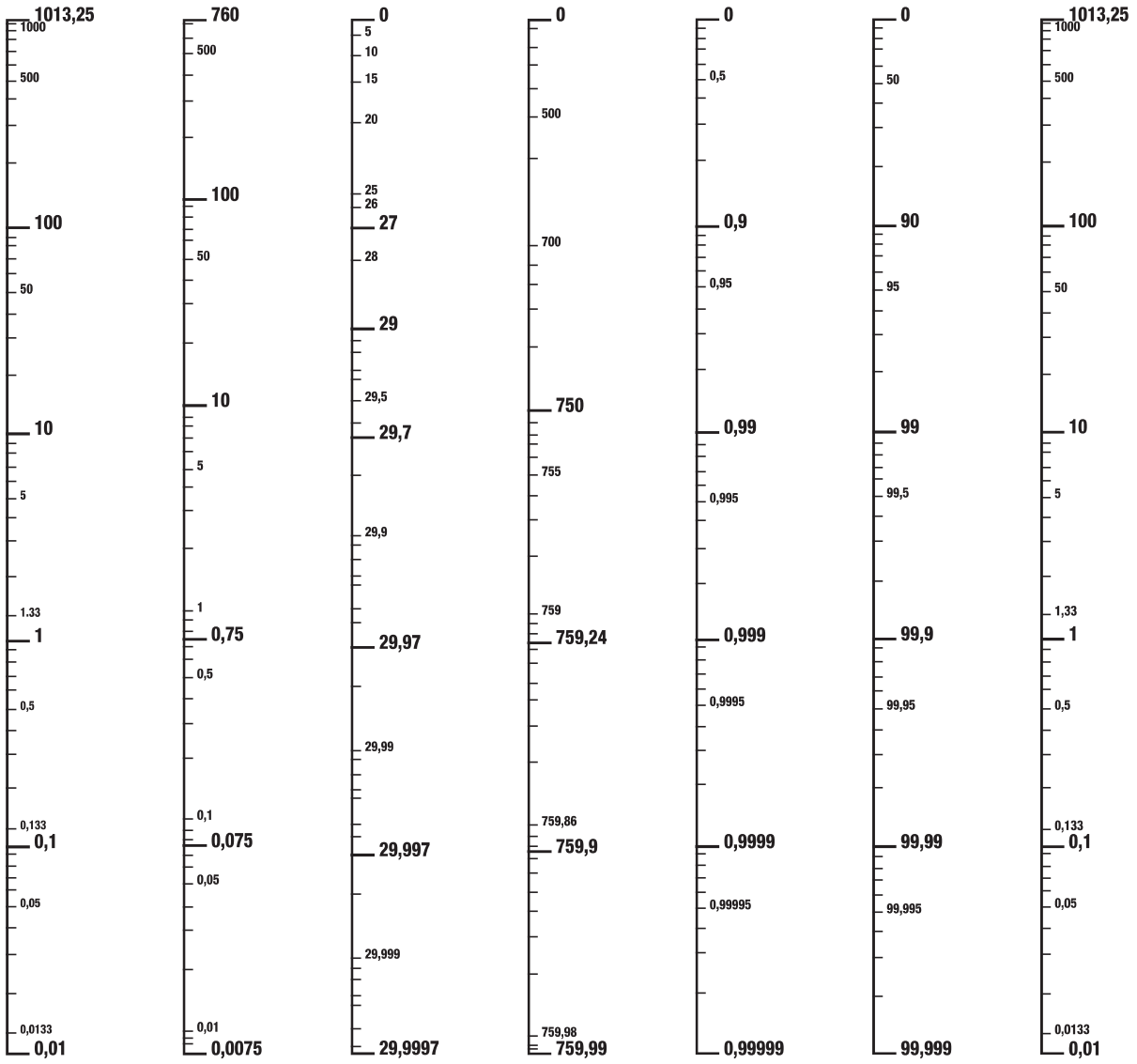
VACUUM MEASUREMENT, CONTROL AND ADJUSTMENT INSTRUMENTS

VACUUM AND PRESSURE UNIT CONVERSION TABLES



PRESSURE MEASUREMENT UNIT CONVERSION FACTORS (ABSOLUTE VALUES)

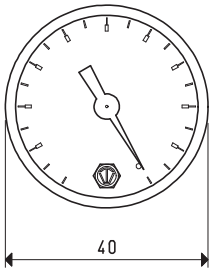
PRESSURE MEASUREMENT UNIT CONVERSION FACTORS (ABSOLUTE VALUES)

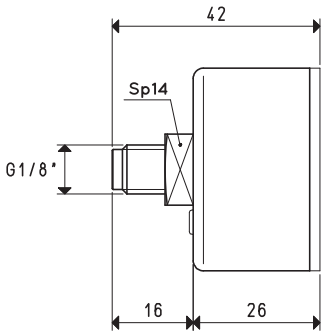
		= mbar	= bar	= torr	= inch. Hg	= psi (lbf/in²)	= atm	= Kg/cm² (at)	= mm H_2O	= m H_2O	= Pa (N/m²)
mbar	**x**	1	10^{-3}	0,75	2,95x 10^{-2}	14,5 x 10^{-3}	9,87 x 10^{-4}	1,02 x 10^{-3}	10,2	1,02 x 10^{-2}	100,0
bar	**x**	1000,0	1	750,0	29,53	14,6	0,987	1,02	10197,0	10,19	100000
torr	**x**	1,33	1,33 x 10^{-3}	1	3,94 x 10^{-2}	1,93 x 10^{-2}	1,316 x 10^{-3}	1,359 x 10^{-3}	13,59	1,359 x 10^{-3}	133,32
inch. Hg	**x**	33,9	33,9 x 10^{-3}	25,4	1	0,491	3,34 x 10^{-2}	3,45 x 10^{-2}	345,0	0,345	3386,0
psi (lbf/in²)	**x**	68,9	6,89 x 10^{-2}	51,7	2,04	1	6,8 x 10^{-2}	7,03 x 10^{-2}	703	0,703	6897
atm	**x**	1013,25	1,013	760,0	30,0	14,696	1	1,033	10332	10,332	101325,0
Kg/cm² (at)	**x**	981	0,981	735,6	28,96	14,2	0,968	1	10000	10	98067,0
mm H^2O	**x**	9,81 x 10^{-2}	9,81 x 10^{-5}	7,35 x 10^{-2}	2,89 x 10^{-3}	1,42 x 10^{-3}	9,67 x 10^{-5}	10^{-4}	1	10^{-3}	9,8067
m H^2O	**x**	98,067	9,81 x 10^{-2}	73,5	2,89	1,42	9,67 x 10^{-2}	10	10000	1	9806,7
Pa (N/m²)	**x**	0,01	10-5	7,5 x 10^{-3}	2,95 x 10^{-4}	1,45 x 10^{-4}	9,87 x 10^{-6}	1,02 x 10^{-5}	0,102	1,02 x 10^{-4}	1

Example: To transform 10 mbar in Torr = 10 x 0.75 = 7.5 Torr

VACUUM AND PRESSURE GAUGES

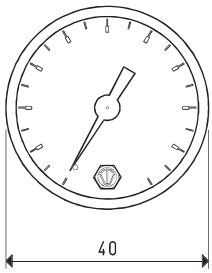
The measurement method of our vacuum gauges is based on the principle of the Bourdon spring (Eugène Bourdon, France, 1808 – 1884).
It is made using section tubes in special copper alloy, one end is welded to the threaded pin of the vacuum-pressure gauge, thus forming a single body with it, while the other closed end is free. As the vacuum or the pressure inside increases, it tends to shift from the initial position (Bourdon effect). The movement of the free end of the spring determines the vacuum-pressure measurement. For easier reading, this movement is amplified by means of a connection lever and transmitted to the pointer.
Everything is contained in a sturdy case made from different materials according to the function of models, fastened onto a threaded fitting for connection to the system. The face and index are visible thanks to a clear plastic protective disc. They are available in various versions, with radial or coaxial connectors, with built-in or external flange, dry or glycerine filled. With the exception of the F 40 mm vacuum gauges, all other models have a double scale dial.
All the vacuum and pressure gauges we will describe on these pages are made in compliance with all the safety standards and measurement units in force in the European Union.

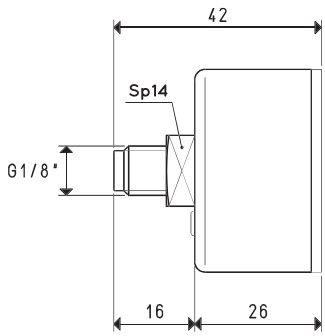




VACUUM GAUGE

Item	Scale KPa	Double Scale	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 03 15	0 ÷ -100	--	2.5%	-10 °C ÷ +50 °C	dry	Black plastic	52



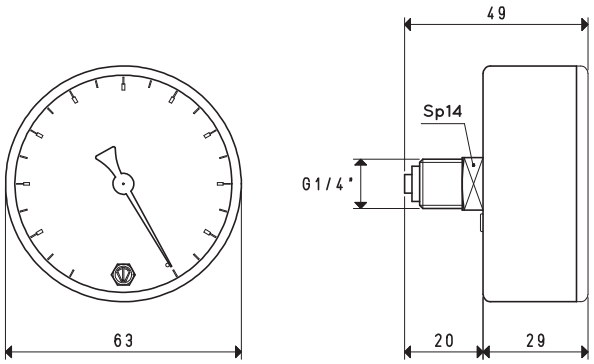


PRESSURE GAUGES

Item	Scale bar	Double Scale	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 03 20	0 ÷ 1.6	0 ÷ 23 psi	2.5%	-10 °C ÷ +50 °C	dry	Black plastic	54
09 03 25	0 ÷ 10	0 ÷ 1.0 MPa	2.5%	-10 °C ÷ +50 °C	dry	Black plastic	54

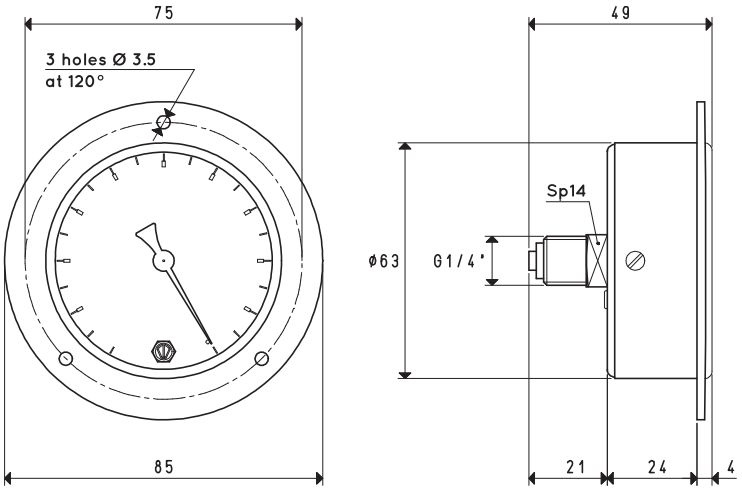
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130



VACUUM GAUGE

Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 03 10	0 ÷ -1000	0 ÷ -100	2.5%	-10 °C ÷ +50 °C	dry	black plastic	134

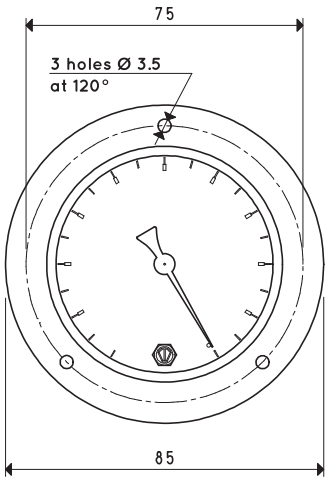


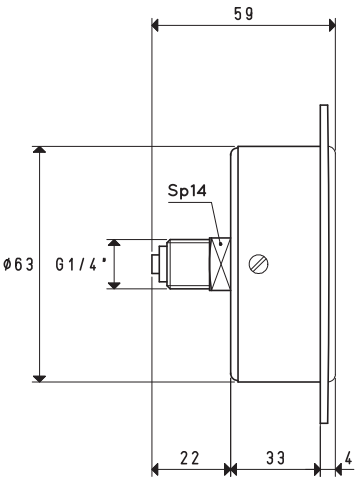
VACUUM GAUGE

Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Flange material	Weight g
09 01 10	0 ÷ -1000	0 ÷ -100	2.5%	-10 °C ÷ +50 °C	dry	black plastic	chrome-plated steel	162

