

Gas pressure switch C6097

TECHNICAL INFORMATION

- Monitoring of gas and air pressures (positive, negative and differential pressures)
- Switches with falling or rising pressure
- FM and UL certified:
With lock-off and hand wheel with "WC/mbar scale"
- EU certified pursuant to EN 1854:
Hand wheel with mbar scale



Contents

Contents	2	6 Accessories	14
1 Anwendung	3	6.1 Fastening set with screws, U-shape bracket	14
1.1 CE approved pressure switches	4	6.2 Connecting set	14
1.2 FM approved and UL listed pressure switches	4	6.3 Restrictor orifice	14
2 Application examples	5	6.4 Standard coupler plug set	14
2.1 Low gas pressure monitoring	5	6.5 Standard coupler plug	15
2.2 Differential pressure monitoring	5	6.6 Pilot lamp set, red or blue	15
2.3 Systems leak tightness check	5	6.7 LED set, red/green	15
2.4 Air line with minimum pressure and flow monitoring	6	6.8 Cover for auto reset	15
2.5 Low and high gas pressure protection device	6	6.9 Cover for manual reset	16
3 Certification	7	6.10 Weather protection cover	16
3.1 Overview of product approvals	7	7 Technical data	17
4 Function	8	7.1 Recommended tightening torque	17
4.1 Vent limiter	8	7.2 EU certified pressure switches	17
4.2 Positive pressure measurement	9	7.3 UL, FM certified pressure switches	18
4.3 Negative pressure measurement	9	7.4 Adjusting range and switching hysteresis CE certified pressure switches	19
4.4 Differential pressure measurement	9	7.5 Adjusting range and switching hysteresis UL, FM certified pressure switches	20
4.5 Connection diagrams	10	8 Dimensions	22
4.5.1 Connection diagram	10	9 Converting units	23
4.5.2 Blue pilot lamp for 230 V AC or for 110/120 V AC	10	10 Maintenance cycles	24
4.5.3 Red/green pilot LED for 24 V DC/AC or for 110 V AC to 230 V AC	10	Fore more information	25
4.6 Wiring	10		
5 Project planning information	11		
5.1 Installation position	11		
5.2 Installation	11		
5.3 Mechanical connection	12		
5.3.1 CE certified pressure switches	12		
5.3.2 UL, FM certified pressure switches	12		
5.4 Resetting pressure switches with manual reset	13		

1 Anwendung



*C6097 with CE approval:
Hand wheel with mbar scale.
M16 cable gland for electrical connection.*



*C6097 with UL listing and FM approval:
Hand wheel with "WC and mbar scale.
1/2" NPT conduit for electrical connection.*



*C6097 with UL listing and FM approval:
C6097 can be supplied with lock-off function.*

The pressure switch monitors extremely low pressure differentials and triggers switch-on, switch-off or switch-over operations if a set switching point is reached. The switching point can be adjusted using a hand wheel.

The pressure switch monitors positive and negative gas pressures on various industrial gas and air appliances, such as boiler fan monitoring and differential pressure monitoring in firing, ventilation and air-conditioning systems.

Pressure switch C6097A switches in the event of decreasing pressure, C6097B switches in the event of increasing pressure.

Pressure switches with manual reset lock off after switching.

Pressure switches with an 0.2 mm (0.008") nozzle are supplied with an integrated vent limiter, see page 8 (Vent limiter).

1.1 CE approved pressure switches

Type	Hand wheel setting/Switching properties	Positive pressure	Negative pressure
C6097A4010 C6097A4110 C6097A4210 C6097A4310 C6097A4410	Hand wheel set to decreasing pressure/ C6097 switches with rising and falling pressure	Gas, air, flue gas or biogas	Air, flue gas

Electrical connection: Screw terminals and M16 cable gland

1.2 FM approved and UL listed pressure switches

Type	Hand wheel setting/Switching properties	Positive pressure	Negative pressure
C6097A3004 C6097A3053 C6097A3079 C6097A3137	Hand wheel set to decreasing pressure/ C6097 switches with rising and falling pressure	Gas, air, flue gas or biogas	Air, flue gas
C6097A3012 C6097A3038 C6097A3095 C6097A3111	Hand wheel set to decreasing pressure/ C6097 switches with falling pressure and locks off	Gas, air, flue gas or biogas	Air, flue gas
C6097B3002 C6097B3028 C6097B3051	Hand wheel set to increasing pressure/ C6097 switches with rising pressure and locks off	Gas, air, flue gas or biogas	Air, flue gas
C6097B3085 C6097B3101 C6097B3119	Hand wheel set to increasing pressure/ C6097 switches with rising and falling pressure	Gas, air, flue gas or biogas	Air, flue gas

