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KOGANEI

ACCESSORIES GENERAL CATALOG

AIR TREATMENT, AUXILIARY, VACUUM, AND FLUORORESIN PRODUCTS

VACUUM REGULATORS

CONTENTS

SMALL VACUUM REGULATORS

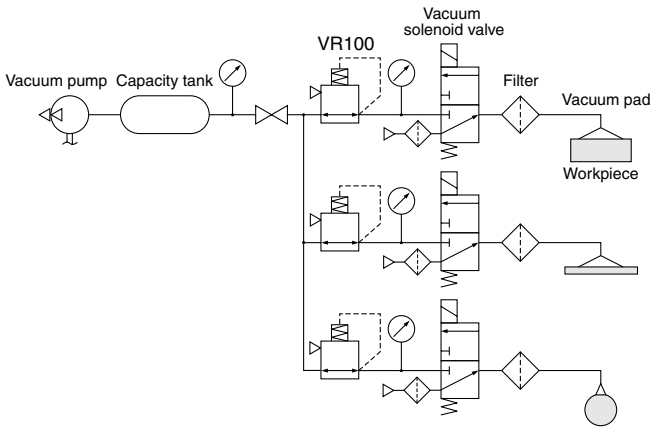
VR100

- **Offer any vacuum pressure setting when mounted on vacuum lines.**
- **Push lock type regulator knob for light, smooth pressure regulation.**
- **Panel mounting is also a simple process, by opening holes in the panel.**
- **Suction flow rate VR100: MAX.45 ℓ /min [1.59ft³/min.] (ANR)Note1**
- **Lightweight (110g [3.88oz.]), compact (28×28×78mm [1.102×1.102×3.071in.])**Note2

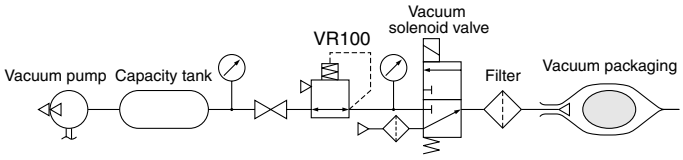
Notes: 1. Values may change depending on operating conditions.
2. Excluding options.

Application Example

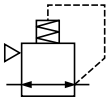
①Multiple vacuum pressured devices required



②Vacuum adjustment used for a vacuum packaging

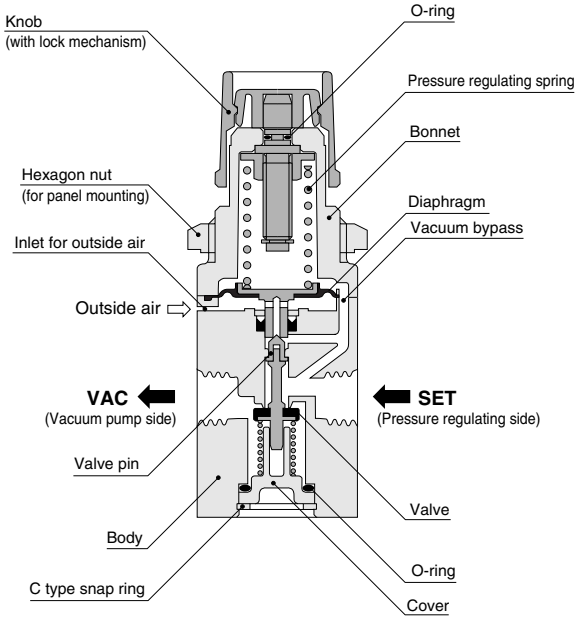


Symbol



Operation Principle

When the knob is pulled firmly out, rotating the knob to the right applies compression force to the pressure regulating spring, acting through a diaphragm to lift up the pressure regulating valve assembly, which then passes through the VAC (vacuum pump side) and SET (pressure regulating side) to reduce pressure on the regulating side. The vacuum pressure on the pressure regulating side passes through a bypass hole to enter a chamber on the lower part of the diaphragm, activating the diaphragm. Here, it resists the compression force of the pressure regulating spring, with the VAC side and SET side closed by the valve assembly to obtain a balance that regulates the required vacuum pressure level. If vacuum pressure on the pressure regulating side falls below the setting value, air flows into the pressure regulating side from the atmosphere, maintaining the proper level.



