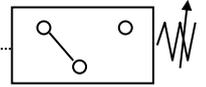


Vakuum switch • Pressure switch

VS-W-D Series



Safety

These operating instructions contain important information on the use of vacuum switches. Please read them carefully and keep them in a safe place for future reference.

You must read and understand these operating instructions before connecting and using the vacuum switch.

Always comply with these instructions and observe the safety notes and warnings.

Warnings:

- The vacuum switch may not be used outside the specified performance limits, since this can result in malfunctions and/or destruction of the switch!
- The vacuum switch may not be used in explosion-hazard areas, since it may cause fires and explosions!
- The switch may not be used for safety-relevant functions
- The switch may not be opened for any purpose (including repairs)! Opening the switch may damage it and may also result in injuries!
- The switch may be used only with power supply units which provide a protective low voltage (PELV) and with reliable isolation of the supply voltage in accordance with EN60204.



Caution:

- Do not carry the vacuum switch by its cable, and do not pull the cable.
- Protect the switch against mechanical interference (tearing off).
- Switch off the supply voltage before connecting the switch.
- Do not expose the switch to splash-water.
- Never insert any objects (such as wires, tools, etc.) into the vacuum connection of the switch.

1. Front panel

	<p>Display: Preset values in setting mode. Vacuum level in measurement mode.</p> <p>The minus sign is not displayed when pressure unit bar, inHg or mmHg is selected (VS-V-W-D).</p>
Mode	Button to select the different modes.
Up & Down	Buttons to change settings.
LED Output 1 and Output 2	Switching indicator, Output 1 = red, Output 2 = green.

2. Connecting power supply in normal operation

After connecting the power supply, in the display panel you can see the preset values.

When connecting the power supply do not push any key.

Type	Selected pressure unit	Display Measured pressure		

3. Zero-point adjustment

Adjust the zero-point only when the vacuum/pressure line is not connected. To adjust the zero-point, push the "Mode"-key at least 3 seconds.

Display Measured p_{atm}	Hold for min. 3 sec	Zero-point adjusted	

4. Clear All

If the switch was wrongly programmed, it can be set back into the factory settings.

All stored values are cleared. To accomplish this function, disconnect the switch from the power supply. Whilst pushing the "Mode"-key and the "Up"-key, connect the power supply again.



Push and hold both keys simultaneous

After connecting the power supply, the display shows "CLA". When you release the buttons, the preset pressure unit is displayed by "-bA" resp. "bA".



When pushing the "Mode"-key one time, the selected pressure unit is confirmed and stored.



1x

To adjust another pressure unit see paragraph 6.3

5. Factory settings

The switch is delivered with following factory settings

Unit	Output 1	Output 2
bar	HYS, N.O.	HYS, N.O.

This setting can be changed (programmed). The programming is described in the following paragraph.

A built-in EEPROM retains data for a period of min. 10 years. The data are min. 10.000 times rewritable. N.O = normally open, N.C. = normal closed, HYS = operating mode „Hysteresis mode“ The initial settings of the operating mode is shown in the table in paragraph 8.

6. Setting of output configuration (N.O. or N.C.) and pressure unit (e.g. bar).

To adjust the output configuration and the pressure unit, push and hold the "Mode"-key, push the "Up"-key.

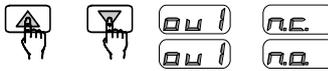


hold

The display is alternating between "ou 1" and "n.o."

6.1 Selection N.O. or N.C. of output 1

To change the setting, push "Up"- or "Down"-key.



Store the settings with the "Mode"-key



1x

Now the display switches to the selection of output 2, the display changes from "ou 2" to "n.o."

6.2 Selection N.O. or N.C. of output 2

To change the setting, push "Up"- or "Down"-key.



Store the settings with the "Mode"-key.



1x

Now the display switches to the selection of the pressure unit.

6.3 Adjust the pressure unit

To change the setting, push "Up"- or "Down"-key.



Store the settings with the "Mode"-key.