Electrical connection: Screw terminals 1/2" NPT conduit

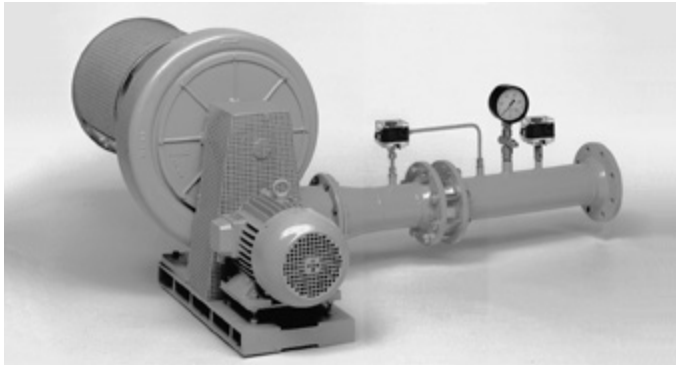
2 Application examples

2.1 Low gas pressure monitoring



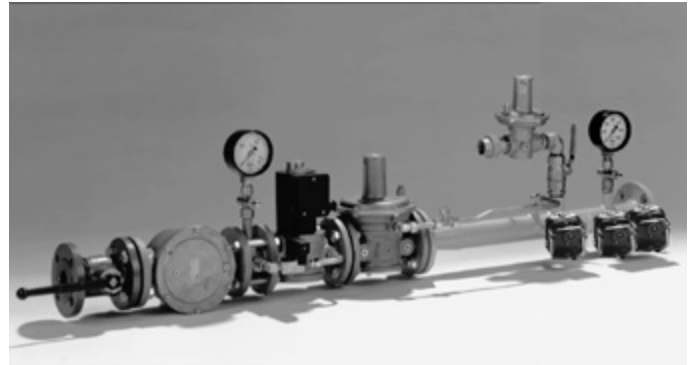
For monitoring the minimum gas inlet pressure

2.2 Differential pressure monitoring



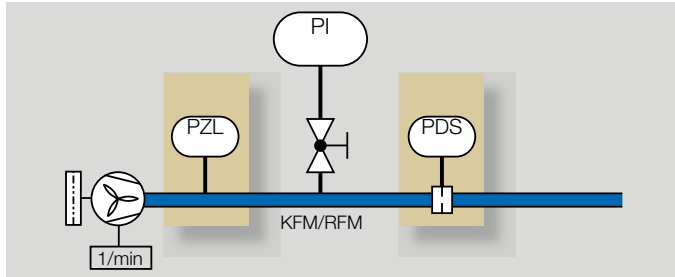
Differential pressure switch for monitoring air filters

2.3 Systems leak tightness check



Electronic safety shut-off valve SAV with leak tightness check of downstream devices

2.4 Air line with minimum pressure and flow monitoring

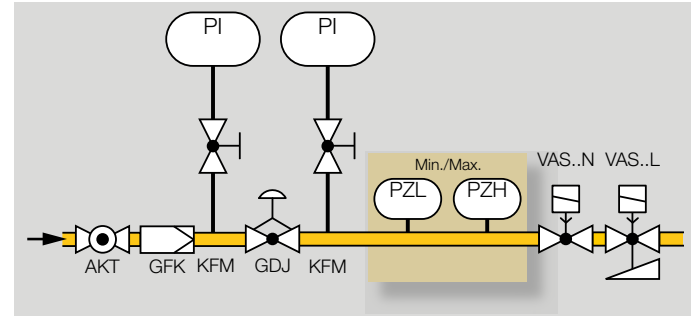


The air flow generated by the fan may be monitored as follows:

The static pressure is monitored by the pressure switch (PZL) as long as it can be demonstrated that the display consequently shows an adequate and secured flow of air, or the pressure switch (PDS) checks the flow of air via the differential pressure on the orifice.

If there is no air pressure supplied or if there is no differential pressure on the orifice, the system will be blocked.

2.5 Low and high gas pressure protection device



If the pressure is either too low or too high, the min./max. pressure switch (PZL/PZH) switches in order to avoid start-up or to initiate a safety shut-down.

3 Certification

EU certified



- 2014/35/EU (LVD) – Low Voltage Directive
- 2014/30/EU (EMC) – Electromagnetic Compatibility Directive
- 2011/65/EU, RoHS II
- 2015/863/EU, RoHS III
- (EU) 2016/426 (GAR) – Gas Appliances Regulation
- EN 1854:2010

FM approved



UL listed

USA and Canada



3.1 Overview of product approvals

C6097A4010 C6097A4110 C6097A4210 C6097A4310 C6097A4410	•	–	–
C6097A3004 C6097A3012 C6097A3038 C6097A3053 C6097A3079 C6097A3095 C6097A3111 C6097A3137 C6097B3002 C6097B3028 C6097B3051 C6097B3085 C6097B3101 C6097B3119	–	•	•

