LP-Gas Technologies

Regulators and Equipment, LPG/NH_3

LP-31 Buyer's Guide (2017-2018)

The industry leader for durability and quality.

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Application: Regulators

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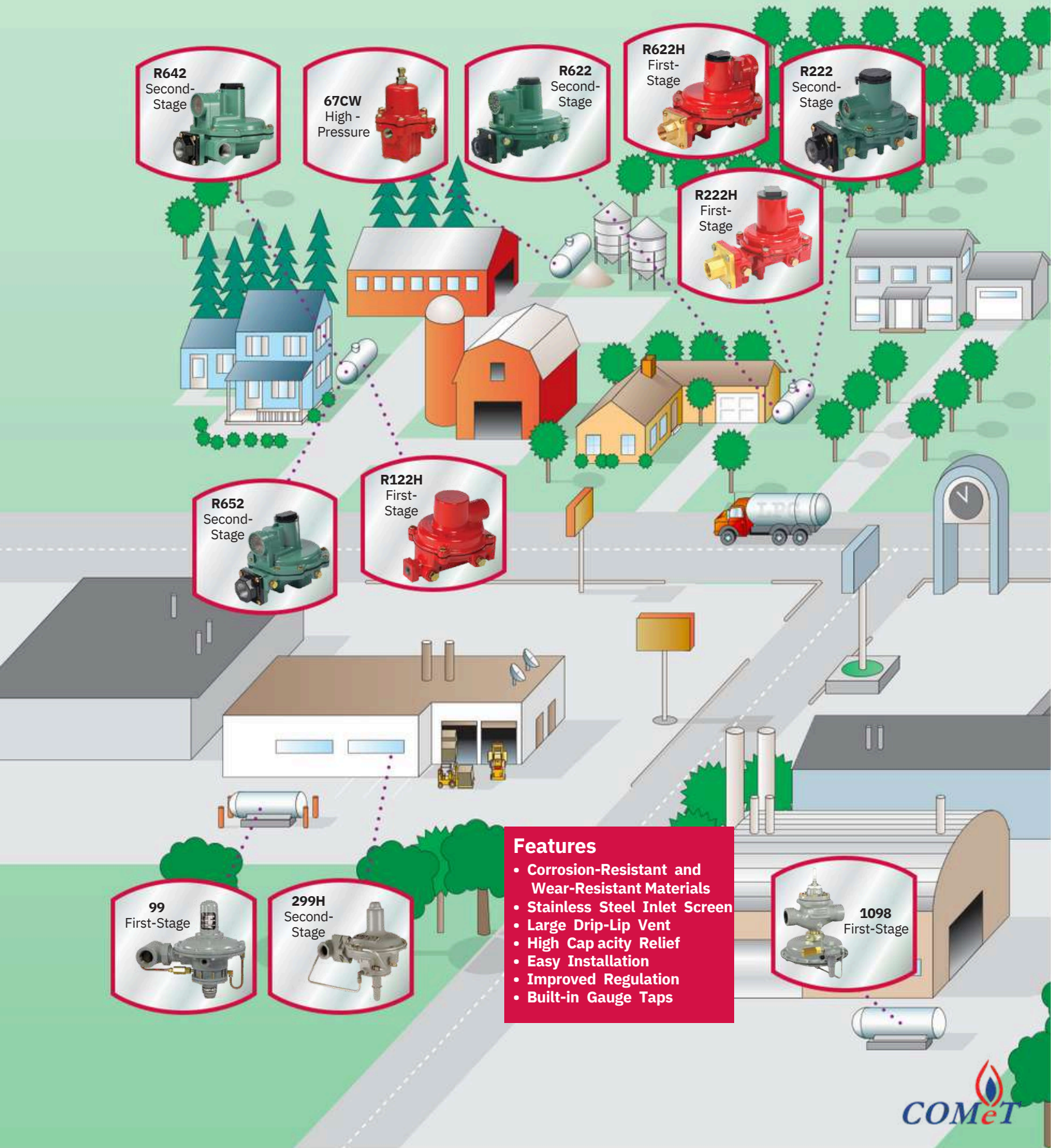