Specifications

Item \ Model	VR100
Media	Air
Setting pressure range kPa [in.Hg]	−6.5～−100 [−1.9～−29.54]Note
Setting pressure sensitivity kPa [in.Hg]	0.26 [0.08]Note
Repeatability kPa [in.Hg]	±0.8 [±0.24]Note
Proof pressure MPa [psi.]	0.2 [29]
Suction flow rate ℓ/min [ft³/min.] (ANR)	MAX. 45 [1.6]Note
Operating temperature range °C [°F]	5～60 [41～140]
Pressure characteristics kPa [in.Hg]	ΔP=4 [1.2]
Port size	M5×0.8, Rc1/8
Vacuum gauge connection port size Rc	1/8
Mass kg [lb.]	0.11 [0.24]

Note: Values may vary depending on conditions. These values do not guarantee performance in practical conditions. Please take note.

Order Codes

VR100 — □ — □ — □ — □

Bracket
Blank — No bracket
B — With bracket

Non-ion specification
Blank — Standard specification
NCU — Non-ion specification

Vacuum gauge
Blank — No vacuum gauge
G — With vacuum gauge

Port size
M5 — M5×0.8
01 — Rc1/8

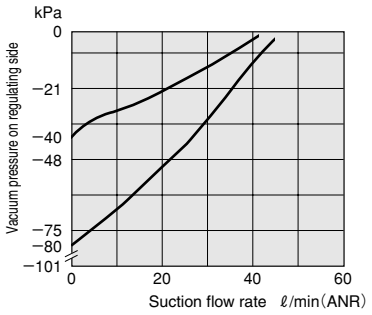
Small vacuum regulator

●Order codes for vacuum gauge only

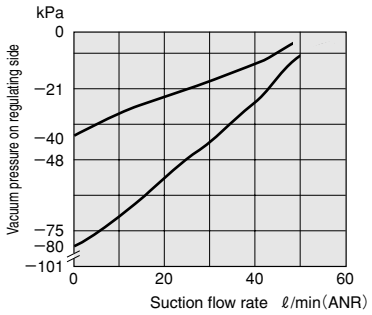
GV-40-01 (Standard specification)
GV-40-01-NCU (Non-ion specification)

Flow Rate Characteristics

●**VR100-M5**



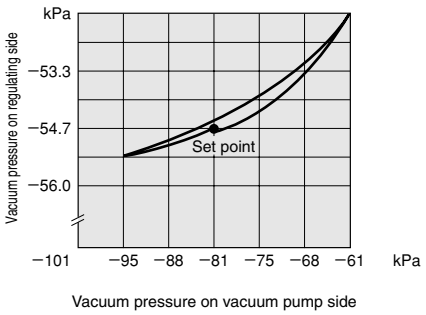
●**VR100-01**



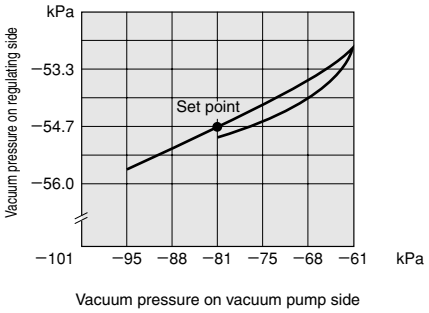
1 ℓ/min = 0.0353ft³/min.
−100kPa = −29.54in.Hg

Pressure Characteristics

●**VR100-M5**



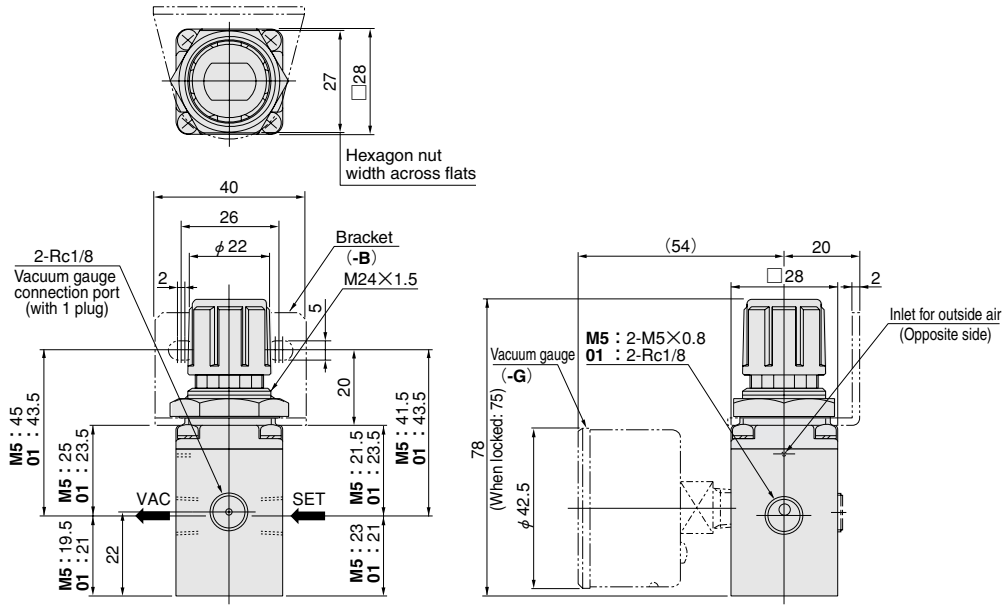
●**VR100-01**



−100kPa = −29.54in.Hg

Dimensions of Small Vacuum Regulators (mm)

