GE
Measurement & Control Solutions

PACE1000

Precision Pressure Indicator

A high precision Druck pressure indicator, designed for test bench, bench top and panel mount calibration, test and monitoring applications.

Features

- Single or multiple pressure range configurations
- Up to three pressures displayed simultaneously
- Utilises GE's new unique range of piezo-resistive & Resonant Pressure Sensor technology
- Pressure ranges up to 1000 bar (14500 psi/100 MPa)
- Choice of precision up to 0.005% FS
- Long term stability up to 0.01% Rdg per annum
- Barometric reference option
- Negative gauge calibration included as standard
- Data Logging as standard with on screen replay
- Selectable graphical display
- High resolution touch screen operation
- Intuitive icon driven menu structure
- Switch Test/Analogue Output option
- Switch Test/Voltage Free Contact option
- RS232, IEEE connectivity, Ethernet and USB as standard
- Aeronautical option
- Leak Test option
- Min/Max/Average display
- Compatible with software packages
- 28 selectable pressure units plus 4 user defined units
- Various service support options available

GE imagination at work

PACE Precision Pressure Indicator

The new PACE precision pressure indicator brings together the latest measurement technology from GE to offer an elegant, fast, flexible and economical solution to pressure measurement for test, calibration and monitoring.

PACE employs digitally characterized pressure sensors which offer the quality, stability, higher bandwidth and precision associated with this latest generation of piezo-resistive and resonant devices.

PACE1000 offers a wide choice of standard pressure ranges, with three levels of precision to ensure that PACE1000 can accommodate specification and budget requirements.

The colour touch screen display of the PACE1000 can be configured by a user to indicate up to three pressure measurements from a possible five sensor inputs; three internal sensors and two external sensors.

The indication configuration extends to an ability to display in a text or graph format and also a differential of P1-P2 if more than two sensors are installed. The indicated display can be logged over a customized time period, sample rate and trigger. All the pressure sensor measurement can be re-transmitted via one of the communication ports.

PACE 1000 Options

Leak Test

Leak Test measures leak rate over the measure dwell time. At the start of the test, the instrument measures the applied test pressure of the user system. The instrument records the pressure change during measure dwell time. On completion the display shows the leak rate results, with leak rate per second or per minute in the current pressure units selected.

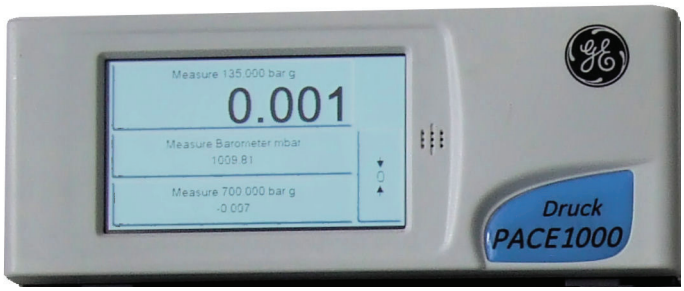
Switch Test – standard with the Analogue Output or Voltage Free Contacts option

Switch Test automates the testing of pressure switch devices. Following the test, displayed is the pressure at which contacts open and close and the switch hysteresis. Switch Test task can also be set to capture switch toggle max, min and average values.

Analogue Output

The Analogue Output can be programmed via the setup menu screen to output a signal proportional to the instrument range selected. This allows the instrument to interface with PC or PLC I/O cards, remote displays, chart recorders or other data logging equipment.

Users can select outputs of 0 to 10 V, 0 to 5 V, -5 to 5 V and 0/4 to 20 mA. Precision with respect to host instrument measured pressure 0.05% FS over the host instrument operating temperature range, variable update rate to 80 readings per second. The option is programmable between minimum and FS pressure for proportional output against pressure.

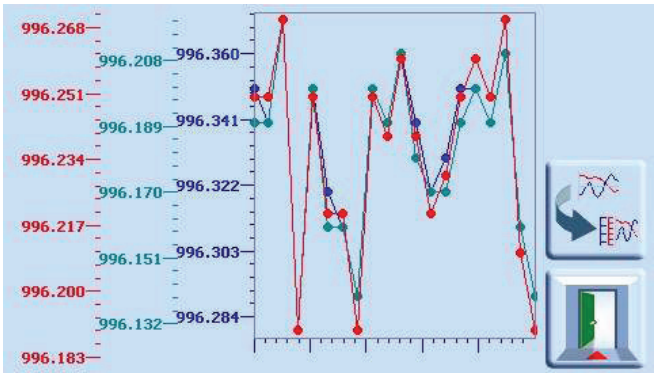


Volt Free Contacts

Volt Free Contacts enable control of peripheral devices such as vacuum pumps, ovens, etc. Each VFC option has three independent volt-free NO/NC relay contacts. A number of conditions can be set within a PACE1000 instrument to trigger a relay toggling its contacts.