Features

- **Corrosion-Resistant and Wear-Resistant Materials**
- **Stainless Steel Inlet Screen**
- **Large Drip-Lip Vent**
- **High Cap acity Relief**
- **Easy Installation**
- **Improved Regulation**
- **Built-in Gauge Taps**

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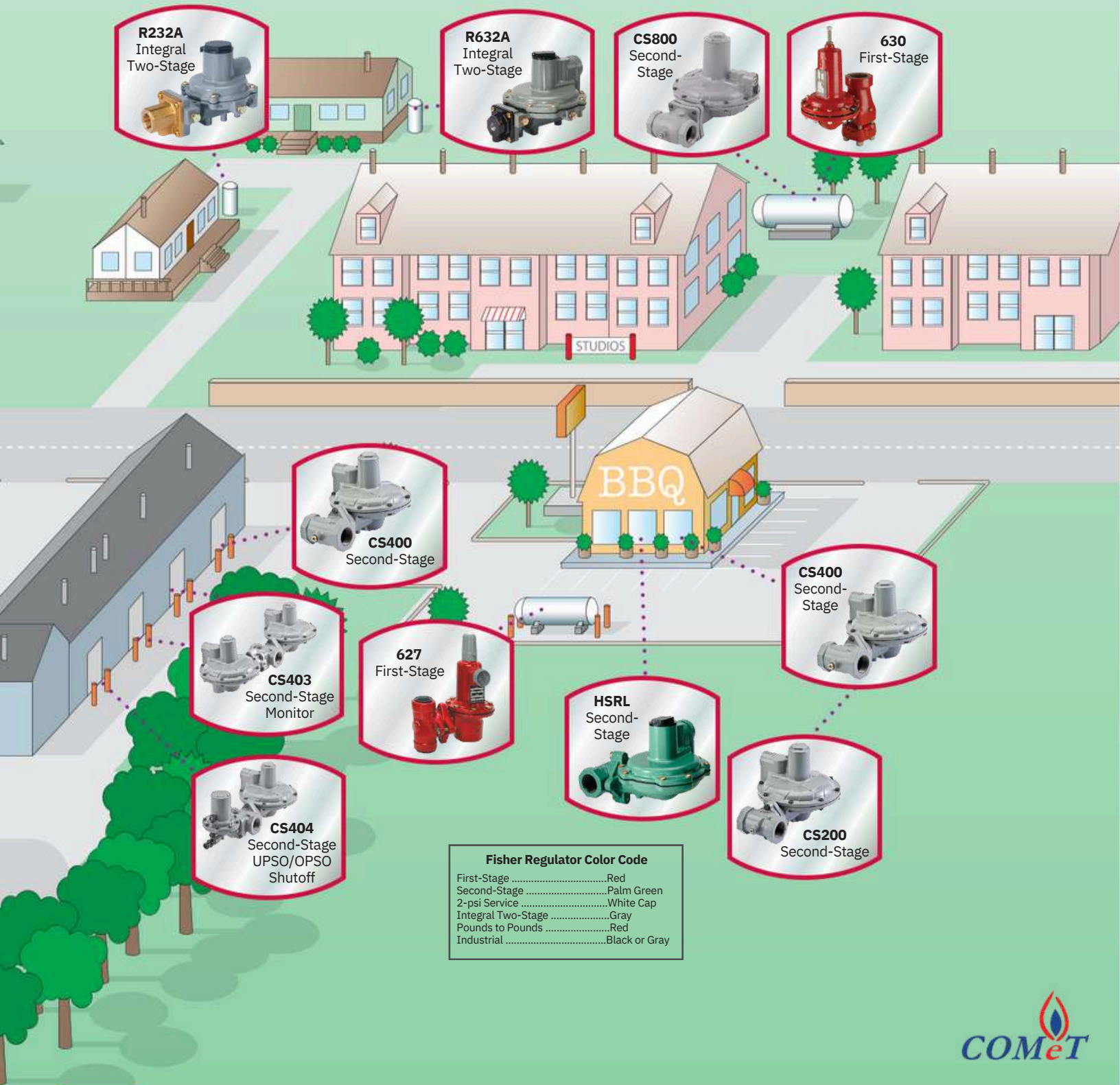
Introduction