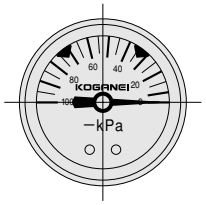
VR100

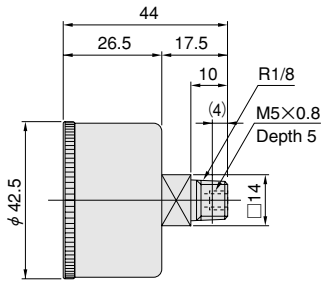


Remark: The mounting hole for installing the **VR100** to a panel, etc., is φ24.5. For mounting, use the provided hexagon nut.

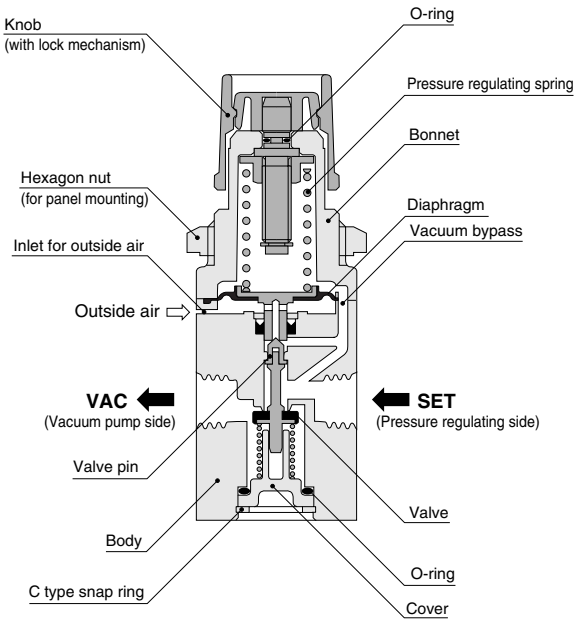
Dimensions of Vacuum Gauge (mm)

GV-40-01





Inner Construction and Major Parts



Vacuum Gauge Specifications

Item \ Model	GV-40-01
Media	Air
Pressure indicator range kPa [in.Hg]	0～−100 [0～−29.54]
Accuracy	F.S.±3%
Operating temperature range °C [°F]	5～60 [41～140]
Port size	R1/8 (female M5×0.8)
Mass kg [lb.]	0.08 [0.18]

Major Parts and Materials

Parts	Materials
Body	Aluminum alloy
Bonnet	PBT
Knob	ABS
Diaphragm	Synthetic rubber (NBR)
Cover	Polyacetal
O-ring	Synthetic rubber (NBR)
Valve	Brass+Synthetic rubber (NBR)

Pressure regulation

1. When regulating the pressure, connect a vacuum gauge to the vacuum gauge connection port (**VR100**: Rc1/8) on the vacuum regulator.
2. Always pull the knob out firmly to perform pressure regulation, rotating it to the right (clockwise) to reduce the pressure "atmospheric pressure → vacuum pressure" and rotating it to the left (counterclockwise) to increase the pressure "vacuum pressure → atmospheric pressure."
3. After regulating pressure, push the knob back into the body and lock it in place.

Caution: The vacuum regulator constantly sucks in a minute amount of atmospheric pressure air to maintain a balance. As a result, be careful to avoid blocking the body's inlet for outside air. Pressure cannot be set when the inlet hole is blocked.

Mounting and Piping

1. If mounting the vacuum regulator as a single unit, use a bracket (optional). A ring nut can also be used for panel mounting.
2. While any mounting direction is acceptable, mount so that the knob can be operated.
3. Do not perform any machining on the body of the unit, etc., for mounting. Its functions could be damaged.
4. For piping to the vacuum regulator, connect so that the VAC mark is on the vacuum pump side. Piping connections on the opposite side must not be made.
5. Since performance is affected by the capability of the vacuum pump used, take special care in selecting the vacuum pump. If the set pressure is undergoing a large change, either change the vacuum pump or change the piping. If the vacuum pump cannot be changed, install a capacity tank on the VAC side.

