

## DPI 605

### Precision Portable Pressure Calibrators

- Integral pressure/vacuum generation
- Barometric accuracy:  $\pm 0.015\%$
- Voltage/current power source
- ISO 9000 systems compatible
- Accuracy:  $\pm 0.05\%$  of reading
- NEMA 4X sealed case - 9 lbs.
- Data transfer via RS 232
- Range: -14.7 to 300 psi
- Functions include

*peak readings  
switch testing  
data logging  
leak testing  
limit setting  
data analysis*



# DPI 605 SERIES: Precision Portable Pressure Calibrator

## INTRODUCTION

The DPI 605 precision pressure calibrator provides a simple and cost effective means of meeting the calibration requirements of ISO 9000, MIL-45662A and other similar quality standards. The instrument, which combines micromachined silicone piezoresistive and resonating element sensors with the latest microprocessor technology, features 0.05% 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 RS 232 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.

Pressure and vacuum generation and adjustments are achieved by an integral hand pump and volume adjust, 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. 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 with internal transducers, and up to 10,000 psi 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.

The DPI 605 features an impact resistant, splash and dust proof NEMA 4X (IP54) enclosure. All of the main controls are via a membrane keypad and the L.C.D. 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 lbs. and is supplied with a water resistant carrying case that contains a separate storage compartment for test leads and other accessories.



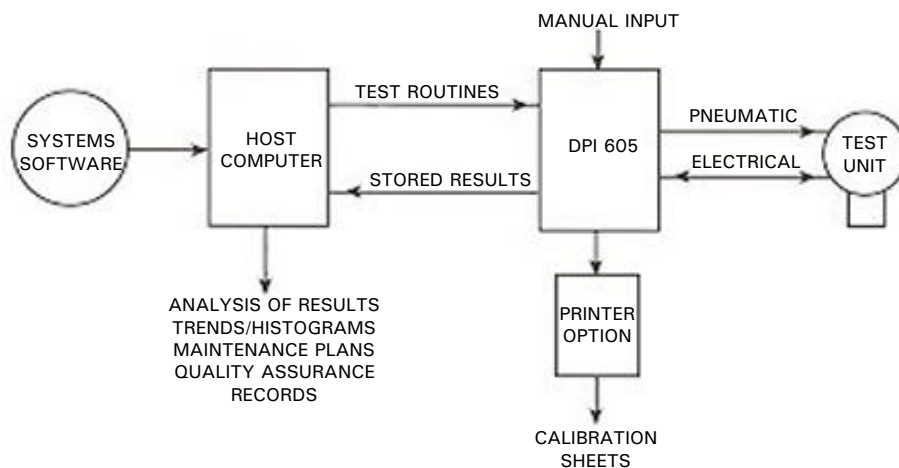
# DPI 605 SERIES: Precision Portable Pressure Calibrator



## TOTAL QUALITY MANAGEMENT

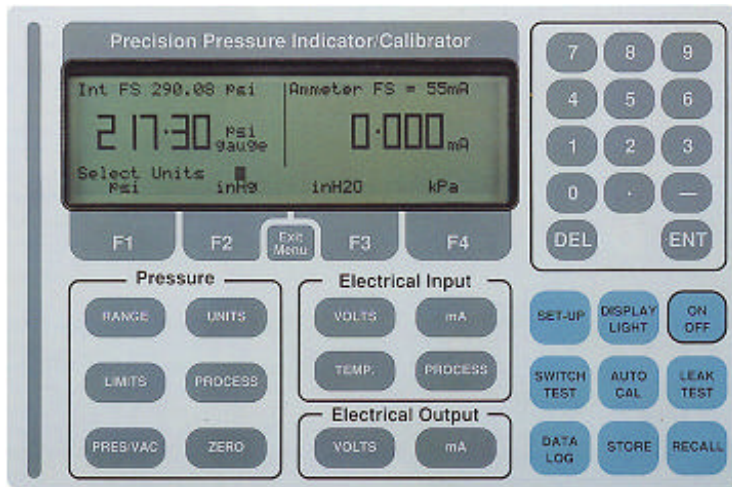
The DPI 605 is a powerful tool in the support to TQM systems. Together with Druck's data analysis and auto calibration software, it can perform an almost limitless range of pressure calibration and test functions. Reports for up to 40 independent 20-point calibrations can be stored and printed via an optional printer. 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.



# DPI 605: Precision Portable Pressure Calibrator

## KEYPAD



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 4 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.

**%F.S.** - converts the indicated pressure reading to a %F.S. reading over the operator defined zero and full scale range.