Theregulator truly is the heart of an LPG installation. It must compensate for variations in tank pressure from 8 to 250 psig / 0.55 to 17.2 bar and deliver a constant outlet pressure of LPG typically at 11 in. w.c. / 27 mbar to consuming appliances. The regulator must deliver this pressure despite the intermittent use of the appliances.

In propane service, NFPA 58 requires Two-Stage regulation on all fixed piping systems that serve 14 in. w.c. / 35 mbar appliance systems (normally operated at 11 in. w.c. / 27 mbar pressure). Two-Stage regulation produces a nearly constant pressure to the appliance and can result in a more efficient LPG operation for the dealer resulting in less maintenance and fewer installation call-backs.

With properly selected regulators, the internal relief valve provides 2 psig / 0.14 bar overpressure protection as required by NFPA 58.

Emerson is a leading international supplier of cost-effective products, services and solutions used in the propane industry. Around the world, Emerson and its distributors offer quality products as well as applications engineering, education programs and after sales service. For any of the products described in this catalog, contact the Fisher™ LPG Equipment distributor near you.



Fisher Regulator Color Code

First-Stage	Red
Second-Stage	Palm Green
2-psi Service	White Cap
Integral Two-Stage	Gray
Pounds to Pounds	Red
Industrial	Black or Gray

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Commercial/Industrial High-Pressure Regulators

Maximum Inlet Pressure	Outlet Pressure Range	Rated Capacity*[1]		Type Number
250 psig / 17.2 bar	3 to 120 psig / 0.21 to 8.3 bar	1.2M BTU per hour / 13.5 SCMH		**67C Series** Page 30
250 psig / 17.2 bar	3 to 100 psig / 0.21 to 6.9 bar	5.25M BTU per hour / 59.1 SCMH		**64 Series** Page 31
250 psig / 17.2 bar	5 to 40 psig / 0.35 to 2.8 bar	20.95M BTU per hour / 235 SCMH		**627 Series** Page 32
250 psig / 17.2 bar	8 to 20 psig / 0.55 to 1.4 bar	14M BTU per hour / 158 SCMH		**630 Series** Page 33
300 psig / 20.7 bar	7 in. w.c. to 65 psig / 17 mbar to 4.5 bar	74.3M BTU per hour / 836 SCMH		**99 Series** Page 34
400 psig / 27.6 bar	3 to 100 psig / 0.21 to 6.9 bar	1.2B BTU per hour / 13,481 SCMH		**1098 Series** Page 35

*See capacity tables in the following sections for expanded rating information.
1. Based on inlet pressure 20 psig / 1.4 bar greater than outlet with 20% droop, unless otherwise noted.

First-Stage Regulators

Maximum Inlet Pressure	Outlet Pressure Setting/Setpoint	Rated Capacity*(1)		Type Number
250 psig / 17.2 bar	10 psig / 0.69 bar +/- 1 psig / 69 mbar nominal outlet setting (non -adjustable)	1.1M BTU per hour / 12.4 SCMH		**R122H Series** Page 25
250 psig / 17.2 bar	5 or 10 psig / 0.35 or 0.69 bar standard setpoints	2.0M BTU per hour / 22.5 SCMH		**R222H Series** Page 25
250 psig / 17.2 bar	5 or 10 psig / 0.35 or 0.69 bar standard setpoints	2.4M BTU per hour / 27.0 SCMH		**R622H Series** Page 25

Second-Stage Regulators(3)