1x

Possible pressure units for VS-V-W-D

Unit	bar	mmHg	inHg	kPa
Symbol				

Possible pressure units for VS-P10-W-D

Unit	psi	kgf/cm²	MPa	bar
Symbol				

7. Adjusting the operating mode

7.1 Adjusting output 1

Example: Switch VS-V-W-D, output 1 has the operating mode "Hysteresis-mode".

switching point: -0,6 bar
hysteresis: 0,15 bar

Further information to the modes see paragraph 8.

Adjusting the operating mode

To select output 1, push "Mode"-key 2x.



2x

After 2 seconds, the display is alternating between "ou 1" and the preadjusted operating mode.



Push the "Up"- or "Down"-key until "HYS" for the desired switching mode „Hysteresis-mode“ is displayed.



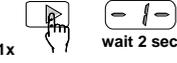
Store the settings with the "Mode"-key.



1x

Setting switching point and hysteresis

To select the switching point of output 1 push "Mode"-key 1x.



1x

After 2 seconds, the display is alternating between "H-1" and the preadjusted value.



To adjust the switching point, push the "Up"- or "Down"-key until the desired value is displayed.



Store the settings with the "Mode"-key.



1x

Now the display switches to the selection of the hysteresis. The display is alternating between "h-1" and the preadjusted value.



To adjust the hysteresis, push the "Up"- or "Down"-key until the desired value is displayed.



Store the settings with the "Mode"-key



1x

7.2 Adjusting output 2

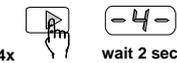
Example: Switch VS-V-W-D, output 2 has the operating mode "Window comparator mode"

Switching points are between -0,57 bar and -0,83 bar (lower margin A=-0,57, upper margin b = -0,83)

Further information to the modes see paragraph 8.

Adjusting the operating mode

To select output 2, push "Mode"-key 4x



4x

After 2 seconds, the display is alternating between "ou 2" and "HYS".



Push the "Up"- or "Down"-key until "CnP" for the desired switching mode "Window Comparator Mode" is displayed.



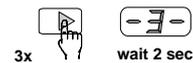
Store the settings with the "Mode"-key.



1x

Adjusting the lower and the upper margin

To select the lower margin of output 2, push "Mode"-key 3x



3x

After 2 seconds, The display is alternating between "A-2" and the preadjusted value.



Push the "Up"- or "Down"-key until the desired value is displayed.



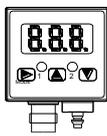
Store the settings with the "Mode"-key.



1x

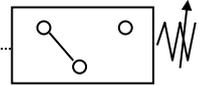
Now the display switches to the adjustment of the upper margin. The display is alternating between "b-2" and the preadjusted value.





Vakuum switch • Pressure switch

VS-W-D Series



To adjust the upper margin, push "Up"- or "Down"-key.



Store the settings with the "Mode"-key.



1x

8. Operating modes of the outputs

The outputs can be operated in two different modes. Each output can be adjusted independent of the other. The modes are described in the following.

8.1 Hysteresis mode

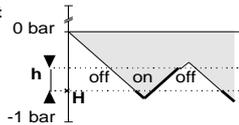
Settings are **switching point H** and **hysteresis h**.

Example: VS-V-W-D

H = -0.60 bar

h = 0.15 bar

N.O. (Normally Open)



At 0 bar, the digital output is off.

When the vacuum level increases up to the **switching point H**, the digital output switches on. As long as the vacuum is higher than -0.45 bar (= 0.6 bar - 0.15 bar), the digital output stays on. When the vacuum decreases and passes -0.45 bar, the digital output switches off.

For the configuration of N.C. (Normally Closed), the output switches reverse (off > H, on < H-h).

Factory setting: Output 1 & 2 in Hysteresis mode

VS-V-W-D	mmHg	inHg	kPa	bar
H - 1	345	13.6	-46	0.46
h - 1	50	2.0	-7	0.07
H - 2	595	23.4	-79	0.79
h - 2	50	2.0	-7	0.07

VS-P10-W-D	psi	kgf/cm ²	MPa	bar
H - 1	67	4.75	0.46	4.6
h - 1	10	0.70	0.07	0.7
H - 2	115	8.2	0.79	7.9
h - 2	10	0.7	0.07	0.7

8.2 Window Comparator mode

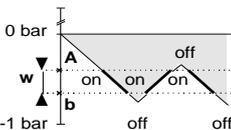
Settings are **lower margin A** and **upper margin b**.