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

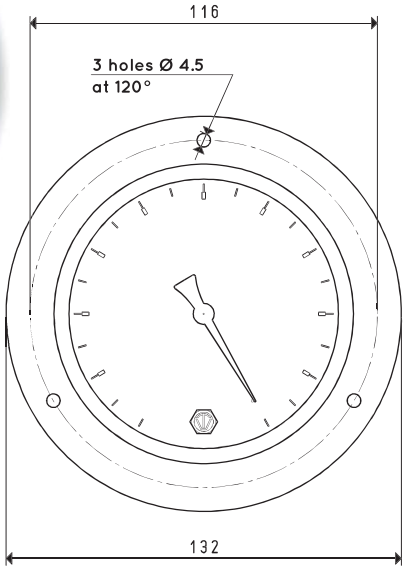
Adapters for GAS - NPT threading available on page 1.130

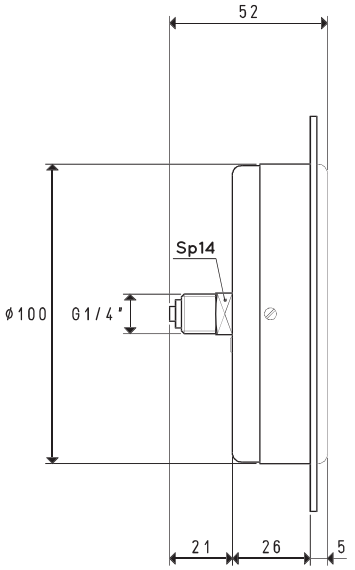




VACUUM GAUGE

Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Flange material	Weight g
09 01 16	0 ÷ -1000	0 ÷ -100	1.6%	-10 °C ÷ +50 °C	in glycerine bath	Die-cast brass	chrome-plated steel	348



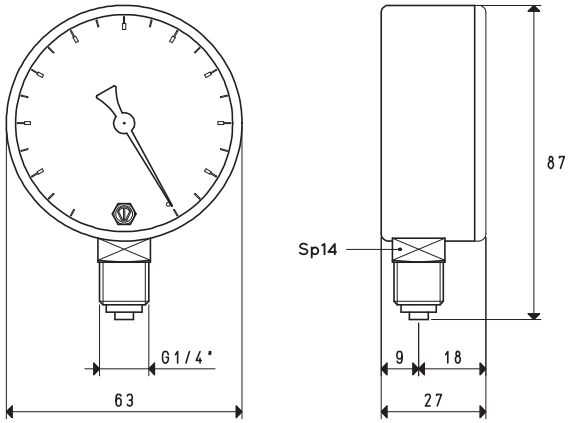


VACUUM GAUGE

Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case and flange material	Weight g
09 02 10	0 ÷ -1000	0 ÷ -100	1%	-10 °C ÷ +50 °C	dry	black steel	346

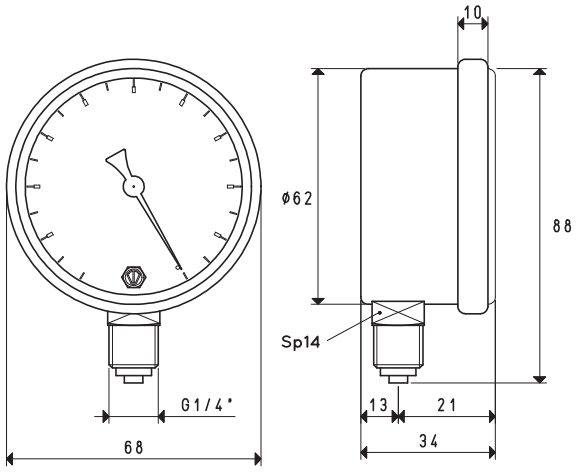
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130



VACUUM GAUGE

Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 05 10	0 ÷ -1000	0 ÷ -100	2.5%	-10 °C ÷ +50 °C	dry	black plastic	136



VACUUM GAUGE

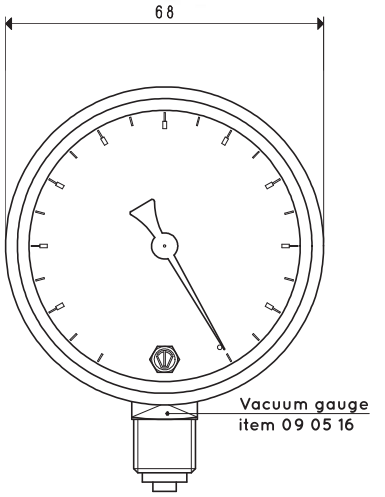
Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 05 16	0 ÷ -1000	0 ÷ -100	1.6%	-10 °C ÷ +50 °C	in glycerine bath	stainless steel	218

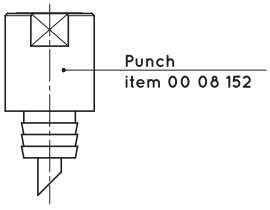
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

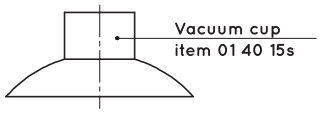
Adapters for GAS - NPT threading available on page 1.130

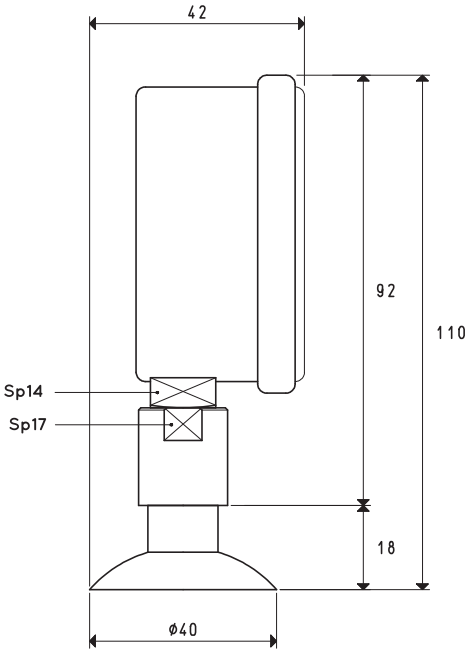
VACUUM GAUGE WITH STEEL PUNCH

This vacuum gauge with punch has been designed to allow the immediate detection of the level of vacuum inside tin cans and food containers in general.
The glycerine bath vacuum gauge item 09 05 16 used for this application (features described on the previous page) is provided with a hardened steel punch to easily perforate the containers and with a vacuum cup in silicon compound to guarantee vacuum seal after perforation.
It is available in the standard version, which is the one shown on this page, but can be provided in other versions upon request.









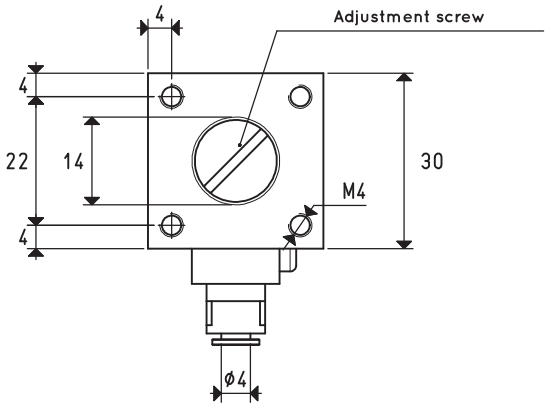
VACUUM GAUGE

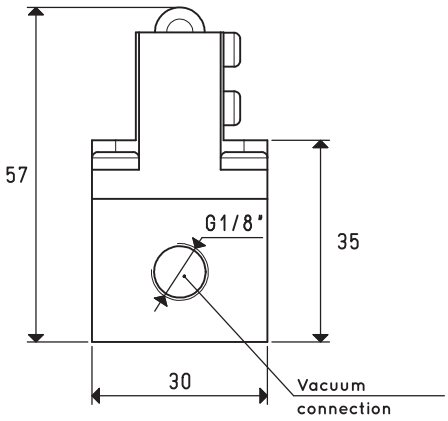
Item	Scale mbar	Double Scale KPa	Admissable scale error	Temperature of use	Notes	Case material	Weight g
09 05 99	0 ÷ -1000	0 ÷ -100	1.6%	-10 °C ÷ +50 °C	in glycerine bath	stainless steel	250

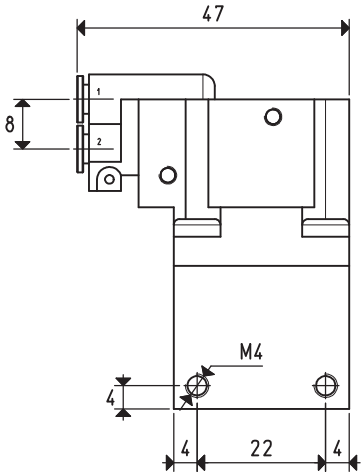
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

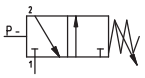
MINI PNEUMATIC VACUUM SWITCHES

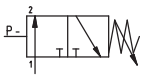
These extremely compact vacuum switches give or remove a pneumatic signal, depending on the model, when a certain adjustable level of vacuum is reached.
The pressure differential existing between the set maximum value and that of the signal recovery at rest is not adjustable.
They are particularly suited for controlling vacuum generators and for activating pneumatic valves.











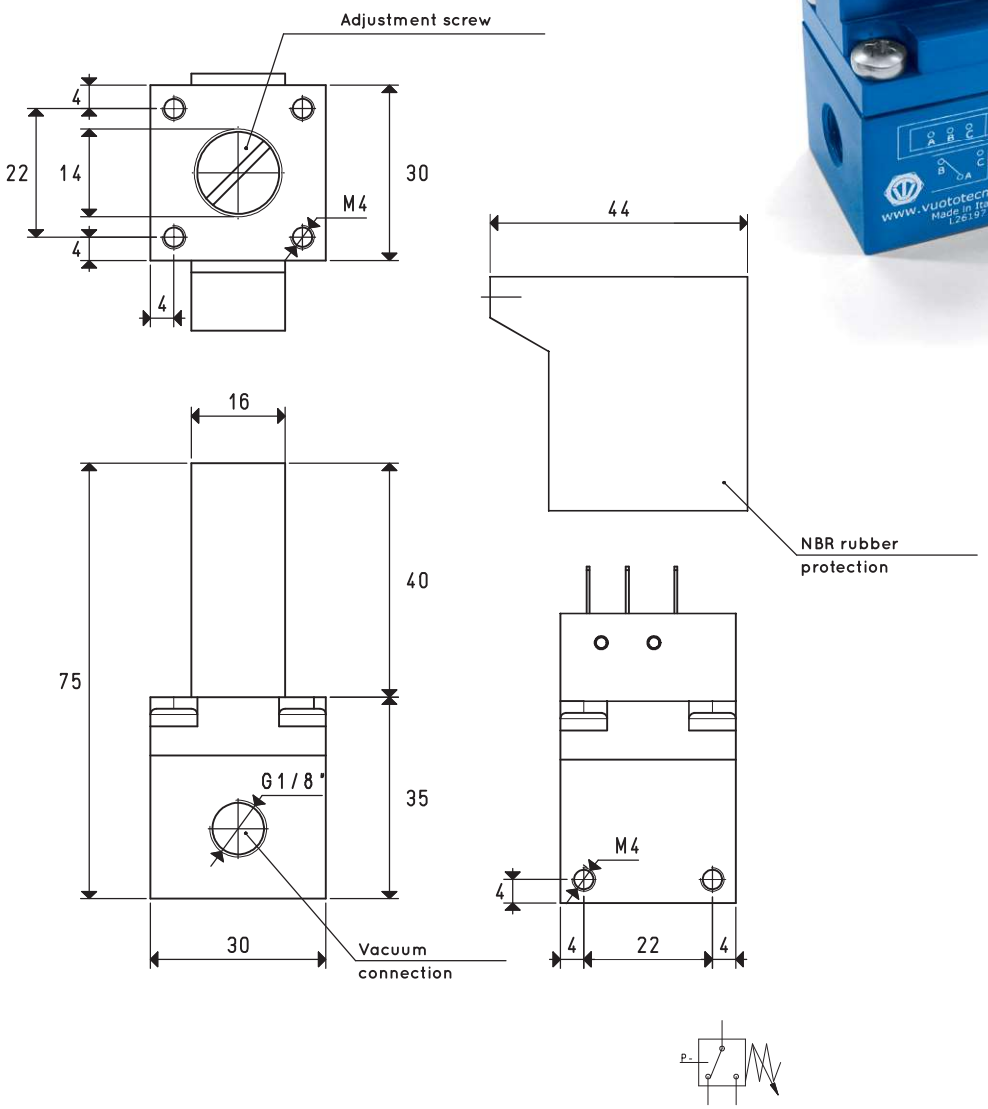
Item		12 01 30	12 02 30
Adjustment range	mbar abs.	930 ÷ 50	900 ÷ 40
Fixed differential	mbar	50 ÷ 80	150 ÷ 180
Repeatability	mbar	± 5	±5
Signal at rest		NC	NO
Supply pressure	bar	2 ÷ 8	2 ÷ 8
Pneumatic microvalve	item	00 12 17	00 12 18
Max flow rate of the microvalve at 6 bar	Nl / s	1.2	1.2
Operating temperature	°C	-10 ÷ +60	-10 ÷ +60
Weight	g	104	102

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

MINI ELECTROMECHANICAL VACUUM SWITCH

This extremely compact vacuum switch gives an electric signal when a certain adjustable level of vacuum is reached.
The pressure differential existing between the set maximum value and the value of reset of the rest signal is 50- 60 mbar and it is not adjustable.
They are particularly suited when an electrical signal is needed when a certain level of vacuum is reached, for safety, for starting a cycle, for checking the cup grip, etc.