Maximum Inlet Pressure	Outlet Pressure Range	Rated Capacity*(2)		Type Number
10 psig / 0.69 bar	9 to 13 in. w.c. / 22 to 32 mbar	2.6M BTU per hour / 29.3 SCMH		**Type HSRL** Page 26
10 psig / 0.69 bar	11 in. w.c. / 27 mbar	650,000 BTU per hour / 7.3 SCMH		**R222 Series** Page 26
10 psig / 0.69 bar	11 in. w.c. / 27 mbar	1.4M BTU per hour / 15.8 SCMH		**R622 Series** Page 26
10 psig / 0.69 bar	11 in. w.c. / 27 mbar	920,000 BTU per hour / 10.4 SCMH		**R642 Series** Page 26
10 psig / 0.69 bar	11 in. w.c. / 27 mbar	1M BTU per hour / 11.2 SCMH		**R652 Series** Page 26

*See capacity tables in the following sections for expanded rating information.
1. Based on 30 psig / 2.1 bar inlet pressure and 20% droop.
2. Based on 10 psig / 0.69 bar inlet pressure setting.
3. Second-Stage regulators are UL® rated.

Second-Stage Regulators

Regulators

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Type R222 | Type R622 | Type R642 | Type R652 | Type HSRl

Types R222, R622, R642, R652 and HSRl Second-Stage regulators are Underwriters Laboratories (UL®) listed regulators designed to reduce the outlet pressure from a First-Stage regulator, usually 10 psig / 0.69 bar to 11 in. w.c. / 27 mbar, in domestic installations. Vents are screened with standard orientation over the inlet, but other orientations are available. Fisher™ Second-Stage regulators are painted palm green for easy identification. Types R222, R622, R642 and R652 are equipped with a stainless steel inlet screen to reduce the amount of debris entering the regulator and have a temperature rating of -20 to 160°F / -29 to 71°C, but have passed Fisher internal testing for lockup, relief start-to-discharge and reseal down to -40°F / -40°C.

Type R222 is designed for small domestic applications up to 650,000 BTU per hour / 7.3 SCMH. The unit provides the same features as the Type R622 in a smaller package and its design provides a recommended replacement life of 20 years.

Type R622 is designed for Two-Stage domestic applications up to 1,400,000 BTU per hour / 15.8 SCMH. The Type R622's time proven design and corrosion resistant materials, provide a recommended replacement life of 20 years.

Type R622 contains a high performance relief valve and a large 3/4 in. screened vent to limit downstream pressure to less than 2 psig / 0.14 bar in an overpressure situation as required by NFPA 58. The relief valve design exceeds the industry standard by limiting the downstream pressure to 2 psig / 0.14 bar even in a double failure situation when used with a Type R622H or R122H First-Stage regulator. The Type R622 is adjustable from 9 to 20 in. w.c. / 22 to 50 mbar.

For easy system checks, the Type R622 has 1/8 in. NPT built-in gauge taps orificed to a No. 54 drill size, on both the upstream and downstream sides. This regulator also features a large 3/4 in. drip-lip vent design.

Types R642 and R652 are designed for domestic applications up to 920,000 / 10.4 and 1,000,000 BTU per hour / 11.3 SCMH, respectively. These units provide all the same features as the Type R622, including the 20-year recommended replacement life and double failure protection, in an angle body for the Type R642 and backmounted design for the Type R652.

Type HSRl is an UL listed regulator designed for light commercial applications up to 2,600,000 BTU per hour / 29.3 SCMH. It utilizes a high strength cast iron body and a 3/4 in. NPT drip lip vent design. The PFC and SFC feature an angle-body design. The design also includes a high capacity internal relief valve and a 20-year recommended replacement life.

