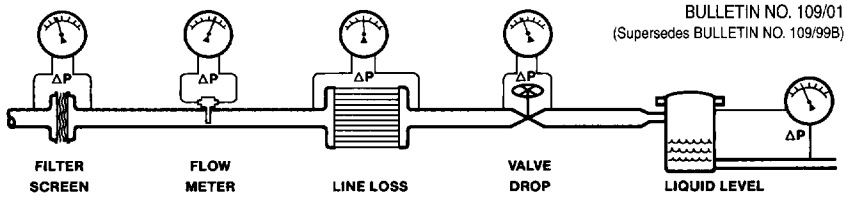
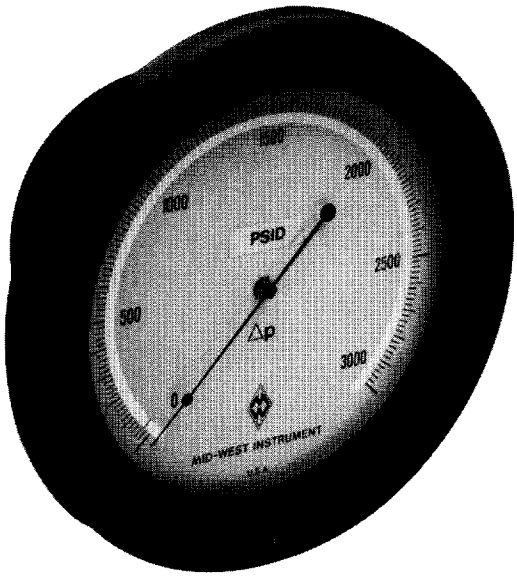
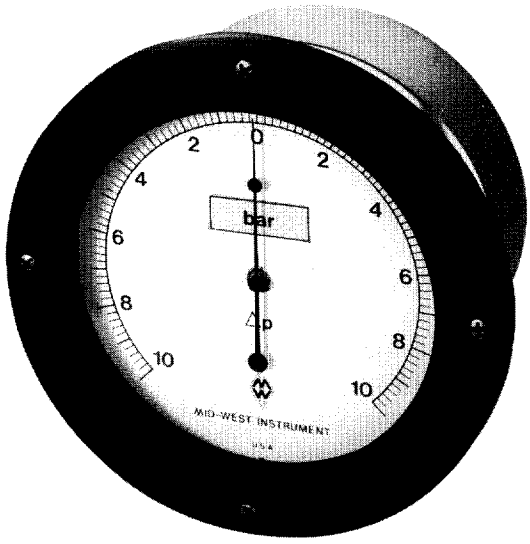
Mid-West®
Instrument



BULLETIN NO. 109/01
(Supersedes BULLETIN NO. 109/99B)

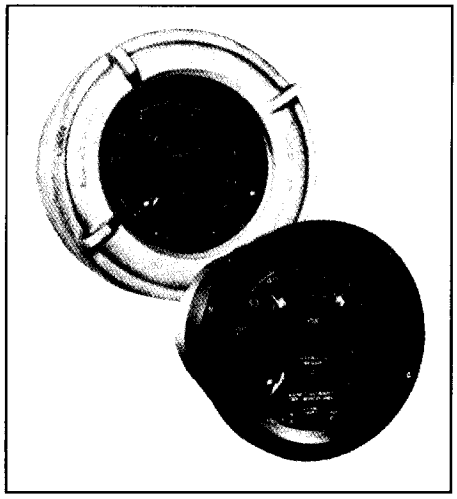
Model 109
Differential Pressure Gauge
(Five Year Limited Warranty)





The Model 109 encapsulated bourdon tube design provides a simple, compact, and accurate differential pressure indicator.

- Range 0-15 psid (0-1.0 bar) to 0-6000 psid (0-400 bar).
- Accuracy of ±1% or ±1/2% full scale.
- Over-range protection to maximum working pressure.
- Working pressure 1500-6000 P.S.I.G. (100-400 bar).
- Aluminum, brass, or carbon steel housing with copper alloy or stainless steel internals; or all 316 stainless steel housing with stainless steel internals.
- Uni-directional or bi-directional (center zero) dials available.
- Anti-parallax mirrored band standard on 6" dial.



"LOCKED LOGIC" ALARM CONTROLS
Model 109 gauges are optionally available with one or two switches for alarm and control.

- All solid-state optical switching. No error-producing mechanical linkage.
- Visible set pointers adjustable from 5-95% of full scale.
- Weatherproof or explosion proof enclosures. Standard input 8 to 28 VDC, standard output 10 amps. S.P.D.T. (See bulletin LLC Latest for details).

