RJ600 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, rules and regulations and Emerson Process Management Regulator Technologies, Inc. The installation in most states must also comply with NFPA No. 54 and 58 standards.

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

Things to tell the gas customer

1. Show the customer the vent or vent assembly or vent tube. Stress that this opening must remain unobstructed at all times. Tell the customer to check the vent opening after a freezing rain, sleet storm or snow to make sure ice has not formed in the vent.
2. Show the customer the shutoff valve on the container. The customer should close this valve immediately if gas is smelled, appliance pilot lights fail to stay on or appear higher than usual or any other abnormal situation occurs.
3. Tell the customer to call your company to service the regulator if the regulator vents gas or a leak develops in the system. Only a qualified gas service person should install or service the regulator.

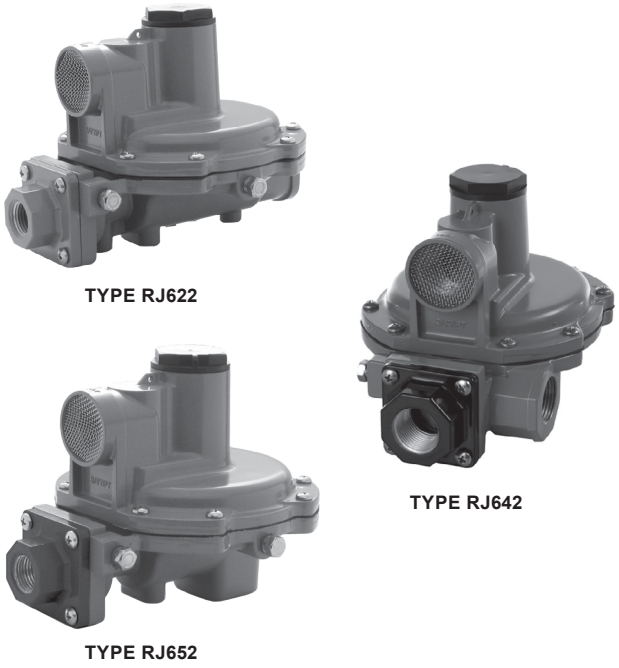


Figure 1. *Types RJ622, RJ642 and RJ652 Regulators*

4. Tell the customer to call your company to have a leak check performed if the gas supply has been shutoff or interrupted for any reason. A leak check must be performed by a qualified gas service person on the piping system immediately after turning on the gas supply.

Introduction

Scope of the Manual

This Instruction Manual covers Installation and Maintenance for the RJ600 Series regulators, which includes second stage and two psig service regulators used on LP-Gas vapor service applications. They are not to be used on liquid service. These regulators are intended for jurisdictional applications where the pressure coming from the first stage is higher than 10 psig / 0.7 bar.

Specifications

Specifications section, Tables 1 and 2 list the specifications for these regulators. Contact the factory if the regulator is to be used on any service other than LP-Gas, natural gas or air. The following information is located on the spring case: Type number, orifice size, spring range and date of manufacture.

Pressure Taps Size Restriction
1/8 NPT: #54 (0.055 in. / 1.40 mm)
Drill on outlet and inlet

Orifice Sizes
7/32 in. / 5.6 mm

Wide-open C_g for Relief Sizing
38

Maximum Allowable Inlet Pressure(1)
Types RJ622, RJ642 and RJ652: 40 psig / 2.8 bar
Types RJ622E and RJ652E: 40 psig / 2.8 bar

Maximum Emergency Inlet Pressure(1)
Types RJ622 and RJ652: 50 psig / 3.4 bar
Type RJ642: 85 psig / 5.9 bar
Types RJ622E and RJ652E: 50 psig / 3.4 bar

Temperature Capabilities(1)
-20 to 160ºF / -29 to 71ºC(2)

Pressure Registration
Internal

Outlet Pressure Standard Setpoint
Types RJ622, RJ642 and RJ652:
11 in. w.c. / 27 mbar
Types RJ622E and RJ652E: 2 psig / 0.14 bar

Outlet Pressure Spring Range
Types RJ622, RJ642 and RJ652:
7.5 to 9.5 in. w.c. / 19 to 24 mbar,
9 to 13 in. w.c. / 22 to 32 mbar,
13 to 20 in. w.c. / 32 to 50 mbar,
16 to 40 in. w.c. / 40 to 99 mbar
Types RJ622E and RJ652E:
1 to 2.2 psig / 69 mbar to 0.15 bar

Approximate Weight
1.4 lbs / 0.64 kg

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.
2. Product has passed Fisher™ testing for lockup, relief start-to-discharge and reseal down to -40ºF / -40ºC.