Second-Stage Regulators

Type	CapaCiTieS (pRopane)(1)		inleT ConneCTion, in.	ouTleT ConneCTion, in.	ouTleT pReSSuRe Range		ouTleT pReSSuRe SeTTing	
	bTu / hr	SCmH			in. w.c.	mbar	in. w.c.	mbar
R222-BAF(2)	650,000	7.3	1/2	1/2 FNPT	9.5 to 13	24 to 32	11	27
R622-BCF(2)	875,000	9.8	FNPT	1/2 FNPT	9 to 13	22 to 32		
R622-CFF(2)(4)	1,400,000	15.8	1/2	3/4 FNPT				
R622-DFF(5)			FNPT 3/4 FNPT					
R642-DFF(2)	920,000	10.4	1/2					
R652-CFF	1,000,000	11.3	FNPT 1/2					
R652-DFF			FNPT					
R622-CFGXA[3]	1,125,000	12.7	3/4 FNPT	3/4 FNPT	13 to 20	32 to 50	18	45
HSRL-BFC	2,300,000	25.9	FNPT 3/4 FNPT	3/4 FNPT	9 to 13	22 to 32	11	27
HSRL-PFC								
HSRL-CFC	2,600,000	29.3	1 FNPT	1 FNPT				
HSRL-SFC								

1. Basedon 10psig / 0.69 bar inlet pressure and 2 in. w.c. / 5 mbar droop.
2. Consult factory for alternate vent over outlet position as "XA" option
3. Vent over Inlet as standard
4. Consult factory for alternate vent opposite gauge taps as "XB" option
5. Consult factory for alternate vent over outlet position as "XB" option

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64 SeRieS

64 Series

High-pressure (pounds-to-pounds) regulators usually reduce tank pressure to an intermediate pressure for use by another regulator. They may be used as high-pressure regulators on distribution systems when used in conjunction with a First-Stage downstream regulator. The Type 64SR may be used for First-Stage when set at 10 psig / 0.69 bar. They are also used for Final-Stage service on high-pressure burners in crop dryers and tobacco curers, as well as other medium sized commercial/industrial applications.

The 1/4 in. FNPT side outlet, which is normally plugged, provides an opening for an outlet pressure gauge. Standard 64's Series are capable of handling liquid or vapor at temperatures under 150°F / 66°C. A cover or auxiliary vent assembly should be used to protect the 1/4 in. FNPT regulator vent opening on outdoor installations. Temperature rating for the 64 and 64SR Series has a temperature rating from -20 to 150°F / -29 to 66°C.

64 Series – is an adjustable high-pressure regulator with a wide range of available outlet pressure ranges. It does not contain a relief valve. It should always be used in conjunction with a downstream regulator and/or separate relief devices in compliance with NFPA 58 overpressure protection requirements.

Type 64SR – is a high-pressure regulator, which has an internal relief valve. As such it may be used as a Final-Stage regulator on high-pressure systems. It may also be used as a First-Stage regulator when set at 10 psig / 0.69 bar or less.

note: 64 Series regulators do not have an internal relief and should be installed with additional/external overpressure protection. These units should not be installed in fixed piping serving 14 in. w.c. / 35 mbar appliance systems. please consult with your lpg equipment distributor for more information.

note: if the installation location makes the ignition of vented gas a possibility, then a vent line should be installed from the Type 64SR vent to a safe location.

High-pressure Regulators

Type	deSCRipTion	CapaCiTieS (pRopane)(1)		ouTleT pReSSuRe SeTTing		ouTleT adjuSTmenT Range		inleT and ouTleT ConneCTionS, in.
		bTu / hr	SCmH	psig	bar	psig	bar	
64-33	Basic Regulator	2,625,000	29.6	10	0.69	3 to 15	0.21 to 1.0	1/2 FNPT
64-35		3,600,000	40.5	20	1.4	5 to 35	0.34 to 2.4	
64-36		4,150,000	46.7	40	2.8	30 to 60	2.1 to 4.1	
64-222		5,250,000	59.1	50	3.4	35 to 100	2.4 to 6.9	
64SR-21	With Internal Relief Valve	2,625,000	29.6	10	0.69	3 to 15	0.21 to 1.0	
64SR-22		3,000,000	33.8	15	1.0	5 to 20	0.34 to 1.4	
64SR-23		3,600,000	40.5	20	1.4	5 to 35	0.34 to 2.4	