**FILTER** - this will stabilize the display if the instrument is connected to a fluctuating pressure line.

**FLOW** - computes flow from differential pressure across an orifice plate.

#### Zero

Used to remove display zero offset.

#### Pres/Vac

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

### Electrical Input Key Functions

For keys control the digital multimeter facilities of the instrument.

#### Volts

Measures  $\pm 50$  V with 0.01mV maximum resolution.

#### mA

Measures  $\pm 55$  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  $-60^{\circ}$  to  $+400^{\circ}$ F and the units are selectable as  $^{\circ}$ F or  $^{\circ}$ 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 24V.

#### mA

Programmable within the range 0 to 55 mA.

### Mode Select Keys (blue keys)

The 9 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 -  $^{\circ}$ F or  $^{\circ}$ C

COMMS - to set up the RS-232 communication parameters, i.e. Baud-rate, Parity, Handshake.

AUTO OFF - provides automatic power saving.

CLOCK - permits operator to set up time and date functions.

CAL - 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.

#### 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 RS 232 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*. Four additional functions are allocated to this facility:

**WAIT** - the delay period between operation of the START function and commencement of test period.

**TIME** - the duration of Leak Test period.

**START** - initiates Leak Test.

**RESET** - resets Leak Test display values to zero on completion of the test.

#### Auto Cal

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

#### Store

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

#### Recall

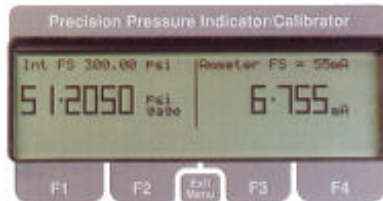
Replays previously stored data.

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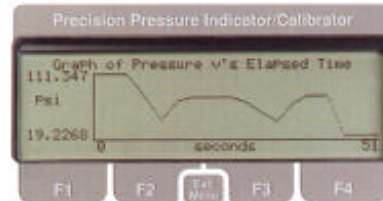
## DISPLAYS

The DPI 605 incorporates a clear, high resolution L.C.D. 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.

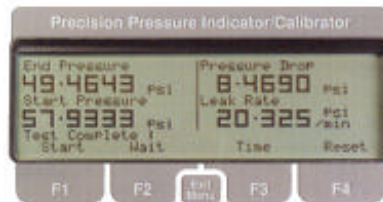
**Standard Calibration**



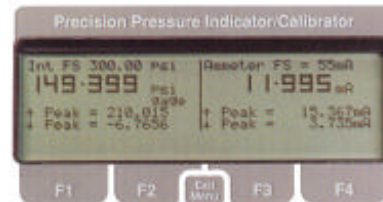
**Data Log Plot**



**Leak Test**



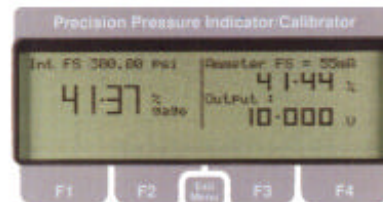
**Peak Hold**



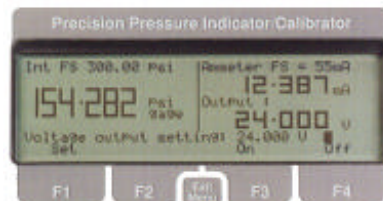
**Switch Test**



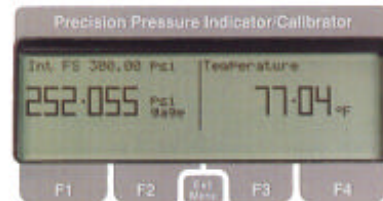
**Percentage Display**



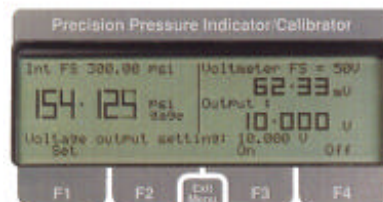
**Powered Transmitter Test**



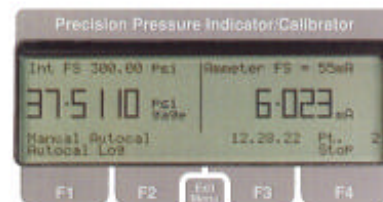
**Pressure & Temperature Display**



**Powered Transducer Test**



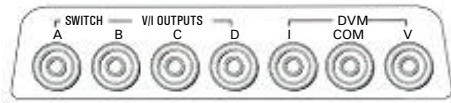
**Auto Cal Screen**



# DPI 605 : Precision Portable Pressure Calibrator

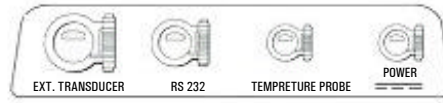
## INTERFACE

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, the 0.15 in. connections made via this panel are shown above. These sockets can be considered as two functional groups. Depending on the selected mode, the first group A, B, C and D provide; programmable voltage/current outputs (B-C), transmitter simulator output (C-D), switch test input (A-B) and trigger signal input (A-D).