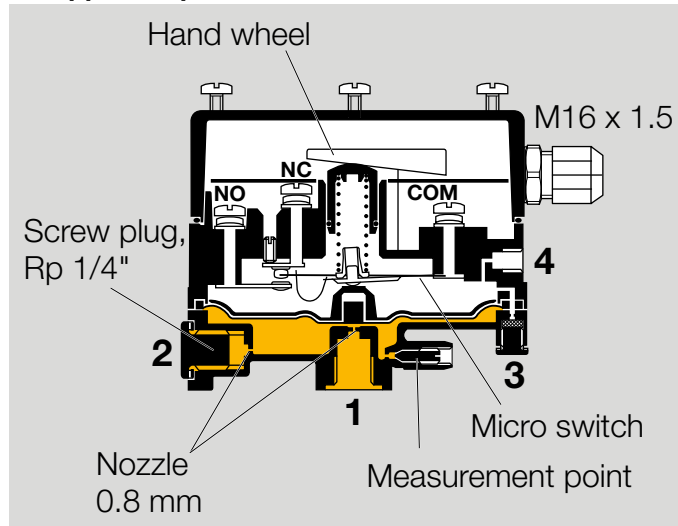
4 Function

Pressure switch C6097A switches with falling pressure, C6097B switches with rising pressure.

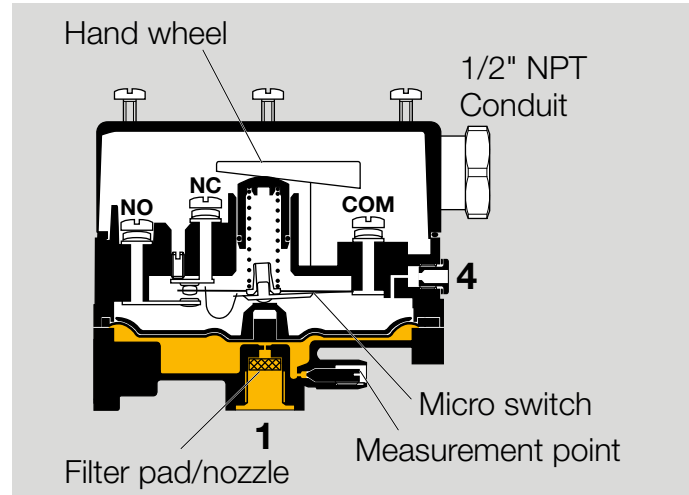
Once the set switching point is reached, a micro switch is activated in the pressure switch which is designed as a change-over contact.

The switching pressure is adjusted using a hand wheel.

CE approved pressure switches



FM approved and UL listed pressure switches



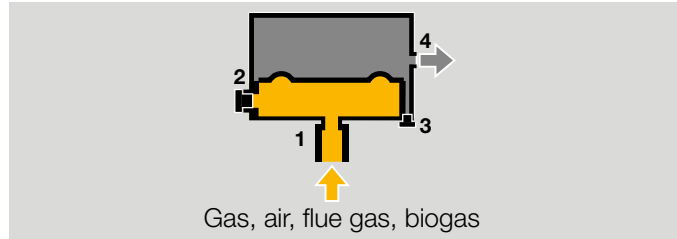
Pressure switches which lock off after switching can only be unlocked with a manual reset, see page 13 (Resetting pressure switches with manual reset).

4.1 Vent limiter

The flow on FM approved and UL listed pressure switches is limited by the nozzle. In the event of a diaphragm tear, the escape of gas is limited to less than 1.0 CFH of natural gas, see max. inlet pressure, page 20 (Adjusting range and switching hysteresis UL, FM certified pressure switches).

4.2 Positive pressure measurement

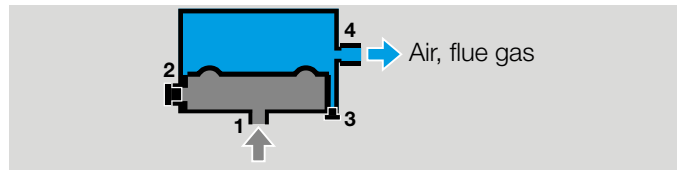
Positive pressure measurement is designed, for example, for checking the fan function or measuring the min./max. gas pressure.



The positive pressure is measured in the lower diaphragm chamber, port **1** (or **2**). The upper diaphragm chamber is ventilated via port **4** (or **3**).

4.3 Negative pressure measurement

Negative pressure measurement is designed, for example, for monitoring a suction pressure blower.

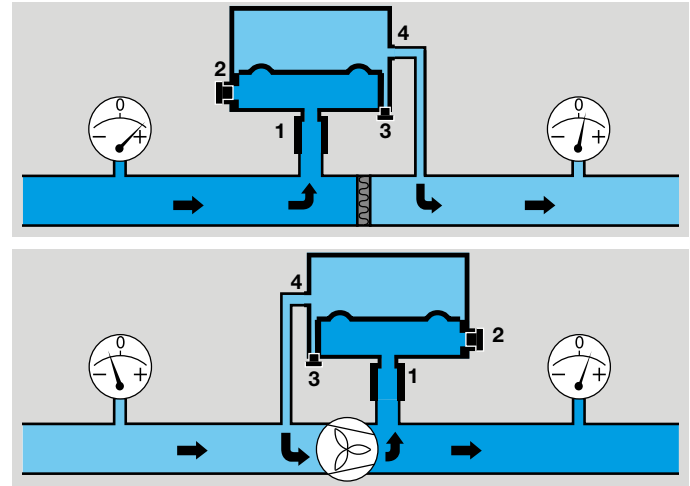


The negative pressure is measured in the upper diaphragm chamber, port **4** (or **3**). The lower diaphragm chamber is ventilated via port **1** (or **2**).

