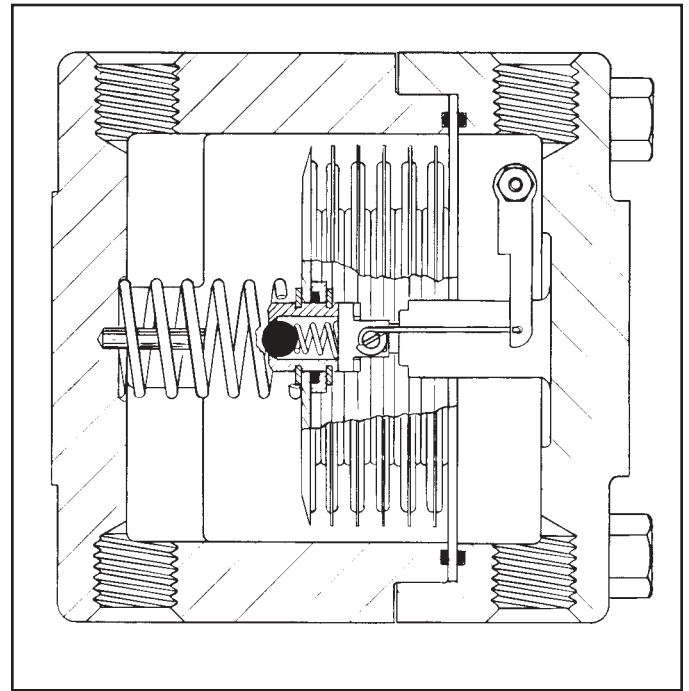


## Model 105/106 Installation and Operating Instructions



### **INSPECTION**

Before installation check the nameplate on each instrument against the receiving paperwork and the intended application for correct part number, materials of construction, working pressure, dial range etc. If equipped with switches, check electrical rating, type of enclosure, etc. Inspect for shipping damage and, if damaged, report it immediately.

**NOTE - Before attempting repairs contact your local Mid-West Representative or our factory. Failure to do so will void any warranty.**

### **PRODUCT DESCRIPTION**

The Model 105/106 is a precision differential pressure gauge capable of working at low differential pressures in high pressure systems. The compact design results in a simple device that is reduced to essential and necessary elements with a high output motion and rugged construction.

The major components of the Model 105/106 are a two-piece body, a multiple diaphragm/bellows sensing element and over-pressure assembly, a torque tube assembly, a range spring and a gauge front assembly.

The body halves provide the pressure containment function. They also clamp the sensing element and over-pressure assembly between the body halves, isolating the high side and low side pressures of the system. The high side body half also provides a mount for the torque tube assembly.

The sensing element is exposed to and deflects in response to the differential pressure. This assembly incorporates a bi-directional relief valve which provides over-pressure protection in both directions. The opening of the valve in either direction equalizes the pressure and protects the unit.

A range spring is provided to adjust the spring rate of the system to suit the various differential pressure ranges of the instrument.

The torque tube assembly consists of a rigid shaft and torque tube. The torque tube is welded to a bushing which is fixed to the high side pressure body half. The other end of the tube is welded to the shaft. The shaft is connected to the sensing element by a linkage. As the sensing element deflects, it causes the torque tube to twist. The torque tube provides a frictionless leak-free transmission of an output which is proportional to the differential pressure.

The torque tube shaft extends into the gauge front assembly and is connected to a low-friction, jeweled movement which provides output to the pointer.

## **INSTALLATION**

Model 105/106 gauges are calibrated and tested prior to shipment and are ready for immediate installation. Use of the following installation procedures should eliminate potential damage and provide optimum trouble free operation.

### **1. CONNECTIONS**

Dual 1/4" FNPT connections, top and bottom, are provided as standard but check paperwork for connections ordered. They are identified "high" and "low", for high pressure and low pressure. Be sure that one "high" and one "low" pressure connection gets plumbed to the proper connection on your system. The other two ports should either be plugged or plumbed as drains or bleeds, depending on whether the service is liquid or gas.

**NOTE: It is strongly recommended that a 3-valve manifold be used in plumbing your model 105/106 to your system. Properly used it should insure that your instrument is not over-ranged or damaged by pressure shocks during pressurization. It will facilitate later zeroing, ranging and calibration checking. It is good practice to purge or flush the instrument loop prior to connecting the instrument.**

### **2. INSTRUMENT LOCATION**

On liquid service the instrument should be located **below** the process connections to facilitate self-bleeding and on gas service it should be located **above** the process connections to promote self-draining. If the process contains particulates, "pigtail" loops or drop legs (manometer "U-Tube" configuration) in the tubing will minimize the possibility of the particulates migrating into the instrument.

