F Series Excess Flow Valves for LP-Gas and NH_3

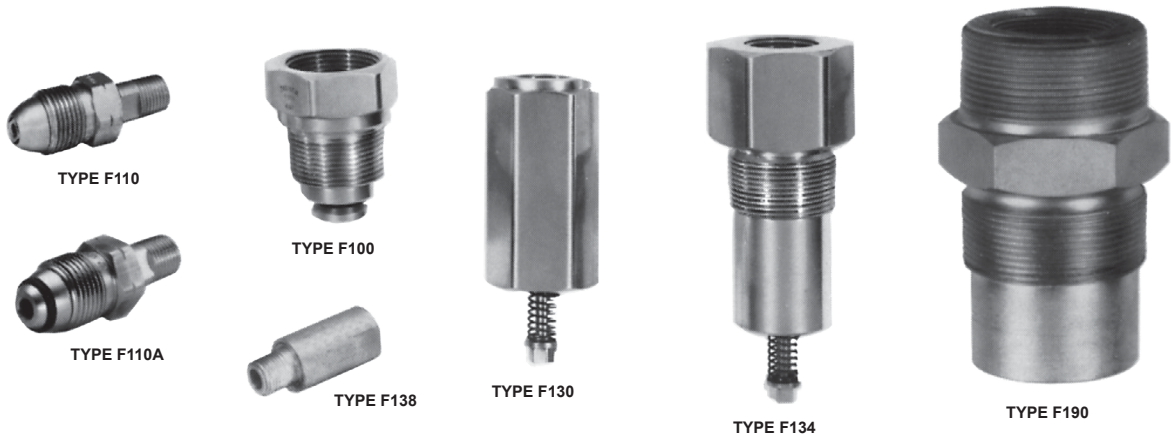

Figure 1. *F Series Excess Flow Valves*

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 No. 58 or ANSI K61.1 standards.

Only personnel trained in the proper procedures, codes, standards, and regulations of the LP-Gas or NH_3 industries should install and service this equipment.

WARNING

A break or leak down stream of an excess flow valve that does not allow a flow equal to the valve flow rating will not actuate the excess flow valve and could result in a fire or explosion from leaking gas. After the excess flow valve closes, the leakage through the equalizing hole must be controlled or a hazard can be created. For this reason the operator must be familiar with the system shutoff valves and close the system if an emergency occurs.

Reference NPGA-113–"The Limitations of Excess Flow Check Valves for LP-Gas."

Introduction

Scope of the Manual

This instruction manual covers installation and maintenance for Fisher® F Series excess flow valves used on LP-Gas and anhydrous ammonia.

DOT Passive Shutdown Equipment Requirement

DOT regulations 49 CFR§173.315(n)(2) require certain cargo tanks transporting propane, anhydrous ammonia and other liquified compressed gases to be equipped with passive emergency discharge control equipment that will automatically shutoff the flow of product without human intervention within 20 seconds of an