Example: VS-V-W-D

A = -0.45 bar

b = -0.60 bar

N.O. (Normally Open)



At 0 bar, the digital output is off.

When the vacuum level increases up to the **lower margin A**, the digital output switches on. As long as the vacuum level is in the "window" between the **lower margin A** and the **upper margin b**, the digital output stays on.

When the vacuum level becomes higher than the **upper margin b**, the digital output switches off.

For the configuration of N.C. (Normally Closed), the output switches reverse (A < off < b, A < on > b).

Factory setting: Output 1 & 2 in Window Comparator mode

VS-V-W-D	mmHg	inHg	kPa	bar
A - 1	195	7.6	-26	0.26
b - 1	400	15.6	-53	0.53
A - 2	495	19.4	-66	0.66
b - 2	645	25.4	-86	0.86

VS-P10-W-D	psi	kgf/cm ²	MPa	bar
A - 1	38	2.7	0.26	2.6
b - 1	77	5.5	0.53	5.3
A - 2	96	6.85	0.66	6.6
b - 2	125	8.90	0.86	8.6

9. Display of Peak and Bottom values

The built-in memory stores in normal operation the peak value and bottom value since the switch was connected to the power supply.

These will be displayed as follow:

To display the peak value, push the "Up"-key



1x

To display the bottom value, push the "Down"-key



1x

10. Rotate display

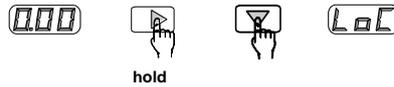
If the mounting position is twisted (rotated on head), the display can be rotated. When connecting the power supply, push and hold the buttons "Up" and "Down".

Note that the decimal point lights up now at the upper margin of the display. The functions keys retain their function, that means that the "Up"-key shows downwards in twisted mounting position!

11. Locking the set values

11.1 Standard versions

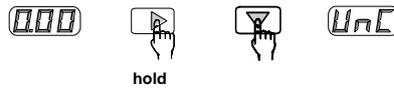
Whilst pushing the "Mode"-key, push the "Down"-key. The switch is locked, which means that the set values can't be changed. On the display appears "LoC", the switch is locked.



hold

When doing this once more, the switch gets unlocked and the settings can be changed again.

On the display appears "UnC", the switch is unlocked.



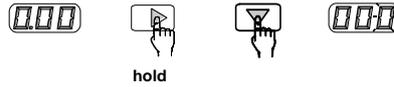
hold

11.2 Version with PIN code (VS-...C-...)

The lock prevents unauthorised persons changing the settings. A 3-digit number combination (PIN code) guarantees that only people who know the PIN code (set by the operator) can change the settings.

Activating the lock:

To activate the lock, press and hold the "Mode" button, then press the "Down" button.

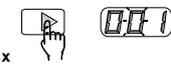


hold

Press the "Up" or "Down" button to change the right digit.



The value for the right digit is saved when you press the "Mode" button. The centre digit flashes.



1x

The centre digit can now be changed. Press the "Mode" button again to change the left digit.

When the "Mode" button is pressed again, the PIN code entered is saved. "LoC" appears on the display and the lock is activated.



1x

Deactivating the lock:

To deactivate the lock, press and hold the "Mode" button, then press the "Down" button.

"000" appears on the display and the right digit flashes.



hold

The saved PIN code must be entered as described above for locking. If the PIN code is correct, "UnC" is displayed and the switch is unlocked.



1x

If the PIN code is incorrect, "LoC" is displayed and the switch remains locked.



1x

If you forget the PIN code saved, the switch can be unlocked in the SCHMALZ factory.

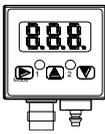
12. Error messages

Error	Message	Solution
Err	Pressure during Zero-point adjustment was higher than ±3% F.S.	Make Zero-point adjustment again at environment pressure.
CE1	Overcurrent at Output 1	Loaded current exceeds rated power of 180 mA max. Check output.
CE2	Overcurrent at Output 2	Loaded current exceeds rated power of 180 mA max. Check output.
FFF -FF*	Applied pressure exceeds measuring range.	Apply pressure within the measuring range.
Er1	EEPROM defective, calibration storage could not be read anymore	Switch defective, replace it

* A display change from 0.00 to -FF or e.g. 0.01 at a atmospheric pressure is not an error, but caused by fluctuations in the air pressure.