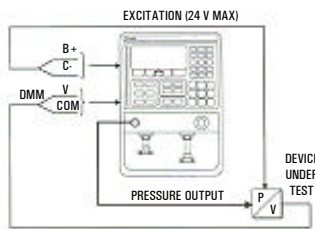
The second group I, COM and V, provide the input to the built-in digital multimeter (DMM). Current inputs are applied between the common (COM) and I terminals. Voltage inputs are applied between the (COM) and (V) terminals.



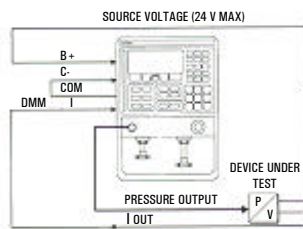
Positioned on the right-hand side of the instrument are the multi-way connections which are illustrated above. These connectors are splash proof with spring closed covers for protection. Each connector has a different pattern and will only mate with a corresponding plug. The sockets are allocated as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

Power adaptor/battery charger (POWER)	3 way.
Temperature probe (TEMPERATURE PROBE)	4 way.
RS 232 serial data interface (RS 232)	6 way.
External transducer (EXT. TRANSDUCER)	12 way.

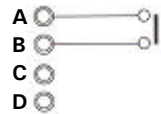
### Transducer/Bridge Testing



### Two Wire Transmitter Testing



### Connections for Switch test

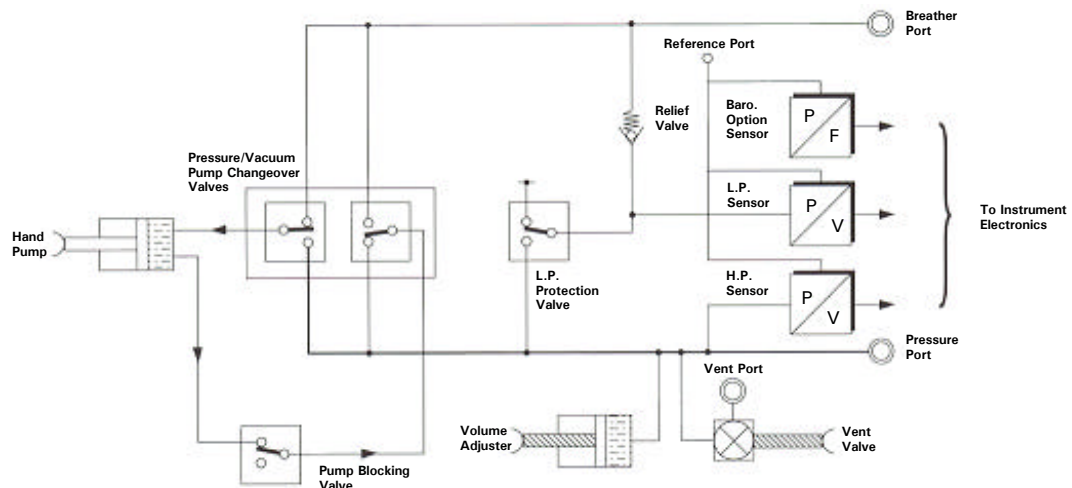


### Connections for Trigger input



## PNEUMATIC CIRCUIT

The Calibrator version of the DPI 605 has a built-in hand pump to generate either pressure up to 300 psi gauge or vacuums to -22 in Hg gauge. Latching solenoid valves provide pressure limiting features, pressure/vacuum change-over of the hand-pump and low range transducer protection.



# DPI 605: Precision Portable Pressure Calibrator

## CALIBRATOR SPECIFICATION

### Pressure Measurement Specification

#### Operating Pressure Range

-14.7 to +300 psi

Option available for absolute pressures via Barometric Reference sensor. See Option A.

#### Pressure Scale Units

Psi, ft, H<sub>2</sub>O, in Hg, kPa standard - 24 different scales under SET-UP, user selectable.

#### Overpressure

To 1.25x 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 (FS).

#### Display

1.5" x 5.2" L.C.D. graphics panel  
240 x 64 pixels. Backlit.

