GAO-A4, GMH-A4, and GML-A4 Gas Pressure Switch Installation Instructions

USA CDN

DUNGS®
Combustion Controls

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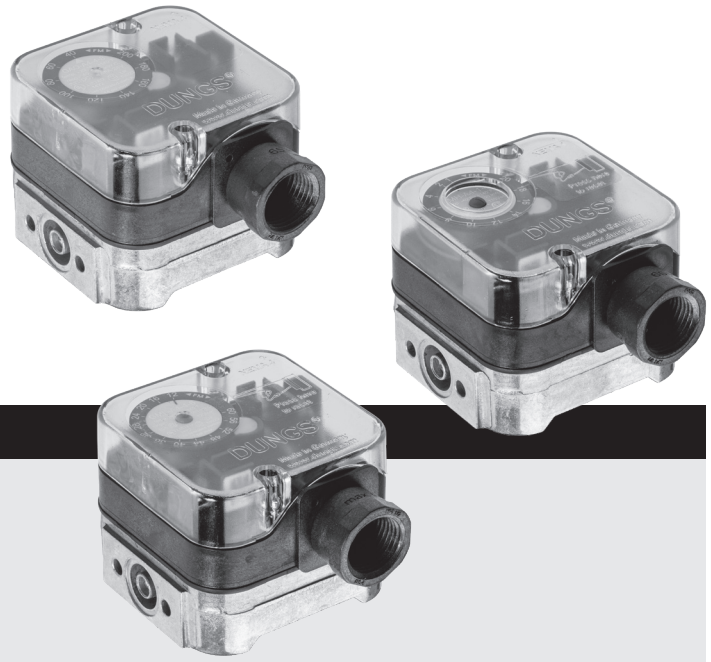


Approvals

UL Listed: UL 353
File # MH 16628

CSA Certified: CSA C22.2 No. 14
Certification File # 201527

FM Approved: Class 3510, 3530
File # J.I. 1Y919.AF

Commonwealth of Massachusetts Approved Product Approval code G3-0106-191

Attention

The installation and maintenance of this product must be done under the supervision of an experienced and trained specialist. Never perform work if gas pressure or power is applied, or in the presence of an open flame.

Check the ratings in the specifications to verify that they are suitable for your application.

Please read the instruction before installing or operating. Keep the instruction in a safe place. You find the instruction also at www.dungs.com. If these instructions are not heeded, the result may be personal injury or damage to property.

On completion of work on the pressure switch, perform a leakage and function test.

Any adjustment and application-specific adjustment values must be made in accordance with the equipment manufacturers instructions.

This product is intended for installations covered by, but not limited to, the following codes and standards: NFPA 86, ANSI Z83.4/CSA 3.7, ANSI Z83.18/CSA 4.9, ANSI Z21.13, CSD-1, UL 795, CSA B149.1 or CSA B149.3

Explanation of symbols

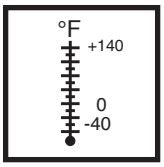
1, 2, 3 ... = Action
• = Instruction

MC • Karl Dungs, Inc. • GAO-, GMH-, GML-A4 • Edition 2023.08 • P/N 261395 • Rev. -0

Specification

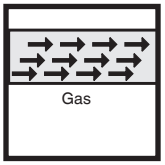
GAO-A4, GMH-A4, GML-A4 High/low ventless gas pressure switch (SPDT) with automatic or manual reset. Includes visual indication of switch position.

Max. Operating Pressure
MOP = 7 PSI (500 mbar)
-8 version 14 PSI (1000 mbar)



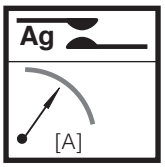
Ambient / Fluid Temperature
Versions
-2, -3, -4, -5 & -6; -40 °F to +140 °F;
(-40 °C to +60 °C)
Versions
-8; -20 °F to +140 °F;
(-30°C to +60 °C)

Electrical Connection
Screw terminals via 1/2" NPT conduit connection

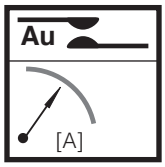


Gases
Dry, natural gas, propane, butane; other noncorrosive gases. Suitable for up to 0.1% by volume, dry H_2S. A "dry" gas has a dew point lower than +15 °F and its relative humidity is less than 60 %.