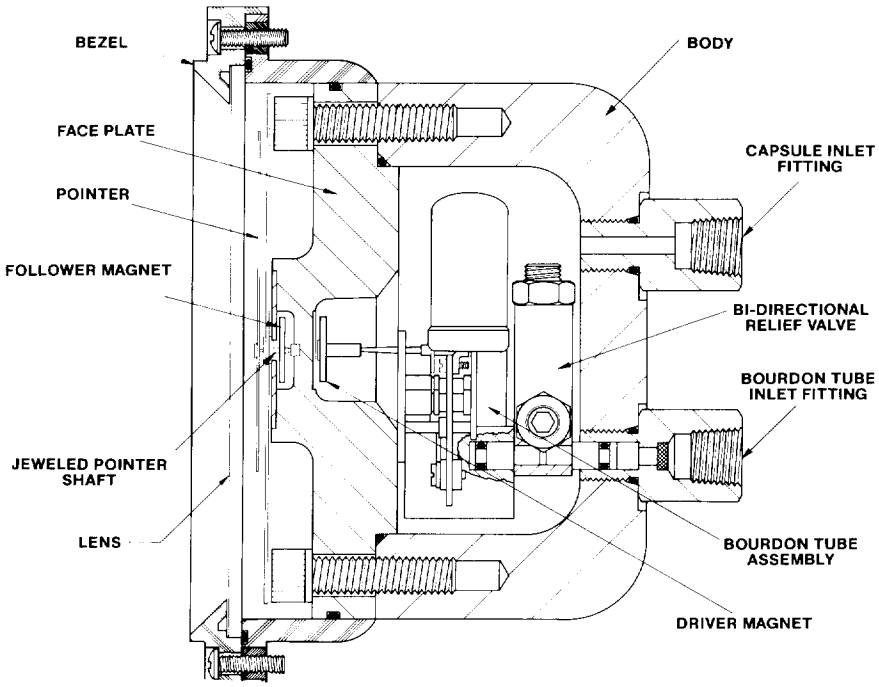
MODEL 109 CHARACTERISTICS

The Model 109 is powered by a test quality Bourdon Tube assembly. The assembly is encapsulated in a high pressure chamber that is fitted with a pressure connection to the inside of the Bourdon Tube and a second connection to the pressure chamber. The model 109 indicates the difference between the pressure applied inside the Bourdon Tube and the pressure inside the chamber.

The pressure chamber for the assembly is small, close fitting and rugged. The volume displacement of the Bourdon Tube through the pressure range is near to zero (0.02 c.c.). The speed of response of the indicator to changes in differential pressure is instantaneous, even on low volume pressure systems. The low volume displacement is an important advantage for differential pressure leak detection, and when isolation diaphragms are required.

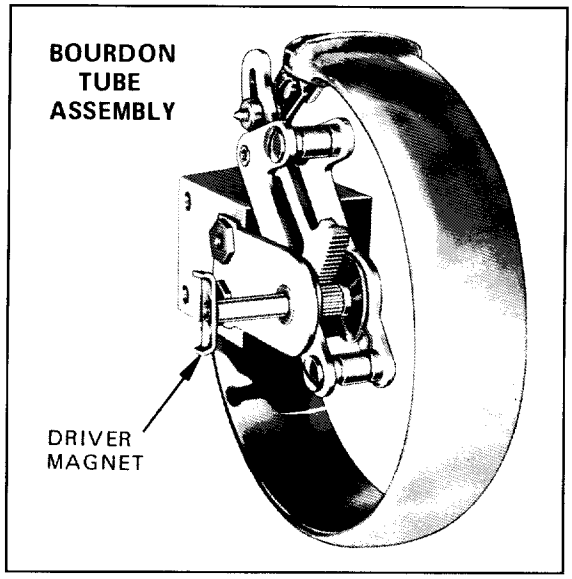
The Bourdon Tube Assembly is protected against over-range in either direction to the rated working pressure by a bi-directional relief valve.

The output shaft of the gauge assembly is magnetically coupled through the solid wall of the pressure chamber to a sensitive jeweled pointer shaft in the dial housing outside the chamber. The magnetic coupling transmits the exact motion of the assembly to the pointer to give an accurate dial reading of the differential pressure.



DETAILS OF CONSTRUCTION

The Bourdon Tube is mounted on a connection block and to an open gear and sector gauge movement. A ceramic coupling magnet is carried on the output shaft of the movement. A bi-directional relief valve is installed between the Bourdon Tube assembly and the high pressure inlet port.