#### Display Overload

110% F.S. pressure overrange nominal. Above this the display flashes.

#### Resolution

17 bits (0.00075% F.S.)

#### Response

2 readings per second nominal.

#### Zero Control

Pressure offset correction by keypad. Ability under PROCESS key to permit TARE of pressure, voltage and current, either manual or displayed value.

#### Accuracy

± 0.05% of reading between 1% and 100% F.S.  
0.002 psi below 1% F.S.  
Figure includes 90 days stability.

Combined non-linearity, hysteresis and repeatability (included within the above accuracy figure)

#### Positive Pressures

± 0.025% of reading between 1% and 100% F.S.  
± 0.001 psi below 1% F.S.

#### Negative Pressures

± 0.025% of reading between -14.7 psi to -3 psi.  
± 0.001 psi between 0 and -3 psi.

#### Temperature Effects

-14.7 to 300 psi gauge calibrator, over 15<sup>0</sup> to 100<sup>0</sup>F the averaged temperature coefficient ± 0.004% of reading per <sup>0</sup>F.

#### Position Effect

Negligible

### Electrical Specification

#### Electrical Inputs

##### Voltage Measurement

0 to ± 50V d.c. auto ranging, resolution 10μV  
Input impedance 10MΩ.  
Accuracy ± 0.04% of reading ± 1 digit  
Figure includes 90 day stability.  
T.C. < 0.00375% of reading/<sup>0</sup>F.

#### Current Measurement

0 to ± 55mA d.c. resolution 0.001 mA.  
Internal resistance nominally 10Ω.  
Accuracy 0.03% of reading ± 1 digit including 90 day stability.  
T.C. < 0.00375% of reading/<sup>0</sup>F.

#### Electrical Outputs

##### Voltage Output

Programmable floating output in the range 0 to 24 V d.c. max 50mA.  
Accuracy: ± 0.025% of reading ± 0.01% FS ± 1 digit.  
Suitable also for current loop energization and switch testing.

##### Current Output

Programmable output in the range 0 to 55 mA d.c. for current display calibrations.  
Accuracy: ± 0.035% of reading ± 0.01% FS ± 1 digit.  
Configured as source, voltage limit 19V.  
Configured as sink, voltage limit maximum 30V, voltage limit minimum 5V.

##### Analog Output Signal

Proportional to displayed pressure or electrical reading.  
Accuracy as display.  
0 to 24V d.c. with 16 bit (0.001% F.S.) resolution. User programmable zero and full scale settings. Bandwidth 1 to 2 Hz-updated each new reading. Current output can also be provided either 0 to 50mA or 4 to 20 mA for 0 to F.S. pressure  
Accuracy: ± 0.05% of reading ± 0.005% F.S. ± 1 digit.  
Current output is also provided, user programmable, 0 to 50 mA.  
Accuracy: ± 0.05% of reading ± 0.005% F.S. ± 1 digit.  
Above accuracies include 90 day stability

#### Digital Interface

RS 232 serial interface to the SCPI protocol for stored data output to host computer or printer and down loaded test routines and remote control.

#### 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. Can also be powered by 6 x D cells, alkaline recommended.  
Battery life: 20 hours nominal for Ni-Cad.  
70 hours nominal for alkaline.  
External PSU/charger unit supplied as standard.

### Environmental Specification

#### Temperature

Operating	15° to 105 <sup>0</sup> F
Storage	0° to 140 <sup>0</sup> F

#### Sealing

Instrument NEMA 4X (IP54)  
Battery charger to laboratory standard.

#### Electro Magnetic Compatibility

Designed to meet EN50081-1 and EN50082-1

### Physical Specification

#### Weight

9 lbs nominal

#### Dimensions

5.5 inches x 11 inches x 14.5 inches

#### Pressure Connections

1/8 NPT 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 in Hg gauge to +300 psi gauge.
- 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:

- Barometric Reference option for barometric pressure and absolute measurement.
- Ability to add external transducers to broaden the dynamic range of measurement.
- Temperature probe for readings over -60<sup>0</sup>F to + 400<sup>0</sup>F.
- Negative 14.7 psi calibrations for the indicator version
- A rugged printer for results recording via the RS 232.
- Extra Ni-Cad battery pack for in field use.
- Calibration software.
- Dirt Moisture Trap to prevent contamination.

## INDICATOR SPECIFICATION

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 full-scale range can be supplied between the ranges listed below:  
1 to 5000 psi gauge  
5 to 5000 psi absolute  
Gauge versions available with -14.7 psi gauge option.