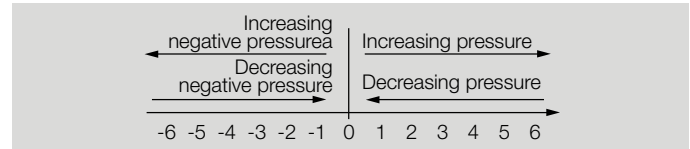
4.4 Differential pressure measurement

Differential pressure measurement is designed for safe-guarding an air flow rate or for monitoring filters and fans, for example.

Do not connect port **4** (or **3**) to pipes carrying gas! For further information, see Project planning information, Mechanical connection page 12 (CE certified pressure switches), page 12 (UL, FM certified pressure switches).



The higher absolute pressure is connected to port **1** (or **2**), and the lower absolute pressure to port **4** (or **3**). The remaining ports must be tightly plugged.

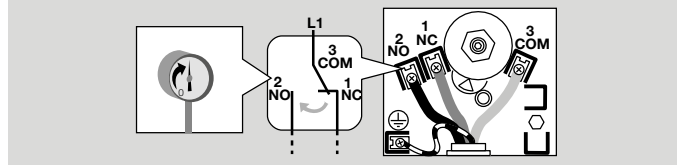


4.5 Connection diagrams

4.5.1 Connection diagram

Contacts 3 and 2 close when subject to increasing pressure.

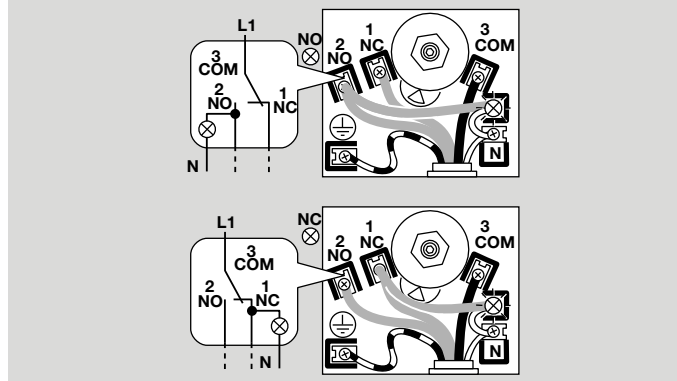
Contacts 1 and 3 close when subject to falling pressure.



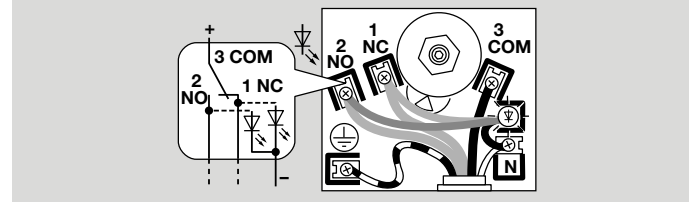
On pressure switches that switch with rising pressure: The contact switches from NC 1 to NO 2.

On pressure switches that switch with falling pressure: The contact switches from NO 2 to NC 1.

4.5.2 Blue pilot lamp for 230 V AC or for 110/120 V AC



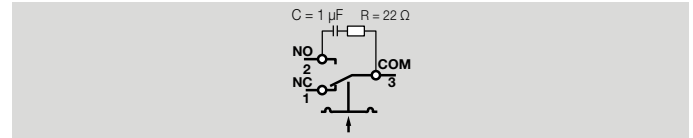
4.5.3 Red/green pilot LED for 24 V DC/AC or for 110 V AC to 230 V AC



4.6 Wiring

When using silicone tubes, only use silicone tubes which have been sufficiently cured. Vapours containing silicone can adversely affect the functioning of electrical contacts.

In the case of low switching capacities, such as 24 V, 8 mA, for example, we recommend using an RC module (22 Ω , 1 μ F) in air containing silicone or oil.

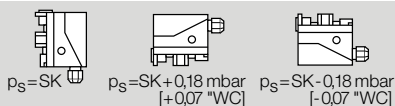


In the case of high humidity or aggressive gas components (H_2), we recommend using a pressure switch with gold contact due to its higher resistance to corrosion. Closed-circuit current monitoring is recommended under difficult operating conditions.

5 Project planning information

5.1 Installation position

Installation in the vertical or horizontal position, or sometimes upside down, preferably with vertical diaphragm. If installed in a vertical position, the switching point p_S will correspond to the scale value SK set on the hand wheel. If installed in another position, the switching point p_S will change and no longer correspond to the set scale value SK. Switching point p_S must be checked.



5.2 Installation

The housing must not be in contact with masonry. Minimum clearance 25 mm (1").

Long-term use in the upper ambient temperature range accelerates the ageing of the elastomer materials and reduces the service life (please contact manufacturer).