Description

2 psig / 0.14 bar Service Regulators

The Types RJ622E and RJ652E regulators are designed for high pressure (pounds per square inch) vapor service. These regulators have high capacity internal relief valves.

The Type RJ622E or RJ652E standard outlet pressure setting is 2 psig / 0.14 bar. The regulator is painted PALM GREEN with a WHITE CAP. It is an intermediate stage regulator that reduces 10 psig / 0.69 bar first stage pressure to 2 psig / 0.14 bar. They are used on 2 psig / 0.14 bar pressure systems. The Types RJ622E and RJ652E are not suitable for first stage service.

Second Stage Low Pressure Regulators

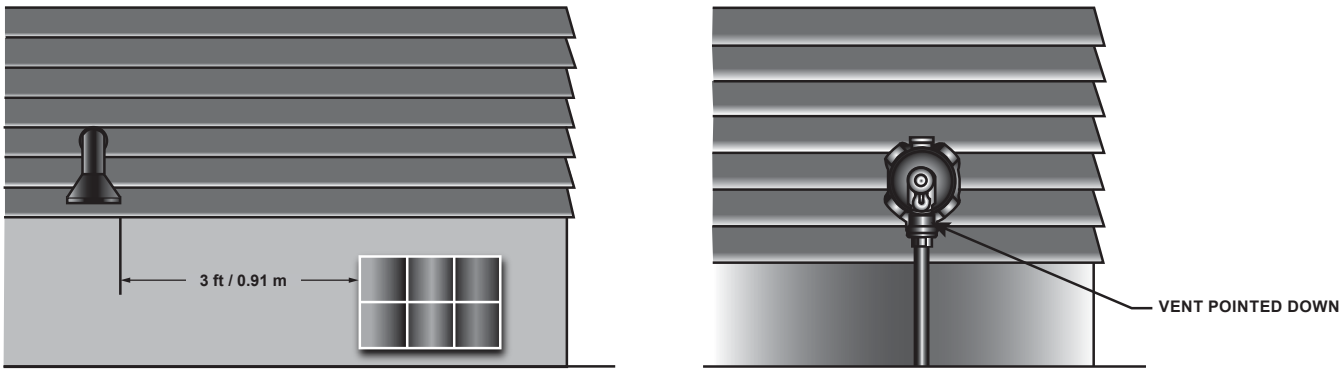
The Types RJ622, RJ642 and RJ652 regulators provide low pressure (inches of water column) delivery pressures. They are normally set at 11 in. w.c. / 27 mbar pressure. They have high capacity internal relief valve construction. The regulators are normally painted PALM GREEN. The units differ in construction and capacity rating.

Installation

WARNING

All vents should be kept open to permit free flow of air in and out of the regulator. Protect vent openings against the entrance of rain, snow, ice formation, paint, mud, insects, water from an irrigation system or any other foreign material that could plug the vent or vent line or accumulate in the vent line.

LP-Gas may discharge to the atmosphere through the vent. An obstructed vent which limits air or gas flow can cause abnormally high pressure that could result in personal injury or property damage. Failure to use a vent line on Indoor Installations can cause a hazardous accumulation of gas which could result in personal injury or property damage.



T14446-A2

Figure 2. *Regulator with Vent Pointed Down*

Table 1. *Relief Valve Specifications*

TYPE	TYPICAL SETPOINT		NOMINAL RELIEF VALVE START-TO-DISCHARGE		MAXIMUM INLET PRESSURE TO NOT EXCEED OUTLET PRESSURE WITH DISC REMOVED			
					Inlet Pressure		Maximum Outlet Pressure	
	psig	bar	psig	bar	psig	bar	psig	bar
RJ622	11 in. w.c.	27 mbar	1	69 mbar	50	3.4	2	0.14
RJ642								
RJ652								
RJ622E	2	0.14	3.5	0.24	50	3.4	5	0.34
RJ652E								

Types RJ622E and RJ652E regulators are not suitable for indoor installations.

Never use a Type RJ622E or RJ652E (pounds-to-pounds) regulator on low pressure (inches of water column) service because personal injury or property damage could occur. The Types RJ622E and RJ652E are not suitable for use as a "first stage" regulator.