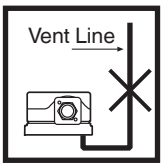
Materials in contact with Gas
Housing: Aluminum & Steel
Diaphragm: NBR-based rubber



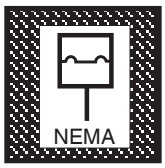
Silver (Ag) contact ratings
AC 10 A resistive @ 120 VAC
AC 8 A pilot duty @ 120 VAC
DC min. 20 mA @ 24 VDC
DC max. 1 A @ 24 VDC & 48 VDC



Gold (Au) contact ratings
DC max. 5 mA @ 5 VDC
DC max. 20 mA @ 24 VDC



Vent Limiter
Incorporates a vent limiter as per UL 353 and limits the escape of gas less than 1.0 CFH of natural gas at 7 PSI if internal switch diaphragm rupture. No vent line required, when accepted by the authority having jurisdiction.



Enclosure
NEMA 1 for GMH,GML
NEMA 4

Model Description & Part Number

Type	Version	Order No.	Setting range in. W.C.	Switching hysteresis in. W.C.	Factory Calibration
GAO-A4…	GAO-A4-4-2	266919	0.16 - 1.20	≤ 0.12	
pressure switch	GAO-A4-4-3	266920	0.40 - 4.00	≤ 0.20	
NEMA 4	GAO-A4-4-5	266921	2.00 - 20.00	≤ 0.40	
	GAO-A4-4-6	266922	12.00 - 60.00	≤ 1.2	
	GAO-A4-4-8	266923	40.00 - 200.00	≤ 4.0	
	GAO-A4-4-3 Gold	266958	0.40 - 4.00	≤ 0.20	
	GAO-A4-4-5 Gold	266959	2.00 - 20.00	≤ 0.40	
	GAO-A4-4-6 Gold	266960	12.00 - 60.00	≤ 1.2	
	GAO-A4-4-8 Gold	266966	40.00 - 200.00	≤ 4.0	
GMH-A4…	GMH-A4-4-4	266927	1.00 - 20.00	--	
pressure switch	GMH-A4-4-6	266928	12.00 - 60.00	--	
NEMA 4	GMH-A4-4-8	266930	40.00 - 200.00	--	
	GMH-A4-4-4 Gold	266961	1.00 - 20.00		
	GMH-A4-4-6 Gold	266962	12.00 - 60.00		
GML-A4…	GML-A4-4-4	266945	1.00 - 20.00	--	
pressure switch	GML-A4-4-6	266947	12.00 - 60.00	--	
NEMA 4	GML-A4-4-8	266948	40.00 - 200.00	--	
	GML-A4-4-4 Gold	266963	1.00 - 20.00		
GMH-A4…	GMH-A4-1-4	298104	1.00 - 20.00	--	
pressure switch	GMH-A4-1-6	298105	12.00 - 60.00	--	
NEMA 1	GMH-A4-1-8	298106	40.00 - 200.00	--	
GML-A4…	GML-A4-1-4	298110	1.00 - 20.00	--	
pressure switch	GML-A4-1-6	298111	12.00 - 60.00	--	
NEMA 1	GML-A4-1-8	298112	40.00 - 200.00	--	

NEMA 4 switches with Silver contacts have 120 VAC neon lights factory installed
NEMA 4 switches with Gold contacts have 24 V lights factory installed

Mounting

Recommended Mounting Procedure

1. Use new, properly reamed and threaded pipe free of chips.
2. Apply good qulaity pipe sealant, purring a moderate amount on the male threads only. If using LP gas, use pipe sealant rated for use with LP gas.
3. Use 13/16" Wrench to secure the switch to the pipe.

