GE Sensing

Features

The PMP 4000 Series provides a complete range of high level voltage output pressure transducers offering advanced levels of measurement accuracy, stability and flexibility from a standard production device.

- Accuracy to ±0.04% full scale (FS) best straight line (BSL)
- Pressure ranges from 1 psi to 10,000 psi (70 mbar to 700 bar)
- Gauge, absolute and differential formats available
- Stability ±0.1% per annum
- 4 x full scale over pressure

Applications

GE manufactures precision pressure sensors with a capability to meet critical applications in industrial and research environments.

- Test equipment
- Research and development
- Environmental test
- Monitoring critical pressures
- General industrial

PMP 4000 Series

Druck Amplified Output Pressure Transducers

PMP 4000 Series is a Druck product. Druck has joined other GE high-technology sensing businesses under a new name—GE Sensing.
GE Sensing

PMP 4000 Series Concept

At the heart of the 4000 Series is an advanced, high stability pressure measurement element micromachined from single crystal silicon within GE’s own processing facility. The silicon element is mounted within a high integrity glass-to-metal seal and is fully isolated from the pressure media by a Hastelloy isolation diaphragm, electron beam welded to the glass-to-metal seal.

Surface mount electronics condition the output from the silicon diaphragm, correct for thermally induced errors and configure the output to the required high level voltage. Advanced design features built into the electronic circuitry enable minimum sensor size with utmost reliability. The electronics incorporate power supply regulation, reverse polarity, over-voltage and short circuit protection, coupled with EMC protection components.

The fully encapsulated solid state design ensures integrity of product under high levels of shock and vibration, with an ingress protection rating up to IP68, dependent upon the electrical termination selected.

Every sensor is fully tested over both pressure and temperature ranges to demonstrate compliance to the specification. Prior to despatch, the sensor is adjusted to meet the particular pressure range and units, configured to the desired high level output voltage and completed with a range of electrical connections.

The demountable electrical connection formats allow the user to access the zero and span trim controls for system interchangeability and ease of re-calibration. A range of stainless steel pressure connections interface the sensor to the process media.

The PMP 4000 Series from GE Sensing is ideally suited to meet the demands of the industrial and automotive test cell market. Improved levels of performance measurement (± 0.04%), coupled with excellent stability, reduces the need for regular re-calibration periods, thus significantly reducing the cost of ownership.

With the benefit of the latest silicon measurement technology, the PMP 4000 Series can withstand the most demanding applications and still provide the performance of a precision pressure measurement device.
PMP 4000 Series Specifications

Pressure Measurement

Operating Pressure Range
Any zero based range from
• 1 to 940 psi (70 mbar to 65 bar) gauge
• 950 to 10,000 psi (65.1 to 700 bar) sealed gauge
• 5 to 10,000 psi (350 mbar to 700 bar) absolute
• 1 to 500 psi (70 mbar to 35 bar) differential

Compound ranges, e.g. -15 to 30 psi (-1 to 2 bar) gauge, bi-directional differential ranges and other pressure units can be specified.

Static/Line Pressure (PMP 4100)
1000 psi (70 bar) maximum

Over Pressure
The rated pressure can be exceeded by the following multiples causing negligible calibration change:

Gauge and absolute reference:
• 10 x for ranges 1 to 5 psi (70 to 350 mbar)
• 6 x for ranges 5 to 10 psi (350 to 700 mbar)
• 4 x for ranges 10 to 940 psi (700 mbar to 65 bar), 2000 psi (140 bar) maximum
• 2 x for ranges 950 to 10,000 psi (65.1 to 700 bar), 20,000 psi (1380 bar) maximum

Differential reference:
Positive side:
• 10 x for ranges 1 to 5 psi (70 to 350 mbar)
• 6 x for ranges 5 to 10 psi (350 to 700 mbar)
• 4 x for ranges 10 to 500 psi (700 mbar to 35 bar), 1500 psi (100 bar) maximum

Negative side:
Must not exceed positive side by greater than
• 6 x for ranges 1 to 5 psi (70 to 350 mbar)
• 4 x for ranges 5 to 10 psi (350 to 700 mbar)
• 2 x for ranges 10 to 75 psi (700 mbar to 5 bar)
• 150 psi (10 bar) for ranges 100 to 500 psi (7 to 35 bar)

Containment
The rated pressure can be exceeded by the following multiples while containing the pressure media:

Gauge reference:
• 12 x for ranges 1 to 2.5 psi (70 to 175 mbar)
• 6 x for ranges 2.5 to 950 psi (175 mbar to 65 bar), 3000 psi (200 bar) maximum

Absolute and Sealed Gauge reference:
• 3,000 psi (200 bar) for ranges up to 940 psi (65 bar)
• 20,000 psi (1380 bar) for ranges 950 psi (65.1 bar) and above

Differential reference:
Positive port:
• 12 x for ranges up to 5 psi (350 mbar)
• 8 x for ranges up to 10 psi (700 mbar)
• 6 x for ranges up to 500 psi (35 bar), 3000 psi (200 bar) maximum

