DPI 145

DPI 145

Druck

Multifunction Pressure Indicator

- Pressure ranges up to 700 bar
- Precision 0.025% of reading
- Precision barometric reference
- Internal or external sensors
- Split-screen LCD display
- Data storage, RS 232 and IEEE 488

DPI 145

Multifunction Pressure Indicator

Druck is a world leading manufacturer of precision pressure instruments based upon it's own piezo resistive and resonant silicon sensor technologies. The DPI 145 combines these in a high precision pressure indicator which is very flexible and simple to operate. It is designed to address a wide range of applications in workshops and laboratories throughout industry.

INNOVATION

Sophisticated measuring and processing technology is incorporated into one compact, functional instrument. Advanced software and a large, self formatting "split-screen" display are amongst a host of features which make the DPI 145 the most flexible indicator on the market. Simplified operation and proven electronics ensure highly reliable service.

Multiple measurements can be made simultaneously with a combination of up to 6 internal/external pressure sensor outputs being continuously monitored. Physically, special attention has been given to ensure suitability for bench use with a rotatable handle providing both a comfortable viewing angle during operation and a convenient carrying grip for portability.

MEASURING

Druck's ability to design and manufacture both sensor and instrument has resulted in a powerful combination of silicon sensors and digital compensation.

A wide range of pressures up to 700 bar can be measured from an extensive choice of sensors. For example, resonant silicon sensors provide high precision and exceptional long term stability for absolute pressure measurements up to 3.5 bar. A sensor auto-selection feature enhances performance over the popular range of -1 to 20 bar gauge using a matched "auto ranging" pair of piezo-resistive sensors.

Absolute pressures can also be measured directly with piezo resistive sensors, or by combining gauge measurements with barometric "pressure of the day" from a resonant sensor. This versatility enables cost and performance to be optimised.

PROCESSING

Comprehensive functions are available on all channels:

- Multiple scaling
- Filtering, average and tare values
- Max/min value capture and alarms
- Flow (square root pressure value)
- Leak and pressure switch test
- Interchannel maths capability

The display screen may be split to suit the required number of measurement or process variables up to a maximum of 8 displays. Features associated with specific applications are grouped under single keys.

QUALITY

Druck is ISO 9001 approved, with all instruments manufactured to strict quality control procedures and calibrated against traceable reference standards. Full UKAS certification is also available.

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Compact and rugged casing
Split-screen graphics display for multi parameter readout
Display mode selector keys
Screen print via RS 232 interface
Notepad and datalog facility
4 "soft" function keys driven by display prompts
Numeric data entry keys
Rotatable carrying handle for convenient benchtop use
DPI 145
Druck
Graph of 20 barg v's Time
8.83378
bar
5.59312
15.40.06
Time
15.41.47
MODE
F1
F2
F3
F4
ENTER
DEL

DPI 145

Multifunction Pressure Indicator

SIMPLICITY

The DPI 145 is simple to operate, even to those unfamiliar with electronic pressure instrumentation. The intuitive menu-style software allows quick selection of the required function, ensuring that measurements and associated data processing can be achieved with ease and confidence.

INSTALLATION

The DPI 145 is designed for convenient bench top use. A rotating handle is fitted as standard, providing a comfortable viewing angle for the operator. An optional rackmounting kit provides a 3U high x 19" wide unit for standard rack installation.

PRECISION

The DPI 145 offers high precision. By utilising proven Druck piezo-resistive sensors, 0.025% reading is standard for pressure measurements from 100 mbar to 70 bar and 0.04%of reading for pressures up to 700 bar.

For gauge, differential and absolute pressures below 100 mbar, the measurement precision is up to 0.05% of reading.

For barometric and low pressure absolute measurements, the DPI 145 can be fitted with Druck resonant pressure sensors. These are the aerospace industry standard, providing precision measurement of 0.013% F.S. and long term stability of better than 0.01% per annum.

By the use of digital characterisation routines, the DPI 145 not only improves the basic precision of the sensors but also enhances temperature performance over 10°C to 30°C.