1. Based on inlet pressure 20 psig / 1.4 bar greater than outlet with 20% droop; Liquid capacity = 160 GPH / 606 l/hr.

Commercial/industrial High-pressure Regulators

Regulators

Type 627 diReCT-opeRaTed RegulaToR

Type 630 diReCT-opeRaTed RegulaToR

For Commercial and Industrial high-pressure applications like factories, office building, restaurants, etc., Emerson has a wide variety of products. For ease of reference, only the most popular commercial and industrial regulators are shown in these pages. Other orifice sizes, body sizes and outlet pressure ranges are available. The higher capacities on commercial and industrial installations usually require a Two-Stage regulator system. **note: because of various spring ranges and orifice sizes, all commercial and industrial regulators should be individually sized for the particular installation. Consult specific product bulletins for maximum pressure ratings. Contact your local lpg equipment distributor for assistance.**

Types627and 630– Large capacity direct-operated high-pressure regulators designed for loads up to 10,700,000 and 14,000,000 BTU per hour / 120 and 157 SCMH, respectively. The Types 627 and 630 are normally used in conjunction with Type CS400 units, however, they can also be used on Final-Stage (pounds-to-pounds) service. Additional overpressure protection is recommended to prevent excessive build-up in the downstream line. The diaphragm case and body of the Type 627 can be rotated in four positions to allow easy installation. Additional configurations of the Type 627 with internal relief and control line connections for monitor systems are available. For both the Types 627 and 630, additional pressure ranges and orifice sizes are available. Temperature ratings for the Types 627 and 630 is -20 to 160°F / -29 to 71°C.

For liquid Service, Types 627W and MR95H are available.

note: Types 627 and 630 regulators do not have an internal relief and should be installed with additional/external overpressure protection. These units should not be installed as part of a two-stage system in fixed piping serving 14 in. w.c. / 35 mbar appliance systems unless additional overpressure protection is installed that will make the system compliant with nFpa 58 requirements for a two-stage system. please consult with your lpg equipment distributor for more information.

Flanged bodies – The Types 630 and 627 are available with flanged bodies. Flanges are available for 2 in. CL300 FF.

overpressure protection – The Type 627 is also available in monitor configurations. Note that the Type 627 monitor regulators have unique type numbers. For more information on monitor overpressure protection, see page 42.

Fluorocarbon (FKm) Trim – The Type 627 is available with Fluorocarbon (FKM) Trim for high temperature applications such as vaporizors. Part numbers are listed below with a 'V' suffix. Temperature ratings for the Type 627 with Fluorocarbon (FKM) Trim is 0 to 180°F / -18 to 82°C.

Type 1301F – The proven reliability and accurate regulation of the Type 1301F regulator makes it ideal for numerous high-pressure drop applications. This multi-purpose regulator can be used as pilot supply or pressure-loading regulators where high-pressure operating medium must be reduced for use by gas regulator pilots or pressure-loaded regulators.

ul® listed Type 627 Constructions

Type	CapaCiTieS(1) pRopane		oRiFiCe SiZe		inleT and ouTleT ConneCTion	ouTleT pReSSuRe Range		SeTpoinT		maximum opeRaTing inleT pReSSuRe	
	bTu / hr	SCmH	in.	mm		psig	bar	psig	bar	psig	bar
627-5810	6,080,000	68.4	3/8	9.5	3/4 in. FNPT	5 to 20	0.34 to 1.4	10	0.69	250	17.2
627-5810V											
627-6210	10,755,000	121	1/2	13							
627-6210V											
627-7710	10,773,000				1 in. FNPT						
627-7710V											

1. For UL listed Type 627 configurations, capacity based on inlet pressure of 30 psig / 2.1 bar Internal registration and 20% droop.
NOTE: Additional spring ranges and body styles available. Ask your LPG Equipment Distributor for additional configurations and for more information.

