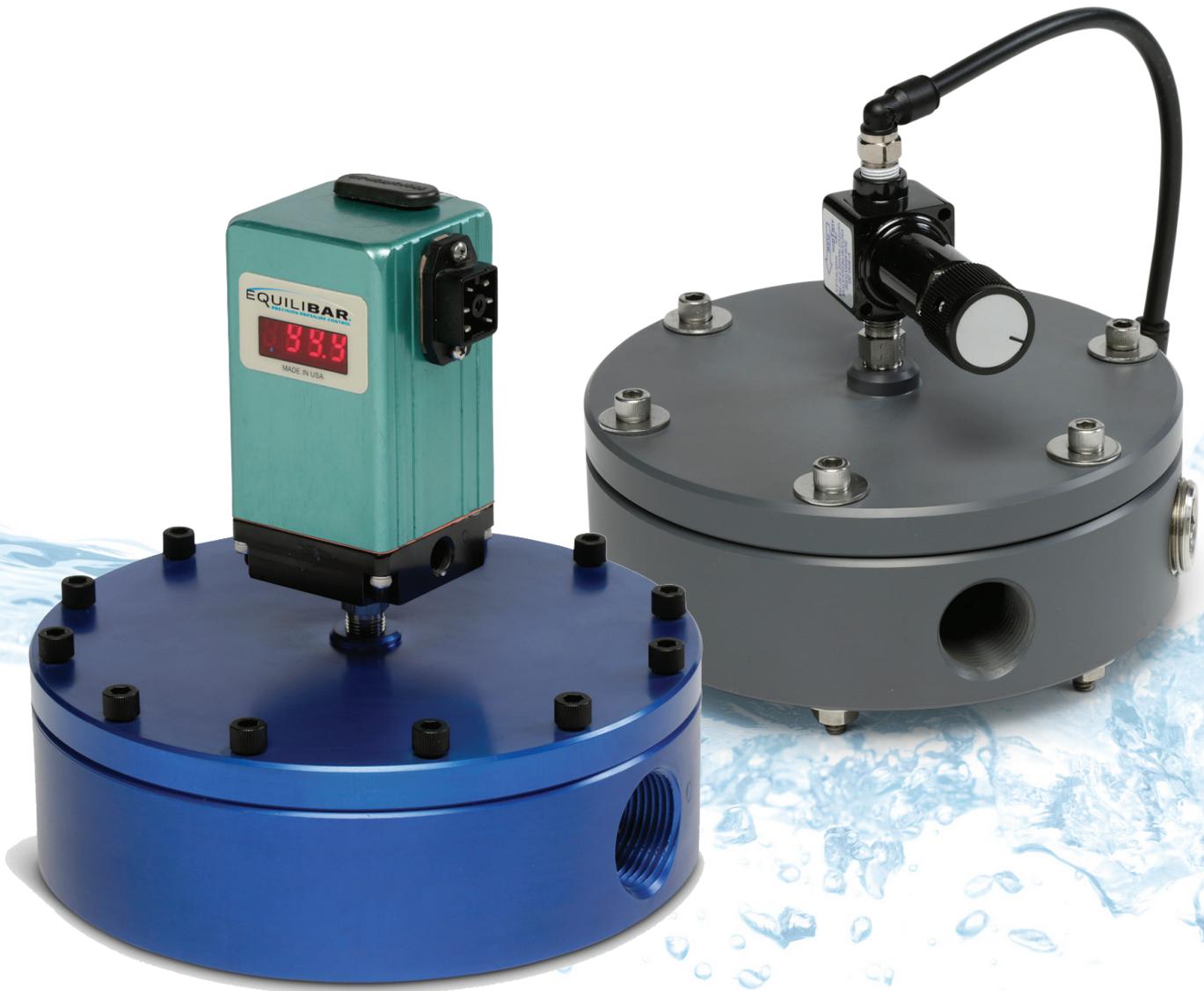


EQUILIBAR[®]
PRECISION PRESSURE CONTROL



EVR Series

Precision Vacuum Regulating Valves

MANUAL AND ELECTRONIC CONTROL OPTIONS

How It Works

The Equilibar® vacuum regulator (EVR) uses the same patented technology as the Equilibar® Precision Back Pressure Regulator, with unmatched precision across varying flow rates.

The EVR series regulators are pilot operated (dome loaded). They match your process(Inlet) vacuum 1:1 to a pilot set-point vacuum. They work to restrict flow between your process and the vacuum pump in order to keep your process very closely matched to the pilot setpoint vacuum.

