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I & M Mark 630

Installation & Maintenance Instructions for Mark 630 High Pressure Regulator

Warning: Jordan Valve Pressure Regulators must only be used, installed and repaired in accordance with these Installation & Maintenance Instructions. Observe all applicable public and company codes and regulations. In the event of leakage or other malfunction, call a qualified service person; continued operation may cause system failure or a general hazard. Before servicing any valve, disconnect, shut off, or bypass all pressurized fluid. Before disassembling a valve, be sure to release all spring tension.

Note: This document is to be used in conjunction with Mark 630 Series Cut Sheet.

WARNING! Over-pressure of this regulator or installation of the regulator in applications which may see pressure levels beyond those for which the regulator is designed may result in leakage and/or catastrophic failure. This failure could result in leaking gas, damage to surrounding equipment, personal injury or death. To prevent such damage/injury the regulator should be installed in a safe location and should be chosen based upon the user's specific application.

It is highly recommended that suitable pressure relieving devices, as recommended by appropriate codes or standards, be installed in your system to assure that maximum rated pressures are not exceeded.

Installation

1. The Mark 630 should be chosen based upon the maximum inlet pressures, pressure drops and outlet pressures as described in Table 1 and 2. Flow capacities are listed in Table 4. The operating temperature range is -20°F to 150°F. When choosing and installing a regulator one must ensure that the conditions do not exceed these parameters. Furthermore, large differentials in pressure across the regulator may result in the formation of ice in the orifice area. The resulting decrease in orifice area may affect the regulators ability to flow in sufficient volume for downstream demand. Therefore, large pressure drop applications may require the use of more than one regulator.
2. Make sure that line pressure has been eliminated prior to the installation of any regulator. Prior to installation the line should be inspected to ensure that there is no debris that might damage the regulator. Install regulator with properly sized threaded connections and utilizing thread sealant.
3. The regulator should be installed with the flow arrow on the side of the body in the correct orientation to flow - i.e. higher pressure upstream, lower regulated pressure downstream. As is true with most regulators, the Mark 630 has an outlet pressure rating that is less than the inlet pressure rating. Overpressure protection must be provided to avoid over-pressure condition if the actual inlet pressure can exceed the outlet pressure rating. Refer to Tables 1 and 2 for maximum inlet pressures, pressure drops and outlet pressure ranges.
4. The regulator may be installed in any orientation as long as the flow is in proper agreement with the flow arrow on the side of the body. However, the regulator should be positioned such that the screened breather (24) will not collect debris or moisture.

Vent Line Option

The Mark 630 includes a vent or Breather (24) in the Spring Housing (3). If there is concern about build-up of gas in a confined location, the Breather may be removed to allow installation of a remote vent line. With the Breather removed, a vent line may be installed into the ¼" NPT port. This vent line should be as large a diameter as possible and should utilize minimal bends and elbows. Furthermore, the vent line opening should be protected from weather or debris and should be checked regularly for blockage.

Start-Up Operation

WARNING! Release downstream pressure to prevent a potential over-pressure of the diaphragm. Failure to do so may result in property damage and/or personal injury. Always employ upstream and downstream pressure gauges to monitor startup pressures.

With the regulator isolated with shutoff valves on both the upstream and downstream sides, slowly open upstream valve followed by slowly opening the downstream valve. Check all connections for leaks and make necessary output adjustments by manipulating the adjusting screw (1) per the adjustment procedures below.

Adjustment

1. The range of adjustment for a particular regulator is indicated on the nameplate. Different ranges can be achieved by substituting a different spring (5).

   IMPORTANT: If a new spring is installed the nameplate must be remarked to indicate the new pressure range.

2. Refer to Tables 1 & 2 prior to adjustment for pressure and flow information, assuring that the chosen spring will facilitate the desired pressure regulation and that the maximum pressure output does not exceed the downstream system pressure limits.
3. Loosen the jam nut (2).
4. **To INCREASE pressure:** Turn adjustment screw clockwise.
5. **To DECREASE pressure:** Turn adjustment screw counterclockwise.
6. Once the desired pressure is achieved, hold adjustment screw while securing the jam nut.

Shutdown

WARNING! Downstream pressure must be released to prevent an over-pressurization of the diaphragm. Failure to do so may result in property damage and/or personal injury.

1. Close the upstream block valve followed by closing the downstream block valve.
2. Open the nearest vent valve between the regulator and the downstream block valve.

Operation

When the outlet pressure is lower than the set pressure, force generated by the spring (5) upon the spring guide (7) and diaphragm (11) causes the lever assembly (14) to hold the valve in an open condition. As the outlet pressure exceeds the set pressure, the diaphragm, acting upon the lower spring guide compresses the spring allowing the lever assembly to close the valve until the outlet pressure equalizes with the set pressure.

Maintenance

Routine maintenance should be expected due to normal wear and tear, damage from external sources or debris. The regulator components, especially the moving and sealing parts, should be inspected periodically and replaced as necessary. Frequency of inspection/replacement depends upon severity of conditions, but may also be required by local/state/federal law or industry standards.

Large pressure drops or large amounts of particulate in the flow will result in accelerated wear on the valve disc assembly (21) and orifice (20).

Replacing the Orifice, Lever Assembly and Disk Assembly

1. Disconnect piping form inlet adapter (18), removing adapter and four cap screws (17).
2. Remove orifice (20) and inlet body gasket (19).
3. Remove vent piping if it is installed.
4. Remove two cap screws (8), which secure the diaphragm adapter (13) to the body (23). Remove the diaphragm adapter and spring case (3) as a unit.
5. If the lever assembly is to be replaced, drive out the pin (15) and slide the lever assembly out of the diaphragm adapter. When replacing the lever assembly, make sure that the slot engages the connector head assembly (12). Replace the pin.
6. Remove the valve carrier (22) from the body.
7. Use a ¾" socket to remove and reinstall the valve disc and holder.
8. Discard old inlet body gaskets and replace with new. Reinstall the valve carrier into the body.
9. Reinstall the diaphragm adapter/spring housing unit, making sure that the lever assembly properly engages the valve carrier. Finally, tighten the two cap screws that secure the diaphragm adapter/spring housing unit to the body. IMPORTANT: Spring case (3) must be oriented such that it points away from the inlet adapter (18).
10. Reinstall the inlet adapter to the body, installing and tightening four cap screws.

Replacing the Diaphragm

1. Remove spring tension by loosening the jam nut (2) and turning the adjusting screw (1) counterclockwise until all spring compression is relieved.

2. Disconnect vent line if installed.
3. Unscrew two cap screws (9) and four cap screws (10) with hex nuts (25).
4. Remove the spring housing (3).
5. Remove from the lever assembly, as a unit, the diaphragm (11), connector head assembly (12), lower spring guide (7) and cap screw (6).
6. Unscrew the cap screw (6) from the connector head (12) and disassemble the diaphragm (11).
7. Install a new diaphragm, making sure that it is properly centered. Reassemble connector head assembly and lower spring guide, securely tightened with the cap screw.
8. Engage connector head in lever assembly.
9. Reinstall the spring housing with cap screws and nuts finger-tight only. Assure proper diaphragm slack by slightly compressing the spring with the adjusting screw (tighten by turning clockwise). Finally, complete the tightening of all cap screws and nuts.

Table 1: Maximum Pressure and Pressure Drops

Port Diameter	1/8″	1/4″	3/8″	1/2″
Max. Allowable Inlet Pressure, psig[1]	1500	1500	1000	750
Max. Allowable Pressure Drop, psid	1500	1000	500	250

† The sum of the outlet pressure setting and the maximum allowable pressure drop determines the maximum allowable inlet pressure for a given installation. For example, with a 3/8″ seat ring orifice (maximum pressure drop of 500 psi) and a 275 psig outlet pressure setting, the maximum inlet pressure is 775 psig (500 psi + 275 psi + 775 psi).

Table 2: Outlet Pressure Ranges

Outlet Pressure Range psig	27-50	46-95	90-150	150-200	200-275	275-500
Max Outlet Pressure over Pressure Setting †, psig	200					200 ‡
Max Emergency Outlet (Casing) Pressure, psig	550					

† Internal parts of the regulator may be damaged if the outlet pressure exceeds the pressure setting beyond the amounts shown.

‡ This applies to outlet pressure settings below 350 psig only. For pressure settings above 350 psig, outlet pressure is limited to 550 psig, the maximum emergency outlet (casing) pressure.

Table 3: Wide-Open Flow Coefficients

Orifice Size	C_g	C_v	C_1
1/8″	13.9	0.49	28.4
3/16″	31.3	1.11	28.2
1/4″	55.1	2.03	27.2
3/8″	122.5	4.61	26.6
1/2″	216.0	8.18	26.4

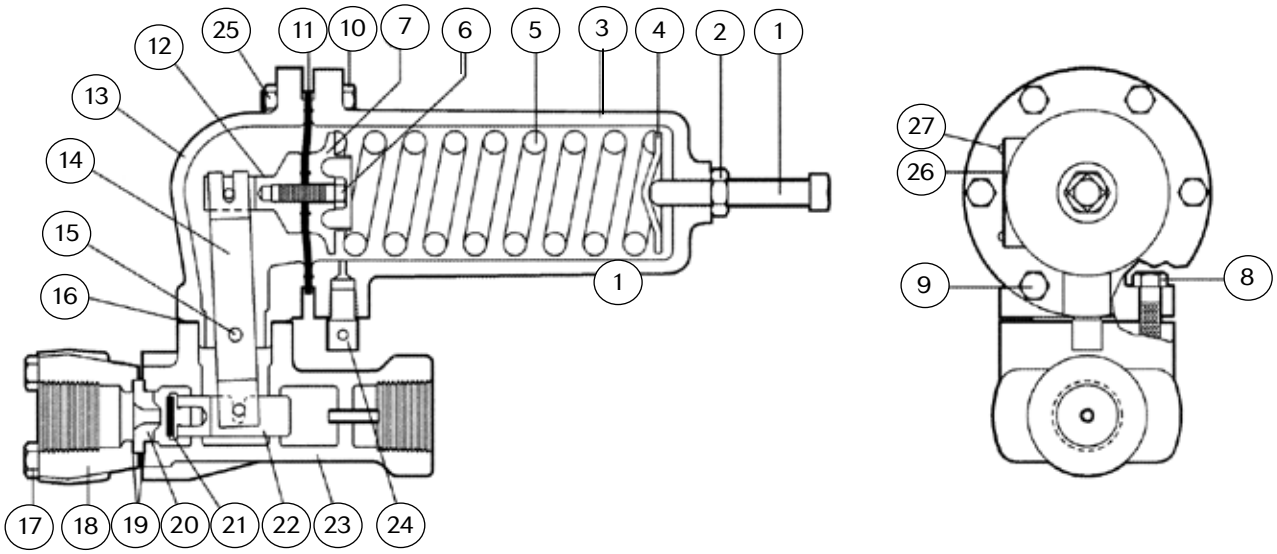
Table 4: High Pressure Regulator Flow Capacities (scfh of 0.6 Specific Gravity Gas; based on 20% Droop)

Outlet Pressure Range psig	Inlet Pressure psig	Outlet Pressure psig	Seat Ring Orifice Diameter (inches)				
			1/8	3/16	1/4	3/8	1/2
27-50	60	50	900	2000	3100	5200	8100
	75		1300	28500	3800	7200	10000
	100		1700	3500	5700	10500	13000
	150		2600	5700	8700	13000	17000
	200		3500	7800	11000	16000	19000
	300		5300	10500	14000	20000	23000
	400		6900	13000	17000	23000	—
	550		9600	16000	20000	26000	—
	600		9800	17000	21000	—	—
	1050		17000	23000	27000	—	—
	1500		19000	25000	—	—	—
46-95	60	50	800	1500	2400	4300	6400
	75		1200	2100	3100	5500	8000
	100		1500	3100	4200	7500	10000
	150		2400	4500	6700	11000	14000
	200		3400	6600	9400	14000	17000
	300		5200	8900	11000	16000	20000
	400		6800	11000	15000	20000	—
	550		9500	13000	17000	23000	—
	600		9800	14000	19000	—	—
	1050		14000	19000	22000	—	—
	1500		18000	24000	—	—	—
46-95	100	75	1700	3200	5000	8000	13000
	125		2200	4300	6700	10000	15000
	200		3500	7300	10000	16000	22000
	250		4400	9400	1300	19000	24000
	325		5700	11000	16000	23000	27000
	400		7100	14000	19000	27000	—
	575		9700	18000	23000	30000	—
	600		9900	19000	25000	—	—
	1075		18000	27000	32000	—	—
	1500		23000	32000	—	—	—
90-150	125	100	2000	3600	5500	9200	13000
	150		2500	4600	6800	11000	16000
	200		3600	6600	9400	13000	22000
	250		4400	8500	11000	18000	26000
	300		5300	9800	14000	21000	30000
	350		6100	10000	16000	25000	32000
	400		7000	13000	18000	27000	—
	600		9500	18000	23000	35000	—
	1100		19500	28000	35000	—	—
	1500		25000	35000	—	—	—