non-ul listed Type 627 Constructions

Type	C apaCiTieS(2) pRopane		oRiFiCe SiZe		inleT and ouTleT ConneCTion	ouTleT pReSSuRe Range		SeTpoinT		maximum opeRaTing inleT pReSSuRe	
	bTu / hr	SCmH	in.	mm		psig	bar	psig	bar	psig	bar
627R-117(3)	10,755,000	121	1/2	13	3/4 in. FNPT	5 to 20	0.34 to 1.4	10	0.69	20	13.8
627M -421(4)										0	17.2
627R-197(3)	10,773,000				1 in. FNPT					25	13.8
627M-471(4)										0	17.2
627-497	14,837,000	16				15 to 40	1.0 to 2.8	40	2.8	250	
627-577	20,948,000	7			2 in. FNPT					0	

2. For Non-UL listed Types 627 and 630 configurations, capacity based on inlet pressure 20 psig / 1.4 bar greater than outlet pressure, Internal registration and 20% droop.
3. "R" denotes token relief. Check with your LPG Equipment Distributor on relief capacities.
4. For monitor applications. Standard with blocked throat and external sensing.
NOTE: Additional spring ranges and body styles available. Ask your LPG Equipment Distributor for additional configurations and for more information.

Type 630 Regulator

Type	CapaCiTieS in bTu peR HouR / SCmH pRopane(2)		oRiFiCe SiZe		inleT and ouTleT ConneCTion	ouTleT pReSSuRe Range		SeTpoinT		maximum opeRaTing inleT pReSSuRe	
	bTu / hr	SCmH	in.	mm		psig	bar	psig	bar	psig	bar
630-104-78	14,000,000	158	1/2	13	2 in. FNPT	8 to 20	0.55 to 1.4	10	0.69	250	17.2

2. For Non-UL listed Types 627 and 630 configurations, capacity based on inlet pressure 20 psig / 1.4 bar greater than outlet pressure, Internal registration and 20% droop.
NOTE: Additional spring ranges and body styles available. Ask your LPG Equipment Distributor for additional configurations and for more information.

monitor overpressure protection

Regulators

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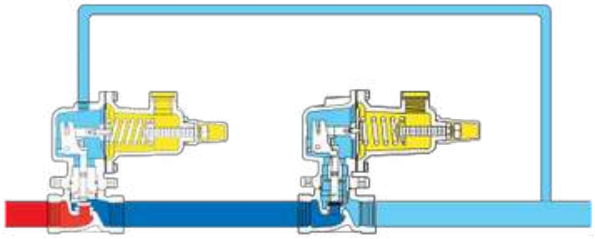
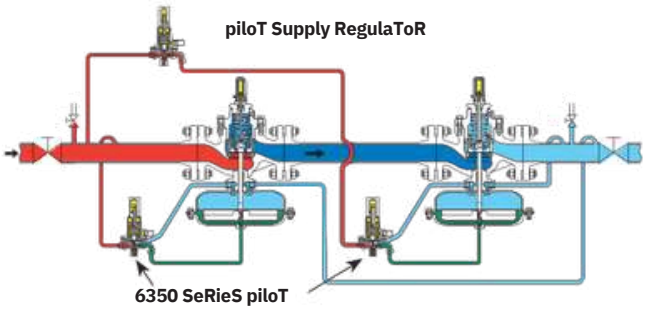
Monitoring is overpressure control by containment. When the working pressure reducing valve ceases to control the pressure, a second regulator installed in series, which has been sensing the downstream pressure, goes into operation to maintain the downstream pressure at a slightly higher than normal pressure. The monitoring concept is gaining in popularity, especially in low-pressure systems, because very accurate relay points permit reasonably close settings of the working and monitoring regulators.