General precautions

1. Always thoroughly blow off (use compressed air) the piping before plumbing.
   Entering chips, sealing tape, rust, etc., generated during plumbing could result in air leaks or other defective operation.
2. Use air for the media. For the use of any other media, consult us.
3. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use something to cover and protect the unit.

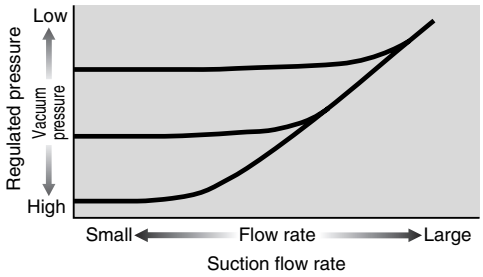
PILOT TYPE VACUUM REGULATORS

NVR200, NVRA200

- **Uses the vacuum pilot method (diaphragm indirect operation type).**
- **Achieves superior pressure stability in the face of fluctuating flow rates.**

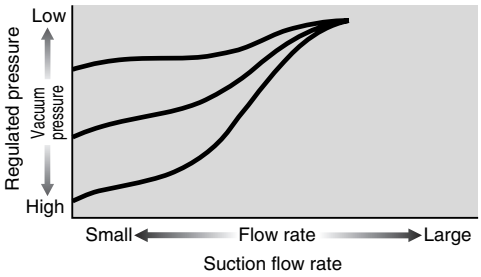
NVR□200

- Small change in the set pressure when flow rate increases.



Conventional product

- Large change in the set pressure when flow rate increases.

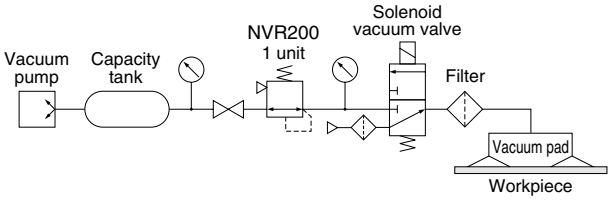


※These graphs are image diagrams. Results vary depending on the performance and conditions of the vacuum pump used.

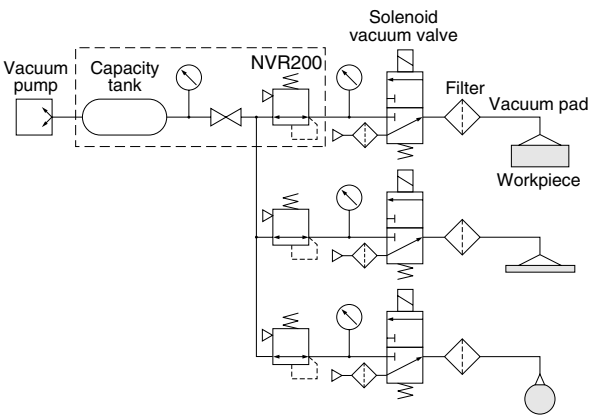
- **Use of the indirect operation type achieves lightweight (0.20kg [0.44lb.]) and compact (50×40×109cm [1.969×1.575×4.291in.]) design with a large flow rate.**
  Suction flow rate MAX.200 ℓ /min [7.06ft³/min.] (ANR)Note Note: Varies depending on conditions.
- **External pilot type (NVRA200) for cases where pressure regulation operations are difficult such as inside panel applications.**
  Enables remote operation by using the vacuum regulator for pilot pressure regulation.
- **Select from two piping port diameters (Rc1/8, Rc1/4).**

Application Examples

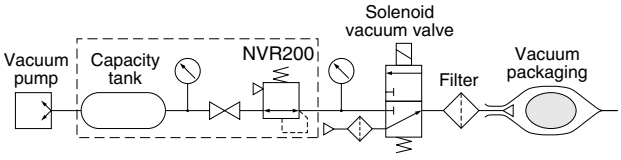
①**NVR200**



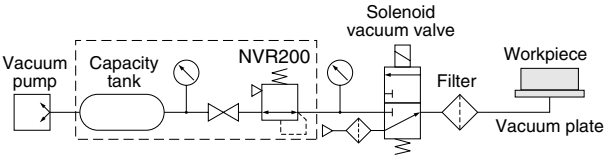
②Multiple vacuum pressure units required



③Vacuum pressure regulation using vacuum packaging

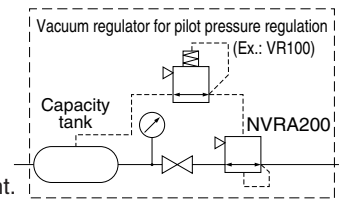


④Vacuum pressure regulation using vacuum plate



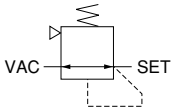
● **NVRA200** (External pilot type)

When using **NVRA200**, the boxed part of the circuit above [ ] is instead configured as shown to the right.