Do not exceed 177 lb-in of torque

4. After installation is complete, perform a leak test.

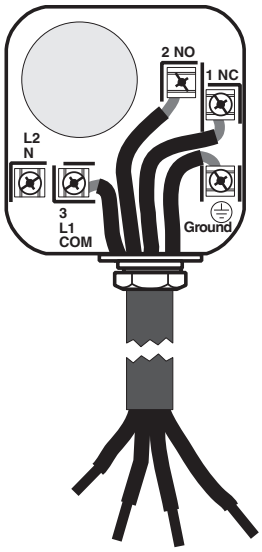
Venting is NOT required, subject to the authority having jurisdiction. The switch has a built in vent limiter.

Wiring

Wiring Procedure

1. Remove the clear cover from the switch.
2. Use 14 or 16 AWG wire rated for at least 75 °C
3. Route the wires through the conduit connector.
4. Install a conduit seal at some point in the conduit run between the switch and closest panel that contains switching contacts or other sparking devices (see NFPA 86 requirements about potential risks of gas leaking down conduit). For NFPA 86/87 applications, recommend using SO cable with chord grip connection into the 1/2 NPT conduit adapter.
5. Connect the wiring to the appropriate screw terminals.

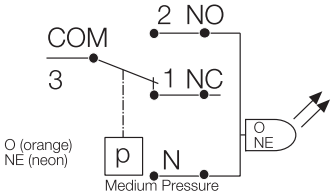
Wiring terminal illustration



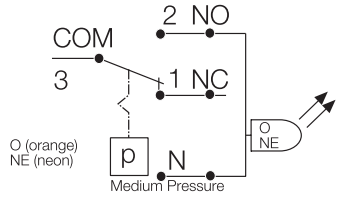
All wiring must comply with local electrical codes, ordinances and regulations.

Do not exceed the switch ratings given in the specifications and on the switch.

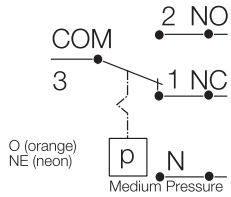
GAO Low or High Gas Switch (Operating state shown as a high limit). **As pressure rises** above set point, 1 NC opens, 2 NO closes, Neon light ON (fault). **As pressure falls** below set point, switch resets: 1 NC closes and 2 NO opens, Neon light off.



GMH High Gas Switch (Operating state shown) As pressure rises above setpoint, 2 NO closes, 1 NC opens, and Neon light ON (fault), switch trips and locks out.

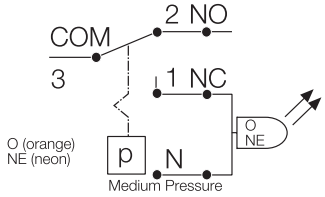


NEMA 4

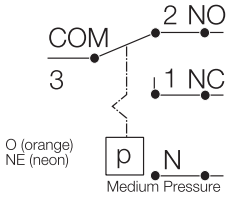


NEMA 1

GML Low Gas Switch (Operating state shown)
As pressure falls below setpoint, 2 NO opens, 1 NC closes, Neon light ON (fault), switch trips and locks out.