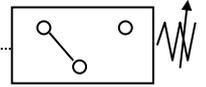
This can be rectified by setting the zero point.

The zero point must also be set after performing a "Clear all" (CLA).

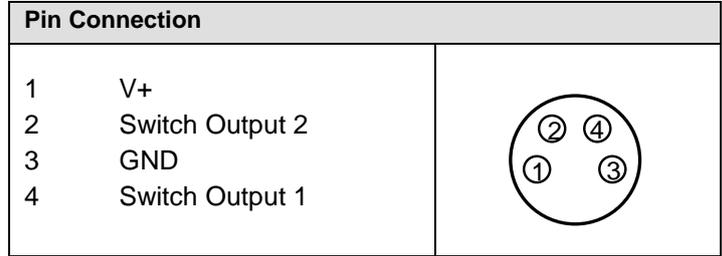
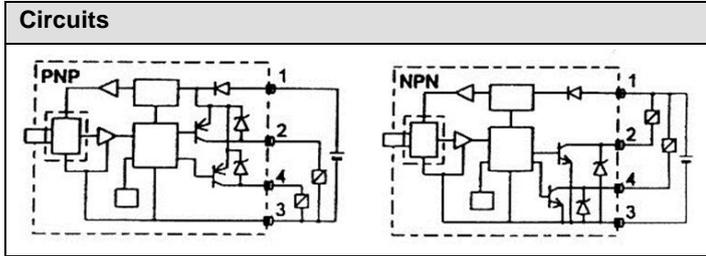


Vakuum switch • Pressure switch

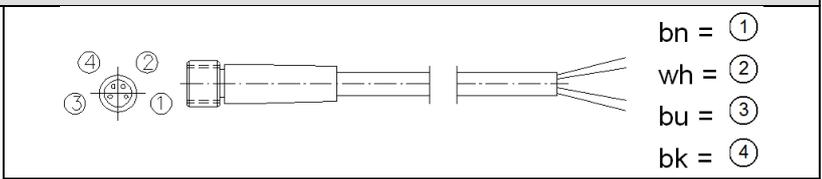
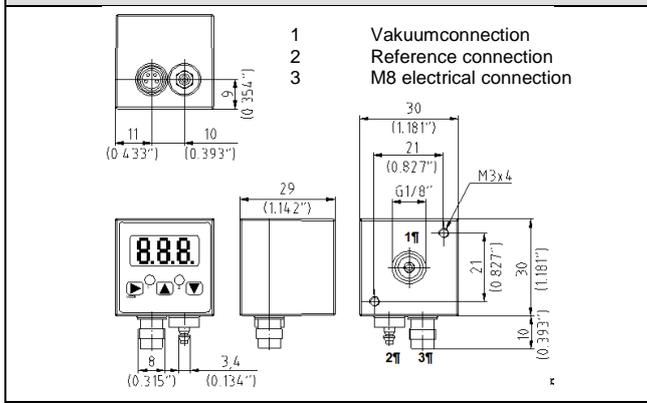
VS-W-D Series



	VS-V-W-D-PNP	VS-V-W-D-PNP-C	VS-V-W-D-NPN	VS-P10-W-D-PNP	VS-P10-W-D-PNP-C	VS-P10-W-D-NPN
Art. #	10.06.02.00113	10.06.02.00271	10.06.02.00126	10.06.02.00114	10.06.02.00272	10.06.02.00127
Pressure range	0 ~ -1 bar (0 ~ -29.5 inHg)	0 ~ -1 bar (0 ~ -29.5 inHg)	0 ~ -1 bar (0 ~ -29.5 inHg)	0 ~ 10 bar (0 ~ 145 psi)	0 ~ 10 bar (0 ~ 145 psi)	0 ~ 10 bar (0 ~ 145 psi)
Overpressure	5 bar (72.5 psi)	5 bar (72.5 psi)	5 bar (72.5 psi)	16 bar (232 psi)	16 bar (232 psi)	16 bar (232 psi)