#### Accuracy

Ranges 1 to 1000 psi  
± 0.05% of reading between 20% and 100% F.S.  
± 0.01% of F.S. between 0 and 20% F.S.  
For -14.7 psi calibrations, full scale range is defined as the compound range.  
Ranges 1001 to 5000 psi  
± 0.08% of reading between 20% and 100% F.S.  
± 0.016% of F.S. between 0 and 20% F.S.  
Figures include 90 day stability.

#### Temperature Effects

1 to 5000 psi internal sensors ± 0.006% of reading/<sup>0</sup>F.

# DPI 605

## Precision Portable Pressure Calibrator

### OPTIONS

#### 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  $\pm 0.0044$  inHg absolute over the ranges 23 to 33 inHg absolute and over a temperature range of 50°F to 85°F. Over extended 15°F to 105°F error 0.0088 inHg over 1 year.

#### External Transducers

In addition to the internal transducers, the instrument can be configured with 10 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 full scale can be specified between the ranges listed below.

- 0-1 psi to 0-10,000 psi gauge
- 0-1001 psi to 0-10,000 psi sealed gauge
- 0-5 psi to 0-10,000 psi absolute
- 0-2.5 psi to 0-500 psi differential

Maximum line pressure 500 psi.

Differential ranges unidirectional calibrations only. For high line pressures, refer to manufacturer

#### Accuracy

For external transducers range 1 to 1000 psi  $\pm 0.05\%$  of reading between 20% and 100% F.S.  $\pm 0.01\%$  of F.S. between 0 and 20% F.S.

For ranges 1001 to 10,000 psi  $\pm 0.085\%$  of reading between 20% and 100% of F.S.

$\pm .016\%$  of F.S. between 0 and 20% F.S.

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.
- Option B3 provides for any sensor complete with calibration as found. Specification to be defined by consultation.

Cable length will be 6 feet as standard. Please refer to the relevant transducer data sheets for specification details, or contact the manufacturer.

#### Temperature Probe

A platinum resistance temperature probe (PT 100) can be supplied to give a digital display in desired units (°F or °C).

Range -60°C to + 400° F  
Resolution 0.01°F or 0.01°C  
Accuracy  $\pm 0.2^\circ\text{F}$  (incl. 90 day stability).

Temperature effects  $\pm 0.001\%$  Reading/°F  
 $\pm 0.0025\%$  per °F

*PT 100 probe not included in above figures*

#### -14.7 PSI Calibration

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

#### Printer

An NEMA 4X rated graphics printer using thermal roll paper is available for the generation of calibration record sheets, labels and other hard copy print out via the RS 232 port. Please refer to Druck for further details

#### Ni-Cad Battery Pack

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

#### Linkpak-W Calibration Software

Developed to help 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 605, DPI 615, TRX-II or the MCX. Calibration results including files from the DPI 610, are uploaded to the PC for analysis and to print calibration certificates.

#### Intecal-W Calibration Database Software

Intecal-W Windows based software builds on the basic concept of the Linkpak-W supporting both portable field calibrators and on-line workshop calibrators. Manual data entry is also a key feature for recording data. Intecal-W is easy to learn and easy to use calibration management software for process plants, workshops, contractors, manufacturers and service companies. It offers high productivity of calibration scheduling, calibration work and documentation. Device information calibration procedures and calibration results are stored in an instrument database and multiple databases can be created for organizing client accounts, processes or areas. Extensive management features are provided including a database search engine, time based calibration due queries and standard reports. An on-line demonstration of the Intecal-W is available by visiting our website at: [www.druck.com](http://www.druck.com)

#### Dirt Moisture Trap

The IDT 600-2 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 600-2 has a transparent body for easy inspection and is designed to fit directly into the DPI 605 pressure port.

Maximum Pressure: rating 500 psi.

Pressure Connections:

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

### ACCESSORIES

Carrying case.

Electrical test probes.

Adaptor lead for RS 232 (6 way circular to 9 way D type).

Handbook and calibration certificate(s)

Battery charger eliminator: part no. 191-119 (include part no. 163-001 for 230V European Lead)

### 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 (see relevant transducer data sheets)
- (6) Battery charger - part number and type.

### RELATED PRODUCTS

Druck manufactures a comprehensive range of pressure transmitters, transducers, indicators, controllers and calibrators. Please contact your local representative for further information and data sheets.

### CALIBRATED STANDARDS

Instruments manufactured by Druck are calibrated against precision pressure calibration equipment which is traceable to the National Institute of Standards and Technology (NIST)

*Continuing development sometimes necessitates specification changes without notice.*



Druck is an ISO 9001 registered company



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