Unique Direct-Sealing Diaphragm Technology

The key to the incredible performance of the Equilibar® vacuum valve is the unique direct sealing diaphragm technology. It works like a fluid transistor by forming a force balance on a flexible membrane between three separate pressures.

The fluid inlet pressure and the downstream outlet pressure exist on the wetted side of the membrane, separated by an orifice plate. The reference air pressure exists on the non-wetted side.

The lower pressure of the outlet tries to hold the membrane in a leak-tight seal with the valve seat. However, any slight excess between the fluid inlet pressure and the reference pressure quickly overwhelms these seating forces and pulls the membrane away from the orifices.

Flow is automatically controlled at a level that maintains pressure equilibrium between the Inlet and Reference pilot ports.

For manual applications, a sensitive 20-turn vacuum regulator is used to supply the set-point. For computer automation, an electro-pneumatic regulator is used to provide the set-point signal.

Visit our website to learn more about how our unique vacuum regulator technology works.

Unlike common vacuum breakers or vacuum relief valves, the Equilibar® vacuum regulating valve is a non-relieving regulator. It restricts flow to your vacuum pump in order to hold your process at the right vacuum pressure upstream.

In order to lower the vacuum pressure in your process, there will need to be at least a small in-flow of gas. Fortunately, most processes have at least a small gas flow or in-leakage.

Simply connect the Outlet of the Equilibar® to your vacuum supply, and the Inlet to your process is in the Figure to the right.

2 SET-POINT OPTIONS

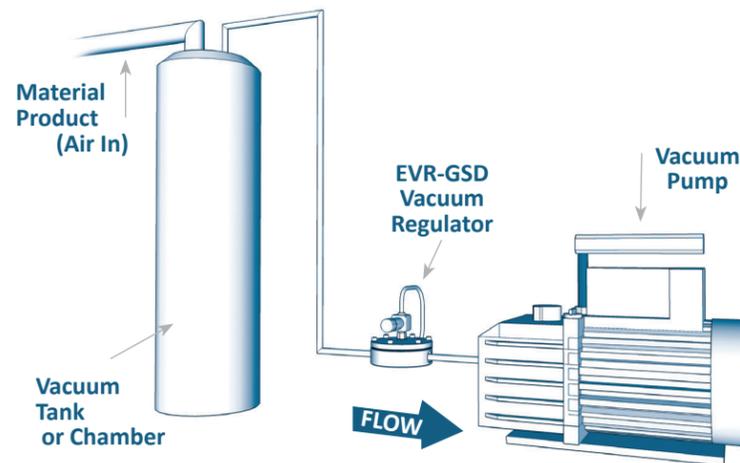
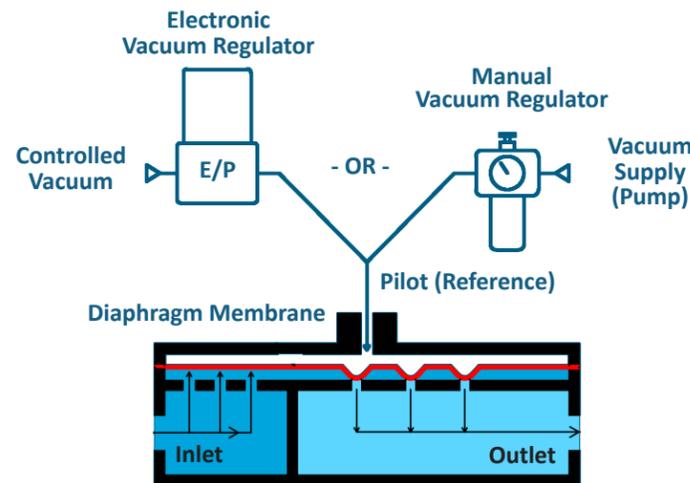
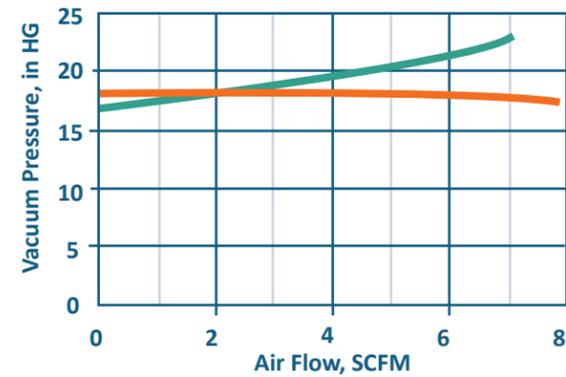