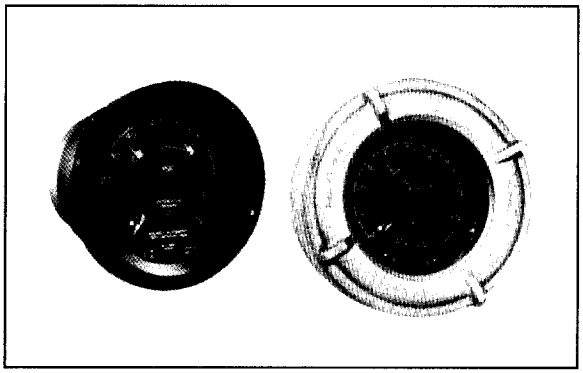


The gauge assembly is a bolted sealed pressure chamber with a solid face plate and a heavy walled capsule. The assembly is rated at 1500, 3000 or 6000 P.S.I.G. working pressure. Pressure connections are located on the back of the capsule.

The indicating mechanism of the model 109 (the pointer, handstaff, and dial) is in a corrosion resistant engineering plastic case bolted and sealed to the face plate of the pressure chamber. The pointer is carried on a shaft with jeweled bearings. The dial, silkscreened on mirrored band aluminum, is designed so it may be rotated underneath the pointer, should rezeroing be necessary.

The shatter resistant acrylic lens is permanently attached to the bezel which snaps on to the gauge case and is sealed by a resilient seal. It is mounted to the dial chamber by four screws.

"LOCKED LOGIC" SOLID STATE ALARM-CONTROL FOR ALL 109 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. (See Bulletin LLC Latest for details).

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

STANDARD MODEL SPECIFICATIONS

109-CE-00-OO*

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 (Carbon Steel), Weather Resistant Engineering Plastic Case & Shatter Resistant Acrylic Lens.

PART NUMBERING SYSTEM

X X X - X X - X X - X X X X - X X X

① **BASIC MODEL NUMBER**

② **MATERIAL**
- C. 1500 P.S.I.G./ Alum. Body & Copper Alloy Int'ls
- D. 3000 P.S.I.G./ Alum. Body & Copper Alloy Int'ls
- E. 6000 P.S.I.G./ Alum. Body & Copper Alloy Int'ls
- F. 1500 P.S.I.G./Alum. Body & S.S. Int'ls
- G. 3000 P.S.I.G./Alum. Body & S.S. Int'ls
- H. 6000 P.S.I.G./Alum. Body & S.S. Int'ls
- J. 1500 P.S.I.G./Carbon Steel Body & Copper Alloy Int'ls
- K. 3000 P.S.I.G./Carbon Steel Body & Copper Alloy Int'ls
- L. 6000 P.S.I.G./Carbon Steel Body & Copper Alloy Int'ls
- M. 1500 P.S.I.G./Carbon Steel Body & S.S. Int'ls
- N. 3000 P.S.I.G./Carbon Steel Body & S.S. Int'ls
- P. 6000 P.S.I.G./Carbon Steel Body & S.S. Int'ls
- Q. 1500 P.S.I.G./316 S.S. Body & S.S. Int'ls
- R. 3000 P.S.I.G./316 S.S. Body & S.S. Int'ls
- T. 6000 P.S.I.G./316 S.S. Body & S.S. Int'ls
- U. 1500 P.S.I.G./Brass Body & Copper Alloy Int'ls
- V. 500 P.S.I.G./Brass Body & Copper Alloy Int'ls
- X. 1500 P.S.I.G./Brass Body & S.S. Int'ls
- Y. 500 P.S.I.G./Brass Body & S.S. Int'ls

③ **DIAL SIZE**
- E. ±1% F.S., Uni-Directional **(STD)**
- F. ±1% F.S., Bi-Directional (±3% Above 1500-0-1500 PSID)
- G. ±1/2% F.S., Uni-Directional (Not available above 1000 PSID)
- Z. Special

④ **SEALS**
- 0. Buna N **(Standard)**
- 1. Viton®*
- 2. Neoprene
- 5. Ethylene Propylene
- 6. Perfluoroelastomer
- 9. Special

*Use of diaphragm seals is not recommended on the Model 109 Gauge and such field installations will automatically void any warranty consideration.

*Viton® is a Registered Trademark of DuPont Dow Elastomers.

⑤ **CONNECTIONS**
- 0. 1/4" FNPT Conn's. (C.S.) **(STD)**
- 1. 1/4" S.S. Compression Tube Fittings
- 2. 1/4" FNPT Adapters (Brass)
- 3. 1/4" FNPT Adapters (316 S.S.) **(STD on 316 S.S. Body)**
- 4. 1/2" FNPT Adapters (Brass)
- 5. 1/2" FNPT Adapters (316 S.S.)
- 6. 7/16" - 20 Str. Thd. O-Ring Adapters
- 9. Special