Continuous operation with gases containing more than 0.1 %-by-vol. H_2S or ozone concentrations exceeding $200 \mu\text{g}/\text{m}^3$ accelerate the ageing of elastomer materials and reduce the service life.

Vapours containing silicone can adversely affect the functioning of electrical contacts. When using silicone tubes, only use silicone tubes which have been sufficiently cured.

Condensation must not be allowed to get into the housing. If possible, install pipework with an ascending gradient). Otherwise, there is a risk of icing of condensation at sub-

zero temperatures, the switching point shifting or corrosion in the device which can lead to malfunctions.

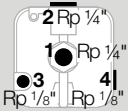
When installing outdoors, place the pressure switch in a roofed area and protect from direct sunlight (even IP 65 version).

The weather protection cover provides permanent protection when installed outdoors. See page 16 (Weather protection cover).

In case of highly fluctuating pressures, install a restrictor orifice. See page 14 (Restrictor orifice).

5.3 Mechanical connection

5.3.1 CE certified pressure switches



Positive pressure	connect	seal	free*
C6097	1	2	3 or 4
C6097	2	1	3 or 4

Negative pressure	connect	seal	free*
C6097	4	3	1 or 2
C6097	3	4	1 or 2

* It is recommended that the port which is best protected from water and dirt be left open.

Differential pressure	connect		seal
	for the higher absolute pressure	for the lower absolute pressure	
C6097	1 or 2	3 or 4	Seal ports that are not in use

Ports **3** and **4** are connected to the micro switch chamber.
Pipes carrying gas must not be connected to port **3** or **4**!
The port that is best protected against soiling (dust/humidity) is to be left open for ventilation (positive pressure measurement) to the atmosphere.

5.3.2 UL, FM certified pressure switches

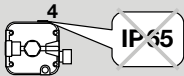


Positive pressure	Connect	Free
C6097	1	4

Negative pressure	Connect	Free
C6097	4	1

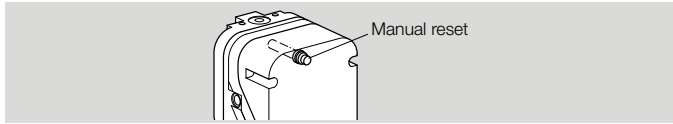
Differential pressure	Connect	
	for the higher absolute pressure	for the lower absolute pressure
C6097	1	4

Port **4** is connected to the micro switch chamber.
For this reason, pipes carrying gas must not be connected to port **4**!
If necessary, port **4** (1/8" NPT) can be used to connect the venting line.
A filter pad at port **4** protects the electrical contacts in the pressure switch from dirt particles in the surrounding air or in the medium.



If port **4** is at the top, IP 65 will not be satisfied.

5.4 Resetting pressure switches with manual reset



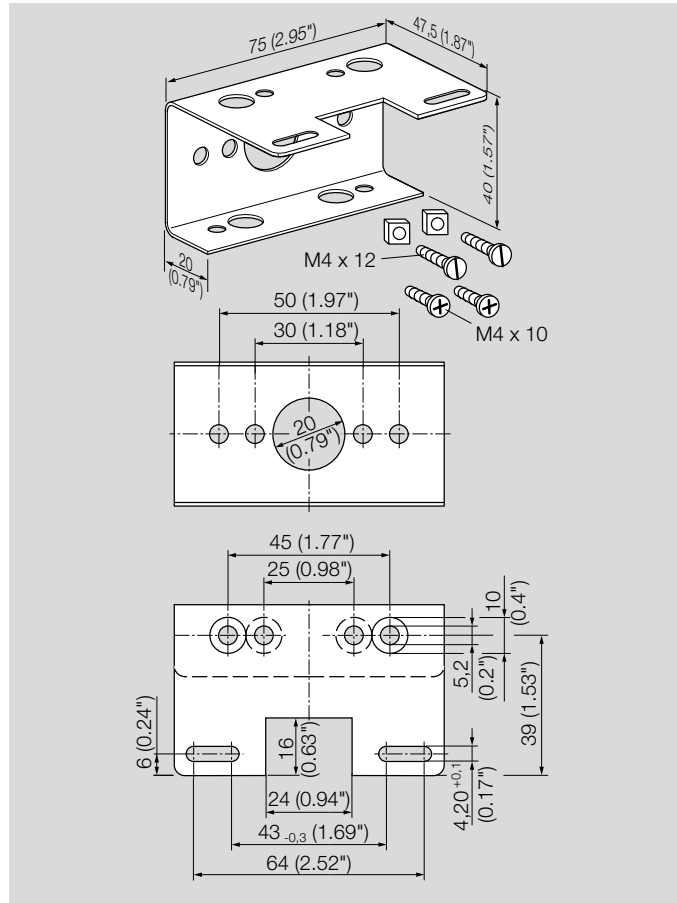
C6097A3012, C6097A3038, C6097A3095, C6097A3111 lock off if the pressure drops to the set switching point:
For resetting, the pressure must have risen to at least the set switching point **plus** the pressure differential between the switching pressure and possible reset.