**NOTE: On liquid applications, unequal liquid heads on the high or low side will result in an inaccurate differential pressure indication.**

### **3. PANEL MOUNTING**

The Model 105/106 is designed for mounting through the **front** of the instrument panel and is normally provided with a panel mounting kit. The kit consists of (4) panel mounting studs and nuts.

Make the cutouts as indicated in (Fig. 1). Insert the (4) panel mounting studs, finger tight, into the metal inserts located in the rear of the bezel. Insert the gauge through the panel aligning the panel mounting studs with the holes in the panel. Install the #8-32 nuts onto the studs and tighten securely.

### **4. PIPE MOUNTING**

The optional pipe mount kit is a "universal" pipe mounting kit which provides for mounting on a 2" vertical or horizontal pipe. See (Fig. 1) for details.

## **INSTRUMENT INSTALLATION RECOMMENDATIONS**

Rapid pressurization can cause severe damage to the sensing element in pressure instruments. Rapid pressure change (either increase or decrease) can be described as a change in pressure occurring fast enough to drive an instrument full scale in less than one second.

Most better quality instruments have over-range protection built-in but they are mechanical in design and cannot be relied upon to react in time to protect the instrument against a rapid change in pressure.

The simplest method to avoid this problem is by installation and proper use of a 3-valve manifold. Open the equalizer valve prior to opening one or both of the block valves to insure pressure is applied simultaneously to both sides of the sensing element.

If a 3-valve manifold is not used, protection can be provided by installation of Mid-West Model 150 snubbers to both sides of the instrument. This unit provides an infinitely adjustable choke valve and an excess flow ball check. The ball check is designed not to shut off completely but will restrict flow during sudden changes in pressure while bleeding pressure to the instrument, preventing sudden surges from being transmitted to the instrument.

Refer any questions regarding these recommended procedures to the local Mid-West representative in your area or our factory in Sterling Heights, Michigan, U.S.A.

## **TROUBLE SHOOTING**

### **1. Gauge does not indicate differential.**

- A. Check for proper hook up, high to high and low to low.
- B. Make certain that block valves are open and, if using a 3-valve manifold, that the equalizer (balance) valve is closed.
- C. If A and B check out correctly, loosen or disconnect the high pressure line to determine if there is pressure to the instrument.
- D. If there is pressure to the instrument, check to determine that there is differential across the unit being monitored. If there is, contact the factory for assistance and for an "RGA" (returned goods authorization) number to return the instrument for repair or replacement.

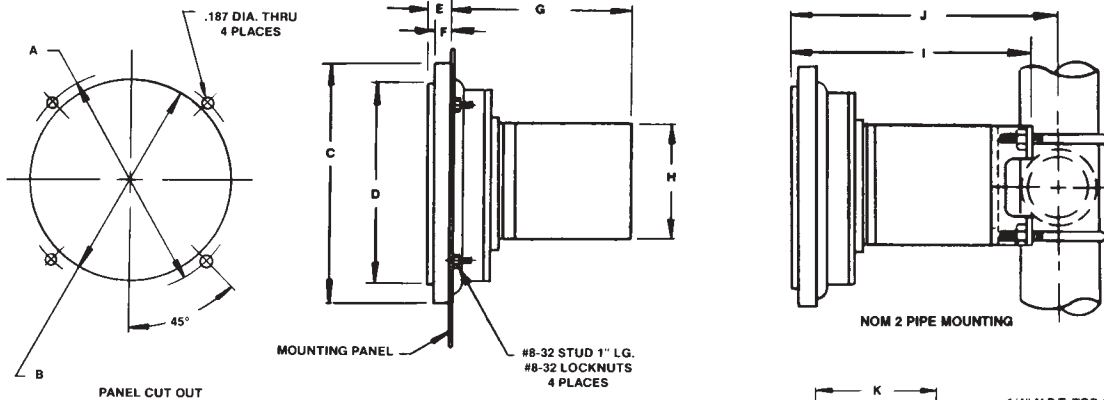
### **2. Indicating pointer off zero. (With block valves closed, equalizer valve open, or no system differential.)**

- A. Tap gauge **lightly**.
- B. Make certain block valves are closed and equalizer valve is open.
- C. If A & B do not correct the "off zero" condition, remove the bezel and lens assembly by removing the (4) bezel screws. Loosen **slightly** the "phillips head" screw, located in a slot in the dial in the lower left dial area at about "7:30". Rotate the dial until "zero" is under the pointer, by use of any pointed object inserted in one of the small notches at the top and bottom of the dial. Retighten the "phillips head" screw and reinstall the bezel and lens assembly.