Fig 1: An illustration of one way the vacuum regulator can be installed for precision volume control

Performance

1/2" Equilibar EVR-GSD4 vs. Fairchild Model 16 Vacuum, Flow Stability Curve



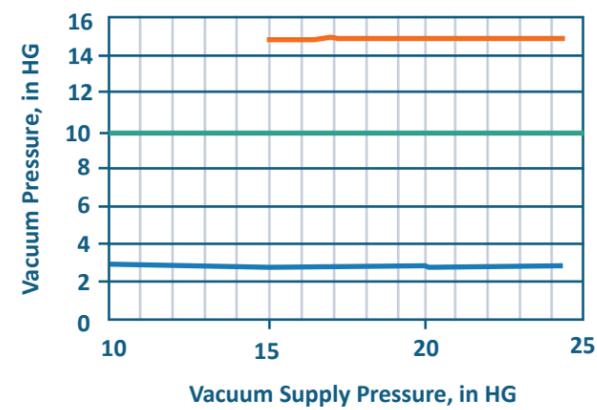
STABILITY

Equilibar® EVR Series Vacuum Regulators have more than 5X the flow stability of traditional spring regulators.

This means that your vacuum process remains stable even as gas flow rates change over a wide range.

- Competitive 1/2" Regulator
- Equilibar 1/2" EVR-GSD4

Effect of Vacuum Supply 3/8" EVR-GSD3, 1 SCFH flow rate

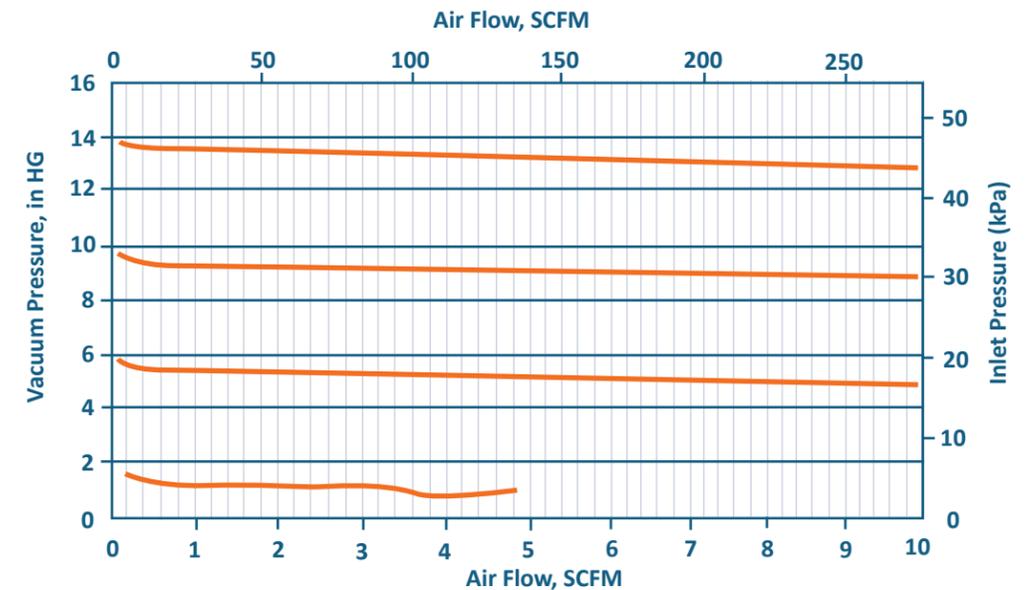


EFFECT OF VARYING PUMP PRESSURE

Traditional vacuum regulators have much larger pressure variability with increasing flow rates.

This chart below shows the excellent vacuum stability through various flow rates and pressure ranges.

EVR-GSD4 Vacuum Performance Vacuum Supply 20-25 in HG



Selecting The Right Size

The chart below shows the projected vacuum performance at various regulator body sizes. For a given regulator size, as flow increases past a critical point, 'droop' increases. Droop is defined as the reduction in vacuum pressure due to friction in the regulator.