C6097B3002, C6097B3028, C6097B3051 lock off if the pressure rises to the set switching point:
For resetting, the pressure must have dropped to at least the set switching point **minus** the pressure differential between the switching pressure and possible reset.

For details of the pressure differential between the switching pressure and possible reset, see page 19 (Adjusting range and switching hysteresis CE certified pressure switches).

6 Accessories

6.1 Fastening set with screws, U-shape bracket



Order No.: 32003042-003/U

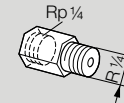
6.2 Connecting set



For monitoring a minimum and maximum inlet pressure with two pressure switches attached to one another.

Order No.: 32003043-003/U

6.3 Restrictor orifice

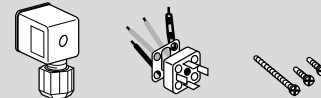


For CE certified pressure switches.

In the case of high pressure fluctuations, we recommend using a restrictor orifice (contains non-ferrous metals).

Hole diameter $\varnothing$ 0.2 mm, Order No.: 32003051-003/U,
Hole diameter $\varnothing$ 0.3 mm, Order No.: 32003052-003/U.

6.4 Standard coupler plug set



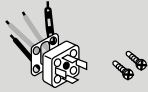
For CE certified pressure switches,

Order No.: 32003053-003/U

For FM, UL certified pressure switches,

Order No.: 32003054-003/U

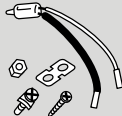
6.5 Standard coupler plug



For CE certified pressure switches
Order No.: 32003055-003/U.

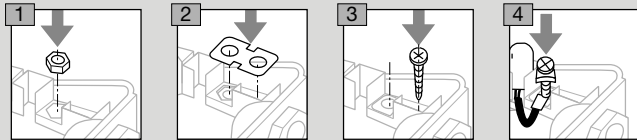
For FM, UL certified pressure switches
Order No.: 32003056-003/U.

6.6 Pilot lamp set, red or blue

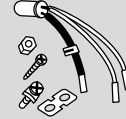


Pilot lamp, red:
110/120 V AC, $I = 1.2 \text{ mA}$, Order No.: 32003044-003/U.
230 V AC, $I = 0.6 \text{ mA}$, Order No.: 32003046-003/U.

Pilot lamp, blue:
110/120 V AC, $I = 1.2 \text{ mA}$, Order No.: 32003045-003/U.
230 V AC, $I = 0.6 \text{ mA}$, Order No.: 32003047-003/U.

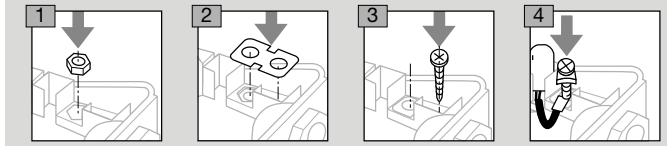


6.7 LED set, red/green

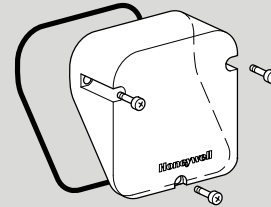


24 V DC, $I = 16 \text{ mA}$; 24 V AC, $I = 8 \text{ mA}$,
Order No.: 32003048-003/U.

110 to 230 V AC, Order No.: 32003049-003/U.

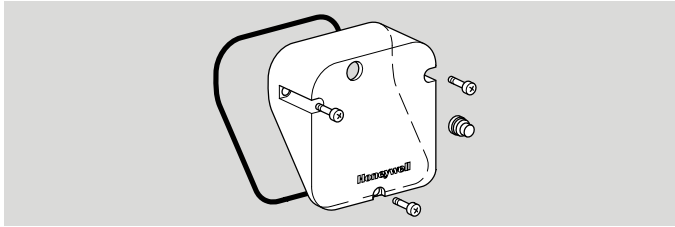


6.8 Cover for auto reset



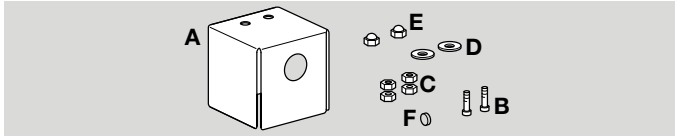
Order No.: 32003040-003/U

6.9 Cover for manual reset



Order No.: 32003041-003/U

6.10 Weather protection cover



When the DG is installed outdoors, the weather protection cover provides permanent protection against condensation and weathering of housing parts.

The weather protection cover is made of 1 mm (0,04")- thick stainless steel.

Installation position: vertical with the cable gland pointing downwards.