VERSATILITY

The DPI 145 multi-function indicator covers a wide range of gauge, absolute and differential pressure ranges from 1 mbar to 700 bar F.S. For both pneumatic or hydraulic measurements up to six sensors may be connected to the instrument simultaneously with a maximum of four internal and two external sensors.

The four internal channels enable two piezo resistive and two resonant pressure sensors to be connected. In addition, the instrument can store the characteristics of up to 10 external pressure sensors, with a maximum of 1 piezo-resistive and 1 resonant silicon type to be used at any one time.

SPLIT-SCREEN DISPLAY

The backlit LCD graphics display is bright and clear for easy viewing and automatically configures itself for single or split-screen readouts. The display splits and formats itself to the optimum viewing size for the number of functions the user requires to display. All functions, messages, prompts and menus are clearly presented and the DPI 145 can generate graphical displays using stored data from its extensive memory to simplify interpretation and to provide quick and easy trend analysis.

POWERFUL DATA PROCESSING

Comprehensive measurement processing is available on every channel to suit numerous applications including multiple scaling (selectable from 24 different units), data filtering, tare, peak/valley, average and alarms.

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OPERATING MODES

The DPI 145 may be used in various modes of operation each with its own dedicated list of menu functions specific to the required task. The instrument is fully configurable and any input channel may be specified for all of the following modes:

Indicator

In this mode, the instrument displays any of the pressure inputs simultaneously on screen. All standard scale units are available for each individual pressure readout.

Process or mathematical functions can be applied as separate displays, each may be re-named for appropriate use or location. Up to 8 pressure/process values may be displayed at any one time in this mode. The instrument can also display time by selecting the clock feature.

Barometer

The DPI 145 may be used as a dedicated high precision barometer. Example functions include standard barometric units, three hour trend analysis with graphical output, selection of QFE or QNH for airfield applications.

Leak Test

The dedicated leak test screen simplifies the calculation of system leak rates. This is particularly effective for confirming system integrity or automated leak test applications. The test wait and test time can be specified and the leak rate in units/minute over the test period.

Switch Test

The instrument can automatically register the change state of a connected pressure switch via a rear panel connector. During a pressure switch test cycle, the contact open and close pressure values are displayed and the switch hysteresis calculated.

Instrument Set-Up

Selection of the "Set-Up" key enables variable parameters such as Pressure Scale Units (24 available), RS 232 format (printer or communication output, baud rate etc), time/date values and Instrument Calibration Data (updated via a protected system).

Data Logging and Printing

A powerful data logging facility enables measurements and processed variables to be saved to files which can then be replayed on the display in numerical or graphical form. Displays can also be recalled from the notepad memory or, alternatively, sent to a printer or PC via the RS 232 serial communications port.

Up to 20 named displays can be accommodated. The instrument will Data Log up to 10,000 readings dependent on screen presentation. The number of transferred readings via RS 232 may be limited by file size.

Aeronautical Option

The DPI 145 can provide the facility to operate directly in standard aeronautical units, automatically converting pressure measurements to readings of altitude and airspeed as defined by standard ICAO conversions. Features include altitude readout in feet and metres, altitude tare, Calibrated Airspeed in knots and km/hr, mach, Rate of Climb (RoC) and timed RoC, total and static pressures, Qc differential pressure. In addition, this option enables leak and switch tests in aeronautical units. Refer to options and separate DPI 145 Aeronautical datasheet.