⑥ **OPTIONS**
- O. None (STD)
- B. Drain & Bleed Conn's. (1/8" FNPT), Brass
- C. Drain & Bleed Conn's. (1/8" FNPT), 316 S.S.
- F. Field Mount Kit (Std. W/Exp. Proof Enclosure)
- L. Liquid Filled Front
- M. Follower Pointer (Not Available with Liquid Fill)
- S. Shatterproof Lens
- T. Oxygen Cleaning
- U. S.S. Tag w/S.S. wire
- V. S.S. Tag w/S.S. screws
- W. Wall Mounting Bracket
- Y. 4-1/2" Dial
- Z. Special

NOTE: NOT ALL OPTIONS AVAILABLE IN COMBINATION WITH OTHER OPTIONS

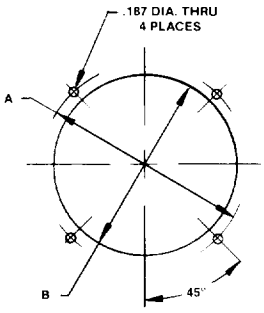
⑦ **ELECTRICAL CONFIGURATIONS**
- O. None **(Standard)**
- A. (1) Switch, Weatherproof Enclosure
- B. (2) Switches, Weatherproof Enclosure
- C. (1) Switch, Class 1, Group B, C, D Exp. Proof Enclosure
- D. (2) Switches, Class 1 Group B, C, D Exp. Proof Enclosure
- Z. Special

⑧ **ELECTRICAL SPECIFICATIONS**

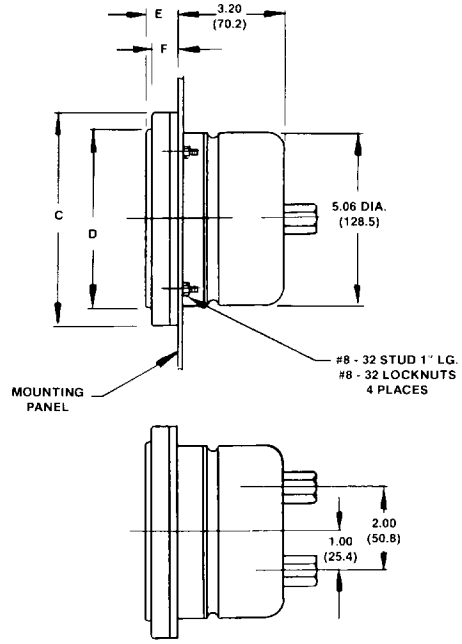
INPUT OPTIONS
- A. 8 to 28 VDC
- B. 115 VAC, 50/60 Hz
- C. 220/240 VAC, 50/60 Hz
- D. 115 VDC
- E. Standby Battery Pack, 9 VDC, 115 VAC, 50/60 Hz
- F. Standby Battery Pack, 9VDC, 220/240 VAC, 50/60 Hz
- Z. Special (Uncoded Options)

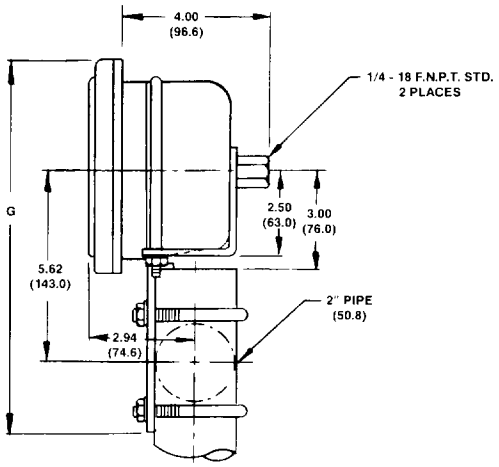
OUTPUT OPTIONS (Resistive Load - 10 Amp. @ 28VDC, 115/230 VAC (50/60 Hz)) (1/2" NPT, 24" Flying Leads Standard Interface)
- A. SPDT Relay(s)
- C. DPDT Relay(s) (available for 2 set points) (3/4" FNPT, 24" Flying Leads for double set point)
- D. Adjustable Deadband, 1 SPDT Output
- E. Adjustable Deadband, 1 DPDT Output
- Z. Special (Uncoded Options)

MOUNTING INFORMATION & DIMENSIONAL DATA



PANEL CUT OUT





PIPE MOUNTING

MODEL	A	B	C	D	E	F	G
109-4½"	5.63 (143.0)	5.29 (134.3)	6.21 (157.7)	5.25 (133.3)	.85 (21.4)	.70 (17.6)	11.03 (280.2)
109-6"	7.00 (177.8)	6.50 (165.1)	8.18 (208.0)	6.94 (176.2)	.91 (23.1)	.76 (19.3)	12.02 (305.5)

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

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 109 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®
Instrument
6500 Dobry Dr. ☐ Sterling Heights, MI 48314 U.S.A.
(586) 254-6500 ☐ FAX (586) 254-6509
E-mail: sales@midwestinstrument.com
Website: www.midwestinstrument.com

Printed in U.S.A.