Item		12 02 10
Adjustment range	mbar abs.	930 - 10
Fixed differential	mbar abs.	from 50 to 60
Repeatability	mbar	±1.5
Maximum overpressure	bar	5
Microswitch	item	00 12 12
Contacts		one in commutation
Flow rate of contacts	A	0.1 at 30 VDC - 10.1 at 250 VAC
Electrical connections		Type 110 fast-on terminals
Operating temperature	°C	-25 - +80
Protection		IP 55
Weight	g	102

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

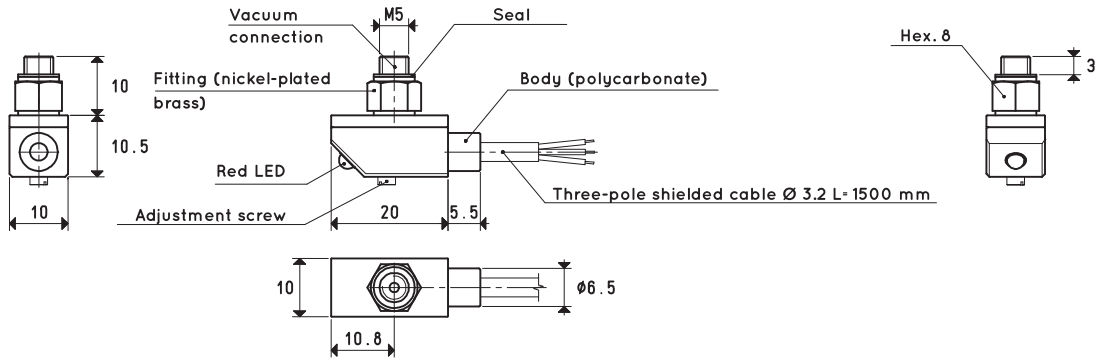
3D drawings are available on **vuototecnica.net**

MICRO DIGITAL VACUUM SWITCHES

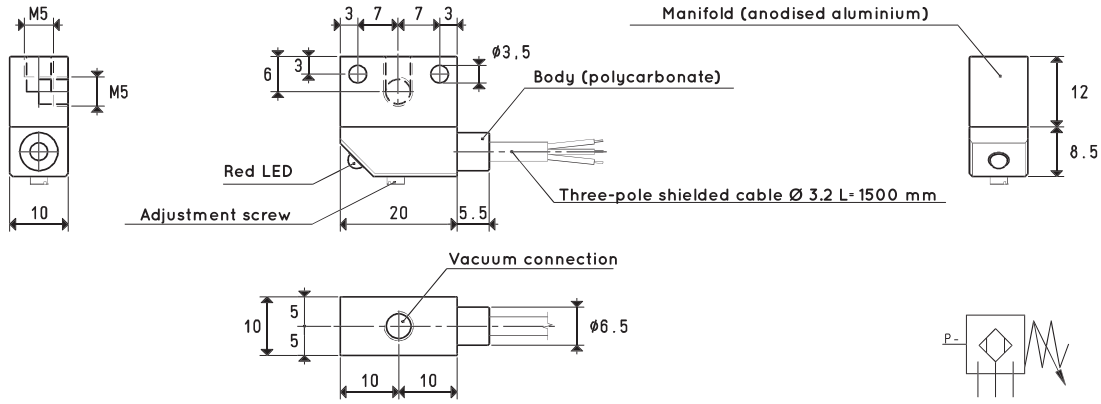
If accurately calibrated and compensated for temperatures, these small devices are able to give very precise digital signals to the set maximum measuring value.
The switching point, which is within the scale value, can be easily programmed by means of an adjustment screw located on the upper part of the device.

A red LED near the screw indicates the digital output signal commutation status.
The pressure differential (hysteresis) between the set maximum value and the value of reset of the rest signal is 2% of the set value and cannot be adjusted.
They are composed of a polycarbonate enclosure, which includes the sensor and the electric circuit, and of a coupler or a small aluminium manifold with the vacuum connections.
Item 12 05 10 can also be rotated freely to place the display in the desired position, without having to unscrew it from the vacuum connection. The vacuum connection can be carried out via male or female M5 connectors, while the electrical connection is made via a three-connector cable with which they are equipped. Mini digital vacuum switches are suited for controlling dry air and non-corrosive gasses. They are recommended in all those cases that require a signal when a certain level of vacuum is reached, for safety, for starting a cycle, for checking the cup grip, etc.

Item 12 05 10



Item 12 05 11

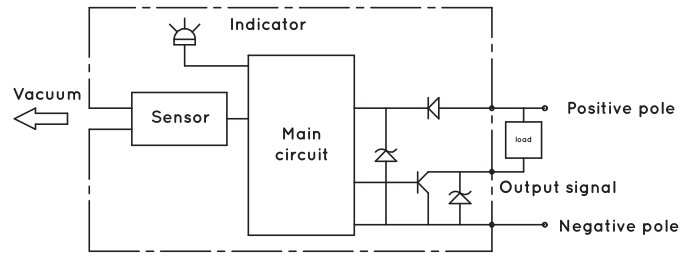


Cable colour	Delivery
brown	positive pole ⊕
black	output signal
blue	negative pole ⊖

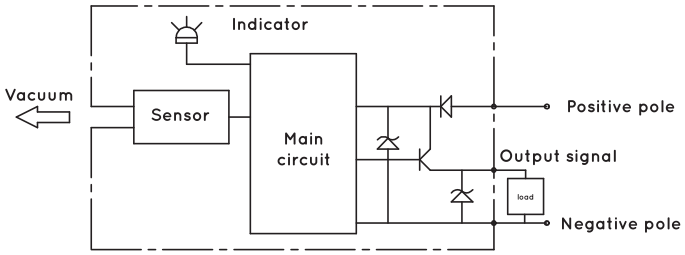
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

INTERNAL ELECTRICAL DIAGRAMS

NPN open contact

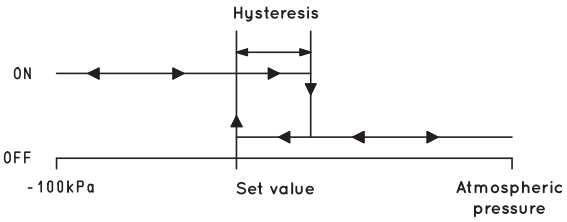


PNP open contact



OUTPUT CONTACT DIAGRAM

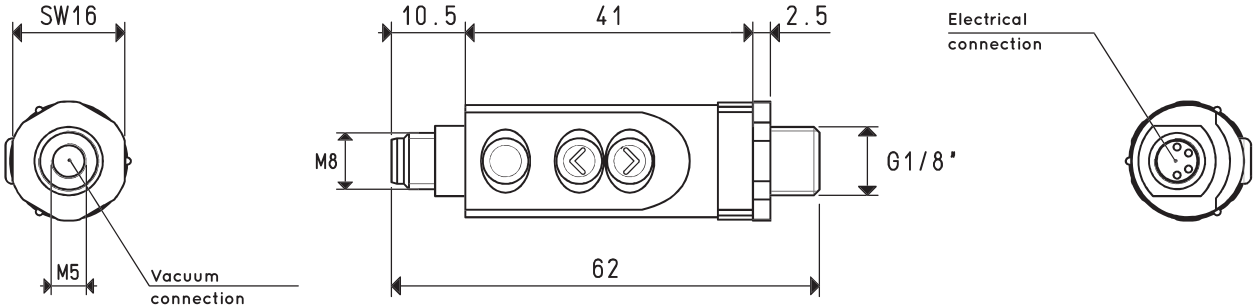
The LED lights up at the pre-set pressure and switches off at the pre-set pressure minus the hysteresis

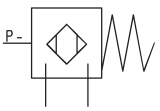


Characteristics and electrical specifications	Item 12 05 10 P Item 12 05 11 P		Item 12 05 10 N Item 12 05 11 N
Adjustment range		from 0 to -1 bar	
Maximum overpressure		2 bar	
Operating voltage		10.8 - 30 VDC (Protection against polarity inversion)	
Electrical absorption		≤20 mA	
Commutation outputs	1 digital PNP, NO	Maximum commutation current 80 mA	1 digital NPN, NO
Reaction time		≤1 ms	
Commutation frequency		1000Hz	
Hysteresis		Not adjustable, 2% of the maximum set value	
Repeatability		±2% of the measuring range	
Commutation indicator		Red LED	
Insulation resistance		100 MΩ	
Test voltage		500 VAC, 1 min	
Degree of protection		IP 40	
Environmental operating conditions			
Installation position		Any	
Controllable fluids		Dry air and non-corrosive gas	
Operating temperature		-10 - +60 °C	
Storage temperature		-20 - +70 °C	
Interference emission		In compliance with EN 55011, Group 1, Class B	
Resistance to interference		In compliance with EN 61326 – 1	
Characteristics and mechanical specifications			
Container material		Polycarbonate PC	
Connection material		Nickel-plated brass and aluminium	
Weight (without cable)		About 5g	
Electrical connection		Three-conductor cable, 1.5 m long	
Connection to the fluid		M5 male or female threading	

ANALOGUE VACUUM SWITCH

These compact and extremely light switches come enclosed in a sturdy ABS casing; these features allow their installation on the machine and close to the application. If accurately calibrated, these analogue switches provide very precise measurements values.
The adjustment range is from 0 to -1 bar and can be interfaced with external logics via an analogue output from 1 to 5 Volts and a digital PNP output, configurable via Teach-In.
The switching point, as well as the hysteresis from 0 to 100% of the set value, can be easily programmed via push buttons located on the control panel; the two two-colour LEDs on the control panel signal the commutation status and the error code, if any.
These devices can be rotated freely to place the display in the desired position, without having to unscrew them from the vacuum connection.
The vacuum connection is dual threaded: male G 1/8" or female M5.
The electrical connection is an M8 4-pin threaded plug and upon request the connection cable is available in PUR, with an axial or radial connector.
These vacuum switches are suited for measuring and controlling dry air and non-corrosive gasses.
They are recommended in all those cases that require a measurement and commutation to be installed on safety or energy-saving devices, on systems for optimising the work cycle time and in circuit level of vacuum adjustment circuits.