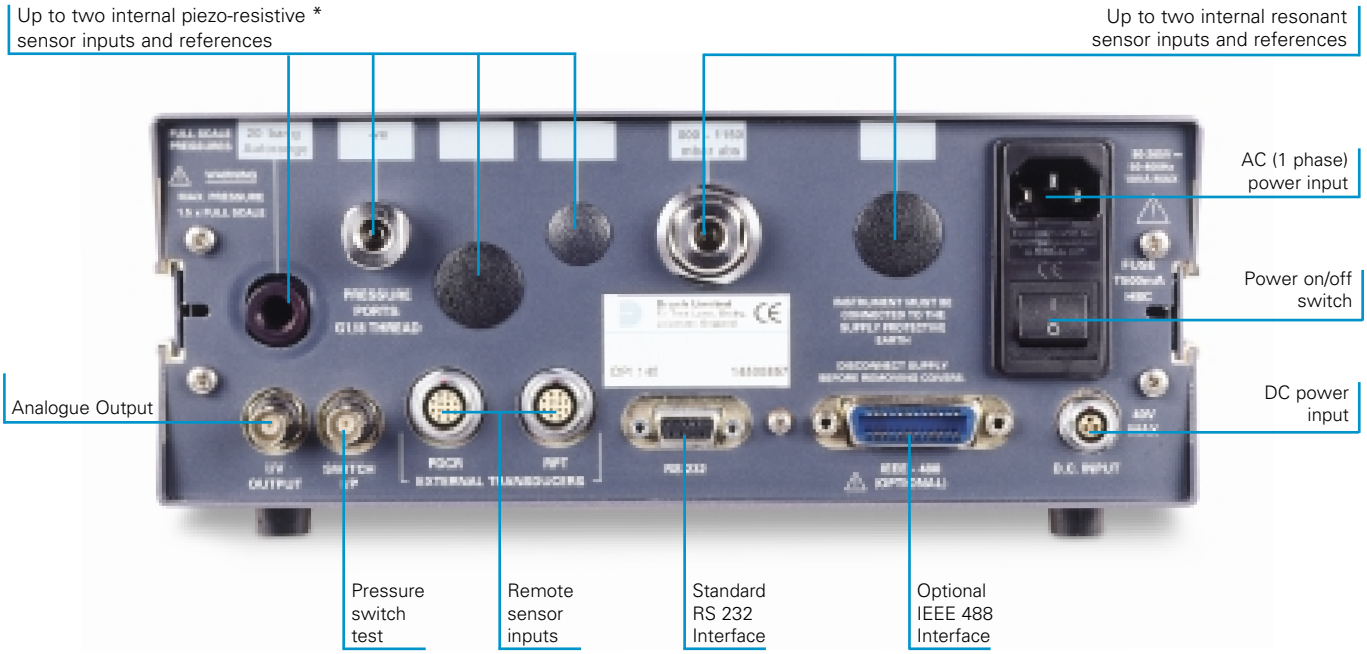
INTERFACING

COMMUNICATION
An RS 232 serial digital interface is fitted as standard in the DPI 145, allowing easy remote control for integrated computer driven systems. The popular SCPI protocol (Standard Commands for Programmable Instruments) is used to provide standardisation with other instruments. IEEE 488 communications is also available. Please refer to options overleaf.

ANALOGUE OUTPUT
The DPI 145 is supplied with a programmable analogue output. This may be assigned to any individual channel or display and set to provide an output between 0 to 30mA or 0 to 10 Volts, over a user defined range.

REMOTE SENSORS
In addition to standard internal pressure sensors, the DPI 145 can be calibrated for use with up to 10 (one at a time) external piezo resistive sensors and one resonant sensor. This covers a wide variety of pressure ranges from 1mbar to 700 bar including gauge, absolute and differential. All external sensors are supplied with a mating connector for direct interfacing with the instrument. Please refer to options overleaf.

CONNECTIONS
All pneumatic and electrical connections are on the rear panel for neat and easy installation. The layout is shown below.



**Note: For each piezo-resistive sensor the reference is brought out to the rear panel for connection as a differential input.*

DPI 145

Standard Specifications

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PRESSURE MEASUREMENT

Internal Sensors
Two independent fixed range piezo-resistive silicon sensors or an autoranging sensor pair can be fitted. Additionally, up to two resonant silicon sensors can be accommodated.