Aeronautical option

Indication available in pure aeronautical units:
Altitude – feet or meters
Air speed – knots or km/hour, mph
Mach – mach number
Derived pressure at mean sea level and barograph for barometric applications.
QFE, QFF and QNH trend for airfield applications



Specifications

Pressure measurement

IPS pressure ranges:	25, 70, 200, 350 and 700 mbar gauge, 1, 2, 3.5, 7, 10, 20, 35, 70, 100, 135, 172, 210 bar gauge, 350, 420, 700 & 1000 bar absolute 0.35, 1, 3, 5, 10, 15, 30, 50, 100, 150, 300, 500, 1000, 1500, 2000, 2500, 3000 psi gauge, 5000, 6000, 10000 & 14500 psi absolute 2.5, 7, 20, 35, 70, 100, 200, 350, 700 kPa gauge, 1, 2, 3.5, 7, 10, 13.5, 17.2, 21 MPa gauge, 35, 42, 70 & 100 MPa absolute All gauge versions available with negative calibration as standard. For pseudo absolute/ gauge pressure range – select any range and add barometric option
IRS pressure ranges:	35-1300, 35-2600 & 35-3500 mbar absolute 0.5-19, 0.5-38 & 0.5-50 psi absolute 3.5-130, 3.5-260 & 3.5-350 kPa absolute
IRS-B barometric reference ranges:	750-1150 mbar absolute, 10.9-16.7 psi absolute, 75-115 kPa absolute
Over range indication:	10% above mbar/bar full scale pressure range.
Pressure media:	Pressure ranges 3.5 bar and above compatible with Stainless Steel 316 and Hastelloy C 276 Gauge ranges below 3.5 bar and absolute ranges below 3500 mbar abs: Dry, oil free, non-corrosive gas, air or Nitrogen recommended. For low pressure ranges below 350 mbar or 5 psi, please consult your sales representative

Display

Panel	¼ VGA wide format 4.3 inch colour graphics LCD c/w integral touch screen
Comms update rate	8 times per second
Display update rate readout	2 times per second ± 9999999
Pressure units	mbar, bar, Pa(N/m^2), hPa, kPa, MPa, mmHg @ 0°C, cmHg @ 0°C, mHg @ 0°C,, inHg @ 0°C, mmH_2O @ 4°C, cmH_2O @ 4°C, mH_2O @ 4°C, mmH_2O @ 20°C, cmH_2O @20°C, mH_2O @ 20°C, kg/m^2, kg/cm^2, torr, atm, psi, lb/ft^2, inH_2O @ 4°C, inH_2O @ 20°C, inH_2O @ 60°F, ftH_2O @ 4°C, ftH_2O @ 20°C, ftH_2O @ 60°F, User Defined 1, User Defined 2, User Defined 3, User Defined 4

Performance over the calibrated temperature range

IPS0 standard precision	0.02% Rdg + 0.02% FS (25 mbar: 0.20% Rdg + 0.20% FS, 70 mbar: 0.10% Rdg + 0.10% FS, 200 mbar: 0.04% Rdg + 0.04% FS) includes linearity, hysteresis, repeatability and temperature effects for gauge pressures and assumes steady state temperature and regular zeroing.
IPS1 high precision	0.01% Rdg + 0.01% FS (25 mbar: 0.10% Rdg + 0.10% FS, 70 mbar: 0.05% Rdg + 0.05% FS, 200 mbar: 0.02% Rdg + 0.02% FS) includes linearity, hysteresis, repeatability and temperature effects for gauge pressures and assumes steady state temperature and regular zeroing.

IPS2 premium precision	0.005% Rdg + 0.005% FS (25 mbar: 0.05% Rdg + 0.05% FS, 70 mbar: 0.025% Rdg + 0.025% FS, 200 mbar: 0.01% Rdg + 0.01% FS) includes linearity, hysteresis, repeatability and temperature effects for gauge pressures and assumes steady state temperature and regular zeroing.
IPS long term stability	0.01% Rdg per annum 2 bar to 210 bar (30 psi to 3000 psi). 0.02% Rdg, 1bar & 0.03% Rdg, 25 mbar – 700 mbar. Assumes regular zeroing
Negative gauge precision	Maximum error at any given pressure value is equal to maximum error at the equivalent positive pressure value.
IRS0 standard precision	0.01% FS includes linearity, hysteresis, repeatability and temperature effects
IRS1 high precision	0.005% FS includes linearity, hysteresis, repeatability and temperature effects
IRS0-B standard precision barometric reference	Precision for the optional barometric reference 0.10 mbar or 0.001450 psi. Includes non-linearity, hysteresis, repeatability and temperature effects between 15°C (59°F) and 45°C (113°F).
IRS1-B high precision barometric reference	Precision for the optional barometric reference 0.05 mbar or 0.000725 psi. Includes non-linearity, hysteresis, repeatability and temperature effects between 15°C (59°F) and 45°C (113°F).
IRS2-B premium precision barometric reference	Precision for the optional barometric reference 0.025 mbar or 0.0003625 psi. Includes non-linearity, hysteresis, repeatability and temperature effects between 15°C (59°F) and 45°C (113°F)
IRS long term stability	0.01% reading per annum, barometer 0.1 mbar/annum
Pseudo absolute mode precision	Gauge mode precision + absolute mode reference precision
Electrical	
Power Supply	90 VAC to 130 VAC @ 47 to 63 Hz & 180 VAC to 260 VAC @ 47 to 63 Hz. 15 VA
Communications	
Communication	RS232, USB and IEEE-488, SCPI, DPI141, DPI142 and DPI150 emulation. LabVIEW drivers Ethernet (VXI-II & Sockets using SCPI).
Environmetal	
Temperature	Operating 10°C to 50°C (50°F to 122°F) Calibrated 15°C to 45°C (59°F to 113°F) Storage -20°C to 70°C (-4°F to 158°F)
Sealing Humidity Vibration Shock Conformity	IP20 (EN60529), indoor use only 5% RH to 95% RH non-condensing. Compliant with Def. Stan. 66-31 8.4 Cat 3 and MIL-T-28800E Cat 2 Mechanical shock conforms to EN61010 LVD EN61010, EMC EN61326, PED, ROHS & WEEE – CE marked
Physical	
Weight	3.2kg (excluding external PSU & packaging) to 6.5 lbs (including external PSU & packaging)
Dimensions	218 mm wide x 88mm (2U) high x 250 mm deep (8.6in x 3.5 (2U) x 9.8 in)
Pressure connection	G 1/8 Female (1/8 NPT Female by adaptor, standard for North America) 25 mbar to 210 bar. 9/16 18 UNF Autoclave male 350 bar to 1000 bar.

Ordering information

Please state the following (where applicable)

1. Model PACE1000

PACE chassis	*PACE internal sensor – IRS absolute	*PACE internal sensor – IRS-B absolute	*PACE internal sensor – IPS gauge	*PACE internal sensor – IPS absolute	1 X Switch Test/ Voltage Free Contact option or Switch Test/ Analogue Output option	2 X Switch Test/ Voltage Free Contact option or Switch Test/ Analogue Output option	Leak Test & Aeronautical option
PACE1000 no internal sensor 3 X IDOS connection	o	o	o	o	•	•	•
PACE1001 1 X internal sensor 2 X IDOS connection	•	•	•	•	•	o	•
PACE1002 2 X internal sensors 2 X IDOS connection	•	•	•	•	• (not available if 1 IPS gauge is selected and no IRS-B)	o	•
PACE1003 3 X internal sensors 2 X IDOS connection	•	•	• (a minimum of 1 IRS-B must also be selected)	•	o	o	•

*Please state precision for each IPS/IRS selected.

• Available

o Not Available

2. Options

The range of optional features includes:

- Leak Test – Automatically measures leak rates in the desired units/minute or units/seconds
- Switch Test/Analogue Output – Accurate calibration of pressure switches/integration into older ATE applications
- Switch Test/Voltage Free Contacts – Accurate calibration of pressure switches/automatically triggering ancillary devices
- Aeronautical - Allows for the test and calibration of aeronautical instruments

3. PACE chassis – Area of use

Please state area of use for instrument set up:

Europe
North America
Japan
Asia
Rest of the world

Please state area of use for mains lead:

UK
Japan
EU
USA
South Africa/India
China
Australia/New Zealand

4. IPS/IRS precision

Standard precision – IPS0
High precision – IPS1
Premium precision – IPS2

Standard precision – IRS0
High precision – IRS1

Standard precision – IRS0-B
High precision – IRS1-B
Premium precision – IRS2-B

PACE1000 from the rear

5. PACE Internal Pressure Sensor ranges – IPS

Bar	psi	Pa
25 mbar g	0.35 psi g	2.5 kPa g
70 mbar g	1 psi g	7.0 kPa g
200 mbar g	3 psi g	20.0 kPa g
350 mbar g	5 psi g	35.0 kPa g
700 mbar g	10 psi g	70.0 kPa g
1 bar g	15 psi g	100.0 kPa g
2 bar g	30 psi g	200.0 kPa g
3.5 bar g	50 psi g	350.0 kPa g
7 bar g	100 psi g	700.0 kPa g
10 bar g	150 psi g	1.0 MPa g
20 bar g	300 psi g	2.0 MPa g
35 bar g	500 psi g	3.5 MPa g
70 bar g	1000 psi g	7.0 MPa g
100 bar g	1500 psi g	10.0 MPa g
135 bar g	2000 psi g	13.5 MPa g
172 bar g	2500 psi g	17.2 MPa g
210 bar g	3000 psi g	21.0 MPa g
350 bar a	5000 psi a	35 MPa a
420 bar a	6000 psi a	42 MPa a
700 bar a	10000 psi a	70 MPa a
1000 bar a	14500 psi a	100 MPa a

PACE Internal Resonant Pressure Sensor ranges – IRS

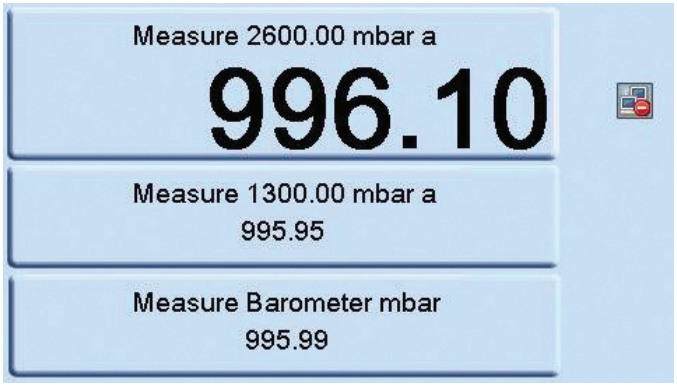
Bar	psi	Pa
35-1300 mbar a	0.5-19 psi a	3.5-130 kPa a
35-2600 mbar a	0.5-38 psi a	3.5-260 kPa a
35-3500 mbar a	0.5-50 psi a	3.5-350 kPa a

PACE barometric option*

PACE Internal Resonant Sensor Barometer ranges – IRS-B

Bar	psi	Pa
750-1150 mbar a	10.9 – 16.7 psi a	75-115 kPa a

*Provides absolute pressure option in addition to gauge pressure. In absolute mode adds barometric pressure to gauge pressure range. For absolute mode ranges below 1 bar please consult your sales representative.



6. Physical accessories

Please order the following as separate line items:

Part number	Description
IO-ADAPT-G1/4	Adaptor G1/8 Male to G 1/4 Female
IO-ADAPT-1/8NPT	Adaptor G1/8 Male to 1/8 NPT Female
IO-ADAPT-1/4NPT	Adaptor G1/8 Male to 1/4 NPT Female
IO-ADAPT-7/16UNF	Adaptor G1/8 Male to 7/16 – 20 UNF Female
IO-ADAPT-AN4	Adaptor G 1/8 Male to AN4 37 Deg Male
IO-ADAPT-AN6	Adaptor G 1/8 Male to AN6 37 Deg Male
IO-ADAPT-BARB	Adaptor G 1/8 Male to 1/4 Hose
IO-ADAPTOR-KIT	Contains one of each of the above adaptors
IO-ADAPT-9/16AC	Adaptor 9/16 18 UNF Autoclave Female to 1/8 NPT Female
IO-SNUBBER-1	Snubber reference port
IO-DIFF-KIT-LP	Differential connection kit low pressure: Helps reduce the impact of thermal and/or pressure changes in ambient conditions occurring during the measurement cycle
IO-RMK-P1000	19" rack mount kit
IO-PAN-P1000	19" panel mount kit

7. Supporting services

Services ordering information:

Please order the following as separate line items:

Calibration

Part number	Description
IO1000-ACAL-PRESS	PACE1000 Accredited Pressure Calibration

PACE Family

PACE – pressure calibration & test solutions

PACE1000 – Precision Pressure Indicator
PACE5000 – Single Channel Pressure Controller Chassis
PACE6000 – Dual Channel Pressure Controller Chassis

CM0 – Standard precision high speed pressure controller module
CM1 – High precision high speed pressure controller module
CM2 – Premium precision high speed pressure controller module

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