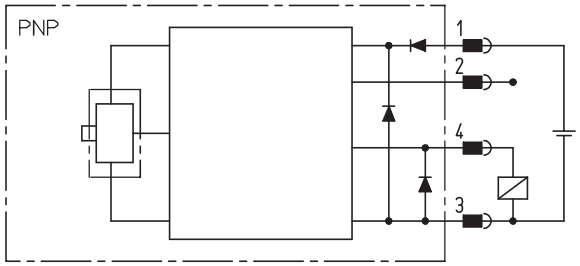




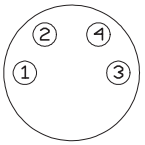
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

WIRING DIAGRAM



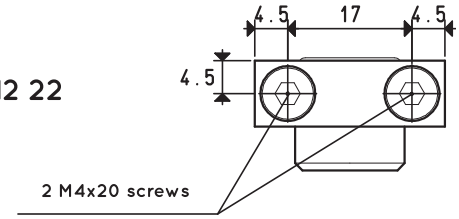
Connections
1. V+
2. analogue output
3. V-
4. commutation output

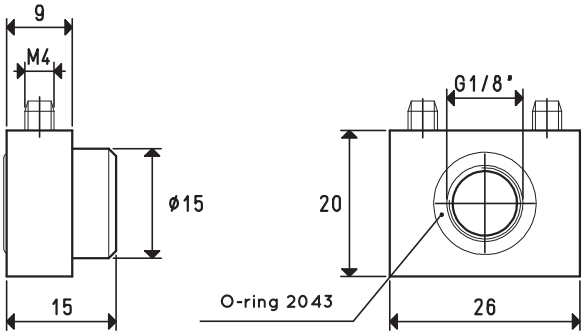


Cable colours
Pin1 = brown
Pin2 = white
Pin3 = blue
Pin4 = black

WALL FIXING KIT

Item 00 12 22





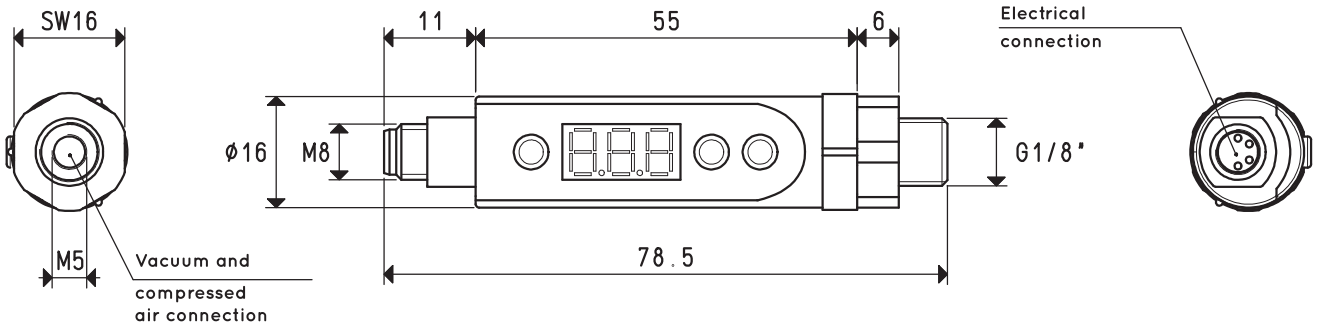
Characteristics and electrical specifications	Item 12 07 10 Vacuum switch
Adjustment range	from 0 to -1 bar
Maximum overpressure	5 bar
Operating voltage	10.8 - 30 VDC (Protection against polarity inversion)
Electrical absorption	≤30 mA
Commutation output	1 digital PNP, NO or NC programmable, maximum commutation current 250 mA
Analogue output	1 - 5 V; impedance load ≥500 Ω
Output tolerance	±1%
Offset	1 V - 0.1 Volt
Reaction time	≤2.5 ms
Commutation frequency	400Hz
Hysteresis	Adjustable from 0 to 100% of the maximum set value
Repeatability	±0.2% of the measuring range
Error code signal	Two-colour LED
Insulation resistance	100 MΩ to 500 VDC
Test voltage	1000 VAC, 1 min
Degree of protection	IP 65
Environmental operating conditions	
Installation position	Any
Measurable fluids	Non-corrosive gas and dry air
Operating temperature	0 - +50 °C
Storage temperature	-20 - +80 °C
Interference emission	In compliance with DIN EN 50081 - 1
Resistance to interference	In compliance with DIN EN 50082 - 2
Characteristics and mechanical specifications	
Container material	ABS plastic - PC
Connection material	Nickel-plated brass
Weight	19 g
Electrical connection	With M8 - 4 pin coupler
Connection to the fluid	Male G 1/8" or female M5 threading
Accessories	
Electrical connection cable	With axial connector, 5 m - PUR M8 x 1x 0.25 mm - Item 00 12 20
Electrical connection cable	With radial connector, 5 m - PUR M8 x 1x 0.25 mm - Item 00 12 21
Wall fixing kit	Support with o-ring and screws - Item 00 12 22

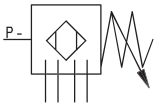
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

DIGITAL VACUUM AND PRESSURE SWITCHES

These compact and extremely light digital vacuum and pressure switches are enclosed in a sturdy ABS casing.
These features allow installation on the machine and close to the application.
These digital switches are accurately calibrated and compensated for temperatures and therefore are able to give very precise measurements values. The detected values are shown on the display, making it unnecessary to use a vacuum gauge. The two LEDs, one red and one green, built-in the control panel, indicate the commutation status of the two digital output signals.
The two commutation outputs are completely independent.
The switching points within the scale values, including hysteresis from 0 to 100% of the set value, are easily programmable via the buttons located on the control panel.
Other additional functions can be configured, such as the comparison between two values, NO and NC contacts, choice of the measurement unit, locking the programmed values and functions, display reversal, etc. These devices can be rotated freely to place the display in the desired position, without having to unscrew them from the vacuum connection.
The vacuum or the pressure connections can be carried out via a dual male G 1/8" or female M5 threading. The electrical connection is an M8 4-pin threaded plug and upon request the connection cable is available in PUR, with an axial or radial connector. These switches are suited for measuring and controlling dry air and non-corrosive gas.
They are recommended in all those cases that require a signal when a certain level of vacuum is reached set for safety, for starting a cycle, for checking the cup grip, etc. Moreover, the hysteresis function allows managing the vacuum generator compressed air supply, allowing considerable energy saving.

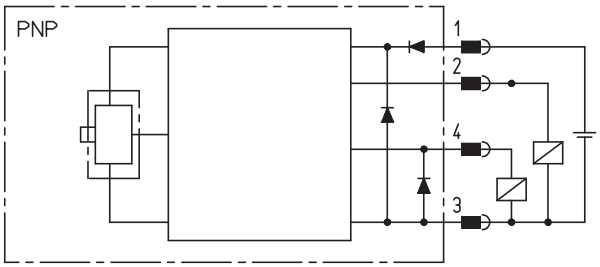




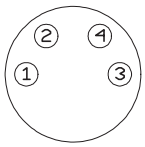
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6}$ = $\frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

WIRING DIAGRAM



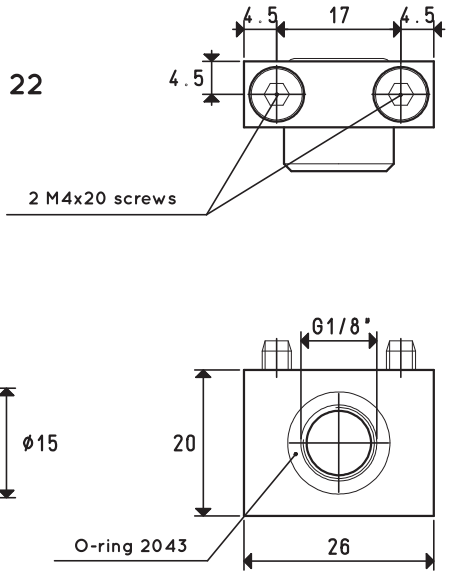
Connections
1. V+
2. commutation output 2
3. V-
4. commutation output 1



Cable colours
Pin1 = brown
Pin2 = white
Pin3 = blue
Pin4 = black

WALL FIXING KIT

Item 00 12 22



Characteristics and electrical specifications	Item 12 10 10 Vacuum switch	Item 12 25 11 Pressure switch
Adjustment range	from 0 to -1 bar	from 0 to 10 bar
Maximum overpressure	5 bar	16 bar
Minimum detectable values	0.01 bar	0.01 bar
	1 KPa	--
	1 mmHg	--
	0.1 InHg	--
Operating voltage	10.8 - 30 VDC (Protection against polarity inversion)	
Electrical absorption	<15 mA / <3 mA energy saving mode	
Commutation output	2 digital PNP, 2 digital NPN, NO or NC programmable, maximum commutation current 250 mA	
Display tolerance	≤ ±2% F.S.	
Reaction time	≤2.8 ms	
Commutation frequency	200Hz	
Hysteresis	Adjustable from 0 to 100% of the maximum set value	
Repeatability	±0.2% of the measuring range	
Display	3-digit, 7-segment LED	
Insulation resistance	100 MΩ to 500 VDC	
Test voltage	1000 VAC, 1 min	
Degree of protection	IP 65	
Environmental operating conditions		
Installation position	Any	
Measurable fluids	Non-corrosive gas and dry air	
Operating temperature	0 - +50 °C	
Storage temperature	-20 - +80 °C	
Interference emission	In compliance with DIN EN 50081 - 1	
Resistance to interference	In compliance with DIN EN 50082 - 2	
Characteristics and mechanical specifications		
Container material	ABS plastic - PC	
Connection material	Nickel-plated brass	
Weight	20 g	
Electrical connection	With M8-4 pin coupler	
Connection to the fluid	Male G 1/8" or female M5 threading	
Accessories		
Electrical connection cable	With axial connector, 5 m - PUR M8 x 1x 0.25 mm - Item 00 12 20	
Electrical connection cable	With radial connector, 5 m - PUR M8 x 1x 0.25 mm - Item 00 12 21	
Wall fixing kit	Support with o-ring and screws - Item 00 12 22	

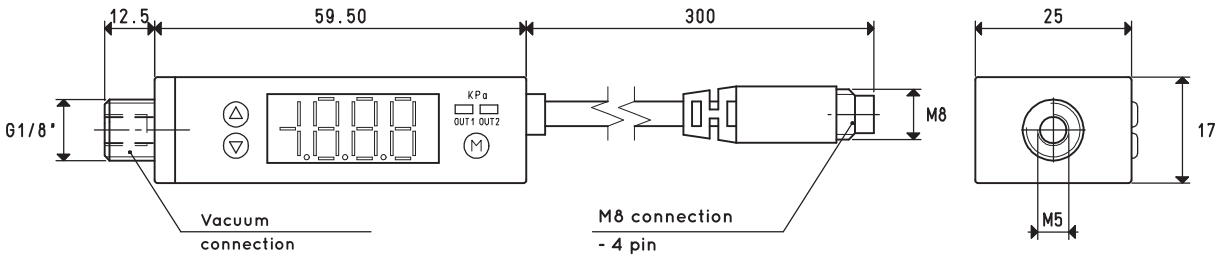
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

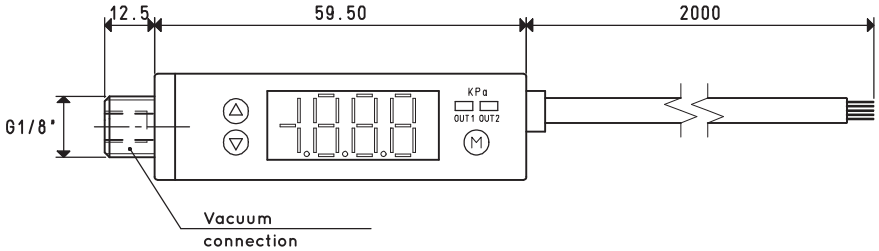
DIGITAL VACUUM SWITCHES

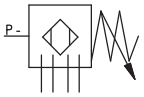
Changes the shape of these digital vacuum switches with respect to those previously described, from cylindrical to parallelepiped. However, the container in which they are enclosed remains in ABS and is also especially compact and extremely light to allow for its installation on board automatisms and near use. These carefully calibrated devices are able to provide very accurate measurement values. The detected values are shown on the display, making it unnecessary to use a vacuum gauge. The panel includes two LED indicators, one green and one red, which indicate the switching status of the two digital output signals. The switching outputs are completely independent. The switching points within the scale values, including hysteresis from 0 to 100% of the set value, are easily programmable via the buttons located on the control panel. Other additional functions can be configured, such as the comparisons between values, NO and NC contacts, the choice of the units of measure, the blocking of functions and programmed values, etc. The vacuum connection can be made by means of a G 1/8" male or M5 female double threading connection.
Electrical connection for item 12 30 10 is push-in with a M8-4 pin threaded jack. A connection cable can be provided in PUR upon request with corresponding axial or radial connector.
Instead, item 12 30 10 A already has an integrated PUR, 2-metre long connection cable. The adjustment range of vacuum switch 12 30 10 is from 0 to -1 bar, with two digital PNP outputs that can be set by means of Teach-in. The adjustment range of item 12 30 10 A, while it is also between 0 and -1 bar, can instead be interfaced with external logics via a 1 to 5 volt analogue output and two digital PNP outputs.
This series of digital vacuum switches is suitable for measuring and control of dry air and non-corrosive gases. These are recommended in all cases where maximum and minimum value signalling is required, set for safety reasons, in order to start a work cycle, to control vacuum cup gripping, and so on. In addition, with the hysteresis function, it is possible to manage the compressed air supply to the vacuum generators, allowing for considerable energy savings.