General Installation Instructions

Before installing the regulator:

- Check for damage, which might have occurred in shipment.
- Check for and remove any dirt or foreign material, which may have accumulated in the regulator body.
- Replace old pigtails. Blow out any debris, dirt or copper sulfate in the copper tubing and the pipeline.
- Apply pipe compound to the male threads of the pipe before installing the regulator.
- Make sure gas flow through the regulator is in the same direction as the arrow on the body. "Inlet" and "Outlet" connections are clearly marked.

Installation Location

- The installed regulator should be adequately protected from vehicular traffic and damage from other external sources.
- Install the regulator with the vent pointed vertically down, see Figure 2. If the vent cannot be installed in a vertically down position, the regulator must be installed under a separate protective cover. Installing the regulator with the vent down allows condensation to drain, minimizes the entry of water or other debris from entering the vent and minimizes vent blockage from freezing precipitation.
- Do not install the regulator in a location where there can be excessive water accumulation or ice formation, such as directly beneath a down spout, gutter or roof line of building. Even a protective hood may not provide adequate protection in these instances.
- Install the regulator so that any gas discharge through the vent or vent assembly is over 3 ft / 0.91 m horizontally from any building opening below the level of discharge.
- Install the regulator high enough above ground level at least 18 in. / 45 cm so that rain splatter cannot freeze in the vent.

Table 2. *Capacity and Connection Sizes*[2]

REGULATOR APPLICATION	TYPE NUMBER	CAPACITY, BTU/HR PROPANE[1]	INLET PRESSURE AT RATED CAPACITY		INLET CONNECTION	OUTLET CONNECTION	OUTLET PRESSURE SETTING
			psig	bar			
Second Stage	RJ622-BCF	875,000	10	0.69	1/2 in. FNPT / DN 15	1/2 in. FNPT / DN 15	11 in. wc / 27 mbar
		1,450,000	25	1.7			
		1,550,000	30	2.1			
		1,700,000	40	2.8			
	RJ622-CFF	1,400,000	10	0.69		3/4 in. FNPT / DN 20	
		2,250,000	25	1.7			
		2,500,000	30	2.1			
		2,650,000	40	2.8			
	RJ622-DFF	1,400,000	10	0.69	3/4 in. FNPT / DN 20		
		2,250,000	25	1.7			
		2,500,000	30	2.1			
		2,650,000	40	2.8			
	RJ642-DFF	900,000	10	0.69			
		975,000	25	1.7			
		980,000	30	2.1			
		990,000	40	2.8			
	RJ652-DFF	1,000,000	10	0.69			
		1,250,000	25	1.7			
		1,300,000	30	2.1			
		1,375,000	40	2.8			
2 psig / 0.14 bar Service	RJ622E-BCH	1,250,000	10	0.69	1/2 in. FNPT / DN 15	1/2 in. FNPT / DN 15	2 psig / 0.14 bar
		1,950,000	25	1.7			
		2,100,000	30	2.1			
		2,300,000	40	2.8			
	RJ622E-DCH	1,500,000	10	0.69	3/4 in. FNPT / DN 20	3/4 in. FNPT / DN 20	
		2,275,000	25	1.7			
		2,525,000	30	2.1			
		2,675,000	40	2.8			
	RJ652E-DFH	1,400,000	10	0.69			
		1,650,000	25	1.7			
		1,725,000	30	2.1			
		1,850,000	40	2.8			

1. Capacities based on specified inlet pressure and 2 in. w.c. / 5 mbar droop for Second Stage and 20% droop for 2 psig / 0.14 bar service.
2. All models have vent orientation above inlet.