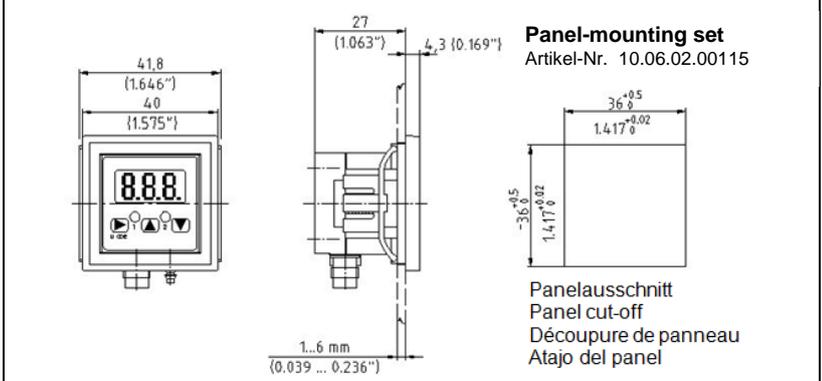
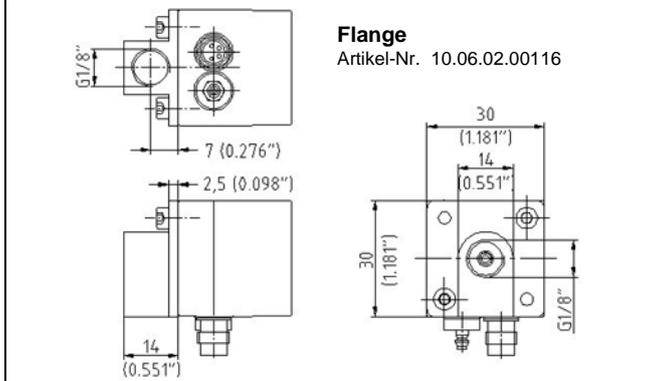


Dimension / Colour codes of Schmalz cables



Warning: If the switch is used in a moist environment, the reference connection (for ambient or reference pressure) must be connected to a deaeration hose (Ø 3 mm) which leads to a dry environment.

Maximum torque:
M3: 1.5 Nm, G1/8": 1.5 Nm
If higher torque is required, use a flange (see below)!



Technical Data

Media	Non corrosive gases and non lubricated air	Operation accuracy	± 1% F.S.
Power supply	10.8 ~ 30 VDC (Protected extra-low voltage PELV), Max. 10% ripple (P-P), Reverse voltage protection	Thermal error	± 3% F.S. in range 0 ~ 50 °C (32 ~ 122 °F)
2 Switch Output	N.O. or N.C. separate selective, max. 180 mA, LED-indication on display, short circuit-proof, PNP or NPN version	Response time	< 5 ms
Output resistance NPN	780 KΩ in open state	Current consumption	< 55 mA
Display	3-digit 7-segment LED	Dielectric strength	1,000 VDC 1 min
Pressure units	VS-V-D: bar, mmHg, inHg, kPa VS-P10-D: bar, psi, kgf/cm ² , Mpa	Insulation resistance	> 100 MΩ at 500 VDC
Display resolution	VS-V-D: 0.01 bar, 5 mmHg, 0.2 inHg, 1 kPa VS-P10-D: 0.1 bar, 1 psi, 0.05 kgf/cm ² , 0.01 MPa	Interference emission	As per DIN EN 50081-1
Hysteresis	Hysteresis mode (0-100%) or Windows Comparator mode separate selective	Immunity to interference	As per DIN EN 50082-2
Electrical connection	Connector M8, 4-pin	Operating temperature range	0 ~ 50 °C (32 ~ 122 °F)
Air connection	G1/8" M	Storage temperature range	-10 ~ 60 °C (14 ~ 140 °F)
Protection	IP 65 (without venting tube IP40)	Operating humidity range	10 ~ 90 % RH
		Vibration resistance	10-55 Hz 1.5 mm (0.06"), XYZ, 2hrs
		Shock resistance	10 G XYZ
		Mass	35 g (1.24 oz)

Immunity to interference: The following minimum operating quality is guaranteed when there is interference from electromagnetic HF-Fields as per ENV 50140 and ENV 50141: The switch point can be modified by max. 10 %.