Item 12 30 10



Item 12 30 10 A



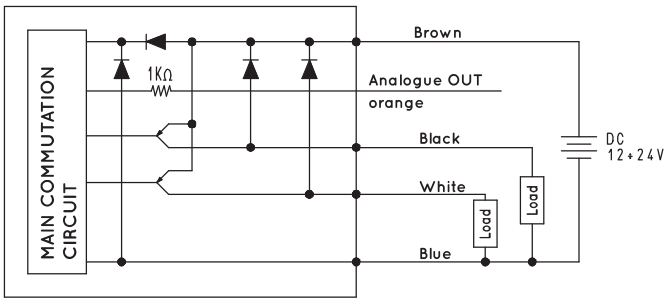


Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

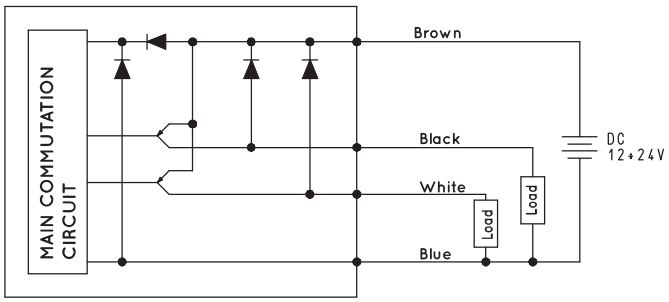
WIRING DIAGRAMS

PNP



Item 12 30 10 A

PNP

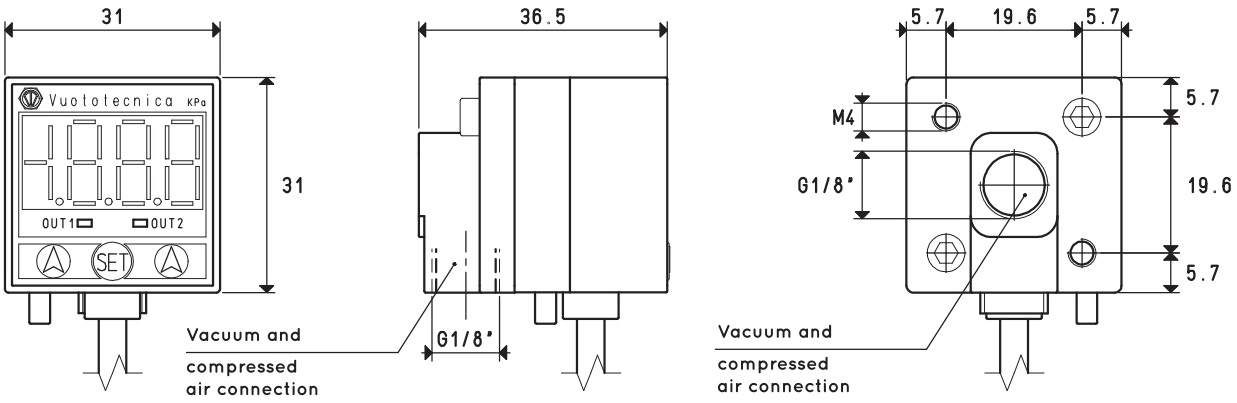


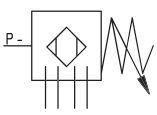
Item 12 30 10

Characteristics and electrical specifications	Item 12 30 10 A Vacuum switch	Item 12 30 10 Vacuum switch
Adjustment range	from 0 to -1 bar	
Maximum overpressure	3 bar	
Minimum detectable values	0.1 KPa 0.001 Kgf/cm^2 0.001 bar 0.01 psi 0.1 InHg 1 mmHg 0.1 mmH_2O	
Operating voltage	12 - 24 VDC ±10% (Protection against polarity inversion)	
Electrical absorption	≤60 mA	
Digital output	2 PNP, maximum commutation current 100 mA	
Analogue output	1 analogue, 1 + 5 V ±2% F.S.	--
Display tolerance	≤ ±2% F.S. ±1 digit	
Reaction time	≤2.5 ms	
Hysteresis	Adjustable	
Repeatability	±0.2% ±1 digit of the measuring range	
Display	LED at 3 1/2 digit, 7 segments, OUT 1 green OUT 2 red	
Insulation resistance	50 MΩ to 500 VDC	
Test voltage	1000 VAC, 1 min	
Degree of protection	IP 40	
Environmental operating conditions		
Installation position	Any	
Measurable fluids	Non-corrosive gas and dry air	
Operating temperature	0 - +50 °C	
Storage temperature	-20 - +60 °C	
Interference emission	In compliance with EN 55011, Group 1, class B	
Resistance to interference	In compliance with EN 61326 – 1	
Characteristics and mechanical specifications		
Container material	ABS plastic - PC	
Connection material	Nickel-plated brass	
Weight	65 g, including electrical cable	35 g, including electrical cable
Electrical connection	--	With M8-4 pin coupler
Electrical connection cable	5-wire 2m cable	4-wire 0.3 m cable
Connection to the fluid	Male G 1/8" or female M5 threading	

DIGITAL VACUUM AND PRESSURE SWITCHES

These compact and extremely light switches come enclosed in a sturdy ABS casing; these features allow their installation on the machine and close to the application.
These digital switches are accurately calibrated and compensated for temperatures and therefore are able to give very precise measurements values. The detected values are shown on the display, making it unnecessary to use a vacuum gauge. The two LEDs, one red and one green, built-in the control panel, indicate the commutation status of the two digital output signals.
The two commutation outputs are completely independent.
The switching points within the scale values, including hysteresis, are easily programmable via the buttons located on the control panel.
Additional functions are also programmable, such as comparison between two values, NO and NC contacts, choice of the unit of measurement, programmed value and function blocking, etc.
The vacuum or the pressure connections can be carried out via a dual connection with female G 1/8" thread, while the electrical connection is carried out through the 4-conductor cable with which they are equipped. These switches are suited for measuring and controlling dry air and non-corrosive gas.
They are recommended in all those cases that require a signal when a certain level of vacuum is reached set for safety, for starting a cycle, for checking the cup grip, etc. Moreover, the hysteresis function allows managing the vacuum generator compressed air supply, allowing considerable energy saving.

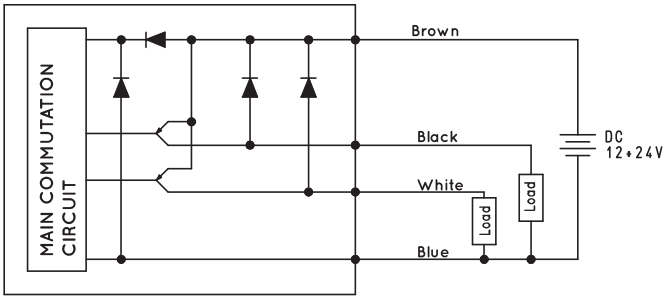




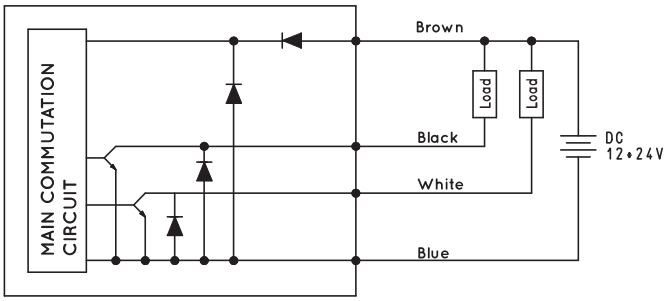
Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$ Adapters for GAS - NPT threading available on page 1.130

WIRING DIAGRAMS

PNP



NPN

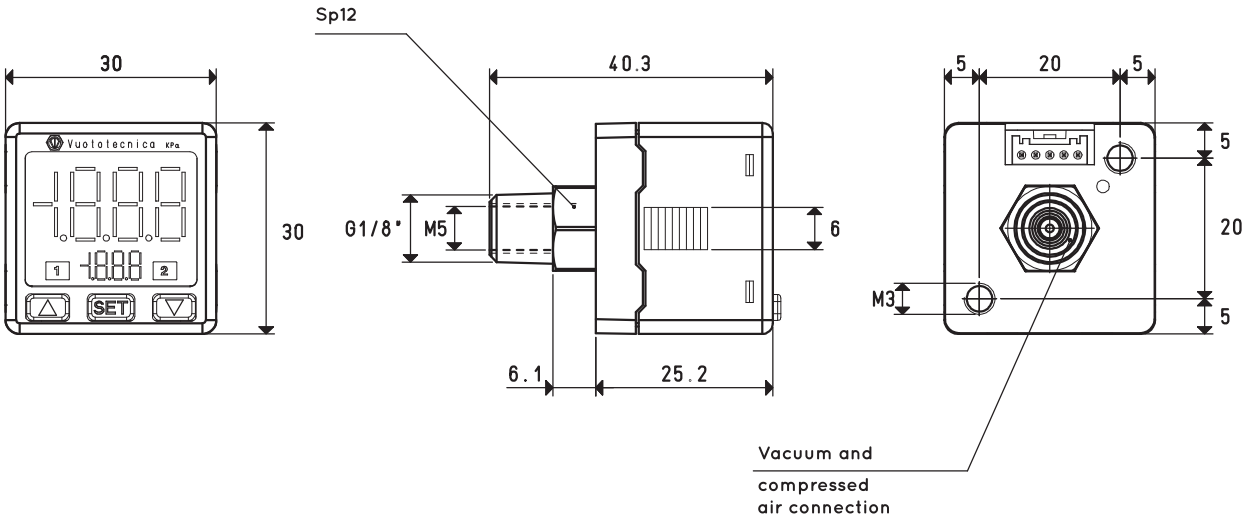


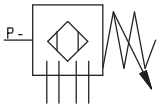
Characteristics and electrical specifications	Item 12 20 10 P Vacuum switch	Item 12 35 10 P Pressure switch
Adjustment range	from 0 to -1 bar	from 0 to 10 bar
Maximum overpressure	5 bar	15 bar
Minimum detectable values	1 mbar	10 mbar
	0.1 KPa	0.001 MPa
	0.001 Kgf/cm^2	0.01 Kgf/cm^2
	0.001 bar	0.01 bar
	0.01 psi	0.1 psi
	0.1 InHg	--
	1 mmHg	--
	10 mmH_2O	--
Operating voltage	12 - 24 VDC ±10% (Protection against polarity inversion)	
Electrical absorption	≤55 mA	
Commutation output	2 digital PNP, NO or NC, maximum commutation current 80 mA	
Display tolerance	≤ ±2% F.S. ±1 digit	
Reaction time	≤2.5 ms	
Hysteresis	Adjustable	
Repeatability	±0.2% of the measuring range	
Display	LED at 3 1/2 digit, 7 segments, OUT 1 green OUT 2 red	
Insulation resistance	50 MΩ to 500 VDC	
Test voltage	1000 VAC, 1 min	
Degree of protection	IP 40	
Environmental operating conditions		
Installation position	Any	
Measurable fluids	Non-corrosive gas and dry air	
Operating temperature	0 - +50 °C	
Storage temperature	-20 - +60 °C	
Interference emission	In compliance with EN 55011, Group 1, class B	
Resistance to interference	In compliance with EN 61326 – 1	
Characteristics and mechanical specifications		
Container material	ABS plastic - PC	
Connection material	Nickel-plated brass	
Weight	105 g, including electrical cable	
Electrical connection	With 4-conductor wire cable length 2 m	
Connection to the fluid	Female G 1/8" threading	
Accessories		
Fixing kit	wall - Item 00 12 30 table - Item 00 12 31 panel - Item 00 12 32	

Note: Add the letter N after the item (for example 12 20 10 N) for NPN and non PNP commutation output.