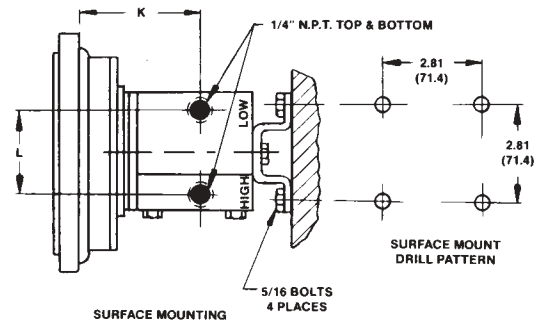
## **RECALIBRATION AND/OR REPAIR**

1. If recalibration or repair is required, secure an "RGA" (returned goods authorization) number from Mid-West Instrument and return the instrument to the factory.
2. If (1) is not practical we recommend you discuss your problem with one of our customer service representatives and request a "technical service" manual. Please have both the model and serial numbers available before calling.

# MOUNTING INFORMATION & DIMENSIONAL DATA



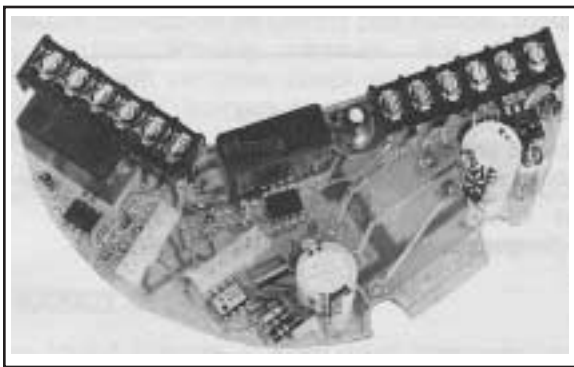
MODEL	A	B	C	D	E	F	G	H	I	J	K	L
105-4-1/2"	5.63 (143.0)	5.29 (134.3)	6.21 (157.7)	5.25 (133.3)	.85 (21.4)	.70 (17.6)	4.88 (123.9)	3.75 (95.2)	6.90 (177.2)	7.62 (193.7)	3.00 (76.2)	2.43 (62.0)
105-6"	7.00 (177.8)	6.50 (165.1)	8.18 (208.0)	6.94 (176.2)	.91 (23.1)	.76 (19.3)	4.88 (123.9)	3.75 (95.2)	7.02 (178.5)	7.74 (196.7)	3.00 (76.2)	2.43 (62.0)
106-4-1/2"	5.63 (143.0)	5.29 (134.3)	6.21 (157.7)	5.25 (133.3)	.85 (21.4)	.70 (17.6)	4.40 (111.7)	3.00 (76.2)	6.42 (163.2)	7.14 (181.5)	3.00 (76.2)	2.43 (62.0)
106-6"	7.00 (177.8)	6.50 (165.1)	8.18 (208.0)	6.94 (176.2)	.91 (23.1)	.76 (19.3)	4.40 (111.7)	3.00 (76.2)	6.54 (166.3)	7.26 (184.5)	3.00 (76.2)	2.43 (62.0)



NOTES: 1. Drawings show standard gauge nominal dimensions. (not to scale)  
2. Dimensions shown in parentheses are in millimeters.

(Fig. 1)

## “LOCKED LOGIC” SOLID STATE ALARM-CONTROL FOR ALL 105, 106 GAUGES (NOTE - 6" DIAL SIZE ONLY)



If your application requires switching in addition to local indication, our all solid state “Locked Logic” system is the most accurate available. With no moving cams, levers, etc. it does not affect the accuracy of the gauge on which it is installed. Switch accuracy is the same as the gauge accuracy.

Visible set pointers are provided, adjustable to within 5% of full scale of each other. The set points are adjustable from 5 to 95% of full scale. Internal adjustment is standard.

Standard electrical input is 8 to 28 VDC, with 115 VDC, 115 VAC 50-60 Hz, or 230 VAC 50-60 Hz optional.

Output is 10 amps @ 28 VDC or 10 amps @ 115/230 VAC-50/60 Hz with SPDT or DPDT relay(s).

(For more complete information, request bulletin no. LLC/LATEST).