Internal Piezo-Resistive Ranges
Any full scale range can be specified between:
70mbar to 70 bar gauge.
71 bar to 350 bar sealed gauge.
350mbar absolute to 350 bar absolute.
175mbar differential to 40 bar differential.
Note: Differential ranges standard line pressure 2 bar (35 bar available on request.). Uni-directional calibration standard, Option (C) for bi-directional.
Autoranging pair: -1 to 20 bar (comprises 2 piezo-resistive sensors).

Internal Resonant Sensor Ranges
The following ranges:
800 - 1150mbar absolute (barometric)
35 - 1300mbar absolute.
35 - 2600mbar absolute.
35 - 3500mbar absolute.

External Transducers
Ranges available from 1mbar up to 700 bar. Please refer to option (B) for details overleaf.

Safe Working Pressure
Maximum 1.5 x F.S. for all ranges up to 385 bar with negligible effect on calibration. *Note: For differential ranges refer to Druck.*

Pressure Media
Autoranging pair: any clean, dry, non-corrosive gas.
Internal piezo-resistive sensors: any gas or fluid compatible with 316L stainless steel and Hastelloy C276.
Internal resonant sensors: any gas compatible with silicon, glass, 316L stainless steel, titanium and epoxy.
External sensors (where specified): refer to separate sensor datasheet.

Display
39 mm x 132 mm LCD graphics panel with 240 x 64 pixels. Backlit with cold cathode tube.

Display Range
Nominally up to 110% F.S.. Above this value, display flashes.

Pressure Scale Units
Bar, psi, mH_2O, kPa standard - 24 different user selectable scales.

Response
2 readings per second maximum.

Readout Resolution
±999999 capability - user programmable to lower values if required.
17 bits (0.00075% F.S.) Resolution will not limit accuracy on any scaling or range.

PERFORMANCE

Piezo-resistive sensors 0 to 100mbar
Static precision ±0.05% rdg* for values 20% to 100% F.S.
±0.01% F.S.* for values 0% to 20% F.S.
**or ±0.065% rdg/0.013% F.S. including 90 day stability.*

Piezo-resistive sensors, 101mbar to 70 bar
Static precision ±0.025% rdg* for values 20% to 100% F.S.
±0.005% F.S.* for values 0% to 20% F.S.
**or ±0.04% rdg/0.008% F.S. including 90 day stability.*

Piezo-resistive sensors, ranges over 70 bar
Static precision ±0.04% rdg* for values 20% to 100% F.S.
±0.008% F.S.* for values 0% to 20% F.S.
**or ±0.07% rdg/0.015% F.S. including 90 day stability.*

Auto Range Sensors, range -1 to 20 bar.
Static precision ±0.025% rdg* for values 1% to 100% F.S.
±0.00025% F.S.* for values below 1%F.S.
**or ±0.04% rdg/0.0004% F.S. including 90 day stability.*

*Note: The above values include non-linearity, hysteresis and repeatability. Temperature effects 0.002% Rdg/°C over the range of 10°C to 30°C. All values ±1 digit. For gauge and differential units, regular use of the zero key is assumed.

Resonant Sensors
Barometric range (800 - 1150mbar absolute) ±0.15mbar.
All other ranges ±0.013% F.S.
These figures include non-linearity, hysteresis, repeatabilty, and temperature effects over 10° to 30°C. 12 month measurement stability better than 100ppm.

ELECTRICAL

Analogue Output
Proportional to selected pressure reading as either 0 to 30mA or 0 to 10Vd.c. max. Zero and F.S. output values are user programmable.
Accuracy ±0.025% rdg ±0.01% F.S. ±1 digit.

Communications Interface
RS 232 serial data port fitted as standard. Communication with a host computer or printer is via the SCPI protocol.

Power Supply
a.c. 80 to 260V, 45 to 400Hz or d.c. 9 to 32V. Reverse polarity and over voltage protected. Power consumption <20 watts.

ENVIRONMENTAL

Temperature
Calibrated 10 to 30°C
Operating 0 to 50°C
Storage -20 to 70°C

Sealing
Front panel to IP54. Case assembly to IP41.