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Specifications

APPLICATION	INLET CONNECTION, NPS*	OUTLET CONNECTION, NPS	TYPE NUMBER		U.L. RATED CLOSING FLOW, PROPANE (HORIZONTAL POSITION)			DIFFERENTIAL PRESSURE, PSIG (bar)
			Brass	Steel	Liquid GPM (l/min)	Vapor SCFH (SCMH)		
						25 Psig (1,7 bar) Inlet	100 Psig (6,9 bar) Inlet	
Portable Service (Torches, burners, etc.)	Male POL	9/16 –18 UNF LH	F110	—	0.7 (2,6)	120 (3,4)	204 (5,8)	7.4 (0,51)
			F183	—	1.5 (5,7)	335 (9,5)	570 (16,1)	9.7 (0,67)
		1/4 MNPT	F173	—	0.7 (2,6)	120 (3,4)	204 (5,8)	7.4 (0,51)
			F181	—	1.5 (5,7)	335 (9,5)	570 (16,1)	9.7 (0,67)
	Soft Nose Male POL	9/16 –18 UNF LH	F110A	—	0.7 (2,6)	120 (3,4)	204 (5,8)	7.4 (0,51)
		1/4 MNPT	F173A	—				
In-Line	1/4 MNPT	1/4 FNPT	F138	—	1.8 (6,8)	377 (10,7)	641 (18,2)	1.4 (0,10)
	Male POL	1/2 SAE Flare	F202	—	1.9 (7,2)	634 (18,0)	1100 (31,2)	2.6 (0,18)
Tanks (Full or Half Coupling)	3/4 MNPT	3/4 FNPT	F170	—	6.6 (25,0)	1184 (33,5)	2012 (57,0)	1.2 (0,08)
			F100	—	8.4 (31,8)	2010 (56,9)	3417 (96,8)	2.4 (0,17)
			F101	—	20 (75,7)	3459 (98,0)	5880 (167)	8.5 (0,59)
	1-1/4 MNPT	1-1/4 FNPT	F102	—	33 (125)	6300 (178)	10 630 (301)	10.7 (0,74)
			F105	—	55 (208)	9982 (283)	16 967 (481)	10.7 (0,74)
	2 MNPT	2 FNPT	F106	—	85 (322)	18 513 (524)	31 467 (891)	2.6 (0,18)
			F107	—	100 (379)	20 796 (589)	35 349 (1001)	3.6 (0,25)
In-Line	1 FNPT	1 FNPT	F130	—	25 (94,6)	5287 (150)	8986 (254)	3.3 (0,23)
	1-1/2 FNPT	1-1/2 FNPT	F131	—	60 (227)	11 694 (331)	19 877 (563)	4.7 (0,32)
	2 FNPT	2 FNPT	F132	—	95 (360)	19 874 (563)	33 877 (959)	2.1 (0,14)
			F133	—	155 (587)	29 202 (827)	49 718 (1408)	4.2 (0,29)
Tanks (Full or Half Coupling)	1-1/2 MNPT x 1 FNPT	1 FNPT	F134	—	28 (106)	5181 (147)	8806 (249)	2.7 (0,19)
	2-1/2 MNPT x 1-1/2 FNPT	1-1/2 FNPT	F135	—	60 (227)	12 000 (340)	20 290 (575)	5.2 (0,36)
Tanks[1] (Full or Half Coupling)	2 MNPT	2 MNPT x 1-1/4 FNPT	—	F190	80 (303)	15 400 (436)	26 250 (743)	3.7 (0,26)
			—	F191	105 (397)	18 800 (532)	32 000 (906)	8.9 (0,61)
	3 MNPT	2 MNPT	—	F194	165 (625)	32 800 (929)	55 950 (1585)	3.1 (0,21)
			—	F195	260 (984)	50 650 (1434)	86 350 (2445)	6.9 (0,48)
	3 MNPT	3 MNPT X 2 FNPT	—	F198	165 (625)	33 000 (935)	56 250 (1593)	3.1 (0,21)
			—	F199	260 (984)	49 500 (1402)	84 350 (2389)	7.1 (0,49)

Maximum Operating Pressure: 250 psig (17,2 bar)

Maximum Differential Pressure: 15 psig (1,0 bar)

Closing Flow Tolerance: 10% to -20% of rated flow

1. LP-Gas or NH_3 service.
* Nominal Pipe Size.

unintentional release caused by complete separation of a delivery hose. The design for each passive shutdown system must be certified by a Design Certifying Engineer (DCE) and all components of the discharge system that are integral to the design must be included in the DCE certification. The DCE certification must consider any specifications of the original component manufacturer.

In the case of downstream ruptures in hose or piping, a variety of operating conditions routinely encountered during an unloading operation restrict the rate of flow through the excess flow valve and make such a valve unsuitable to serve as the means of passive shutdown required under 49 CFR§173.315(n)(2). Such variables include restrictions incorporated in the discharge system (due to pumps, pipe and hose length and dimensions, branching, elbows,

reductions in pipe diameter, or a number of other in-line valves or fittings), low operating pressure as a result of ambient temperature, or a partially closed valve downstream from the excess flow valve. Due to the variety of conditions, in the case of a hose separation, that can restrict the rate of flow below the level necessary to activate the excess flow valves, the F Series excess flow valves cannot be used to satisfy the passive shutdown equipment requirement under/ in 49 CFR§173.315(n)(2). Also, a Design Certifying Engineer cannot include the F Series excess flow valve as a component of the discharge system in any DCE certification under 49 CFR§173.315(n)(2).

⚠ EXPLOSION HAZARD

DO NOT USE the F Series excess flow valves to satisfy the passive shutdown equipment requirement in 49 CFR§173.315(n)(2). DO NOT include the F Series excess flow valves in a DCE certification under 49 CFR§173.315(n)(2). The cargo tank manufacturer must install some other equipment that satisfies the requirement for passive shutdown capability under 49 CFR§173.315(n)(2).

Failure to follow this warning could result in serious personal injury or property damage from a fire or explosion in the event of an unintentional release of product during an unloading operation.

Description

Excess flow check valves close when the flow rate of vapor or liquid exceeds the valve's rated flow capacity. They are used to protect cylinder, tank, and piping systems. The valves are available in a variety of sizes and body configurations.

When flow exceeds the valve's setting, the valve closes and remains closed until the system equalizes. A built-in equalizing passage automatically opens the valve once pressures on both sides of the poppet are equal.

Specifications

⚠ CAUTION

If the valve is to be used in service other than LP-Gas or anhydrous ammonia, contact the factory to determine if the valve materials are suitable for the particular service.

Valves with brass materials must not be used on anhydrous ammonia service.

Installation

⚠ CAUTION

Do not install the valve in any piping which tends to restrict the valve inlet. This may prevent the excess flow valve from closing.

Flow through the excess flow valve must be in the same direction as the flow arrow stamped on the valve.

1. A rule of thumb for sizing excess flow valves is to choose a valve with a closing flow 1.5 times the maximum operating flow. For surge conditions, 2 times maximum flow may be required.

   However, the excess flow valve's closing flow rate must be **less** than the capacity of the LP-Gas or NH_3 system in which the valve is being used. The flow rating of the piping, fittings, pump, valves, and hose on both the inlet and outlet of the excess flow valve must be **greater** than the flow rating of the excess flow valve. If branching, piping length, additional valves, reduction in pipe size, elbows, or other necessary components in the piping system create restrictions which reduce the flow rating to less than that of the excess flow valve rating, the valve will not give excess flow protection, and additional excess flow valves must be installed at these points.
2. Brass valves are not suitable for NH_3 applications.
3. Manually operate the excess flow valve's poppet before installation to assure parts were not damaged in shipment or blocked with dirt or foreign material.
4. Use pipe dope on the male threads of the valve or the pipeline. PTFE tape or PTFE pipe dope compound is recommended for the male threads of the larger valves such as the NPS 2 and 3 (DN 50 and 80) sizes.
5. After the excess flow valve is installed, the system should be tested for excess flow valve operation by simulating a break downstream in the system at the furthermost point being protected. To test the unit, pressure the system and then open a shutoff vave quickly at the farthest point in the piping that the excess flow valve is intended to protect. There should be a sudden decrease in flow, indicating that the valve has closed and is working properly.

Because of the bleed that permits the valve to equalize itself, a small amount of leakage will continue after the excess flow check closes.

6. To reopen a closed excess flow valve, close a shutoff valve on either the upstream or downstream piping. When pressure is equal on both sides of the valve, it will "click" open and flow can be resumed by opening the shutoff valve.

WARNING

Trained personnel should test the excess flow valve in a safe location and with the permission of local authorities because testing with a flammable gas is hazardous.

Excess flow closure should be checked annually or on a regularly scheduled basis to insure that the valve is still functional.

Maintenance

Excess flow valves are non-repairable. Replace non-functioning valves.

Troubleshooting

If the excess flow valve fails to close – check the following:

1. Flow direction is the same direction as arrow stamped on the valve.
2. Shutoff valves on the inlet and outlet of the piping are fully open.
3. Restrictions on the inlet or outlet of the excess flow valve are restricting flow into or out of the valve.
4. Flow capacity at point of test is not great enough to close the excess flow valve.
5. Pipe scale, welding slag, or other debris is holding the valve open.

Premature closing or valve chattering – check the following:

1. Surge conditions – Increase flow slowly to prevent surge. A larger excess closing flow may be required.
2. Chattering – Normal flow conditions may be too near to the closing flow rate, or flow direction is wrong or back flowing is occuring.
3. Restriction on inlet of valve.

WARNING

Back flowing or flowing too near to the excess flow valve closing rate may cause chattering which may result in excessive wear on parts and valve failure.

LP-Gas Equipment

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