DIGITAL VACUUM AND PRESSURE SWITCHES WITH TWO-COLOUR DISPLAY

These devices are also enclosed within a robust ABS container. They are carefully calibrated and at compensated temperature, ensuring high-precision measurement values. Detected values are viewed on the main two-colour (red and green) display and programmable by the user to set different conditions. Setting values are easily viewable on a secondary display within the command panel. Two luminous indicators pertaining to outlets 1 and 2 indicate the switching status of both digital and the analogue output signals.
The switching outputs are completely independent.
The switching points within the scale values, including hysteresis, are easily programmable via the buttons located on the control panel. Additional functions are also programmable, such as comparison between two values, NO and NC contacts, choice of measurement unit, programmed value and function blocking, etc. The connection to the vacuum may be established by means of a male G 1/8" or female M5 double threading connection. It is possible to establish an electric connection by means of a removable, rapid installation data cable, supplied as standard.
Digital vacuum and pressure switches are suitable for measuring and controlling dry air and non-corrosive gases. They are recommended in all those cases that require a signal when a certain level of vacuum is reached set for safety, for starting a cycle, for checking the cup grip, etc. Moreover, the hysteresis function allows managing the vacuum generator compressed air supply, allowing considerable energy saving.



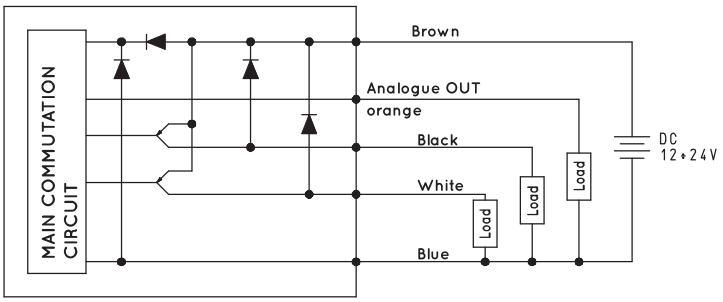


Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

WIRING DIAGRAMS

PNP



Characteristics and electrical specifications	Item 12 40 10 Vacuum switch	Art. 12 40 12 Vacuum switch	Item 12 40 20 Vacuum Switch - Pressure Switch
Adjustment range	from 0 to -1 bar	from 0 a -1 bar	from -1 to 10 bar
Maximum overpressure	3 bar	3 bar	15 bar
Minimum detectable values	1 mbar	1 mbar	10 mbar
	0.001 Kgf/cm^2	0.001 Kgf/cm^2	0.01 Kgf/cm^2
	0.001 bar	0.001 bar	0.01 bar
	0.01 psi	0.01 psi	0.1 psi
	0.1 inHg	0.1 inHg	--
Operating voltage	12 - 24 VDC ±10% (Protection against polarity inversion)		
Electrical absorption	≤40 mA		
Digital output	2 PNP, maximum commutation current 125 mA		
Analogue output	1 analogue, 4 - 20 mA ±2.5% F.S. 1 ÷ 5 V ±2,5% F.S. for Item 12 40 12		
Display tolerance	≤ ±2% F.S. ±1 digit		
Reaction time	≤ 2.5 ms		
Hysteresis	Adjustable		
Repeatability	±0.2% F.S. ±1 digit of the measuring range		
Display	7 segments, main two-colour (red - green) display, secondary display (orange)		
Insulation resistance	50 MΩ to 500 VDC		
Test voltage	1000 VAC, 1 min		
Degree of protection	IP 40		
Environmental operating conditions			
Installation position	Any		
Measurable fluids	Non-corrosive gas and dry air		
Operating temperature	0 - +50 °C		
Storage temperature	-20 - +60 °C		
Interference emission	In compliance with EN 55011, Group 1, class B		
Resistance to interference	In compliance with EN 61326 – 1		
Characteristics and mechanical specifications			
Container material	ABS plastic - PC		
Connection material	Nickel-plated brass		
Weight	80 g, including electrical cable		
Electrical connection	4-wire 2 m cable		
Connection to the fluid	Male G 1/8" or female M5 threading		
Accessories			
Fixing kit	wall - Item 00 12 40 table - Item 00 12 41 panel - Item 00 12 42 panel + protection - Item 00 12 43		

FIXING KIT

Wall Item 00 12 30

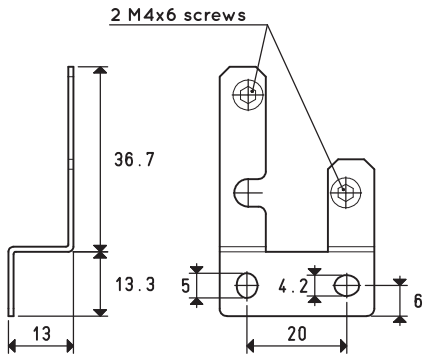
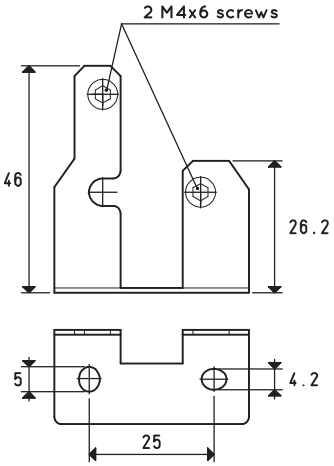
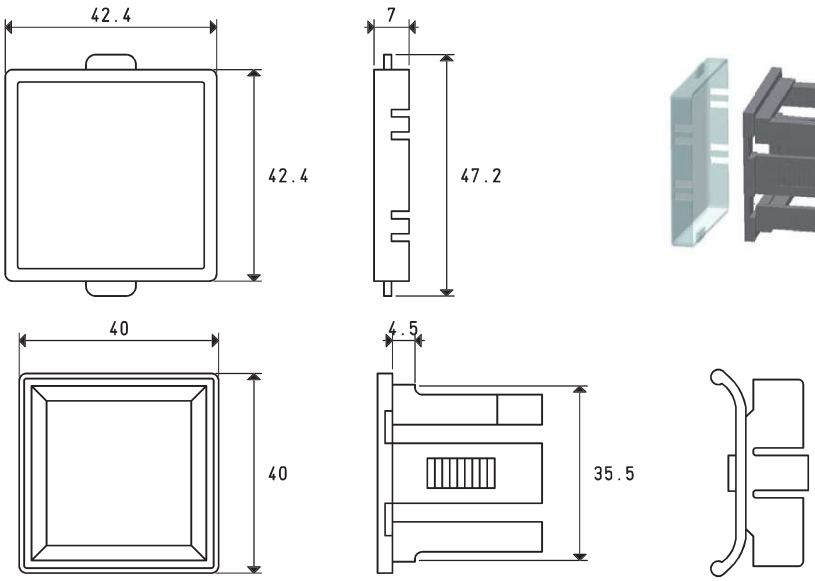
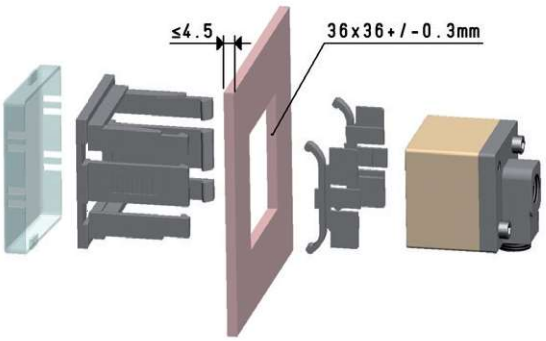


Table Item 00 12 31



Panel Item 00 12 32

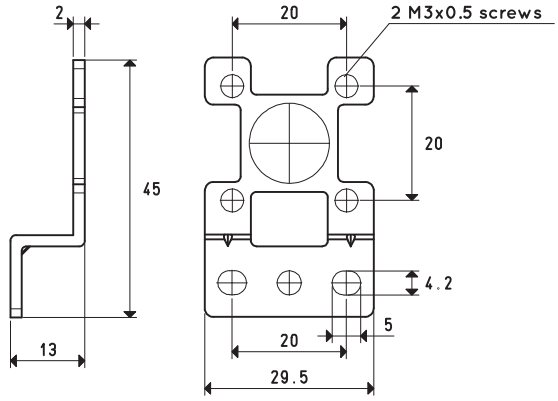




Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

FIXING KIT

Wall Item 00 12 40



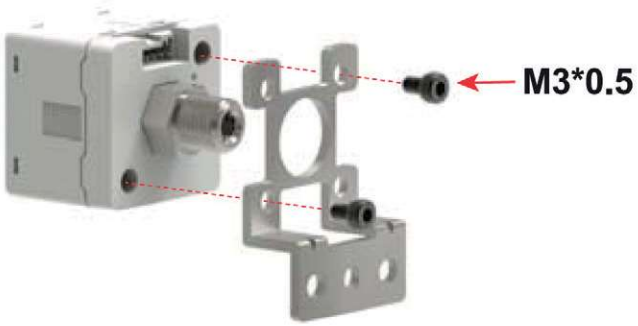
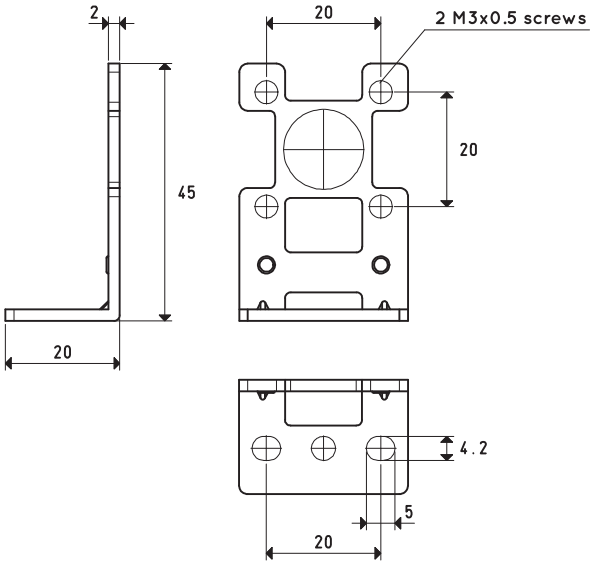
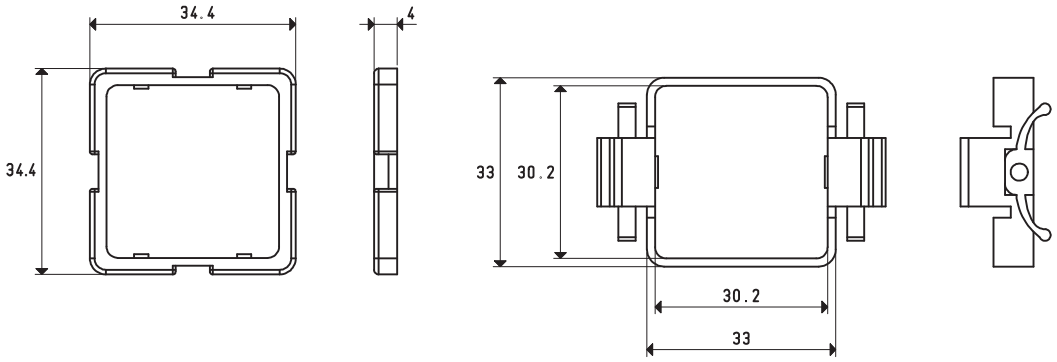


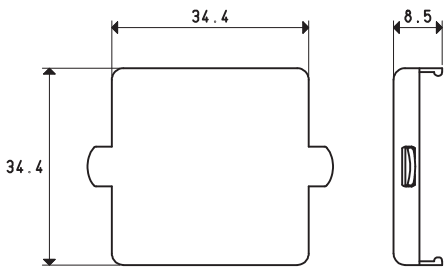
Table Item 00 12 41

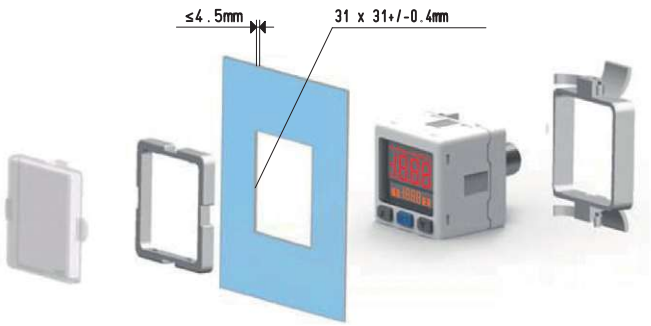


Panel Item 00 12 42



Panel plus protection Item 00 12 43





Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

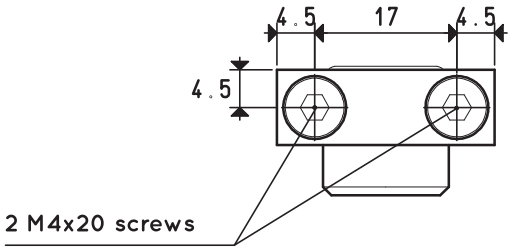
Cable with axial connector

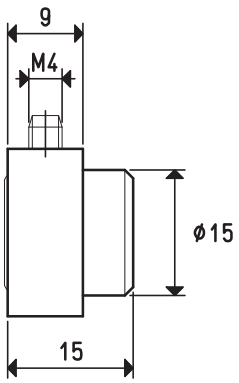
Item	Description
00 12 20	Electrical connection cable with axial connector for digital vacuum and pressure switches Cable length 5 m