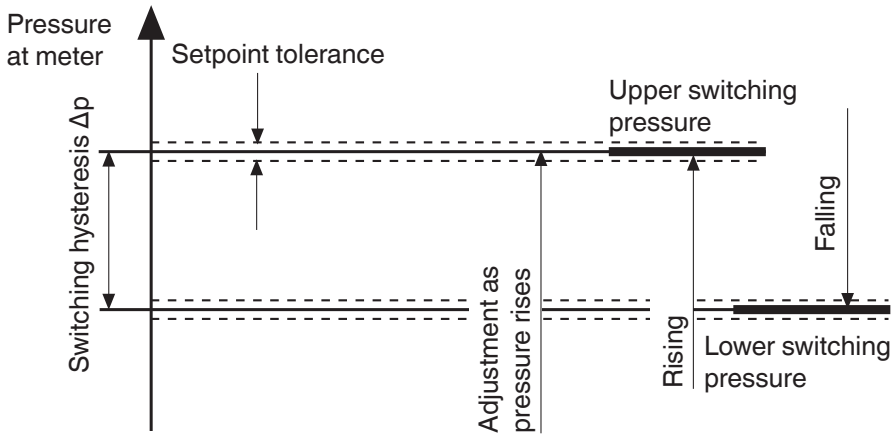
NEMA 4



NEMA 1

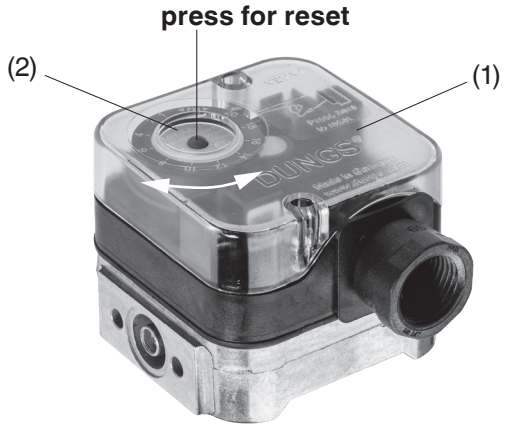
Operation

Definition of switching hysteresis Δp
The pressure difference between the upper and lower switching pressures.



Operation & Adjustment

Annually check the switch for proper operation
Set Point Calibration
The set point dial of the GAO and GMH is factory calibrated with increasing pressure (GML: decreasing pressure). Due to hysteresis, the GAO switch will actuate at a slightly lower point as the pressure decreases.



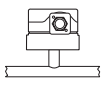
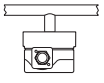
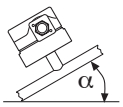
Note: Always calibrate the switch in the desired mounting position

Adjusting the Set Point
1. Remove the clear cover (1) from the switch.
2. Turn the dial (2) until the desired trip pressure is opposite the white arrow (mark) on the yellow dial face.
3. After adjusting the set point for normal operation check to see that the gas pressure switch operates as intended.
4. Use an accurate pressure gauge connected upstream from the switch to measure the actual pressure.
5. Replace the clear cover.

Automatic Reset
The NC contact of the GAO breaks when pressure rises above the set point. It makes automatically when pressure returns to the normal operating level.

Manual Reset
The NC contact of the GMH breaks when pressure rises above the set point. The NO contact of the GML breaks when pressure falls below the set point. Neither of the switches will return to their former position automatically. To reset, wait until the pressure returns to the normal operating level. Then press and release the reset button or clear cover over the red reset button in the center of the yellow dial face; it is not necessary to remove the cover. The neon light indicates a fault condition for the GML and GMH series and for the GAO series when used as a high gas limit. The lead for the light wired to terminal #2 on the GAO series should be wired to terminal #1 when used as a low gas limit.

Installation Position

	Standard installation position is **vertical** upright diaphragm.
	When installed **horizontally**, the pressure switch switches at a pressure higher by approx. 0.2 in. W.C.
	When installed **upside down**, the pressure switch switches at a pressure lower by approx. 0.2 in. W.C.
	When installed in **other positions**, the pressure switch switches at pressure deviating from the set reference value by max. ± 0.2 in. W.C.

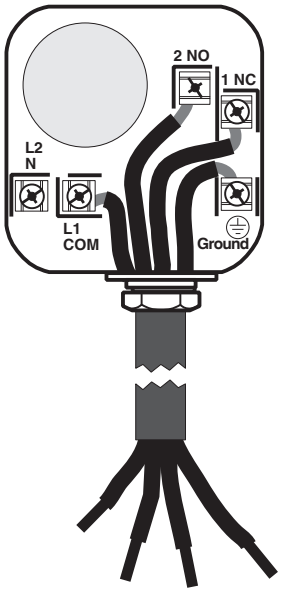
Annually check the switch for proper operation