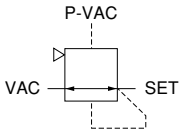


Symbols

Internal pilot



External pilot



Specifications

Item \ Model	NVR200		NVRA200	
Pilot specification	Internal vacuum pilot type		External vacuum pilot type	
Port size Rc	1/8	1/4	1/8	1/4
Media	Air			
Set pressure range[Note1] kPa [in.Hg]	−2.5～−95 [−0.74～−28.06]			
Set pressure sensitivity[Note1] kPa [in.Hg]	0.1 [0.03]			
Repeatability[Note1] % (F.S.)	2		0.6	
Proof pressure MPa [psi.]	0.5 [73]			
Suction flow rate[Note1] ℓ/min [ft³/min.] (ANR)	MAX.130 [4.59]	MAX.200 [7.06]	MAX.130 [4.59]	MAX.200 [7.06]
Operating temperature range °C [°F]	5～60 [41～140]			
Vacuum gauge port diameter Rc	1/4			
Mass[Note2] kg [lb.]	0.20 [0.44]		0.17 [0.37]	

Notes: 1. May vary depending on conditions on the SET (pressure regulation) side and pump performance on the VAC (vacuum pump) side.
These figures are for the case connected to a vacuum pump with exhaust speed of 1000 ℓ/min [35.3ft³/min.] or higher, and a maximum vacuum level of −101kPa [−29.84in.Hg] or more. (Reference)
2. Excluding the option

Order Codes

NVR □ **200** — □ — □ — □

Pilot specification
Blank — Internal pilot
A ——— External pilot

Bracket
Blank — No bracket
B ——— With bracket

Vacuum gauge
Blank — No gauge
G ——— With **GV40** vacuum gauge
E1 ——— With **EG110** pressure gauge with electronic switch (negative specification)[Note]

Body model

Port size Rc
01 : Rc 1/8
02 : Rc 1/4

Pilot type vacuum regulator

● Order Code only for vacuum gauge

GV-40 (standard)

● Order code for pressure gauge with electronic switch (negative pressure specification)[Note]

EG110

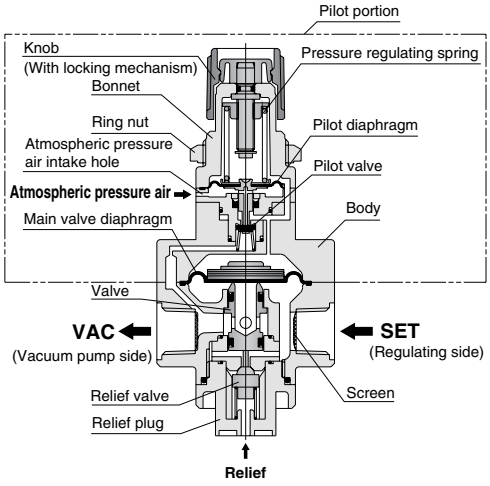
Note: For specifications, dimensions, and handling of the pressure gauge with electronic switch, see p.177, pressure gauge with electronic switch.

Inner Construction and Major Parts

Internal Pilot
NVR200

Major Parts and Materials

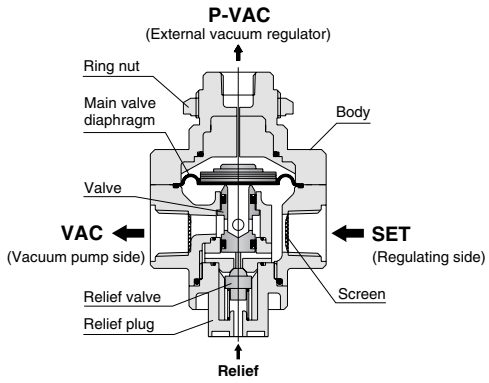
Parts	Materials
Body	Aluminum die-casting
Bonnet	Plastic
Knob	Plastic
Pilot diaphragm	Synthetic rubber
Main valve diaphragm	
Pilot valve	Synthetic rubber＋Aluminum alloy
Valve	Brass
Relief valve	Aluminum alloy
Relief plug	Plastic



External Pilot
NVRA200

Major Parts and Materials

Parts	Materials
Body	Aluminum die-casting
Main valve diaphragm	Synthetic rubber
Valve	Brass
Relief valve	Aluminum alloy
Relief plug	Plastic