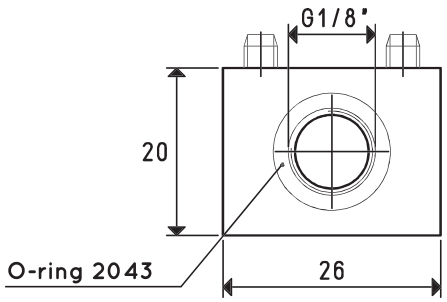
Cable with radial connector

Item	Description
00 12 21	Electrical connection cable with radial connector for digital vacuum and pressure switches Cable length 5 m

Wall fixing kit







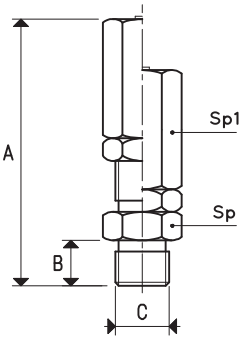
Item	Description
00 12 22	Wall-fixing kit for digital vacuum and pressure switches

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

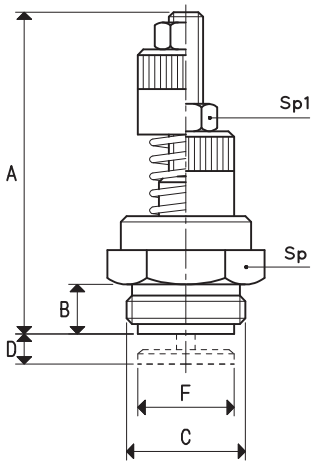
Adapters for GAS - NPT threading available on page 1.130

VACUUM ADJUSTMENT VALVES

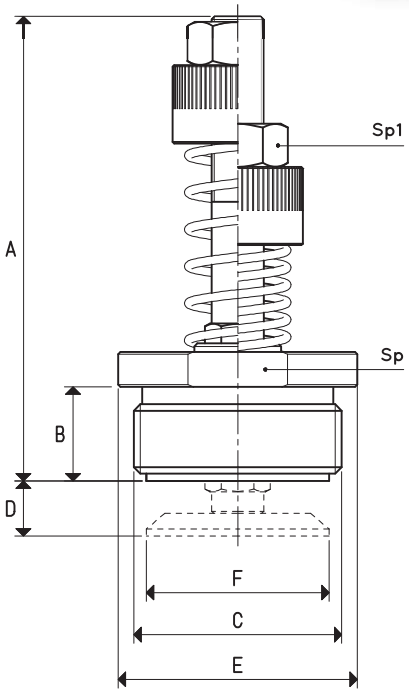
When these valves reach a certain pre-calibrated vacuum degree, they introduce atmospheric air into the circuit to prevent the increase of the set value and to keep it constant.
They can be used as regulators only on circuits having only one vacuum pump and only one use (or more uses but all working at the same vacuum degree).
In most cases, they are used as safety valves on non-commissioned tanks or containers at high levels of vacuum and on vacuum cup lifting systems.
The level of vacuum is adjusted by rotating the knurled bush in both directions. The fine thread with which the valve is provided ensures a very accurate calibration.
The temperature values within which the valves can operate go from -20 °C to +120 °C.



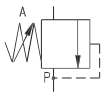
Item 04 01 10



Item 04 02 10
04 03 10
04 04 10



Item 04 05 10



Item	Vacuum adj. mbar abs.	A	B	C Ø	D	E Ø	F Ø	Sp	Sp1	Material	Max flow rate of the pump m³/h	Weight g
04 01 10	670 ÷ 1	45	8	G1/8"	-	-	-	12	12	nickel-plated brass	4	30
04 01 10 I	670 ÷ 1	45	8	G1/8"	-	-	-	12	12	stainless steel	4	30
04 02 10	670 ÷ 1	57	9	G1/2"	5	-	17	24	10	nickel-plated brass	20	78
04 02 10 I	670 ÷ 1	57	9	G1/2"	5	-	17	24	10	stainless steel	20	78
04 03 10	670 ÷ 1	60	11	G3/4"	5	-	23	30	17	nickel-plated brass	60	150
04 03 10 I	670 ÷ 1	60	11	G3/4"	5	-	23	30	17	stainless steel	60	150
04 04 10	670 ÷ 1	65	14.5	G1"	7	-	29	35	17	nickel-plated brass	100	212
04 04 10 I	670 ÷ 1	65	14.5	G1"	7	-	29	35	17	stainless steel	100	212
04 05 10	670 ÷ 1	104	22	G1" 1/2	15	55	42	50	20	nickel-plated brass	250	490
04 05 10 I	670 ÷ 1	104	22	G1" 1/2	15	55	42	50	20	stainless steel	250	490

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

VACUUM REGULATORS

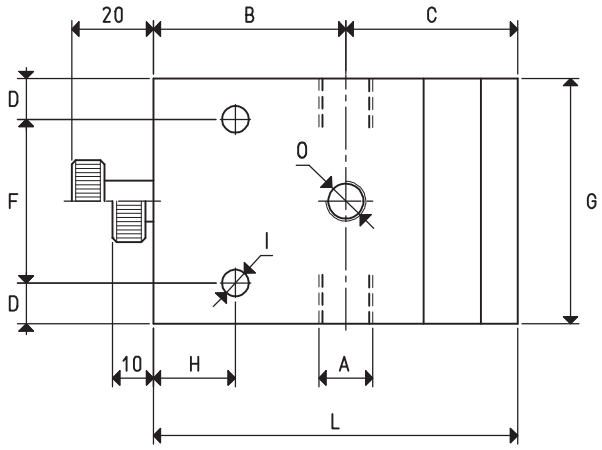
These devices control the level of vacuum, maintaining it constant at the pre-set value (secondary vacuum), regardless of the network's flow rate and the fluctuations in vacuum level (primary vacuum). They operate by membrane-piston and exploit the pressure differential between the secondary vacuum and the atmospheric pressure.
Unlike the vacuum control valves, reducers do not release air into the circuit, thereby allowing for the creation more grip points taken at different degrees of vacuum, from a single vacuum source.
The level of vacuum is adjusted manually by turning the knurled thumb screw clockwise to increase it, and counter clockwise to decrease it.

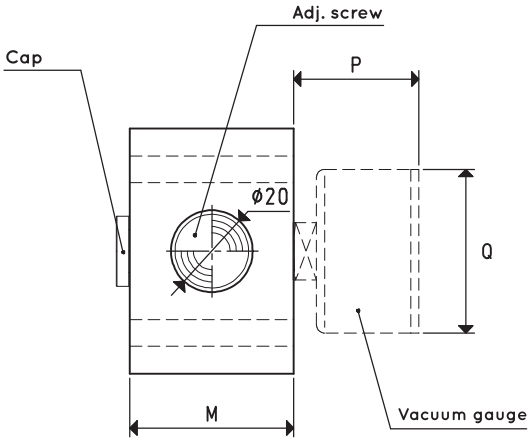
Technical features

- Operation: membrane-piston regulator
- Adjustable operating pressure: from 800 to 1 mbar abs.
- Flow rate : from 2 to 160 m³/h.
- Room temperature: from -10 to +80 °C
- Installation position: any

Usage

The best use of vacuum reducers is in centralised plants where, regardless of the plant's level of vacuum, each outlet can be adjusted within that value. Moreover, they are necessary whenever the working vacuum must be lower than the primary vacuum.





Item	A Ø	Max capac. m³/h	B	C	D	F	G	H	I Ø	L	M	O Ø	P	Q Ø	Vacuum gauge item	Weight Kg
11 01 10	G1/4"	6	47	42.0	10	40	60	20	6.5	89.0	40	G1/8"	30	40	09 03 15	0.60
11 02 10	G3/8"	10	47	42.0	10	40	60	20	6.5	89.0	40	G1/8"	30	40	09 03 15	0.58
11 03 10	G1/2"	20	53	52.0	15	55	85	25	8.5	105.0	50	G1/4"	36	63	09 03 10	1.15
11 04 10	G3/4"	40	55	55.5	15	70	100	30	8.5	110.5	50	G1/4"	36	63	09 03 10	1.39
11 05 10	G1"	80	60	58.0	15	90	120	30	8.5	118.0	60	G1/4"	36	63	09 03 10	2.08
11 06 10	G1" 1/2	160	54	77.5	15	130	160	20	8.5	131.5	99	G1/4"	36	63	09 03 10	5.49

Note: The vacuum gauges are not integral parts of the regulators and, therefore, must be ordered separately.

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

REGULATORS FOR ROUGH VACUUM LEVELS

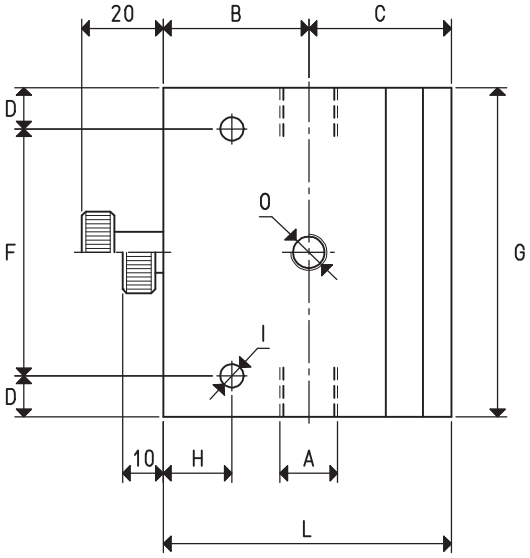
The regulators on this page are based on the same operation principle as the ones described in the previous page and have the same function. The only difference is that in these ones the minimum adjustable level of vacuum is close to the atmospheric pressure value. The level of vacuum is adjusted manually by turning the knurled thumb screw clockwise to increase it, and counter clockwise to decrease it.

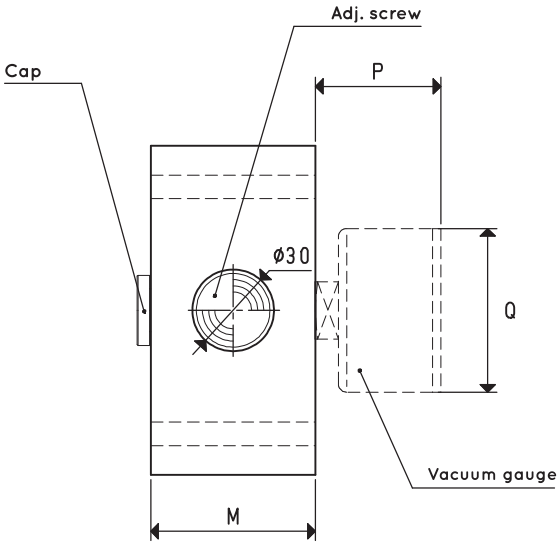
Technical features

- Operation: membrane-piston regulator
- Adjustable operating pressure: from 980 to 1 mbar abs.
- Flow rate: from 20 to 160 m^3/h
- Room temperature: from -10 to +80 °C
- Installation position: any

Usage

These regulators are used as the previously described ones, but they offer the additional advantage of regulating even levels of vacuum close to the atmospheric pressure.





