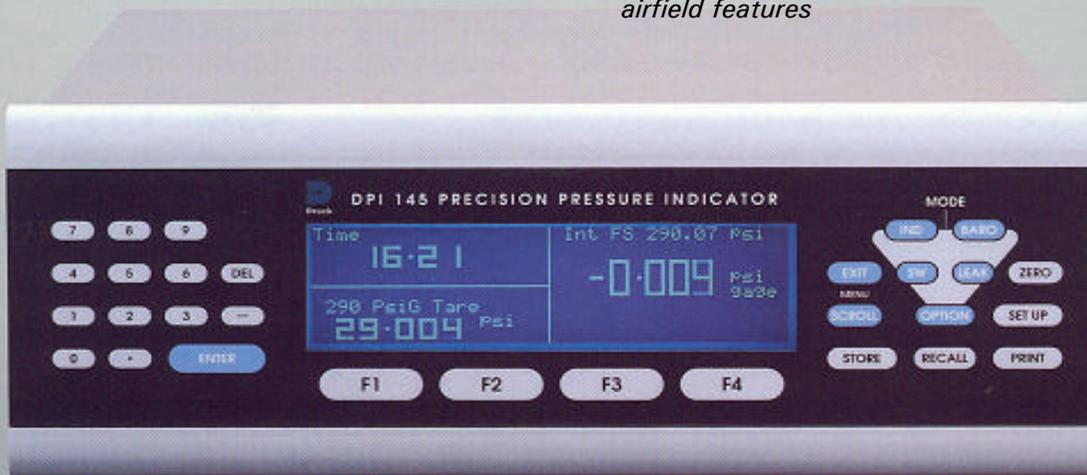


## DPI 145

### Multi-Function Pressure Indicator

- **Transfer standard accuracy**  
 $\pm 0.15\%$  reading absolute  
 $\pm 0.025\%$  reading gauge
- **Single or multi-channel instruments**  
Ranges from 1 psi to 10,000 psi F.S.
- **Application oriented processing**  
Interchannel maths, aeronautical functions, leak test, data logging
- **Enhanced display formats**  
Variable text size, graphical displays
- **Advanced sensor formats**  
Piezo-resistive and resonant sensor options
- **Barometer version**  
High accuracy, meteorological and airfield features



# DPI 145: Multi-Function Pressure Indicator

## INTRODUCTION

The DPI 145 high accuracy, digital pressure indicator combines the latest in pressure sensing technology with advanced, application oriented, processing and display facilities. Designed to satisfy a wide range of applications in general industry, meteorology, calibration laboratories, aeronautical engineering and on airfields, the DPI 145 is easily configured to the users needs.

### Measurements

#### High Performance

Digital compensation applied to micro-machined silicon sensor elements provide outstanding performance over a wide range of pressures and temperatures.

Revolutionary resonant silicon sensors provide remarkable stability for absolute measurements.

#### Wider Range

A wide range of pressures can be measured by selection from Druck's extensive range of transducers.

Transducers can work together through auto selection to maintain performance over a wider pressure range.

Absolute pressures can be measured directly with high precision or by combining gauge measurements with pressure of the day.

#### Multiple Measurements

From one to four transducers can be fitted internally, two piezo-resistive sensors, and two resonant sensors; externally, up to ten piezo-resistive and one resonant sensor to cover a wide range of applications.

Pressure ranges up to 10,000 psi full scale in gauge, absolute and differential are available. All connections, pneumatic and electrical are on the rear panel of the instrument.

### Data Processing

Comprehensive measurement processing is available on every channel to suit each application; multiple scaling, filtering, tare, peak/trough (max and min), average, alarms and flow.

A number of application oriented processing features are provided:

- Leak Test.
- Switch Test.

- Altitude, airspeed, mach and rate for aeronautical applications.
- Derived pressure at mean sea level and barograph for barometric applications.
- QFE, QNH and 3 hour trend for airfield applications.

A maths pack allows interchannel calculations such as the sum or difference of two measurements.

### Display

The bright, clear, backlight LCD graphics display features:

- Display formats to suite the number of measurements and processed variables.
- Variable text size to suite the number of values being displayed.
- Clear, English language operator messages and prompts.
- Graphical display of results.

Despite the power of the product, it is easy to use. Features associated with specific applications are grouped under single command keys and the instrument is menu driven with clear prompts.

### Data Logging and Printing

Data displays can be stored and recalled in scratchpad memory or can be output to a printer via the serial communications port.

A powerful data logging facility allows measurements and processed variables to be recorded to files in memory, on an interval or event driven basis. Files of results can be replayed to the display in numeric or graphical form or can be output via the communications port to a printer or computer.