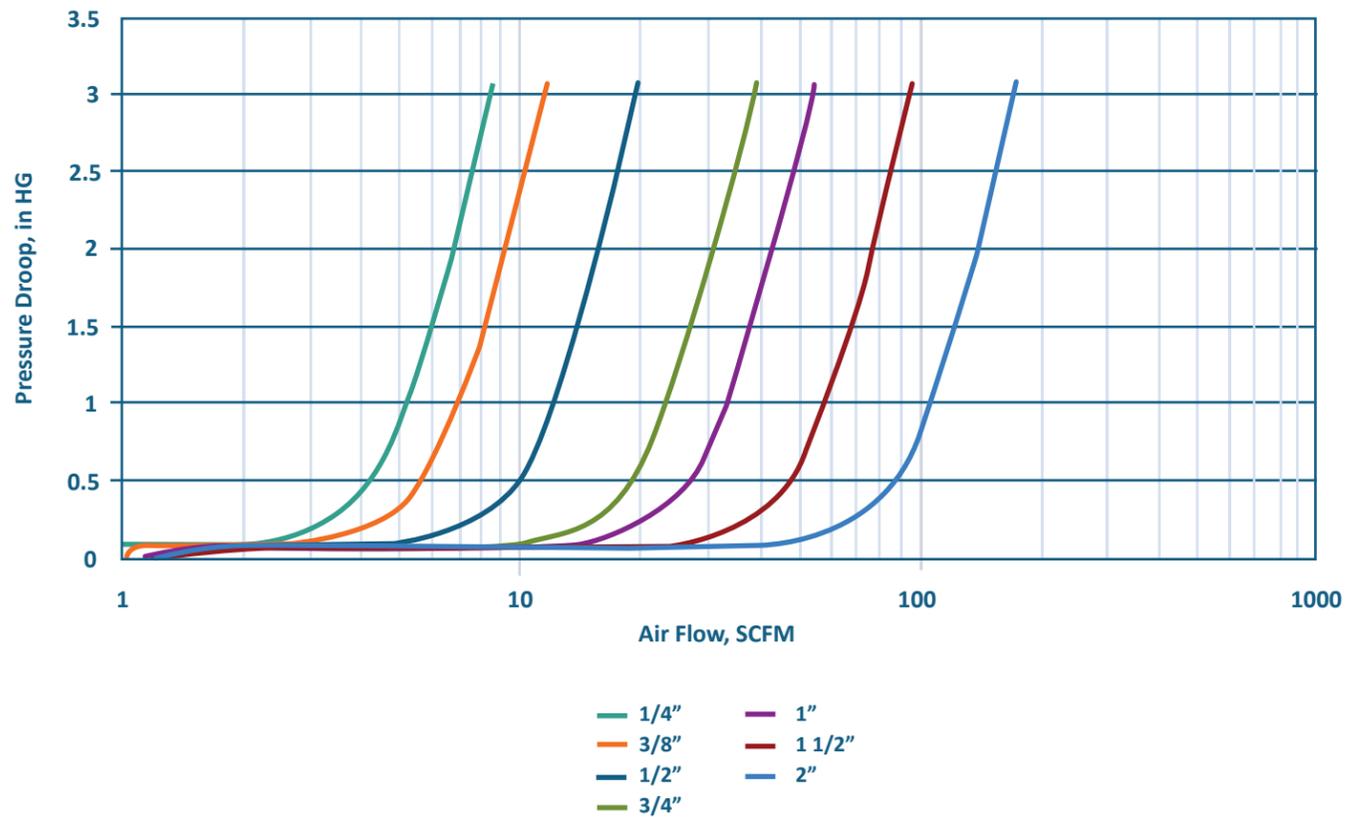
In order to select the optimum size for your application, find the smallest regulator that has acceptable pressure variance in your flow range.

For example, for flow rates between 5 and 20 SCFM, the 3/4" shows only 0.25 in Hg variance and would be acceptable for most applications. The 1" regulator shows virtually no variance in this range.

If you don't know your flow rates, you can select the Equilibar® Vacuum Regulator to match your existing pipe size.



EVR FLOW SIZING CHART
(10inHG)



EVR Series Specifications

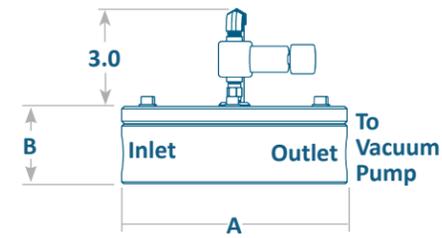


Fig 2: Dimensional Drawing for Regulators with line size 1/4" to 1"

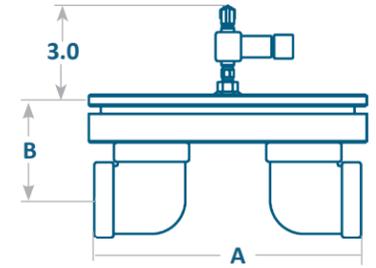


Fig 3: Dimensional Drawing for Regulators with line size 1.5" to 4"

MODEL NUMBER	INLET / OUTLET PORT	STANDARD BODY MATERIALS	DIM A		DIM B		CV RANGE (PRECISION)		PRESSURE RANGES
			INCH (MM)		MIN ¹	MAX	MIN	MAX	
REGULATORS WITH LINE SIZE 1/4" TO 1" REFERENCE FIGURE 1									
EVR-GSD2A	1/4"	Anodized Aluminum	3 (76)		1.3 (33)		1.00E-03	1	0 to -29.5 inHg (12 to 760 torr) [0 to -980 mbar]
EVR-GSD2S	1/4"	Stainless Steel 316	3 (76)		1.3 (33)		1.00E-03	1	0 - 10 in Hg [0 to -340 mbar]
EVR-GSD2P	1/4"	PVC	3.25 (83)		1.5 (38)		1.00E-03	1	*Pressure ranges as low as 0 to -2 in H2O [0 to -5 mbar] and custom pressure ranges available with electronic options. Consult an application engineer for assistance.
EVR-GSD3A	3/8"	Anodized Aluminum	3.5 (89)		1.4 (36)		1.00E-03	1.8	
EVR-GSD3S	3/8"	Stainless Steel 316	3.5 (89)		1.4 (36)		1.00E-03	1.8	
EVR-GSD3P	3/8"	PVC	3.75 (95)		1.6 (41)		1.00E-03	1.8	
EVR-GSD4A	1/2"	Anodized Aluminum	4.5 (114)		1.6 (41)		1.00E-03	3	
EVR-GSD4S	1/2"	Stainless Steel 316	4.5 (114)		1.6 (41)		1.00E-03	3	
EVR-GSD4P	1/2"	PVC	4.75 (121)		1.8 (46)		1.00E-03	3	
EVR-GSD6A	3/4"	Anodized Aluminum	6 (152)		2 (51)		1.00E-02	6.2	
EVR-GSD6S	3/4"	Stainless Steel 316	6 (152)		2 (51)		1.00E-02	6.2	
EVR-GSD6P	3/4"	PVC	6.25 (159)		2.25 (57)		1.00E-02	6.2	
EVR-GSD8A	1"	Anodized Aluminum	7 (178)		2.6 (66)		1.00E-02	9.9	
EVR-GSD8S	1"	Stainless Steel 316	7 (178)		2.6 (66)		1.00E-02	9.9	
EVR-GSD8P	1"	PVC	7.25 (184)		2.9 (74)		1.00E-02	9.9	
REGULATORS WITH LINE SIZE 1.5" TO 4" REFERENCE FIGURE 2									
EVR-BD12A	1.5"	Anodized Aluminum	9.5 (241)		3.9 (99)		1.00E-02	14.3	
EVR-BD12S	1.5"	Stainless Steel 316	9.5 (241)		3.9 (99)		1.00E-02	14.3	
EVR-BD12P	1.5"	PVC	9 (229)		4.3 (109)		1.00E-02	14.3	
EVR-BD16A	2"	Anodized Aluminum	11 (279)		4.1 (104)		3.00E-02	30.2	
EVR-BD16S	2"	Stainless Steel 316	11 (279)		4.1 (104)		3.00E-02	30.2	
EVR-BD16P	2"	PVC	11 (279)		5.1 (130)		3.00E-02	30.2	
EVR-BD24A	3"	Anodized Aluminum	15 (381)		6.1 (155)		6.00E-01	60	
EVR-BD24S	3"	Stainless Steel 316	15 (381)		6.1 (155)		6.00E-01	60	
EVR-BD24P	3"	PVC	15 (381)		8.8 (226)		6.00E-01	60	
EVR-BD32A	4"	Anodized Aluminum	20 (508)		8.1 (206)		1.50	160	
EVR-BD32S	4"	Stainless Steel 316	20 (508)		8.1 (206)		1.50	160	
EVR-BD32P	4"	PVC	20 (508)		9.6 (244)		1.50	160	
									FITTINGS
									NPT (Standard)
									BSPP
									SAE
									150# Flange
									DIAPHRAGM OPTIONS
									Buna - N (Nitrile)
									FKM
									EPDM
									PTFE (Glass Reinforced)
									PTFE (Virgin)
									O RING OPTIONS
									Buna - N (Nitrile)
									Viton
									Kalrez
									EPDM
									PTFE
									TEMPERATURE RATING
									Polymer Units: 40C
									Metallic Units: 60C
									*High temperature models are available, consult an application engineer.

Vacuum only, absolute, and vacuum-to-positive options are available. Consult an application engineer for assistance.

Electronic Pilot Regulators

FOR USE WITH EVR SERIES VACUUM REGULATORS

PART NUMBER	TYPE	MANIFOLD MATERIAL	THREAD TYPE	INPUT SIGNAL RANGE	MONITOR SIGNAL RANGE	PRESSURE RANGE	BLEED ORIFICE	DIGITAL DISPLAY?	LEAD TIME
QPV1MANEEZN30IHGXCL	Single Loop	Aluminum	NPT	0 to 10 VDC	0 to 10 VDC	0-30 in Hg	Include Bleed Orifice	N	1 Day
QPV1MANISZN30IHGXCL	Single Loop	Aluminum	NPT	4 to 20 mADC	4 to 20 mADC (Sourcing)	0-30 in Hg	Include Bleed Orifice	N	1 Day
QPV1MANEEZP760TRACXL	Single Loop	Aluminum	NPT	0 to 10 VDC	0 to 10 VDC	0-760 torr	Include Bleed Orifice	N	1 Day
QPV1MANEEZN30IHGXCL-DD	Single Loop	Aluminum	NPT	0 to 10 VDC	0 to 10 VDC	0-30 in Hg	Include Bleed Orifice	Y	4-6 Weeks
QPV1MANISZN30IHGXCL-DD	Single Loop	Aluminum	NPT	4 to 20 mADC	4 to 20 mADC (Sourcing)	0-30 in Hg	Include Bleed Orifice	Y	4-6 Weeks
QPV1MANEEZP760TRACXL-DD	Single Loop	Aluminum	NPT	0 to 10 VDC	0 to 10 VDC	0-760 torr	Include Bleed Orifice	Y	4-6 Weeks

HOW TO UPGRADE YOUR EVR VACUUM REGULATOR TO ELECTRONIC CONTROL

1. Remove the manual set point kit that comes with your EVR vacuum regulator.
2. Replace the manual set point regulator with your desired electronic vacuum regulator from the list above, or pick your own part number from the QPV Series Brochure.