Item	A Ø	Max capac. m^3/h	B	C	D	F	G	H	I Ø	L	M	O Ø	P	Q Ø	Vacuum gauge item	Weight Kg
11 03 50	G1/2"	20	53	52.0	15	90	120	25	8.5	105.0	60	G1/4"	36	63	09 03 10	2.07
11 05 50	G1"	80	60	58.0	15	90	120	30	8.5	118.0	100	G1/4"	36	63	09 03 10	3.74
11 06 50	G1" 1/2	160	54	77.5	15	130	160	20	8.5	131.5	99	G1/4"	36	63	09 03 10	5.54

Note: The vacuum gauges are not integral parts of the regulators and, therefore, must be ordered separately

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130

VACUUM REGULATORS WITH PNEUMATIC ADJUSTMENT

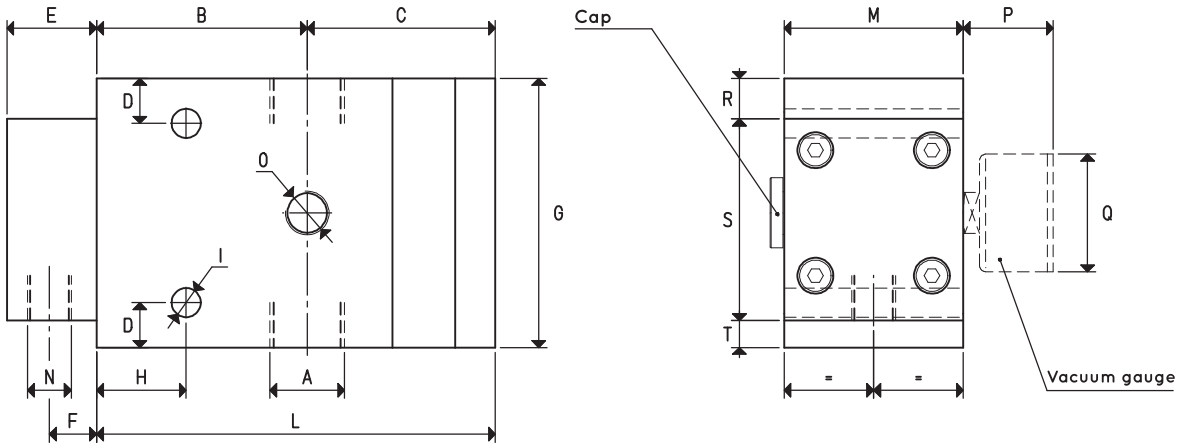
Vacuum regulators with pneumatic adjustment differ from the previous ones for the way they adjust the level of vacuum; in fact, instead of acting manually on the adjustment screw, it is necessary to act on the pneumatic cylinder compressed air supply: the higher the pressure, and the higher the level of vacuum and vice-versa.
Vacuum regulators are used to adjust the pre-set level of vacuum and keep it constant (secondary vacuum), regardless of the pump vacuum level or the vacuum level (primary vacuum).
Unlike the vacuum adjusting valves, regulators do not introduce atmospheric air into the circuit, thus producing more gripping points with different vacuum values, from only one vacuum source.
Their operating principle is based on the contrasting action between a pneumatic cylinder with short stroke and a fluctuating piston driven by the pressure differential existing between the secondary vacuum and the atmospheric pressure.

Technical features

- Operation: membrane-piston regulator
- Supply pressure: from 0 to 3 bar for regulators item 11 .. 30;
  from 0 to 5 bar for regulators item 11 .. 80.
- Adjustable working pressure: from 800 to 1 mbar abs. for regulators item 11 .. 30;
  from 980 to 1 mbar abs. for regulators item 11 .. 80:
- Flow rate: from 2 to 160 m^3/h.
- Room temperature: from -10 to +80 °C
- Installation position: any

Usage

Vacuum regulators are mainly used on centralised plants where, regardless of the plant level of vacuum, each grip can be adjusted within that value. Moreover, they are necessary whenever the working vacuum must be lower than the primary vacuum and kept constant. Vacuum regulators with pneumatic adjustment can be installed away from the control point, since it is sufficient to have a pressure regulator on the control panel to act on them.

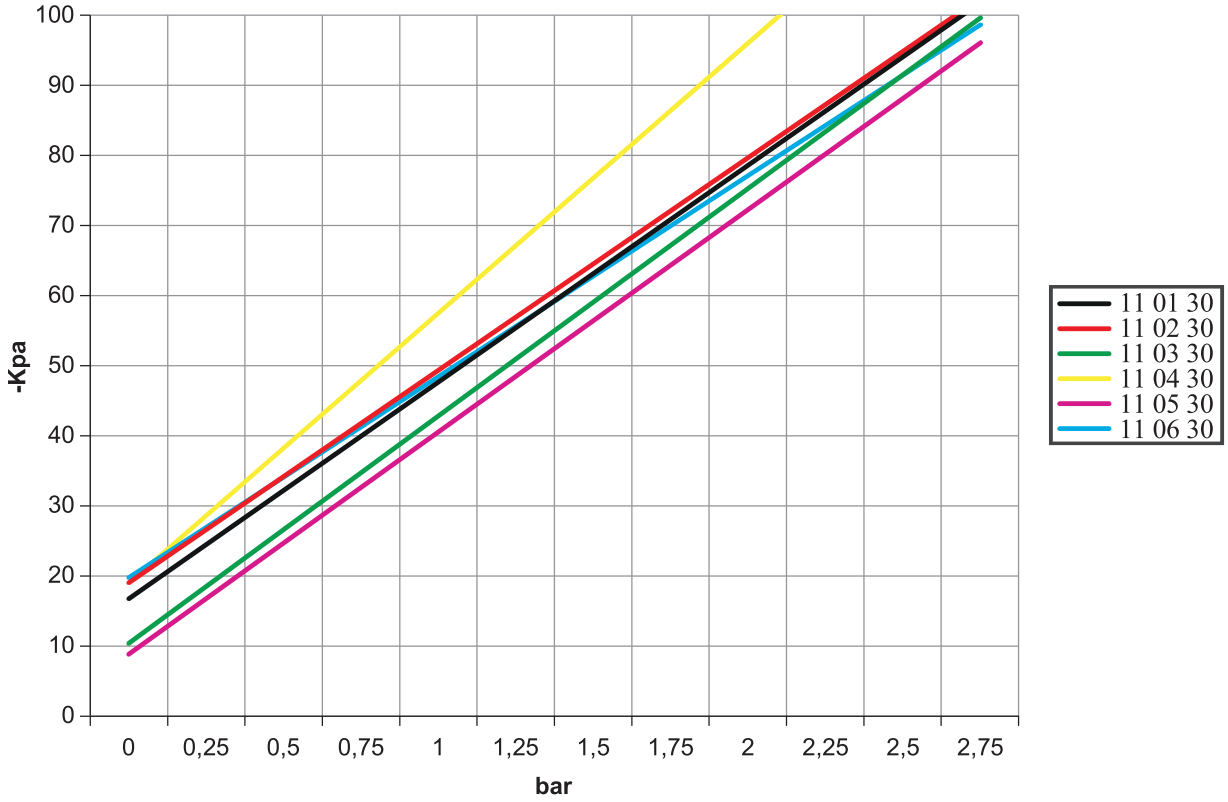


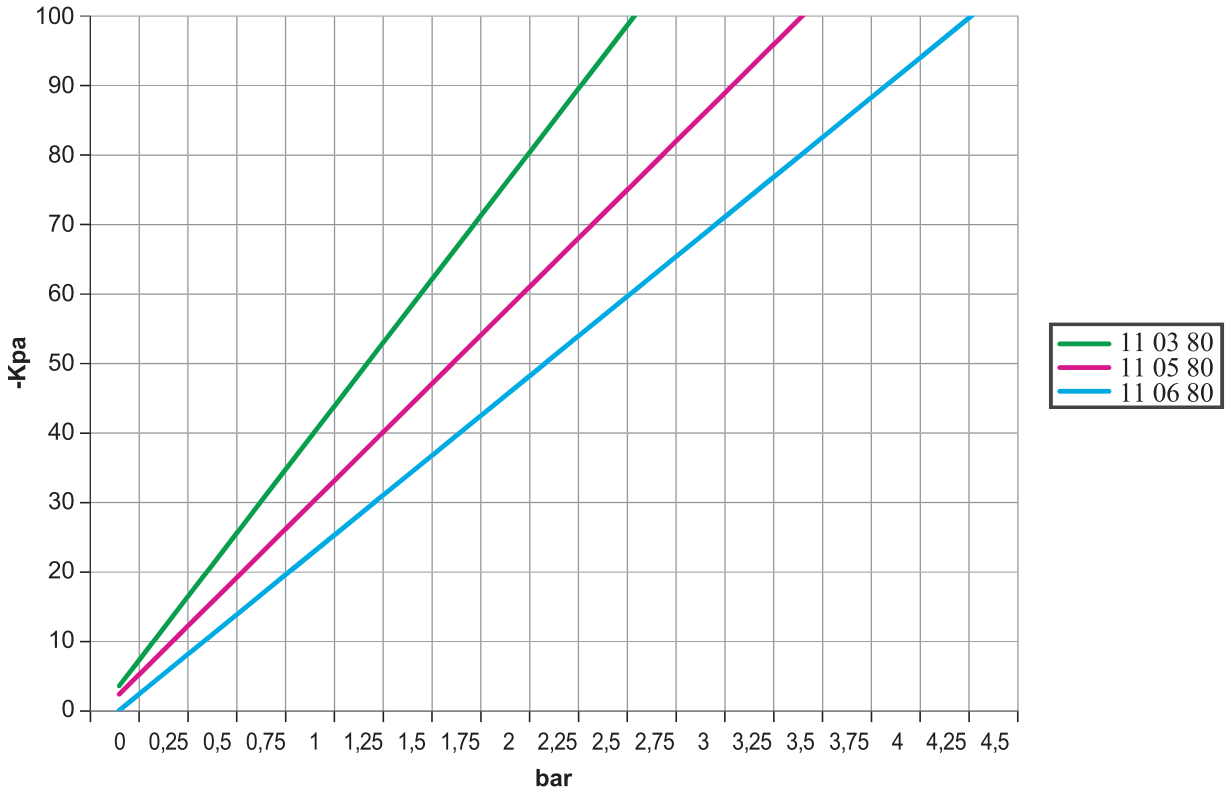
Item	A Ø	Max capac. m^3/h	B	C	D	E	F	G	H	I Ø	L	M	N Ø	O Ø	P	Q Ø	R	S	T	Vacuum gauge item	Weight Kg
11 01 30	G1/4"	6	47	42.0	10	20	10.5	60	20	6.5	89.0	40	G1/8"	G1/8"	30	40	9.0	45	6.0	09 03 15	0.71
11 02 30	G3/8"	10	47	42.0	10	20	10.5	60	20	6.5	89.0	40	G1/8"	G1/8"	30	40	9.0	45	6.0	09 03 15	0.69
11 03 30	G1/2"	20	53	52.0	15	26	16.5	85	25	8.5	105.0	50	G1/8"	G1/4"	36	63	16.5	58	10.5	09 03 10	1.32
11 04 30	G3/4"	40	55	55.5	15	26	16.5	100	30	8.5	110.5	50	G1/8"	G1/4"	36	63	24.0	58	18.0	09 03 10	1.94
11 05 30	G1"	80	60	58.0	15	26	16.5	120	30	8.5	118.0	60	G1/8"	G1/4"	36	63	34.0	58	28.0	09 03 10	2.35
11 06 30	G1" 1/2	160	54	77.5	15	30	19.5	160	20	8.5	131.5	99	G1/4"	G1/4"	36	63	37.5	80	42.5	09 03 10	5.56
11 03 80	G1/2"	20	53	52.0	15	26	16.5	120	25	8.5	105.0	60	G1/8"	G1/4"	36	63	34.0	58	28.0	09 03 10	2.28
11 05 80	G1"	80	60	58.0	15	26	16.5	120	30	8.5	118.0	100	G1/8"	G1/4"	36	63	34.0	58	28.0	09 03 10	3.96
11 06 80	G1" 1/2	160	54	77.5	15	30	19.5	160	20	8.5	131.5	99	G1/4"	G1/4"	36	63	37.5	80	42.5	09 03 10	5.60

Note: The vacuum gauges are not integral parts of the regulators and, therefore, must be ordered separately.

Transformation ratio: N (newton) = Kg x 9.81 (force of gravity) inch = $\frac{mm}{25.4}$; pounds = $\frac{g}{453.6} = \frac{Kg}{0.4536}$

Adapters for GAS - NPT threading available on page 1.130





Note: The values shown in the tables are purely indicative as they depend on atmospheric pressure, the flow rate of the vacuum source and the quality of the compressed air supply

Item	Vacuum regulator item
00 11 113	11 01 10
00 11 114	11 02 10
00 11 115	11 03 10
00 11 116	11 04 10
00 11 117	11 05 10
00 11 118	11 06 10
00 11 119	11 03 50
00 11 120	11 04 50
00 11 121	11 05 50
00 11 122	11 01 30
00 11 123	11 02 30
00 11 124	11 03 30
00 11 125	11 04 30
00 11 126	11 05 30
00 11 127	11 06 30
00 11 128	11 03 80
00 11 129	11 05 80
00 11 130	11 06 80