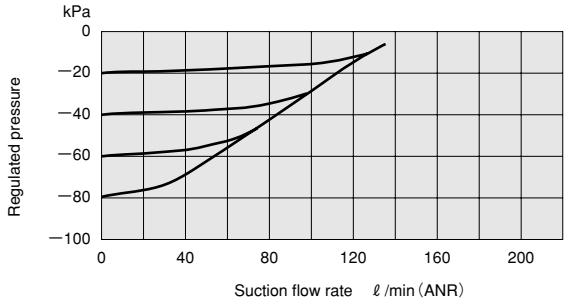


Configuration and Features of Vacuum Pilot Type (Diaphragm Indirect Operation Type) **Refer to NVR200 inner construction**

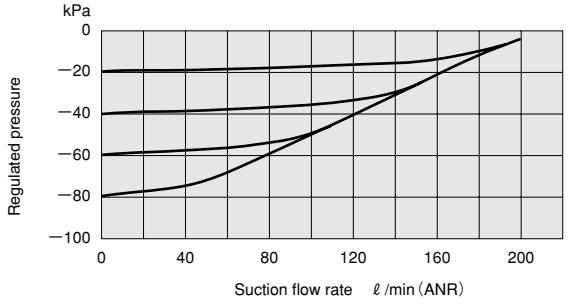
When rotating the knob to regulate the vacuum pressure, the pressure regulation spring compression force does not directly operate on the main valve diaphragm in this configuration. Instead, pressure on the upper part of the body (the pilot) is regulated, so that only a constantly maintained vacuum pilot pressure operates on the main valve diaphragm. As a result, even if the flow rate is increased when required by conditions, it eliminates the effect of fluctuations in the pressure regulation spring force on the main valve diaphragm operation stroke, and achieves a stable flow rate characteristic that shows little change in set vacuum pressure due to a rising flow rate.
In addition, use of the vacuum pilot type eliminates the need to set the pressure regulation spring to match the size of the main valve diaphragm, to achieve a more compact, more lightweight body.

Flow Rate Characteristics

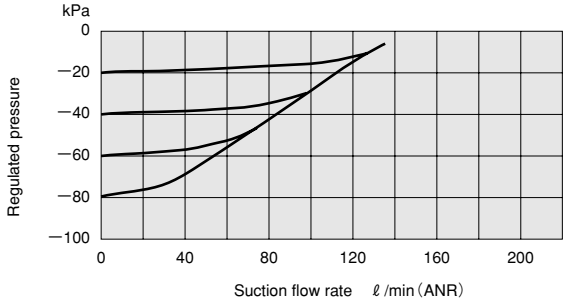
Internal pilot
NVR200-01



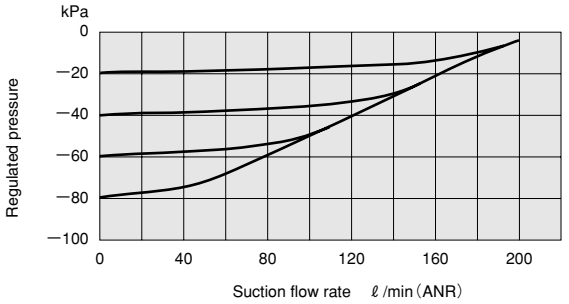
NVR200-02



External pilot
NVRA200-01



NVRA200-02

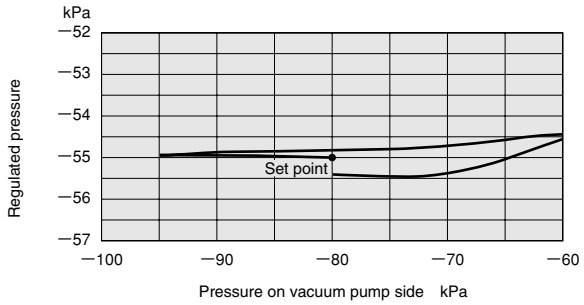


1 ℓ/min [0.353 ft³/min.] −100kPa = −29.54in.Hg

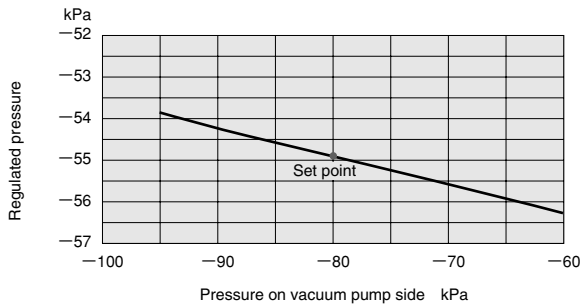
Remark: Characteristics when connected to a vacuum pump with exhaust speed of 1000 ℓ/min [35.3 ft³/min.] or higher, and a maximum vacuum level of −101kPa [−29.84in.Hg] or more.