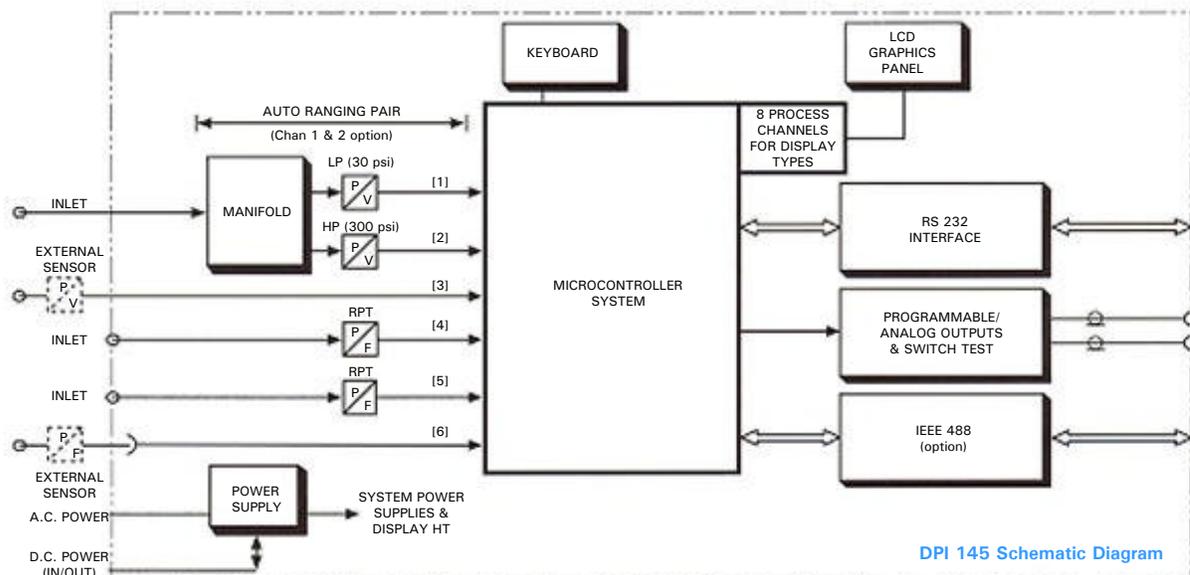
### Communications

An RS 232 serial communications port is provided as standard, an IEEE 488 port is available as an option. The instrument communicates using the SCPI protocol standard.

The communications port allows access to:

- All instrument configuration and setup parameters.
- All measured and processed data.
- All stored results and scratchpad memories.

Selected data can be retransmitted via the high precision analog output which can also be used to signal alarms.



# DPI 145: Specifications

## Integral Transducer Specification

Provisions exist to fit either two independent fixed range sensors or an autoranging sensor pair. Additionally up to two resonant sensors can be accommodated.

### Operating Pressure Ranges Piezo-Resistive Sensors

Any range can be specified between the limits listed below:

0-1 psi to 0-1000 psi gauge  
 0-1001 psi to 0-5000 psi sealed gauge  
 0-5 psi to 0-5000 psi absolute  
 0-2.5 to 0-500 psi differential  
 Maximum line pressure 500 psi.

*Differential ranges uni-directional calibration only. For higher line pressures refer to manufacturer.*

### Operating Pressure Ranges Resonant Sensors

Ranges as follows can be specified:  
 11.6 - 16.7 psi absolute - barometric range  
 .5 - 16.7 psi absolute  
 .5 - 37.7 psi absolute  
 .5 - 50 psi absolute

### External Transducers

See details under option B for ranges available up to 10,000 psi.

### Pressure Scale Units

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

### Maximum Safe Working Pressure

To 1.5x on all ranges up to 5580 psi max. Causing negligible calibration change. For differential sensors consult Druck.

### Pressure Media

Fixed ranges piezo-resistive - most common fluids. Auto ranging version - most non-corrosive gases. Resonant sensor versions - refer to manufacturer.

### Transduction Principle

Either integrated silicon strain gauge sensors or vibrating elements.

### Readout Resolution

± 999999 capability - user programmable to lower values if required. 17 bits (0.00075% F.S.). Ensures resolution does not compromise the accuracy on any scaling or range.

### Display

1.54 ins. X 5.2 ins. LCD graphics panel 240 x 64 pixels. Backlit with cold cathode tube.

### Display Range

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

### Response

2 readings per second maximum.

### Zero Control

Pressure offset correction, by keypress. Ability under INDICATOR "Process" key to permit TARE of displayed values.

