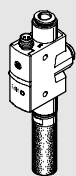


Vacuum generator VN-...-P

FESTO



Operating instructions

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Warning

Products under pressure can cause injury to human beings and damage to property.

- Before carrying out installation and maintenance work always switch off the compressed air supply.
- Use shut-off valves in the compressed air tubing for exhausting the system.



Warning

Depending on the functioning of the machine/system, the manipulation of signal states can cause serious injury to human beings and damage to property.



Please note

Fitting and commissioning to be carried out only by qualified personnel in accordance with the operating instructions.

This product is designed to be operated with compressed air only. The product is not suitable for use with other media (liquids or gases).

1 Application

The vacuum generator type VN-...-P is designed for generating vacuum. With the vacuum generated, a force is built up via suction grippers with which work items can be transported. The integrated vacuum switch monitors here the vacuum generated and provides electric signals. The vacuum switch closes (switch element function NO: normally-open) a current circuit when the programmed switching pressure is reached. The switching element function is preset at the factory. The VN-...-P is available with different switching functions.

Key features	Type (order code)	Design
Vacuum suction nozzle	VN-...	
Rated size of Laval nozzle	-05-...	0.45 mm
	-07-...	0.7 mm
	-10-...	0.95 mm
Vacuum type	-H-...	High vacuum/standard
	-L-...	High suction volume current/standard
Housing type	-T4-...	T-form, housing width 16 mm
Compressed air connection 1	-PQ2-...	Plug connector QS6
Vacuum connection 2	-VQ2-...	Plug connector QS6
Switching function	-01-...	Threshold value with fixed hysteresis, 2 teach points, normally-open contact
	-02-...	Threshold value with variable hysteresis, normally-open contact
Electric output	-P	Switching output PNP

2 Safety conditions



Please note

Improper handling can result in malfunctions. Make sure that the following specifications are always observed.

- Compare the maximum values specified in these operating instructions with your actual application (e.g. operating media, pressures, forces, torques, temperatures, masses, speeds, operating voltages, flow rates).
- Please comply with national and local safety laws and regulations.
- Take into consideration the ambient conditions at the location of use.
- Unauthorised product modification is not permitted.
- Remove dirt particles in the supply lines by blowing out the tubing with compressed air. In this way you will protect the VN-...-P from premature failure or heavy wear (see DIN ISO 4414, section 9.4).

3 Installation

The valve terminal can be fitted in any position. Do not mount with the Edit button facing downwards in order to avoid condensation gathering in the sensor.

3.1 Mechanical installation

- Fasten the VN-...-P with two M3 screws [3] in the intended position, tightening torque max. 0.6 Nm. We recommend that suitable washers be used.

3.2 Pneumatic installation

- Connect the QS6 plug connections for compressed air [1] and vacuum [2] of the VN-...-P with suitable tubing. We recommend that tubing type PUN-6 be used.

3.3 Electrical installation



Warning

Use only power units which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1. Observe also the general requirements for PELV power circuits as per IEC/DIN EN 60204-1.



Please note

Long signal cables reduce the immunity to interference.

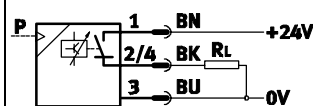
- Make sure that the signal cable is never longer than 30 m. In this way you can avoid non-operate currents caused by electromagnetic interference.



Please note

If there are electrostatic discharges on the device, the digital switching output may in some cases be switched for a brief period.

Circuit diagram



- Wire the electrical connection [5] of the VN-...-P as follows:

Pin	Assignment	Cable colours 1)	Plug 2)
1	+ 24 V DC power supply	brown (BN)	M8 x 1, 3-pin 1 2/4 3
2/4	Output A (out A)	black (BK)	
3	0 V	blue (BU)	

- 1) Using the connector socket with cable as specified in the chapter "Accessories"
- 2) Tightening torque max. 0.3 Nm

4 Commissioning

- Make sure that:
 - nobody is standing in the positioning range of the work item
 - there are no objects in the path of the moveable mass (e.g.: by means of a protective screen).
- Avoid long tubing and large volumes between the suction grippers and the vacuum suction nozzle. A large volume leads to long exhausting times and possibly incorrect settings on the vacuum switch.
- Take into account accelerations, external influences, etc. on the work item when setting the required holding force.