Fig 4: Manual EVR Regulator



Fig 5: EVR Regulator with Electronic Pilot

Application Spotlight

CENTRALIZED VACUUM DISTRIBUTION

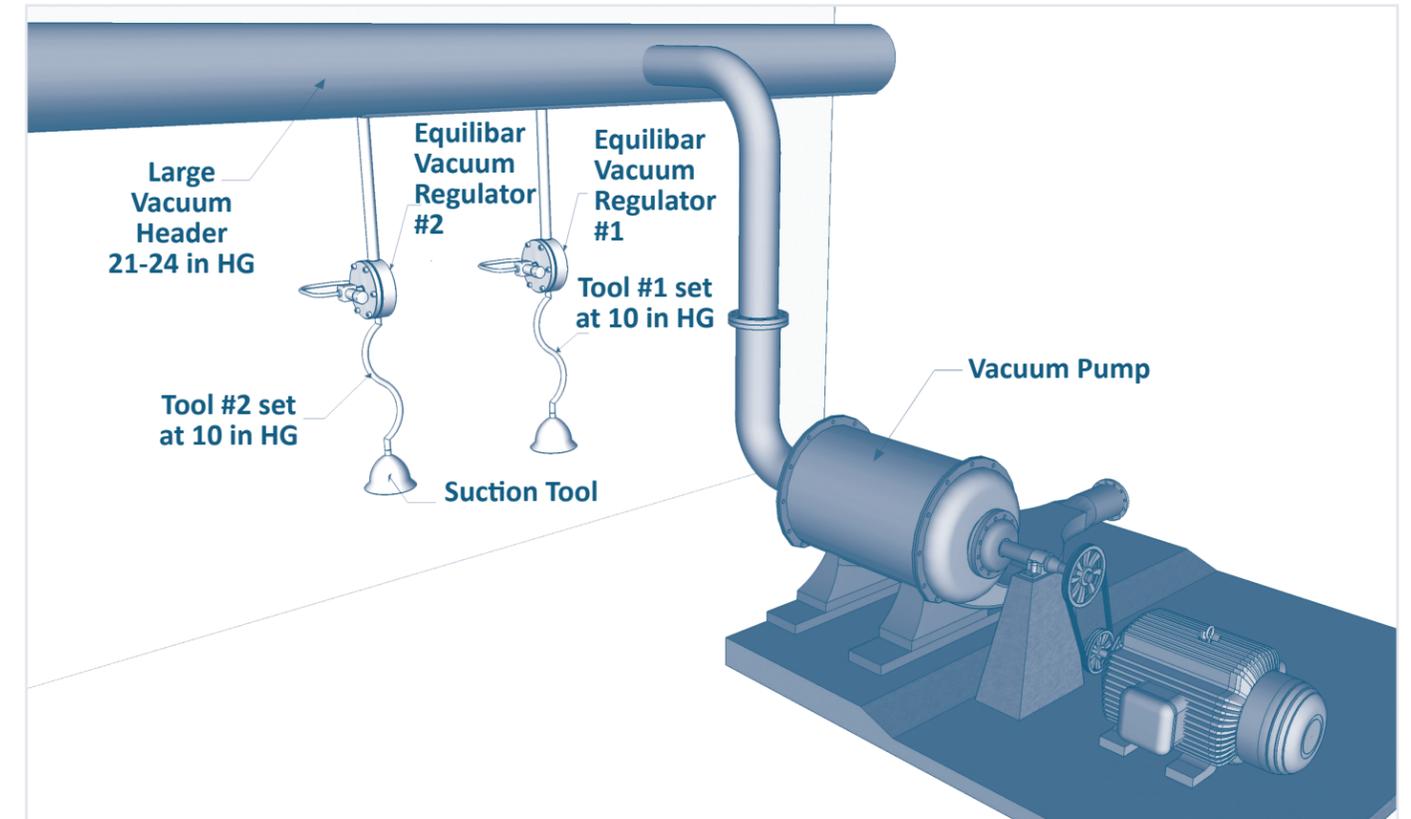


Fig 6: An example installation of multiple Equilibar vacuum regulators in a facility which shares a common vacuum supply.

In industrial settings, it is common for a single vacuum utility header to supply several diverse processes, each with separate vacuum pressure requirements. For example, one piece of equipment function best with 10 inHg vacuum, while another process requires 15 inHg vacuum.

For this application, a vacuum regulating valve is needed on the process requiring the lower vacuum. While vacuum breaking regulators (VBR) are commonly used on vacuum pumps that supply a single pressure, these VBR's are not suitable because they spoil the system vacuum for the entire header.

In the illustration above, Tool #1 requires a higher vacuum level than Tool #2. In order to use a shared pump or pumps, vacuum regulators would be needed to reduce the vacuum to the required level.

EVR Series Vacuum regulators work by restricting the flow from the pump to the process, and do not let any significant amount of air into the process.



Ordering Information for Pipe Size 1/4" to 1"

EXAMPLE																				
EVR	-	GS	2	S	N	G	X	-	N	S	X	P	30	T	100	V	X	VV	B	
EVR	-																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					

- 1 MODEL**
EVR Equilibar Vacuum Use Regulator
- 2 MODEL TYPE**
GSD GSD Series (Includes Wetted Elastomers)
GS GS Series (No Wetted Elastomers)
- 3 PORT SIZE**
2 1/4"
3 3/8"
4 1/2"
6 3/4"
8 1"
- 4 BODY MATERIAL**
S Stainless Steel 316/316L
P PVC
A Anodized Aluminum
Others available. Consult an application engineer for assistance
- 5 PORT THREADS**
N NPT
B BSPP
S SAE
O VCO®
R VCR®
F 150# Flanges
- 6 RECESS**
(Factory Selected)
- 7 MOD #**
(Factory Selected)
- 8 REFERENCE PORT THREADS**
N NPT
B BSPP
- 9 CAP MATERIAL (NON WETTED)**
S Stainless Steel 316/316L
P PVC
A Anodized Aluminum
- 10 BOLTS**
(Factory Selected)
- 11 PRESSURE RATING**
30 30 in Hg
10 10 in Hg
- 12 TEMPERATURE RATING**
40 40C (Polymer Units)
60 60C (Metallic Units)
Others available. Consult an application engineer for assistance
- 13 DIAPHRAGM MATERIAL**
G PTFE (Glass Reinforced)
B Buna-N (Nitrile)
V FKM Fluoroelastomer
M EPDM
E Polyethylene
F PTFE (Virgin)
I Polyimide
- 14 DIAPHRAGM THICKNESS**
(Factory Selected)
- 15 O RING (GSD UNITS ONLY)**
(Wetted)
VV Viton® Shore 75
KK Kalrez® Grade 7075
FF PTFE
EE EPDM
BB Buna-N (Nitrile)
- 16 SPECIAL OPTIONS**
B Mounting Bracket
(Port Size 2 & 3 Only)
O Oxygen Cleaning