### Temperature Effects

For all piezo-resistive sensors, 50° to 86°F range, average temperature coefficient ± 0.0012% of reading/°F. For resonant units, accuracy figure includes temperature effects.

### Position Effect

Negligible.

## Accuracy

Static accuracy figures include non linearity, hysteresis and repeatability. Regular use of the zero key for gauge and differential measurements assumed. All values ±1 digit.

ACCURACY	STATIC	STATIC AND 90 DAYS STABILITY	STATIC	STATIC AND 90 DAYS STABILITY
	Ranges to 1000 psi		Ranges over 1000 psi	
FIXED RANGE SENSORS PIEZO-RESISTIVE	±0.025% of reading 20% to 100% F.S. ±0.005% F.S. 0% to 20% F.S.	±0.04% of reading 20% to 100% F.S. ±0.008% F.S. 0% to 20% F.S.	±0.04% of reading 20% to 100% F.S. ±0.008% F.S. 0% to 20% F.S.	±0.07% of reading 20% to 100% F.S. ±0.015% F.S. 0% to 20% F.S.
AUTO RANGE SENSORS PIEZO-RESISTIVE	±0.025% of reading 1% to 100% F.S. ±0.00025% F.S. below 1% F.S.	±0.04% of reading 1% to 100% F.S. ±0.0004% F.S. Below 1% F.S.		
	Note auto range 300 psig F.S. only at present			
DRUCK RESONANT SENSORS	Barometric range 11.6 - 16.7 psi absolute Absolute ±0.002 psi Other ranges ±0.013% F.S. These figures include linearity, hysteresis and repeatability, and temperature effects over 50° to 86°. Stability over 12 months - 100 ppm.			

### External Transducers Accuracy

As for internal fixed range sensors.

### External Transducers Temperature Effects

Options:

B1 provides normal transducer temperature error bands;  
 B2 provides enhanced coefficients as for internal sensors.

### Electrical Specification

#### Analog Output Voltage or Current

Proportional to selected pressure reading 0-30mA or 0 to 10V d.c. maximum. Programmable zero and F.S. output values. Current output configured as a supply only into passive loads.

Bandwidth approx 1Hz - updated each reading.  
 High resolution DAC (16 bit 0.002% F.S.) Accuracy ±0.025% of reading ±0.01% F.S. ±1 digit.

#### Programmable Output

Values and performance as for analog output but as values defined via the numeric keypad.

#### Communications Interface

RS 232 serial data communications link for point to point operation fitted as standard. Interfacing to a host computer or printer is via the SCPI communication protocol.

#### Calibration Controls

Via instructions from the keypad. Access to calibration mode is under SET-UP protected by PIN number for security.

#### Power Supply

a.c. - 80 to 260V 45 to 400Hz  
 d.c. - 9 to 32V reverse polarity and over voltage protected.  
 Power consumption - less than 10 watts.

### Environmental Specification

#### Temperature

Operating 32° to 122°F  
 Calibrated 32° to 86°F  
 Storage -5° to +175°F

### Sealing

Front panel generally to NEMA 12.  
 Case assembly generally to NEMA 2.

### Humidity

0-90% RH non-condensing.

### Shock and Vibration

Design to meet IEC1010.

### Electro Magnetic Compatibility

Designed to meet EN50081-1 for emissions  
 Designed to meet EN50082-1 for immunity

### Electrical Safety

IEC1010.

### Physical Specifications

#### Weight

10 lbs. nominal.

#### Dimensions

4.3 ins. high x 11.4 ins. wide x 9.8 ins. deep.