Low Gas Pressure Switch

1. First, connect a meter capable of reading +/- 0.1 ohms to the NO and COM contacts, and verify that the NO and COM contacts are made. Measure the resistance, and if the resistance is more than 1.0 ohm, remove switch from service. (See terminal illustration below for guidance).
2. Then, verify that the low gas pressure switch will change state when a low gas condition is sensed by connecting a meter capable or reading +/- 0.1 ohms to the NC and COM contacts and then by causing the switch to go into a fault condition. Once the fault occurs, Measure the resistance, and if the resistance is more than 1.0 ohm, remove switch from service.
3. To cause the fault, perform one of the two procedures:
   1. Turn the pressure switch setpoint counterclockwise until the switch trips.
   2. Depressurize the volume of gas the low gas pressure switch is sensing. For FRI/6 regulators, this can be done by opening the side tap on the oppositive side of the FRI/6 regulator. For DMV, MBC and MBE safety shutoff valves, this can be done opening the port 1 pressure tap. For SV valves, open port 1 of the upstream valve.
4. Allow the burner to go through a startup sequence, and then verify that the burner faults and is not allowed to light off.
5. Close all test taps (ports) and open upstream ball valve.
6. When finished, close all pressure test points used, and then open the upstream ball valve **SLOWLY** to allow gas pressure to gradually bleed into the system.

⚠ **Opening the upstream ball valve to fast can permanently damage the pressure switch.**

⚠ **Do not similate fault conditions while the burner is firing.**



High Gas Pressure Switch

1. First, connect a meter capable of reading +/- 0.1 ohms to the NC and COM contacts, and verify that the NC and Measure the resistance, and if the resistance is more than 1.0 ohm, remove switch from service.
2. Then, verify that the high gas pressure switch will change state when a high gas condition is sensed by connecting a meter capable of reading +/- 0.1 ohms to the NO and COM contacts and then by causing the switch to go into a fault condition.
3. To cause the fault, perform one of the two procedures:
   1. Turn the pressure switch setpoint clockwise until the switch trips.
   2. Pressurize the volume of gas the high gas pressure switch is sensing. This can be done by closing the downstream ball valve, opening port 3 tap on a DMV and MBC safety shutoff valves, or port 2 or 3 of the downstream SV valve, and then using a pump to pressurize the test chamber.
4. Measure the resistance across the NO and COM contacts. If the resistance is more than 1.0 ohm, remove switch from service.
5. Allow the burner to go through a startup sequence, and then verify that the burner faults and is not allowed to light off.
6. When finished, close all test taps (ports) and open the dowmstream ball valve.

NOTE: A resistance of more than 1.0 ohm indicates that the switch contacts are starting to either corrode or carbonize.

Water entering switch

If water is entering the switch, potential causes are:

1) NEMA 4 does not mean hermetically sealed, and thus moist air can enter into the switch when sunlight or another heat source increases the temperature of the air inside the switch. If the air contains moisture and cools, the water in the air can precipitate. This can continue, and over time the water can accumulate.
2) Water is entering the conduit through other connections, and the seal tight acts like a funnel to direct water into the switch.
3) Water can also enter the switch through a loose conduit adapter. This occurs most often after seal-tight is connected to the adapter, but if during assembly the opposing end of the seal tight is bent or twisted, this can loosen the adapter.
4) Water can enter if the switch cover is too loose.
5) Water can enter if the switch cover o-ring is missing.
6) IP 65 connector is used. These permit a small amount of water to enter.
7) NEMA 1 switch type is not allowed to be exposed to water.

Accessories & Replacement	
Accessory for pressure switch	**Order No.**
NEMA 4 Replacement cover (with screws)	267182 (for GAO switches) and 267181 (for GMH and GML switches)
NEMA 1 Replacement cover (with screws)	298234 (for GMH and GML switches)
PG 11 - 1/2” NPT conduit adapter (1 pcs)	220566
M 20 - 1/2” NPT conduit adapter	240671
120 VAC neon light (orange/yellow)	244156
24 VDC/VAC light (orange/yellow)	244157
DIN connector (female plug)	210318
Male plug for DIN connector	219659 (for GAO switches) and 227644 (for GMH and GML sitches)
Mounting bracket (metal)	230288 (optional mounting bracket)

We reserve the right to make modifications in the course of technical development.

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