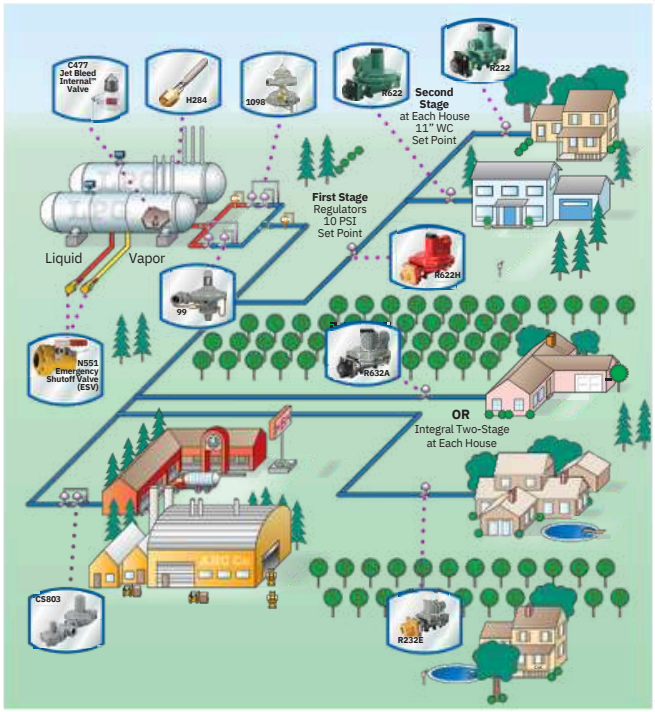
Type 627m (diReCT-opeRaTed) moniToR



Type 1098H (piloT-opeRaTed) moniToR

inleT pReSSuRe
ouTleT pReSSuRe
loading pReSSuRe
aTmoSpHeRiC pReSSuRe
inTeRmediaTe pReSSuRe

When selecting regulators for use in a monitor system, the upstream regulator must have a control line. When determining the capacity of a monitor system you will get approximately 70% to 73% of the capacity of a single regulator when using the same regulator for both regulators in the system.



CommuniTy SySTem map

The major advantage is that there is no venting to atmosphere. During an overpressure situation, monitoring keeps the customer on line and keeps the downstream pressure relatively close to the setpoint of the working regulator. Testing is relatively easy and safe. To perform a periodic test on a monitor, increase the outlet set pressure of the working device and watch the pressure to determine if the monitor takes over.

Fisher™ offers a wide variety of products for monitor applications. Provided for your reference below is a list of commonly used regulators for various capacity requirements. Note that pilot-operated regulators may be used in conjunction with direct-operated regulators in monitor applications, depending on the application requirement. Please call your local LPG Equipment Distributor to review your monitor requirements.

Typical Wide-open monitor System

opeRaTing Regu-laToR	oRiFiCe SiZe		body SiZe, in.	moniToR RegulaToR	oRiFiCe SiZe		body SiZe, in.	RegulaTing CapaCiTy(1)	
	in.	mm			in.	mm		bTu/hr	SCmH
Type 627-5810	3/8	9.5	3/4 NPT	Type 627M-421	1/2	13	3/4 NPT	5,750,000	64.6
Type 627-6210	1/2	13	3/4 NPT	Type 627M-421			3/4 NPT	7,050,000	79.2
Type 627-7710			1 NPT	Type 627M-471			1 NPT		
Type 630-104/78			2 NPT	Type 627M-267			2 NPT	8,400,000	94.4
Type 630-104/78			2 NPT	Type 99M-504PH	1-1/8	28.6	2 NPT	13,500,000	152
Type 99-504PH			2 NPT	Type 99M-504PH			2 NPT	42,650,000	479
Type 99-504PH	1-1/8	28.6	2 NPT	Type 1098H	2-3/8	60.3	2 NPT	54,500,000	612
Type 1098	2-3/8	60.3	2 NPT	Type 1098H			2 NPT	136,900,000	1538
Type 1098			3 NPT	Type 1098H	3-3/8	85.7	3 NPT	283,700,000	3187
Type 1098			4 NPT	Type 1098H	4-3/8	111	4 NPT	437,800,000	4918

1. Capacities are based on 30 psig / 2.1 bar in and 8 psig / 0.55 bar out.

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