Scope of delivery:

A 2 x covers, 100 x 100 x 100 mm

B 2 x screws M4 x 16

C 4 x nuts

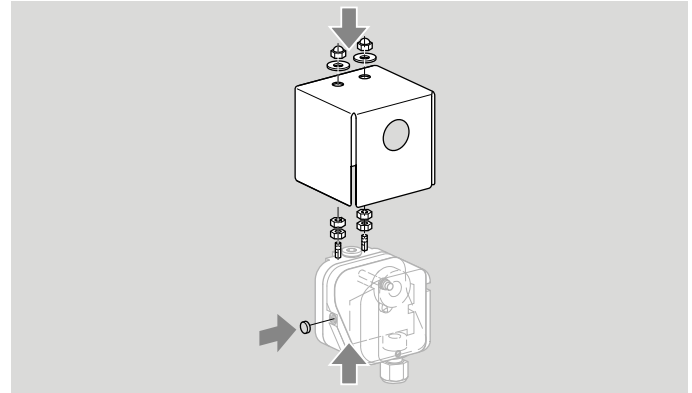
D 2 x washers

E 2 x cap nuts

F 1 x filter pad (1/8"-Anschluss)

Order No.: 32003050-003/U

Installation position: vertical with the cable gland pointing downwards.



7 Technical data

Gas type: natural gas, town gas, LPG (gaseous), flue gas, biogas (max. 0.1 %-by-vol. H₂S) and air.

Electrical connection type: screw terminals.

Diaphragm pressure switch, silicone-free.

Diaphragm: NBR.

Housing: glass fibre reinforced PBT plastic with low gas release.

Lower housing section: AISi 12.

Schutzart: IP 65, Schutzklasse: 1.

Max. medium and ambient temperatures:
-20 to +40 °C (-4 bis +104 °F).

Long-term use in the upper ambient temperature range accelerates the ageing of the elastomer materials and reduces the service life (please contact manufacturer).

The set switching point may palpably change in media and ambient temperatures below -22°F (-30 °C).

Weight:
270 to 320 g (9.5 to 11.3 oz) depending on equipment.

7.1 Recommended tightening torque

Component	Tightening torque [Ncm]
Cover screws	65
M16 x 1.5 cable gland	50
1/2" NPT Conduit	170 (15 lb")
Rp 1/8 pipe connection, aluminium lower housing section	250
Rp 1/4 connection (1/4" NPT), aluminium lower housing section	1300
Rp 1/8 connection, upper housing section	250

Component	Tightening torque [Ncm]
Clamping terminal screws	80
T15 test point screw	150

7.2 EU certified pressure switches

Max. inlet pressure p_{max.} = withstand pressure, see adjusting range, page 19 (Adjusting range and switching hysteresis CE certified pressure switches).

Cable diameter: AWG 24 to AWG 13, 0.5 to 1.8 mm (0.02 to 0.07").

Maximum medium and ambient temperatures:
-20 to +80°C (-4 to +176°F).

Switching capacity:
U = 24–250 V AC,
I = 0,05–5 A at cos φ = 1,
I = 0,05–1 A at cos φ = 0,6.

Line entrance:
M16 x 1,5 cable gland,
clamping range: diameters of 4 to 10 mm.

Cable diameter: AWG 24 to AWG 13, 0.5 to 1.8 mm (0.02 to 0.07").

7.3 UL, FM certified pressure switches

Max. inlet pressure $p_{\max.}$ = withstand pressure, see adjusting range, page 20 (Adjusting range and switching hysteresis UL, FM certified pressure switches).

Maximum medium and ambient temperatures:
-40 bis +60 °C (-40 bis +140 °F).

switching capacity:

$U = 24\text{--}240\text{ V AC}$,

$I = \max. 5\text{ A at } \cos \varphi = 1$

$I = \max. 0,5\text{ A at } \cos \varphi = 0,6$.

Line entrance: 1/2" NPT Conduit.

Cable diameter: AWG 24 to AWG 13,
0.5 to 1.8 mm (0.02 to 0.07").

7.4 Adjusting range and switching hysteresis CE certified pressure switches

Type	Adjusting range*	Mean switch- ing differential at min. and max. setting	Max. inlet pres- sure p _{max.} = withstand pressure	Difference be- tween switch- ing pressure and possible reset	Deviation from the switching point during testing pursuant to EN 1854	
	mbar	mbar	mbar	mbar	Gas pressure switch	Air pressure switch
C6097A4010	0.4–6	0.2–0.3	100	–	± 15 %	± 15 %
C6097A4110	1–10	0.25–0.4	500	–	± 15 %	± 15 %
C6097A4210	2.5–50	0.8–1.5	500	–	± 15 %	± 15 %
C6097A4310	30–150	3–5	600	–	± 15 %	± 15 %
C6097A4410	100–500	8–17	600	–	± 15 %	± 15 %

* Adjusting tolerance = ± 15% of the scale value.
Switching properties, see Application page 4 (CE approved pressure switches).

7.5 Adjusting range and switching hysteresis UL, FM certified pressure switches

Switching properties at setpoint value: NO-to-COM connection is interrupted if the pressure drops.