Items marked in blue are typically in stock for fast shipment

Ordering Information for Pipe Size 1.5" to 4"

EXAMPLE																			
EVR	-	BD	12	S	N	G	X	-	N	S	X	P	30	T	100	V	X	V	
EVR	-	BD																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					

- 1 MODEL**
EVR Equilibar Vacuum Use Regulator
- 2 MODEL TYPE**
BD BD
- 3 PORT SIZE**
12 1.5"
16 2"
24 3"
32 4"
- 4 BODY MATERIAL**
S Stainless Steel 316/316L
P PVC
A Anodized Aluminum
Others available. Consult an application engineer for assistance
- 5 PORT THREADS**
N NPT
B BSPP
F 150# Flanges
- 6 RECESS**
(Factory Selected)
- 7 MOD #**
(Factory Selected)
- 8 REFERENCE PORT THREADS**
N NPT
B BSPP
- 9 CAP MATERIAL (NON WETTED)**
S Stainless Steel 316/316L
P PVC
A Anodized Aluminum
- 10 BOLTS**
(Factory Selected)
- 11 PRESSURE RATING**
30 30 in Hg
10 10 in Hg
- 12 TEMPERATURE RATING**
40 40C (Polymer Units)
60 60C (Metallic Units)
Others available. Consult an application engineer for assistance
- 13 DIAPHRAGM MATERIAL**
G PTFE (Glass Reinforced)
B Buna-N (Nitrile)
V FKM Fluoroelastomer
M EPDM
E Polyethylene
F PTFE (Virgin)
I Polyimide
- 14 DIAPHRAGM THICKNESS**
(Factory Selected)
- 15 O RING**
(Wetted)
VVVV Viton® Shore 75
KKKK Kalrez® Grade 7075
FFFF PTFE
EEEE EPDM
BBBB Buna

Items marked in blue are typically in stock for fast shipment



ABOUT EQUILIBAR

Equilibar, LLC manufactures and markets our specialized products worldwide. Equilibar branded products are made in the USA, and protected by US and foreign patents. All of our products are assembled, inspected and tested by trained technicians in Fletcher, NC.

APPLICATION ENGINEERING— HOW WE ARE DIFFERENT

Unlike mass-market regulator distributors, everything about Equilibar is focused on you, the scientist or engineer with a unique pressure control challenge.

We assign an Application Engineer to you, typically within moments of your call. We work with you closely to identify the optimum model, trim, and diaphragm to best meet your challenge. You can stay in touch with your Application Engineer by email, telephone, mobile phone, or fax.

After installation, if there are any unexpected issues, your Application Engineer is still available to support you with start-up information or (if needed) expedited replacement parts.

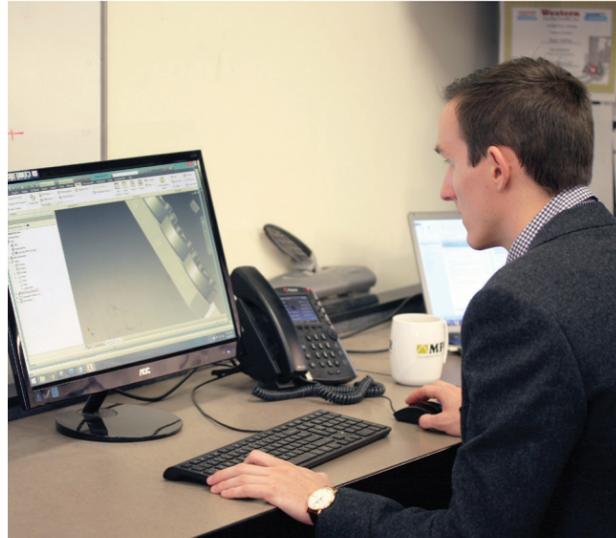
CONTACT OUR ENGINEERS

At Equilibar, your application's unique requirements will be carefully addressed by one of our trained Application Engineers. Please contact us if you have any questions or special requirements.

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Each application is reviewed by our engineering team to ensure quality performance of our products.



Have a special application? Equilibar also offers custom designed solutions to meet your needs.

EQUILIBAR
PRECISION PRESSURE CONTROL