Pressure Characteristics

Internal pilot
NVR200-01, -02



External pilot
NVRA200-01, -02



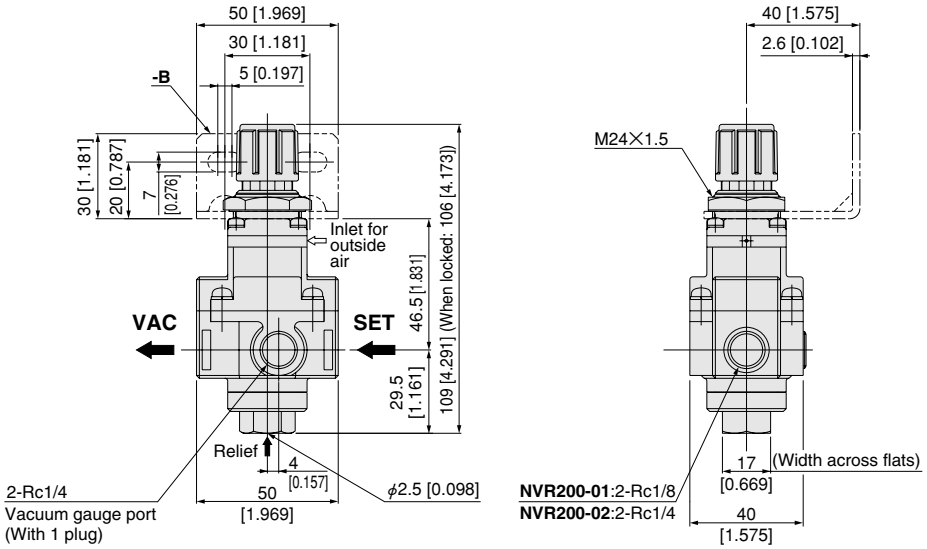
Remark: The external pilot type is affected by the characteristics of the pilot pressure vacuum regulator.

−100kPa = −29.54in.Hg

Dimensions of Pilot Type Vacuum Regulators mm [in.]

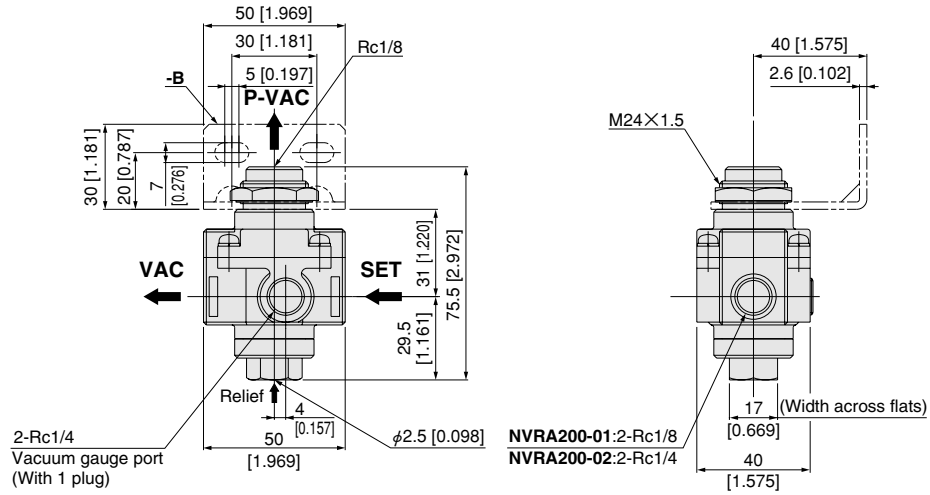
Internal pilot
NVR200

NVR200



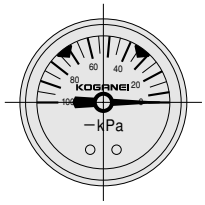
External pilot
NVRA200

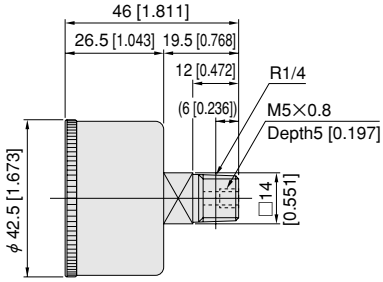
NVRA200



Dimensions of Vacuum Gauge and Pressure Gauge with Electronic Switches mm [in.]