Humidity
0 - 90% RH non-condensing.

Shock and Vibration
Designed to meet IEC1010.

Electro Magnetic Compatibility
Emissions EN50081-1
Immunity EN50082-1.

Electrical Safety
IEC1010.

PHYSICAL

Weight
4.6kg (10lb) nominal.

Dimensions
110 mm high x 290 mm wide x 250 mm deep.
(4.3" x 11.4" x 9.9" approx).

Pressure Connections
$G^1/_8$ (female BSP).

Options and Related Products

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OPTIONS

(A) IEEE 488 (GPIB) Interface
Full computer control is available via a databus using the SCPI protocol. The standard IEEE parallel D connector is provided on the rear panel and all standard front panel facilities remain accessible.

(B) External Pressure Sensors
In addition to internal sensors, the DPI 145 can be calibrated for use with 10 (one at a time) external piezo-resistive sensors and one resonant type sensor. These are supplied assembled with mating 12 pin connector for direct interfacing with the instrument. Cable lengths up to 10m for piezo-resistive sensors and 2m for resonant sensors.

Any full scale can be specified between the ranges listed below:
70mbar to 70 bar gauge
71mbar to 700 bar sealed gauge
350mbar to 700 bar absolute
175mbar to 40 bar differential*

**Maximum line pressure 2 bar. 3 bar available on request. Uni-directional calibrations only.*

(B1) Specifies normal piezo-resistive transducer temperature error bands. Refer to relevant sensor datasheet.

(B2) Specifies enhanced temperature coefficients for internal sensors.

(B3) Any non-standard sensor complete with calibration certificate as found or low pressure LPE sensor calibration. Full scale range available for LPE 9145: 1 to 50mbar gauge/differential

Other ranges available on request.

(C) Negative calibration
Calibration of bi-directional channels is usually in the positive direction only. If negative direction calibrations are required this option should be requested and corresponding instrument channel specified. *Note: Auto range provides -1bar calibration as standard.*

(D) Aeronautical units
Additional facilities for the testing of altitude and airspeed instrumentation. Converts linear pressure values into the non linear values of feet, metres, Rate of Climb, knots, km/hr and Mach number. Altitudes from -2,000 to 100,000 ft and airspeeds from 0 to 1000 knots can be measured. For additional information, please refer to DPI 145 Aeronautical datasheet.

(E) Airfield Barometer
Software capability for providing barometric pressure displayed for QFE, QNH and QFF where datum heights and runway heights are given. For additional information, please refer to DPI 145 Aeronautical datasheet.

(F) Rack Mount
Rack mounting kit which provides a 3U (5¼"/133mm) high plate into which the instrument is mounted and clamped. Suitable for installation into standard 19" wide rack systems.

(G) Connectors
If mating connectors are required the following should be requested:
(G1) specifies 12 Way LEMO - external sensors (for spares)
(G2) specifies 9 Way 'D' type - RS 232
(G3) specifies BNC x 2 for I/V output and switch input
(G4) specifies 3 way LEMO for d.c. input.

SUPPLIED AS STANDARD

An a.c. power connector/power lead, handbook and calibration certificate are supplied as standard with the instrument.

CALIBRATION STANDARDS

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

RELATED PRODUCTS

Druck manufacture a comprehensive range of pressure indicators, controllers, calibrators, deadweight testers, transducers and transmitters. Further information and datasheets are available upon request.

ORDERING INFORMATION

Please state the following (where applicable):

1 Model number.
2 Pressure range(s).
3 Gauge, sealed gauge, absolute or differential.
4 Options.
5 When external sensor is required:
  (a) Pressure range and scaling
  (b) Gauge, sealed gauge, absolute or differential
  (c) Transducer type - from approved list
  (d) Temperature range for sensor
  (e) Pressure connection

For non-standard requirements, please refer to manufacturer.

Continuing development sometimes necessitates specification changes without notice.

Druck

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