Table 4: High Pressure Regulator Flow Capacities (scfh of 0.6 Specific Gravity Gas; based on 20% Droop) (cont'd)							
Outlet Pressure Range psig	Inlet Pressure psig	Outlet Pressure psig	Seat Ring Orifice Diameter (inches)				
			1/8	3/16	1/4	3/8	1/2
90-150	150	125	2400	4600	6700	11000	17000
	200		3500	6800	10000	15000	23000
	250		4300	8900	12000	19000	29000
	300		5200	10000	15000	25000	34000
	375		6600	13000	18500	28000	39000
	400		7300	14500	19000	29000	—
	500		7900	15000	25000	36000	—
	625		10000	22000	29000	41000	—
	1125		18000	33000	42000	—	—
	1500		26000	43000	—	—	—
90-150	200	150	2400	6800	10000	16000	26000
	250		4400	8800	13000	20000	32000
	300		5300	10000	15000	24000	35000
	400		7100	14000	22000	34000	42000
	450		7700	17000	24000	36000	—
	650		9000	24000	33000	49000	—
	800		13000	29000	38000	—	—
	1150		20000	38000	49000	—	—
	1500		26000	47000	—	—	—
150-200	200	150	3400	6200	9300	16000	24000
	250		4300	8800	12000	20000	27000
	300		5300	10000	15000	24000	30000
	400		7100	14000	21000	32000	38000
	450		7600	15000	24000	36000	—
	650		9000	21000	33000	48000	—
	800		13000	27000	37000	—	—
	1150		19500	34000	49000	—	—
	1500		26000	44000	—	—	—
150-200	250	200	4200	8300	12000	20000	30000
	300		5200	10000	16000	25000	35000
	450		7800	16000	26000	43000	50000
	600		9500	22000	34000	55000	—
	700		11000	25000	40000	61000	—
	800		13000	30000	43000	—	—
	1000		16000	37000	50000	—	—
	1200		20000	41000	59000	—	—
	1500		26000	53000	—	—	—
200-275	250	200	4200	8200	11000	20000	29000
	300		5200	10000	14500	25000	35000
	450		7700	1600	24000	40000	50000
	600		9500	22000	31000	51000	—
	700		11000	25000	35000	55000	—
	800		13000	29000	42000	—	—
	1000		16000	36000	50000	—	—
	1200		19000	41000	55000	—	—
	1500		26000	51000	—	—	—

Table 4: High Pressure Regulator Flow Capacities (scfh of 0.6 Specific Gravity Gas; based on 20% Droop) (cont'd)							
Outlet Pressure Range psig	**Inlet Pressure psig**	**Outlet Pressure psig**	**Seat Ring Orifice Diameter (inches)**				
			1/8	**3/16**	**1/4**	**3/8**	**1/2**
200-275	300	250	4900	9000	15000	28000	42000
	400		7000	14000	23000	40000	56000
	500		8500	18000	29000	51000	65000
	600		9500	22000	34000	59000	—
	750		12500	28000	44000	69000	—
	1000		16000	39000	58000	—	—
	1250		21000	49000	69000	—	—
	1500		26000	59000	—	—	—
200-275	300	275	4700	9000	15000	28000	39000
	400		6900	14000	25000	40000	54000
	525		8600	18000	35000	68000	94000
	775		11000	28000	51000	95000	—
	1000		16000	39000	67000	—	—
	1275		21000	50000	87000	—	—
	1500		26000	60000	—	—	—
275-500	300	275	4500	7500	10000	20000	31000
	400		6600	12000	16600	31000	43000
	525		8600	16000	21000	39000	56000
	775		11000	24000	32000	55000	—
	1000		17000	32000	43000	—	—
	1275		21000	40000	53000	—	—
	1500		26000	46000	—	—	—
275-500	400	300	6600	11000	16000	31000	42000
	550		9700	18000	23000	44000	63000
	600		9900	19000	26000	48000	—
	700		11000	23000	30000	54000	—
	800		13000	26000	35000	61000	—
	900		15000	29000	39000	—	—
	1300		22000	43000	58000	—	—
	1500		26000	49000	—	—	—
275-500	500	400	8300	16000	24000	44000	62000
	650		10000	24000	33000	61000	86000
	800		13000	30000	41000	76000	—
	900		15000	34000	49000	85000	—
	1000		17000	38000	54000	—	—
	1200		20000	46000	63000	—	—
	1400		24000	55000	76000	—	—
	15000		26000	60000	—	—	—
275-500	550	500	8700	16000	26000	50000	77000
	750		12000	28000	40000	78000	100000
	900		15000	34000	52000	92000	—
	1000		17000	39000	60000	100000	—
	1500		26000	59000	72000	—	—

Illustration and Parts List



Item	Description	Qty.	Item	Description	Qty.
1	Adjusting Screw	1	15	Pin	1
2	Jam Nut	1	16	Gasket	1
3	Spring Housing	1	17	Cap Screw	4
4	Upper Spring Guide	1	18	Inlet Adapter	1
5	Spring	1	19	Inlet Body Gasket	2
6	Cap Screw	1	20	Orifice	1
7	Lower Spring Guide	1	21	Valve Disc Assembly	1
8	Cap Screw	2	22	Valve Carrier	1
9	Cap Screw	2	23	Body	1
10	Cap Screw	4	24	Breather	1
11	Diaphragm	1	25	Hex Nut	4
12	Connector Head Assembly	1	26	Name Plate	1
13	Diaphragm Adapter	1	27	Drive Screw	4
14	Lever Assembly	1	28	Plug	1

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