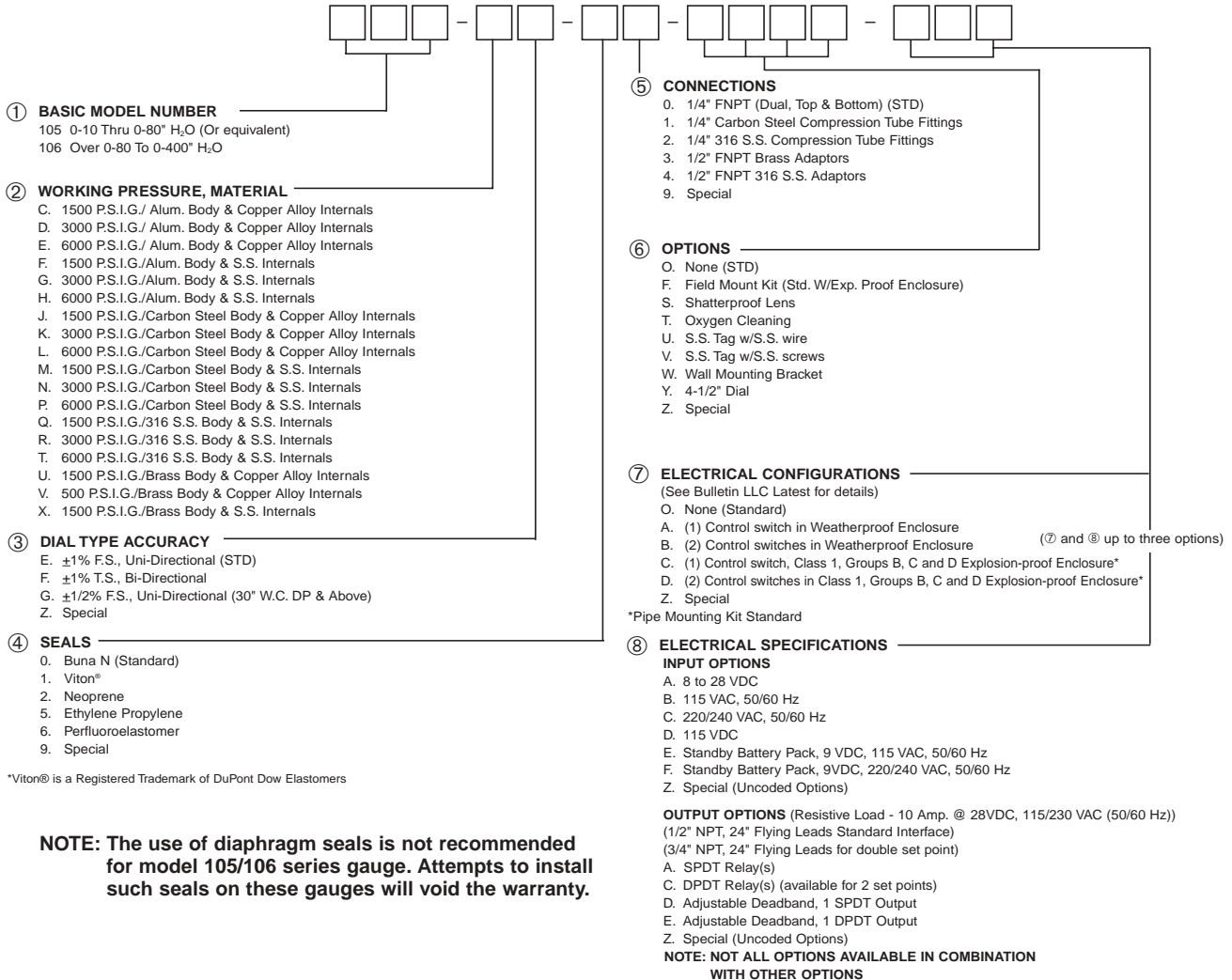


## STANDARD MODEL SPECIFICATION

### 105-CE-00-00

1500 P.S.I.G./Working Pressure; Aluminum Body & Copper Alloy Internals; 6" Uni-Directional Dial;  
 ±1% Full Scale Accuracy; Buna N Seals, 1/4" FNPT Connections (Dual-Top & Bottom).  
 Weather resistant engineering plastic case & shatter resistant acrylic lens.

## PART NUMBERING SYSTEM



Manufacturer reserves the right to change specifications without prior notice.

**PROOF PRESSURE:** Two times working pressure or 10,000 PSI whichever is lower at ambient temperature.

**TEMPERATURE LIMITS:** -40°F(-40°C) to +200°F (+93°C) - These limits are based on the entire instrument being saturated to these temperatures. System (process) temperatures may exceed these limitations with proper installation. Contact our customer service representative for details.

**STANDARDS:** All Model 105/106 Series gauges either conform to and/or are designed to the requirements of the following standards:

ASME B1.20.1  
 ASME B40.1  
 CSA-C22.2 No. 14.25 and 30  
 EN-61010-1

NACE MR0175  
 NEMA Std. No. 250  
 SAE J5141  
 UL Std. No. 50, 508 and 1203

# Mid-West<sup>®</sup>

## Instrument

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 Website: www.midwestinstrument.com



REPRESENTED BY: