

GE Sensing

Features

- Integral pressure vacuum generation, vacuum to 300 psi (20 bar)
- Barometric accuracy ± 0.0044 inHg (± 0.15 mbar)
- Voltage/current power source
- Calibration management software compatible
- $\pm 0.025\%$ of reading accuracy
- Dual pressure and electrical readout
- Data storage and transfer via RS232
- Temperature measurement to 400°F (200°C)
- Intrinsically safe version
- Functions include:
 - Peak readings
 - Switch testing
 - Data logging
 - Leak testing
 - Limit setting
 - Data analysis

The DPI 605 precision pressure calibrator provides a simple and cost effective means of meeting the calibration requirements of ISO 9000 and other similar quality standards. The instrument, which combines micromachined silicon piezoresistive and resonating element sensors with the latest microprocessor technology, features 0.025% of reading accuracy. It is a totally self contained, battery powered pressure test and calibration system. Standard features include electrical measurement and supply capability, pressure and vacuum generation, simultaneous displays of pressure/vacuum and electrical parameters, extensive data processing and storage capability and RS232 interface.

To simplify field calibration and the collection and transfer of data, it offers a wide range of standard functions. Peak readings, switch testing, data logging, leak testing, limit setting and results analysis all add to the versatility of this instrument. Test data is safely stored in the non-volatile memory and, when the calibration work is completed, can be easily downloaded into the computer. Druck also offers auto calibration and data analysis software specifically designed to run on a PC. This enables completely automated calibrations to be carried out with the DPI 605.

DPI 605

Druck Precision Portable Pressure Calibrators

DPI 605 is a Druck product.
Druck has joined other
GE high-technology sensing
businesses under a new name—
GE Industrial, Sensing.



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Pressure and vacuum generation and adjustments are achieved by an integral hand pump and volume adjuster, with a release valve for venting. When it is important that the maximum pressure for the unit under test is not exceeded, a safety LIMITS function may be selected to automatically block the pumping action at the desired set pressure.

The advanced sensor and thermal compensation technologies employed allow the standard instrument to cover a range of -14.7 to 300 psi (-1 to 20 bar). Unlike competitive calibrators, it is not necessary to purchase multiple pressure modules to test units over this range.

An indicator version is available for operation up to 5000 psi (350 bar) with internal transducers, and up to 10,000 psi (700 bar) with external transducers. The indicator includes all the features of the calibrator except for the integral pressure and vacuum generation capability.

For barometric pressure measurement, a high accuracy resonating silicon pressure transducer is added to the instrument. This sensor allows simulation of other absolute pressures by adding the barometric value to the gauge measurement. In addition, an optional temperature probe can be supplied for temperature measurements up to 400°F (200°C).

The DPI 605 features an impact resistant, splash and dust proof enclosure. All of the main controls are via a membrane keypad and the LCD graphics display is mounted behind a tough polycarbonate window. The display can be illuminated when measurements have to be made under poor lighting conditions. All of the electrical input and output connections are recessed into the sides of the enclosure to avoid accidental damage. The instrument weighs only 9 lb (4 kg) and is supplied with a carrying case that contains a separate storage compartment for test leads and other accessories.

Total Quality Management

The DPI 605 is a powerful tool in the support to quality management systems. Together with data analysis and auto calibration software, it can perform an almost limitless range of pressure calibration and test functions. Reports for up to 40 independent 20-point calibrations can be stored. Routine Calibrations can be transferred

from the data base to the DPI 605 and results downloaded to update records, analysis and histograms, etc. The complete system permits audit trail compliance with all of the major quality management standards, FDA validation and OSHA requirements.

The simple keypad operation of the DPI 605 provides easy and rapid access to all the calibration and test facilities.

Pressure Key Functions

These keys define the desired pressure measurement parameters.

Range

This is used to select an internal or external transducer and the gauge, absolute or barometric pressure reading.

Units

Up to four alternative pressure units are immediately available. In conjunction with the SET-UP key, 24 pressure units can be assigned to the instrument.

Limits

This key is used when it is necessary to protect the instrument under test from pressure overload. A safety limit will block the pump action at the desired maximum pressure and trigger an audible alarm.

Process

The process key allows access to a range of functions:

- *Tare*—provides a facility to offset the displayed pressure reading by either the currently displayed pressure or a manually entered value.
- *Peak*—records the maximum and minimum pressure levels obtained during operation.
- *% full scale (FS)*—converts the indicated pressure reading to a % FS reading over the operator defined zero and FS range.
- *Filter*—this will stabilize the display if the instrument is connected to a fluctuating pressure line.

Zero

Used to remove display zero offset

Pressure/Vacuum

Changes the operation of the hand pump from pressure generation to vacuum generation

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Electrical Input Key Functions

Four keys control the digital multimeter facilities of the instrument.

Volts

Measures ± 50 V with 0.01mV maximum resolution

mA

Measures ± 55 mA with 0.001 mA resolution

Temp

With the optional PT 100 platinum resistance probe, the instrument provides a temperature measurement display. The scale is from -60°F to 400°F (-55°C to 200°C) and the units are selectable as $^{\circ}\text{F}$ or $^{\circ}\text{C}$.

Electrical Output Key Functions

These two keys are used to configure the electrical outputs as either a fixed voltage or current, programmable via the keypad, or an analog output of any of the measured parameters, i.e. pressure, temperature, voltage and current.

Volts

Programmable within the range 0 to 24 V

mA

Programmable within the range 0 to 55 mA

Mode Select Keys (blue keys)

The nine mode select keys provide access to a variety of functions

On/Off

Switches the instrument on or off. The DPI 605 can be programmed to automatically switch itself off after a defined period of inactivity.

Display Light

Improves viewing visibility in poorly lit locations. Can be programmed to switch itself off after a defined period of time.

Set-up

Enables selection of the following variables:

- *Units*—24 pressure scales
- *Temperature*— $^{\circ}\text{F}$ or $^{\circ}\text{C}$
- *Comms*—to set up the RS232 communication parameters, i.e. Baud-rate, Parity, Handshake.
- *Auto off*—provides automatic power saving.
- *Clock*—permits operator to set up time and date functions.
- *Calibration*—provides access to calibration parameters. A password (PIN #) is required before entry is permitted.

Switch Test

This key configures the instrument to test pressure switches. The pressure display indicates the applied pressure and status of the switch contacts. When the pressure is varied and the switch contacts change, the display records the event, i.e. switch contacts opened at 50 psi (3.5 bar) and closed at 30 psi (2 bar).

Data Log

This enables the DPI 605 to act as data logger and store up to 10,000 readings. Record and Replay facilities are included:

- *Record*—provides for entry of tag number, selection of data log trigger (internal or external), selection of stop event (time or number of samples), and set up of start delay time.
- *Replay*—is used to either recall any selected data log file to the display, or to download the stored data to an external printer via the RS232 port. The data can be presented in a numerical or graphical format. The graph can be displayed as pressure vs time, electrical vs time or pressure vs electrical.

Leak Test

This function provides a leak test facility for the unit or system under test. The display is reconfigured to indicate pressure drop and leak rate. Three additional functions are allocated to this facility:

- *Wait*—delay the start to allow pressure setting
- *Time*—the duration of leak test period.
- *Reset*—resets leak test display values to zero on completion of the test.

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Auto Cal

Permits the storage of up to 40 independent 20 point calibrations together with the tag numbers of the units under test.

Store

Snapshot memory allows the current display to be stored in one of 20 memory locations.

Recall

Replays previously stored data

Display

The DPI 605 incorporates a clear, high resolution LCD which provides excellent viewing visibility under a wide range of plant conditions. Display presentations are available for virtually every pressure calibration and test requirement. To simplify the calibration process, electrical parameters are positioned alongside the pressure data.

Interface

The DPI 605 is both a versatile calibrator and flexible instrumentation system capable of interfacing with numerous options, inputs and outputs. Connections are located in protected areas at the two sides of the case.

Located in the left-hand side of the instrument are the 0.15 in (4 mm) electrical connections. These sockets can be considered as two functional groups. Depending on the selected mode, the first Group A,B,C&D provide;

programmable voltage/current outputs (B-C), transmitter simulator output (C-D), switch test input (A-B) and trigger signal input (A-D).

The second group I, COM and V, provide the input to the built-in digital multimeter (DMM). Current inputs are applied between the common (COM) and I terminals. Voltage inputs are applied between the (COM) and (V) terminals.

Positioned on the right hand side of the instrument are the multiway connections. These connectors are splash proof with spring closed covers for protection. Each connector has a different pattern and will only mate with a corresponding plug. The sockets are allocated as follows:

- Power adaptor/battery charger (power)
- Temperature probe (temperature probe)
- RS232 serial data interface (RS232)
- External transducer (external transducer)

Pneumatic Circuit

The Calibrator version of the DPI 605 has a built-in hand pump to generate either pressure up to 300 psig (20 barg) or vacuum to -22 inHg (-850 mbar) gauge. Latching solenoid valves provide pressure limiting features, pressure/vacuum change-over of the hand-pump and low range transducer protection.



DPI 605 Specifications

Pressure Measurement

Operating Pressure Range

-14.7 to 300 psi (-1 to 20 bar)

Option available for absolute pressures via barometric reference sensor. See option A.

For external sensors see option B.

Pressure Scale Units

24 different scales under set-up, user selectable.

Overpressure

To 1.25 x causing negligible calibration change.

Pressure Media

Compatible with most common non-corrosive gases.

Transduction Principle

Dual, integrated silicon strain gauge sensors. Optional barometric reference utilizes vibrating silicon element.

Readout

- ± 999999 capability on both pressure and electrical parameters.
- ± 9999 for ranges below 1.5 psi (100 mbar) FS

Display

1.5 in x 5.2 in (38 mm x 132 mm) LCD graphics panel, 240 x 64 pixels backlit (backlight not available on IS version)

Display Overload

110% FS pressure overrange nominal. Above this the display flashes.

Resolution

17 bits (0.00075% FS)

Response

Two readings per second nominal.

Zero Control

Pressure offset correction by keypress. Ability under process key to permit tare of pressure, voltage and current, either manual or displayed value.

Accuracy

Positive Pressures

- $\pm 0.025\%$ of reading between 3% and 100% FS
- ± 0.002 psi (± 0.15 mbar) below 3% FS

Negative Pressures

- $\pm 0.025\%$ of reading between -14.7 psi to -8.7 psi. (-1 bar to -600 mbar)
- ± 0.002 psi (± 0.15 mbar) between 0 and -8.7 psi (0 to -600 mbar)

Temperature Effects

- -14.7 to 300 psig (-1 to 20 barg) calibrator, over 15°F to 105°F (-10°C to 40°C) the averaged temperature coefficient $\pm 0.001\%$ of reading per °F ($\pm 0.002\%$ of reading per °C)

Position Effect

Negligible

Electrical Specification

Electrical Inputs

Voltage Measurement

0 to ± 50 VDC auto ranging, resolution 10 μ V (± 30 VDC IS version)

Input impedance 10 M Ω

Accuracy $\pm 0.04\%$ of reading ± 1 digit. Figure includes 90 day stability, T.C. < 0.00375% of reading/°F (< 0.0075% of reading °C)

Current Measurement

0 to ± 55 mA d.c. resolution 0.001 mA

Internal Resistance 10 Ω

Accuracy 0.03% of reading ± 1 digit including 90 day stability, T.C. < 0.00375% of reading/°F (< 0.0075% of reading °C).

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Electrical Outputs

Voltage Output (Not IS Version)

Programmable floating output in the range 0 to 24 VDC max 50 mA.

Accuracy: $\pm 0.025\%$ of reading $\pm 0.01\%$ FS ± 1 digit.
Suitable also for current loop energization and switch testing.

Current Output (Not IS Version)

Programmable output in the range 0 to 55 mA DC

Accuracy: $\pm 0.035\%$ of reading $\pm 0.01\%$ FS ± 1 digit.

Configured as source, voltage limit 19 V.

Configured as sink, voltage limit maximum 30 V (voltage limit minimum 5 V)

Analog Output Signal (Not IS Version)

Proportional to displayed pressure or electrical reading. 0 to 24 VDC with 16 bit (0.001% FS) resolution. User programmable zero and FS settings.

Current output can also be provided 0 to 50 mA

Bandwidth 1 to 2 Hz updated each new reading.

Accuracy: $\pm 0.05\%$ of reading $\pm 0.005\%$ FS ± 1 digit.

Above accuracies include 90 day stability.

Digital Interface

RS232 serial interface to the SCPI protocol for stored data output to host computer or printer and down loaded test routines and remote control. (Not for use in hazardous area.)

Calibration Controls

Via instructions from the keypad. Access to calibration mode is under set-up protected by pin number for security.

Power Supply

- Supplied fitted with Ni-Cad rechargeable pack (not IS version). Can also be powered by six D cells, alkaline recommended. Battery life 20 hours nominal for Ni-Cad. 70 hours nominal for alkaline (20 hours for IS).
- External PSU/charger unit supplied as standard.

Environmental Specification

Temperature

- Operating: 15°F to 105°F (-10°C to 40°C)
- Storage: 0°F to 140°F (-20°C to 60°C)

Electro Magnetic Compatibility

Designed to meet EN50081-1 and EN50082-1

Physical Specification

Weight

9 lb (4 kg) nominal

Dimensions (h x w x l)

5.5 in x 11 in x 14.5 in (140 mm x 280 mm x 370 mm)

Pressure Connections

1/8 NPT female and G1/8 female

Carrying Case

This is supplied with the instrument as standard and a complete set of test leads are included.

Pressure Generation and Adjustment

The Calibrator version is complete with:

- Hand pump capable of generating -22 inHg (-850 mbar) gauge to 300 psig (20 bar)
- Volume adjuster for fine control
- Vent valve for pressure release
- Solenoid valves for pressure/vacuum switchover and pump limiting for safety

Options Available

See the details under the Options listing on the back page. The following facilities are available:

- A) Barometric reference option for barometric pressure and absolute measurement.
- B) Ability to add external transducers to broaden the dynamic range of measurement.
- C) Temperature probe for readings over -60°F to 400°F (-55°C to 200°C).
- D) Negative 14.7 psi (1 bar) calibrations for the indicator version
- F) Extra Ni-Cad battery pack for in field use (not IS version)
- G) Calibration software.
- H) Dirt moisture trap to prevent contamination

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Indicator

The DPI 605 can also be supplied as an indicator having wider pressure range capability but no pressure generation and adjustment facilities. Vent valve for pressure release fitted as standard.

An external pressure source such as bottled gas can be utilized to enable an indicator to be configured as a calibrator.

Operating Pressure Range

Any FS range can be supplied between the ranges listed below:

- 1 to 5000 psig (70 mbar to 350 bar)
- 5 to 5000 psia (350 mbar to 350 bar)
- Gauge versions available with -14.7 psig (-1 barg) calibration.

Accuracy

Ranges 1 to 1000 psi (70 mbar to 70 bar)

- $\pm 0.05\%$ of reading between 20% and 100% FS
- $\pm 0.01\%$ of FS between 0 and 20% FS
- For -14.7 psi (-1 bar) calibrations, FS range is defined as the compound range

Ranges 1001 to 5000 psi (71 to 350 bar)

- $\pm 0.08\%$ of reading between 20% and 100% FS
- $\pm 0.016\%$ of FS between 0 and 20% FS

Figures include 90 day stability.

Temperature Effects

1 to 5000 psi (70 mbar to 350 bar) internal sensors, $\pm 0.0015\%$ of reading/ $^{\circ}\text{F}$ ($\pm 0.003\%$ of reading $^{\circ}\text{C}$).

Options

(A) Barometric Reference

A precision resonant pressure transducer (RPT) monitors barometric pressure and, when used in conjunction with the normal gauge sensors, allows absolute ranges to be measured.

The RPT provides an accuracy of ± 0.0044 inHg (± 0.15 mbar) over the ranges 23 to 33 inHg (800 to 1150 mbar) absolute and over a temperature range of 50°F to 85°F (10°C to 30°C). Over extended 15°F to 105°F (-10°C to 40°C) error 0.0088 inHg (0.3 mbar). Accuracy includes one year stability.

(B) External Transducers

In addition to the internal transducers, the instrument can be configured with ten external piezo resistive sensors (one at a time), and one resonant sensor. Supplied assembled with the 12-pin connector for direct interfacing with the instrument.

Any FS can be specified between the ranges:

- 0 to 1 psi (0 to 70 mbar) to 0 to 1000 psi (0 to 70 bar) gauge
- 0 to 1001 psi (0 to 71 bar) to 0 to 10,000 psi (0 to 700 bar) sealed gauge
- 0 to 5 psi (0 to 350 mbar) to 0 to 10,000 psi (0 to 700 bar) absolute
- 0 to 2.5 psi (175 mbar) to 0 to 500 psi (0 to 40 bar) differential

Maximum line pressure 500 psi (35 bar). Differential ranges unidirectional calibrations only. For high line pressures, refer to manufacturer.

Accuracy

For external transducers range 1 to 1000 psi (70 mbar to 70 bar):

- $\pm 0.05\%$ of reading between 20% and 100% FS
- $\pm 0.01\%$ of FS between 0 and 20% FS
- For ranges 1001 to 10,000 psi (71 to 700 bar) $\pm 0.08\%$ of reading between 20% and 100% of FS
- $\pm 0.016\%$ of FS between 0 and 20% FS

Figure includes 90 day stability.

Temperature Effects

- Option B1: provides normal piezo-resistive transducer temperature error bands—see data sheets
- Option B2: provides enhanced temperature coefficients as detailed for internal sensors.

Standard cable length 6 ft (2 m).

(C) Temperature Probe

A platinum resistance temperature probe (PT 100 Class A):

- $^{\circ}\text{F}$ or $^{\circ}\text{C}$
- Range: -60°F to 400°F to (-55°C to 200°C)
- Resolution: 0.01°F or 0.01°C
- Accuracy: $\pm 0.2^{\circ}\text{F}$ ($\pm 0.1^{\circ}\text{C}$); includes 90 day stability
- Temperature effects: $\pm 0.0005\%$ reading/ $^{\circ}\text{F}$ $\pm 0.0044\%$ $^{\circ}\text{F}$ ($\pm 0.0009\%$ reading/ $^{\circ}\text{C}$ $\pm 0.0022^{\circ}\text{C}$)

PT 100 probe accuracy not included in above figures

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(D) -14.7 PSI (-1 bar) Calibration

With calibrator versions of the DPI 605, a -14.7 psi (-1 bar) calibration is supplied as standard. For external transducers and indicator versions, if -14.7 psi (-1 bar) calibration data is required then Option D should be specified.

(F) Ni-Cad Battery Pack (Not IS Version)

Extra battery packs can be provided as a back up if required.

(G1) Intecal for Industry (P/N Intecal-Ind)

Developed to meet the growing demand on industry to comply with quality systems and calibration documentation. Test procedures are created in a Windows® based application and devices due for calibration are reported and grouped into work orders for transfer to the DPI 325, DPI 335, DPI 605, DPI 615, TRX-II and the MCX II. Calibration results, are uploaded to the PC for analysis and to print calibration certificates.

Visit www.gesensing.com for more information and free download.

(G2) Intecal Calibration Management Software (P/N 7000-Intecal)

Builds on the concept of Intecal for industry supporting both portable calibrators and on-line workshop instruments. Intecal is a simple to use calibration management software, which enables a high productivity of scheduling, calibration and documentation.

Visit www.gesensing.com for more information and free download.

(H) Dirt Moisture Trap

The IDT 600 Dirt Moisture Trap prevents contamination of the DPI 605 pneumatic system and also eliminates possible cross-contamination from one device under test to another where cleanliness is important. The IDT 600 has a transparent body for easy inspection and is designed to fit directly into the DPI 605 pressure port.

- Maximum Pressure: rating 500 psi (35 bar)

(H1) G1/8 B male/G 1/8 female

(H2) 1/8 NPT male/1/8 NPT female

Intrinsic Safety (Not ATEX)

For Hazardous Area Use:

EEX ib gas group IIC with T4 temperature rating to EN50014 (BS5501 part I) and EN50020 part 7 (BS5501 part 7).

Accessories

- Carrying case
- Electrical test probes
- Adaptor lead for RS232 (six way circular to nine way D type).
- Handbook and calibration certificate(s)
- Battery charger eliminator (not IS version)

Related Products

GE manufactures a comprehensive range of pressure transmitters, transducers, indicators, controllers and calibrators.

Calibrated Standards

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

Ordering Information

Please state the following (where applicable):

- 1) Type number
- 2) Calibrator version or Indicator version
- 3) Pressure range—gauge, absolute or differential
- 4) Options
- 5) External pressure transducer specifications

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