Type	Adjusting range*	Mean switch- ing differen- tial at min. and max. setting	Max. inlet pressure		Lock-off	Difference be- tween switch- ing pressure and possible reset	Medi- um	NPT
	"WC (mbar)	"WC (mbar)	with venting line psi (mbar)	without vent- ing line psi (mbar)		"WC (mbar)		
C6097A3004	0.4–4 (1–10)	0.1–0.16 (0.25–0.4)	8,5 (600)	7 (480)	no	–	Air/gas	1/4"
C6097A3012	1–20 (2.5–50)	–	8.5 (600)	7 (480)	Yes	0.4–0.8 (1–2)	Air/gas	1/4
C6097A3038	12–60 (30–150)	–	8.5 (600)	7 (480)	Yes	0.8 – 4.8 (2 – 12)	Air/gas	1/4"
C6097A3053	1–20 (2.5–50)	0.3–0.6 (0.75–1.5)	8.5 (600)	7 (480)	No	–	Air/gas	1/4"
C6097A3079	12–60 (30–150)	1.2–2 (3–5)	8.5 (600)	7 (480)	No	–	Air/gas	1/4"
C6097A3095	0.4–4 (1–10)	–	8.5 (600)	7 (480)	Yes	0.16–0.4 (0.4–1)	Air/gas	1/4"
C6097A3111	40–200 (100–500)	–	8,5 (600)	7 (480)	Yes	2–7.2 (5–18)	Air/gas	1/4"
C6097A3137	40–200 (100–500)	3.2–6.8 (8–17)	8.5 (600)	7 (480)	No	–	Air/gas	1/4"

* Adjusting tolerance = ± 15% of the scale value.

Switching properties at setpoint value: NC-to-COM connection is interrupted if the pressure rises.

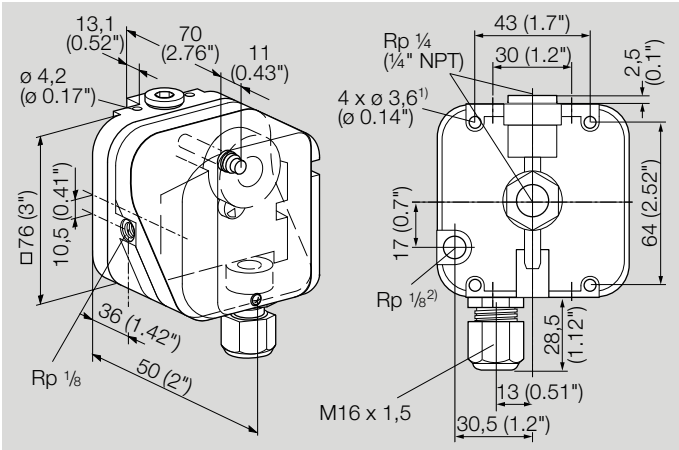
Type	Adjusting range*	Mean switching differential at min. and max. setting	Max. inlet pressure		Lock-off	Difference between switching pressure and possible reset	Medium	NPT
	"WC (mbar)	"WC (mbar)	with venting line psi (mbar)	without venting line psi (mbar)		"WC (mbar)		
C6097B3002	12–60 (30–150)	–	8.5 (600)	7 (480)	Yes	0,8–4,8 (2–12)	Air/gas	1/4
C6097B3028	1–20 (2,5–50)	–	8.5 (600)	7 (480)	Yes	0,4–0,8 (1–2)	Air/gas	1/4
C6097B3051	40–200 (100–500)	–	8.5 (600)	7 (480)	Yes	2–7.2 (5–18)	Air/gas	1/4
C6097B3085	12–60 (30–150)	1.2–2 (3–5)	8.5 (600)	7 (480)	No	–	Air/gas	1/4
C6097B3101	40–200 (100–500)	3.2–6.8 (8–17)	8.5 (600)	7 (480)	No	–	Air/gas	1/4
C6097B3119	1–20 (2.5–50)	0.3–0.6 (0.75–1.5)	8.5 (600)	7 (480)	No	–	Air/gas	1/4

* Adjusting tolerance = ± 15% of the scale value.

For further information, see Application page 4 (FM approved and UL listed pressure switches).

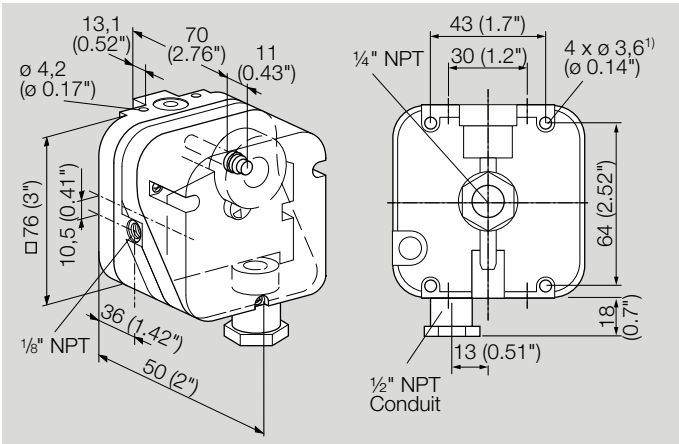
8 Dimensions

EU certified pressure switches



1) Holes 10 mm (0.4") deep, for self-tapping screws.

UL, FM certified pressure switches



1) Holes 10 mm (0.4") deep, for self-tapping screws.