GV-40

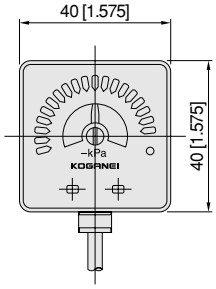


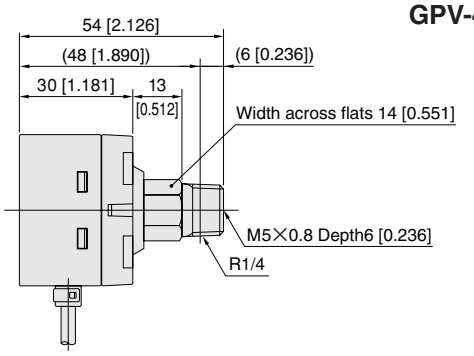


● Panel mount vacuum gauge[Note1]

GPV-40

EG110[Note2]

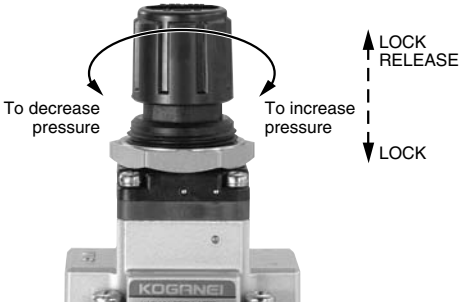




Notes: 1. The panel mounting type is available for vacuum gauge. See p.175.
2: For specifications, dimensions, and handling of the pressure gauge with electronic switch, see p.177.

Pressure regulation

1. When regulating the pressure, connect a vacuum gauge to the vacuum gauge connection port (Rc1/4) on the pilot type vacuum regulator.
2. Always pull the knob out firmly to perform pressure regulation, rotating it to the right (clockwise) to reduce the pressure "atmospheric pressure → vacuum pressure" and rotating it to the left (counterclockwise) to increase the pressure "vacuum pressure → atmospheric pressure." To set the pressure, rotate it to the right "atmospheric pressure → vacuum pressure" direction. Using left rotation "vacuum pressure → atmospheric pressure" to set may result in an imprecise pressure setting.
   After regulating pressure, push the knob back into the body and lock it in place.



Cautions: **1.** The vacuum regulator constantly sucks in a minute amount of atmospheric pressure air to maintain a balance. As a result, be careful to avoid blocking the body's inlet for outside air. Pressure cannot be set when the inlet hole is blocked.
2. At the start of operations, such as when the vacuum pump operation is restarted, or when vacuum pressure fluctuations on the VAC side are large, the set pressure on the SET side may shift slightly. If precise pressure settings are required, perform the pressure regulation operation again.

Mounting and Piping

1. If mounting the pilot type vacuum regulator as a single unit, use a bracket (optional). A ring nut can also be used for panel mounting. Do not exceed a ring nut tightening torque of 980.7N・cm [7.23ft・lbf].
2. Set the mounting position so that the knob is top. If the knob must unavoidably be mounted facing down, there may be noise from vibration. In this case, either change the setting pressure, or adjust the suction flow rate, etc.
3. Do not mount the pilot type vacuum regulator in a location where it will be directly subjected to strong shocks or vibrations.
4. Do not perform any machining on the body of the unit, etc., for mounting. Its functions could be damaged.
5. For piping to the vacuum regulator, connect so that the VAC mark is on the vacuum pump side. Piping connections on the opposite side must not be made.
6. Since performance is affected by the capacity of the vacuum pump used, take special care in selecting the vacuum pump. If the set pressure is undergoing a large change, either change the vacuum pump or change the piping. If the vacuum pump cannot be changed, install a capacity tank on the VAC side.

Cautions: **1.** Avoid an application that involves installing a valve partway along the piping between the vacuum pump and pilot type vacuum regulator, and repeatedly switching the VAC side vacuum pressure.
2. The pilot type vacuum regulator uses a metal seal configuration for its relief portion, which means that the SET side vacuum pressure cannot maintain the set pressure when the VAC side supply stops due to shutdown of the vacuum pump, etc. To prepare for situations where the VAC side supply has stopped while a workpiece is in being transferred using a vacuum pad, install check mechanisms along the SET side piping to prevent workpiece falls.
3. For ϕ4 [0.157in.]×ϕ2.5 [0.098in.] tube, if piping using it is connected to the external pilot type (NVRA200) pilot port, we recommend the length to 5m [16.4ft.] or less. A large piping volume or piping resistance can prevent a proper pressure setting.

General precautions

1. Always thoroughly blow off (use compressed air) the piping before plumbing.
   Entering chips, sealing tape, rust, etc., generated during plumbing could result in air leaks or other defective operation.
2. Use air for the media. For the use of any other media, consult us.
3. If using in locations subject to dripping water, dripping oil, etc., or to large amounts of dust, use something to cover and protect the unit.