Building up the vacuum:

- Pressurize the VN-...-P with an operating pressure at pressure connection [1]. A suitable vacuum will then be generated at vacuum connection [2]. The vacuum can be set by modification to the operating pressure. The work item must be held reliably against the suction gripper by the vacuum generated.

Setting the vacuum switch:

The setting of the vacuum switch for monitoring the vacuum depends on the application.

- Switch on the operating voltage. The VN-...-P is in the basic status.

Definition

Switching pressure SP	Vacuum at which the VN-...-P switches
Teach pressure TP	Vacuum at time of programming

Set the switching pressure in EDIT mode as follows:

1. Pressurize the VN-...-P with a teach pressure (e.g.: TP1). The sequence of the teach pressures is not important.
 2. Press the Edit button [7] until the LED [6] begins to flash. When the button is released, the VN-...-P saves the first teach pressure. The LED then continues to flash.
 3. Pressurize the VN-...-P with the other teach pressure (e.g.: TP2).
 4. Press the Edit button [7] until the LED [6] ceases to flash. When the button is released, the VN-...-P saves the second teach pressure and concludes the EDIT mode. The relationship between teach pressure, switching pressure and hysteresis is shown in the following table. With the VN-...-01-P the switching pressure is formed from the average value of both teach pressures ($SP = 1/2 (TP1 + TP2)$). With the VN-...-02-P the higher teach pressure becomes the switching pressure.
- Carry out a test run with various pressures to ascertain whether the VN-...-P switches as desired. The LED [6] lights up parallel to the programmed switching behaviour.

Type	Switching function
VN-...-01-P	Threshold value comparator with fixed hysteresis, normally-open contact
VN-...-02-P	Threshold value comparator with fixed hysteresis, normally-open contact

Building up the vacuum:

- Block the supply of compressed air at connection [1]. The vacuum connection [2] is exhausted via the silencer [4]. The work item detaches itself from the suction gripper.

5 Operation

Modifying the switching pressure, see chapter "Commissioning".

In the event of a power failure, the last setting of the switching pressure will be saved.

6 Trouble-shooting

Fault	Possible cause	Remedy
No LED display	Supply voltage not applied or no permitted operating voltage	Switch on supply voltage / maintain permitted operating voltage range
	Connections swapped (incorrect polarity)	Wire the VN-...-P as shown in the circuit diagram.
	Pressure failure	Eliminate pressure failure
	VN-...-P operated with non-permitted medium	Replace the VN-...-P and operate only with compressed air
	VN-...-P is defective	Send VN-...-P to Festo with description of fault
LED display or switching output does not react in accordance with the settings made	Short circuit or overload at the output	Eliminate short circuit/overload
	Incorrect switching point taught (e.g. at 0 bar)	Repeat the teach procedure (see chapter "Commissioning")
	VN-...-P is defective	Send VN-...-P to Festo with description of fault

7 Accessories

Designation	Type
Plug socket with cable M8x1, 3-pin	SIM-M8-3..D-...

8 Technical specifications

Type VN-...	-01-P	-02-P
Operating pressure [bar]	1 ... 8	
Overload pressure at vacuum connection [bar]	≤ 5	
Operating medium	Dried, filtered and non-lubricated compressed air	
Pressure measuring range [bar]	-1 ... 0	
Accuracy [% FS]	±1.5	
Threshold value setting range [bar]	-1 ... 0 (recommended working range: -0.95 ... -0.05 % FS)	
Hysteresis [% FS]	2	-
Setting range Hysteresis [% FS]	-	0 ... 100 (recommended working range: 5 ... 95 % FS)
Temperature coefficient of switching point [% FS/K]	±0.05	
Ambient temperature [°C]	0 ... +50	
Medium temperature [°C]	0 ... +60	
Operating voltage [V DC]	15 ... 30	
Idle current [mA]	≤ 30	
Max. output current [mA]	100	
Protective functions	Adapted to MZ, MY, ME coils	
- Inductive protective circuit	Pulsed	
- Protection against short circuit	Exists	
- Protection against overloading	Exists	
Protection class	IP40	
Interference emission	As per EN 61000-6-4 (industry)	
Interference immunity	As per EN 61000-6-2 (industry)	
Resistance to vibration as per DIN/IEC 68/EN 60068 part 2-6: 0,35 mm path at 10 ... 60 Hz, 5 g acceleration at 60 ... 150 Hz		
Resistance to shock as per DIN/IEC 68/EN 60068 part 2-27: 30 g acceleration at 11 ms duration (half-sine)		

Fig. 1

Fig. 2