Negative port:
• 8 x for ranges up to 5 psi (350 mbar)
• 6 x for ranges up to 10 psi (700 mbar)
• 4 x for ranges up to 500 psi (35 bar), 200 psi (15 bar) maximum

Excitation Voltage
• 9 to 32 VDC
• 15 to 32 VDC for all ranges and spans below 10 psi (700 mbar)
• 15 to 32 VDC for 10 VDC output

Output Voltage
• 1 psi (70 mbar) 0 to 2 VDC (maximum)
• 2 psi (175 mbar) 0 to 4 VDC (maximum)
• 5 psi (350 mbar) and above

Standard Output 0 to 5 VDC
Alternate Output, e.g. 1 to 5 VDC
0 to 10 VDC, -5 to +5 VDC can be specified
• Compound and bi-directional outputs are available
• 4 wire outputs are available

Note: maximum offset at zero pressure cannot exceed +2.5 VDC.

For non standard output, please check with your local sales office before ordering.

Output Impedance
<20 Ω

Load Impedance
Greater than 10 kΩ for quoted performance

R-Cal Facility/Shunt Calibration (Option C)
Connecting an external link between the appropriate terminals results in a positive shift of 80% FSO. Other values are available—refer to GE Sensing.
Performance

Accuracy
Combined Non-linearity, Hysteresis and Repeatability
- Standard: ±0.08% FS BSL
- Option A: ±0.04% FS BSL ranges above 2.5 psi (175 mbar) except ±0.06% FS BSL for 75 psi range (5 bar)

Zero and Span adjustment
±5% site adjustable by sealed, noninteracting potentiometers. (Demountable electrical connections only.)

Temperature Effects
- Standard: ±1% FS TEB over 32 to 122 °F (0 to 50 °C)
  ±2% FS TEB over -4 to 176 °F (-20 to 80 °C)
- Option B: ±0.5% FS TEB over 32 to 122 °F (0 to 50 °C)
  ±1% FS TEB over -4 to 176 °F (-20 to 80 °C)
For ranges below 5 psi (350 mbar) these values increase pro rata.

Acceleration Sensitivity
Typically 0.02% FS/g for 5 psi (350 mbar) decreasing to 0.0003% FS/g for ranges above 900 psi (60 bar), along the sensitive axis.

Mechanical Shock
1000g, 1ms half sine pulse in each of 3 mutually perpendicular axes will not affect performance.

Vibration
Response less than 0.05% FS/g at 30g peak 10Hz-2kHz, limited by 0.47 in (12 mm) double amplitude. (MIL-STD 810C Proc 514.2-2Curve L)

Physical

Operating Temperature Range
-4 to 176 °F (-20 to 80 °C).

Positive Pressure Media
Fluids compatible with stainless steel 316L and Hastelloy C276

Negative pressure media (PMP 4100)
Fluids compatible with stainless steel 316L, silicon, pyrex and adhesive

Weight
- 0.24 lb (120 g) nominal, 1 to 940 psi (70 mbar to 65 bar) ranges
- 0.37 lb (170 g) nominal, 950 to 10,000 psi (65.1 to 700 bar) ranges
- 0.42 lb (200 g) nominal for differential ranges

CE marking
CE marked for electromagnetic compatibility and the pressure equipment directive

Pressure Connection
- 1/4 NPT female as standard
- Other pressure connections available
- For pressure ranges above 950 psi (65.1 bar) alternative pressure connections are via adaptors (refer to GE Sensing for details).

Electrical Connection
A range of cable and connector versions are available. Some electrical options are demountable to allow access to zero and span potentiometers. See installation drawings and ordering information for details.

Calibration Standards
Instruments manufactured by GE are calibrated against precision pressure calibration equipment which is traceable to National Standards.

Options
- (A) Improved accuracy ±0.04% FS BSL, ±0.06% FS BSL for 75 psi (5 bar) ranges
- (B) Improved temperature effects
- (C) “R” Cal/shunt facility
- (D) Mating connectors for PMP4X6X variants
Please state the following:
1) Select model number
   Code Base model number
   PMP4  Base model
   Code Pressure Reference
   0  Gauge, Absolute or Sealed Gauge
   1  Differential
   Code Electrical Connector
   10  Fixed cable
   15  Demountable cable
   30  Fixed submersible cable
   60  Fixed 6 pin bayonet
   65  Demountable 6 pin bayonet
   70  Demountable DIN plug/socket
   Code Options
   O  None
   A  Improved accuracy
   B  Improved temperature effects
   C  Rcal/shunt facility
   D  Mating bayonet connector (for 4X6X)

2) State pressure range and units
3) State pressure reference (Gauge, Absolute, Sealed Gauge)
4) Output voltage at lowest pressure (check output voltage rules)
5) Output voltage at highest pressure (check output voltage rules)
6) Non standard pressure connection (refer to GE Sensing)

Wiring detail
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