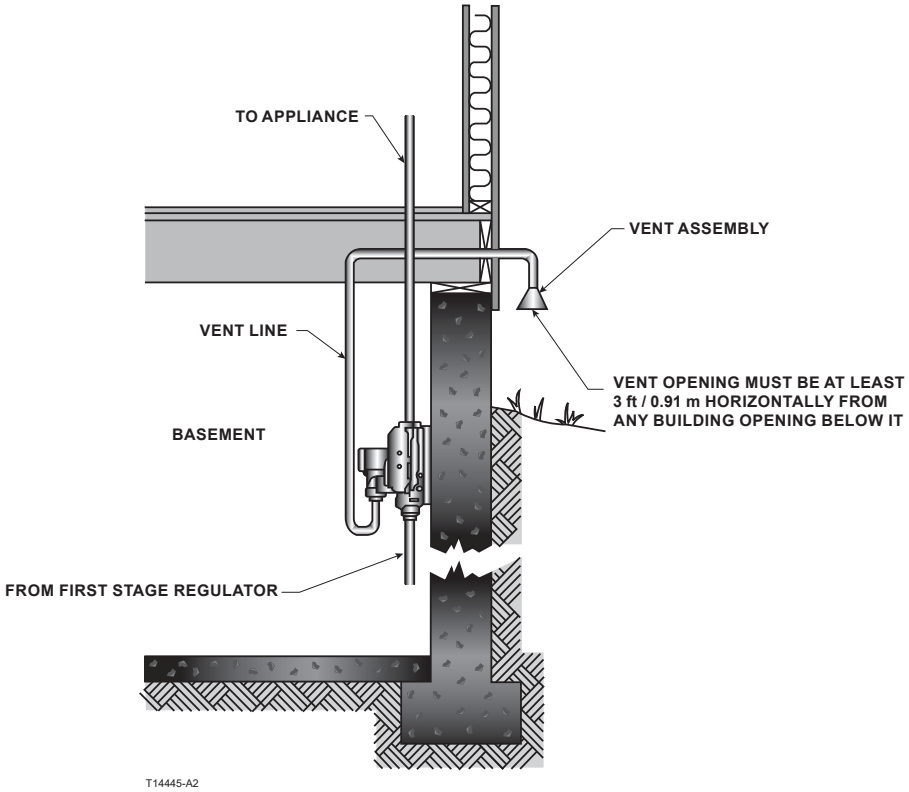


Figure 3. *Basement Installation*

Regulators Subjected to Heavy Snow Conditions

Some installations, such as in areas with heavy snowfall, may require a hood or enclosure to protect the regulator from snow load and vent freeze over.

Meter Installations

Type RJ642 regulators have an angle body that makes it easy to install on to a gas meter instead of piping leading directly into a building.

Meter and Type RJ642 with Vent over Regulator Inlet

Install the regulator per instructions given in the previous section “Installation Location”.

Meter and Type RJ642 with Vent over the Regulator Outlet and Installed over the Top of the Meter

This installation orientation will put the Type RJ642 regulator vent in a vertical down position, but very close to the top of the gas meter. The regulator vent may become blocked during a freezing rain storm or heavy snows. Therefore, some type of protective cover should be installed over the regulator and meter or vent piping should be installed so that the vent remains open.

Meter and Type RJ642 Regulator Installed Indoors

Pipe the regulator vent per the section “Indoor Installations”.

Indoor Installations

By code, regulators installed indoors have limited inlet pressure and they require a vent line to the outside of the building, see Figure 3. A vent assembly, such as Y602 Series, should be used on the end of the vent line. The same installation precautions, previously discussed throughout this manual for the regulator vent, apply to the end of the vent tube assembly. Vent lines must not restrict the gas flow from the regulator’s internal relief valve. Vent lines should be at least 3/4 NPT pipe or 3/4 NPT size PVC Schedule 40 Rigid Conduit, meeting the requirements of UL® 651. To install the vent line, remove the vent screen and apply a good grade of pipe dope to the male threads of the line. Vent lines should be as straight as possible with a minimum number of bends.

UL® is a mark owned by Underwriters Laboratories.

Outdoor Installations with Underground Vent Lines

When installed per code, the underground vent line must not restrict the gas flow from the regulator's internal relief valve and must remain clear of debris, dry and fully open at all times. Joints in the vent line must be fully sealed to prevent moisture intrusion into the vent line. A vent assembly, such as the Y602 Series, should be used on the end of the vent line to prevent entry of precipitation, water or other debris. When underground vent lines are used in humid environments, the vent line must be designed to allow for proper drainage of any collected moisture or condensation.

Adjustment

Each regulator is factory set. If it becomes necessary to increase the outlet pressure, remove the closing cap and turn the adjustment screw clockwise. Turn the adjusting screw counterclockwise to decrease the outlet pressure.

The inlet and outlet pressure plug may be removed using a 7/16 in. / 11 mm hexagon wrench. The pressure tap is restricted, so the plug can be removed with pressure on the outlet of the regulator. Install a pressure gauge to determine the regulator's inlet pressure and outlet setting during adjustment, (actual pressure at the second stage regulator may be less due to line loss). After setting, add thread sealant to the 1/8 NPT pipe plugs. Reinstall the pipe plugs by threading into the gauge ports finger-tight and then wrench tighten 1-1/2 to 3 turns past finger-tight (approximate maximum torque of 12 ft-lb / 16 N•m). Replace the closing cap. Check the pipe plugs for leakage.

Overpressure Protection

WARNING

Some type of overpressure protection is needed if actual inlet pressure can exceed the outlet pressure rating. Overpressuring any portion of this equipment above the limits shown in the Specifications section may cause damage to regulator parts, leaks in the regulator or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas.

If any portion of the regulator is exposed to an overpressure condition that exceeds the limits in the Specifications section, it must be inspected for damage that may have occurred.

Large volumes of gas may discharge through the regulator vent during internal relief valve operation, which can, if not controlled, result in fire or explosion from accumulated gas.

The RJ600 Series regulators contain internal relief valves. The internal relief valve in all units will give overpressure protection against excessive build-up resulting from seat leakage due to worn parts or chips or foreign material on the orifice. The amount of internal relief protection provided varies with the regulator type and the cause for the overpressure relief valve operation. When the internal relief valve opens, gas escapes to the atmosphere through the regulator's vent.

Some type of additional external overpressure protection must be provided if the outlet pressure in an overpressure condition exceeds the inlet pressure rating of the gas system or downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shutoff devices and series regulation.

Maintenance

WARNING

To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure.

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Fisher™ should be used for repairing Fisher regulators. Relight pilot lights according to normal startup procedures.

Due to normal wear or damage that may occur from external sources, these regulators must be inspected and maintained periodically. The frequency of inspection and replacement of the regulators depends upon the severity of

service conditions or the requirements of local, state and federal regulations. Even under ideal conditions, these regulators should be replaced after 20 years from date of manufacture or sooner should inspection reveal the need.

Failure to replace a regulator that has had water inside due to flooding, water table level or weather events or has corrosion present could result in personal injury or property damage.

Visually inspect the regulator each time a gas delivery is made for:

- Improper installation, vent not pointed vertically down or under a cover; no vent tube on underground systems
- Plugged or frozen vent
- Wrong regulator or no regulator in the system
- Internal or external corrosion, including paint chipping or flaking
- Flooded Regulator; water in spring case; regulator submersed on underground tanks
- Regulator age
- Any other condition that could cause the uncontrolled escape of gas

Vent Opening

Make sure the regulator vent, vent assembly or vent tube does not become plugged by mud, insects, ice, snow, paint, etc. The vent screen aids in keeping the vent from becoming plugged and the screen should be clean and properly installed. Make sure any irrigation system operated near a regulator or vent line does not spray water into the vent opening of the regulator or vent assembly.

Water Inside Regulators from Floods, Weather or Water Table on Underground Systems

Replace any regulator that had water in their spring case, has been flooded, has been submersed below the water table of an underground tank or shows evidence of external or internal corrosion. Checking for internal corrosion can be done by removing the closing cap and with the aid of a flashlight observing the condition of the relief valve spring, main spring and internal spring barrel area. A more detailed examination will require shutting down of the gas system and the complete removal of the adjusting screw. Closely examine regulators installed with their vent horizontal for signs of corrosion. Correct any improper installations.

Regulator Replacement

Older regulators are more likely to catastrophically fail because of worn or corroded parts. Replace RJ600 Series regulators over 20 years of age. Other service or environmental conditions may dictate replacement of the regulator before it becomes 20 years old. Regulators that are installed in corrosive environments including but not limited to the following conditions should be inspected annually for visual indication of external or internal corrosion and paint chipping or flaking. Regulators in these applications may require replacement sooner and must be replaced if corrosion is evident:

- Regulators that are installed in areas subject to sea salt (coastal) atmosphere
- Regulators that are installed on underground systems
- Regulators installed with underground vent piping
- Regulators that are used in installations where the gas system is only operated and pressurized intermittently

Refer to LP-32 Bulletin, D450142T012, for additional information.

Regulator Repair

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Fisher™ should be used to repair Fisher regulators. Be sure to give the complete type number of the regulator when corresponding with the factory.

The type number, orifice size and spring range are on a label attached to the spring barrel. The date of manufacture is stamped on the regulator. Always provide this information in any correspondence with your Fisher Distributor regarding replacement parts or technical assistance. If construction changes are made in the field, be sure that the regulator marking is also changed to reflect the most recent construction.

RJ600 Series

Webadmin.Regulators@emerson.com
Fisher.com
Facebook.com/EmersonAutomationSolutions
LinkedIn.com/company/emerson-automation-solutions
Twitter.com/emr_automation

Emerson

Americas
McKinney, Texas 75070 USA
T +1 800 558 5853
+1 972 548 3574

Europe
Bologna 40013, Italy
T +39 051 419 0611

Asia Pacific
Singapore 128461, Singapore
T +65 6777 8211

Middle East and Africa
Dubai, United Arab Emirates
T +971 4 811 8100

EMERSON™