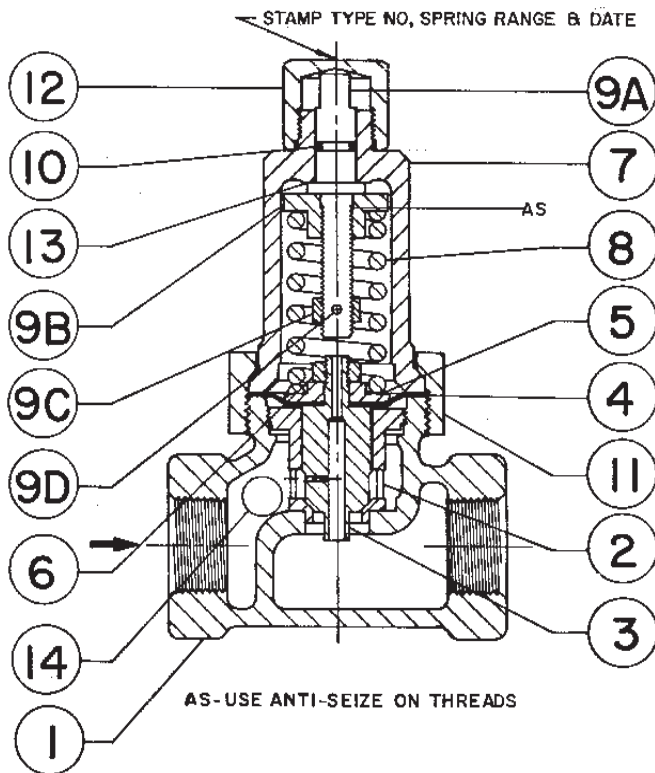


DC- USE DOW CORNING NO. 3 GREASE
AS- USE ANTI-SEIZE ON THREADS

Figure 4. Type N100 and N100A

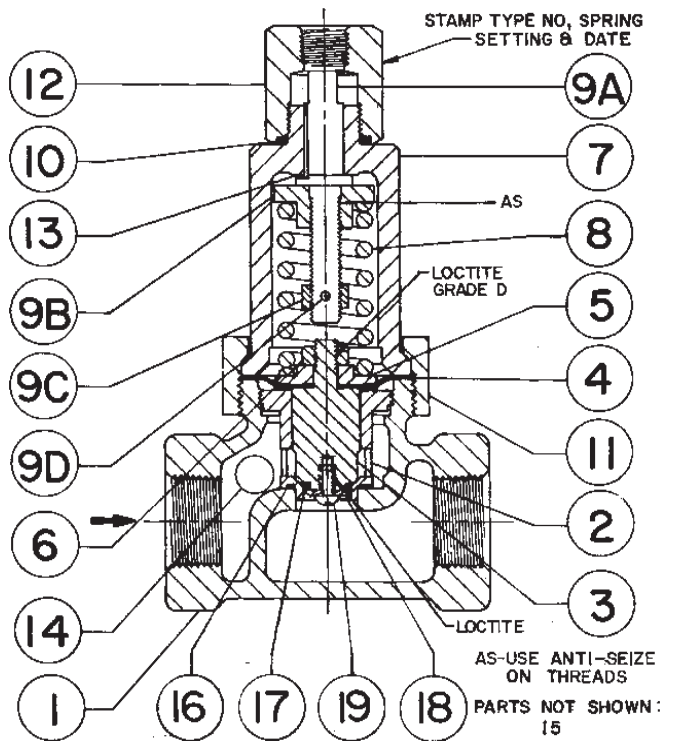
Key No.	Name of Part
1.	Body
2.	Spring Case
3.	Closing Cap
4.	Spring Adjustment Assembly
4A.	Upper Spring Seat
4B.	Adjusting Screw
4C.	Nut
4D.	Roll Pin
6.	Spring
7.	Adjusting Screw Gasket
(8.)	Inner Valve
9.	Drive Screw (not shown)
10.	Nameplate (not shown)
(11.)	O-Ring
(12.)	O-Ring
13.	Counterbore Screw, 4 required
(14.)	Washer
(15.)	O-Ring
(16.)	Capseal
17.	Pipe Plug (not shown)
18.	Instruction Tag (not shown)
19.	Lock Washer, 4 required
20.	Instruction Manual (not shown)

() Recommended Spare Parts.



T10583

Figure 5. Type N110



T10695

Figure 6. Type N120

Key No.	Name of Part
1.	Body
2.	Valve Guide Orifice
3.	Valve Plug
(4.)	Diaphragm
5.	Diaphragm Head
6.	Nut
7.	Spring Case
8.	Spring
9.	Spring Adjustment Assembly
9A.	Stem
9B.	Spring Seat
9C.	Nut
9D.	Pin
(10.)	O-Ring
11.	Union Nut
12.	Seal cap
13.	Washer
14.	Pipe Plug
15.	Instruction Tag (not shown)
(16.)	O-Ring
(17.)	O-Ring
(18.)	O-Ring Washer
(19.)	Machine Screw
20.	Instruction Manual (not shown)

() Recommended Spare Parts.

Type N100, N100A, N110 & N120 Series

1. Unscrew the Union Ring [11] and remove the spring case [7] from the body.
2. To replace the diaphragm, remove the diaphragm assembly that includes the valve plug [3].
3. Unscrew the nut [6] and remove the diaphragm head [5]. Replace the diaphragm and reassemble. Reassemble with Loctite on the valve plug [3] threads.
4. To replace the O-ring seal [17], remove the screw [19] and the O-ring Washer [18]. Reinstall the screw and O-ring washer. Place a small amount of Loctite on the screw before reassembly and tighten.
5. Replace the Valve Guide Orifice [2] if the seat is badly damaged or O-ring [16] is leaking. A special tool is required to replace the valve guide orifice. Replace the O-ring and reassemble the valve guide seat by firmly seating into the body.
6. O-ring [10] can be replaced by removing the Seal Cap [12].
7. After reassembly, pressure test for leakage and readjust the set point.

Parts Ordering

When corresponding about this equipment, always reference the equipment type number found on the product. When ordering Fisher replacement parts reference the key number and description.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Emerson Process Management

Fisher Controls International, LLC

P.O. Box 8004

McKinney, Texas 75070, USA

Telephone: 1 (800) 432-8711

Telephone: 1 (972) 542-5512

www.FISHERregulators.com/lp



©Fisher Controls International LLC, 2002; All Rights Reserved

Fisher and Fisher Regulators are marks owned by Fisher Controls International LLC. The Emerson logo is a trade mark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.