#### Pressure Connections

1/8" NPT female

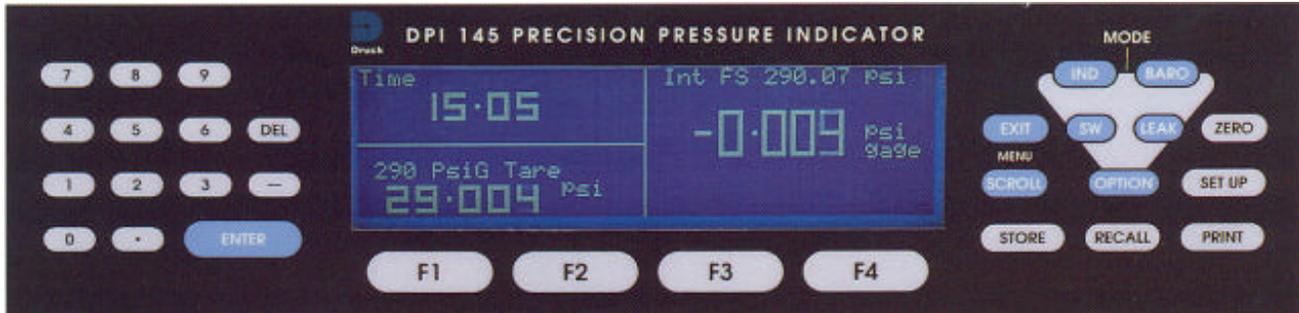
### Options Available

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

- (A) IEEE 488 with the SCPI protocol for communications interface.
- (B) Ability to add external transducer to broaden the application range of the instrument.
- (C) Negative calibration for applications such as differentials.
- (D) An Aeronautical Instrument Calibration capability providing parameter readout in feet/knots etc.
- (E) Airfield barometric version where QFE, QFF, QNH and runway offsets are provided.
- (F) A rack mount kit is available for 19" racking giving a 3U high unit.
- (G) Mating connectors when required.

# DPI 145: Functions

## OPERATOR CONTROLS



The membrane keypad, used for all manual commands on the DPI 145 multi-function pressure indicator, has been designed to provide the optimum operator interface.

**NUMERIC KEYS** Data entry keys for value inputs.

**ENTER** The executive key which finally inputs the value required.

**F1, F2, F3, F4** Four function keys whose actual duties vary according to the changing titles shown on the display screen immediately above each key.

**IND** INDICATOR mode key used for general pressure measurement from any of the six channels gives access to range of menu selections, channels, units, process, maths etc.

**BARO** BAROMETER mode readout with the ability to access the specific sensor being used and provide barometric units and trends.

**SCROLL** To access further the menus available.

**EXIT** To step back towards original settings when in menu levels deeper than required.

**SW** SWITCH test mode with display of trigger point.

**LEAK** LEAK test mode setting for unit per time pressure drop data with user selected timing periods.

**ZERO** To enable the piezo-resistive sensor offsets to be removed.

**OPTION** Enables access to software options when fitted.

**SETUP** Enables the selection of variables associated with:

Units: up to 24 different pressure scales on the function keys.

RS 232: printer or communication format output, baud rate etc.

Time/Date: settings of current values

Calibration: updates calibration via protected system.

**STORE/RECALL** Notepad and data log facility.

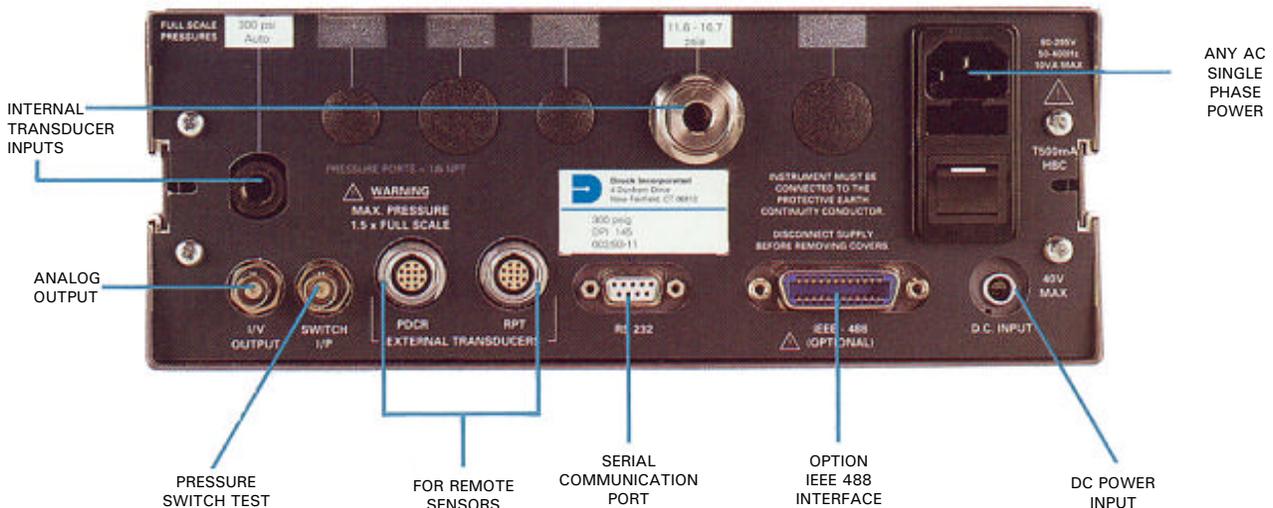
Stores and recalls displayed screens into memory.

Up to 20 named displays can be accommodated.

Data log up to 10,000 readings where a display raises between 2 and 9 readings dependent on screen presentation. Number of transferred readings over RS232 may be limited by file size.

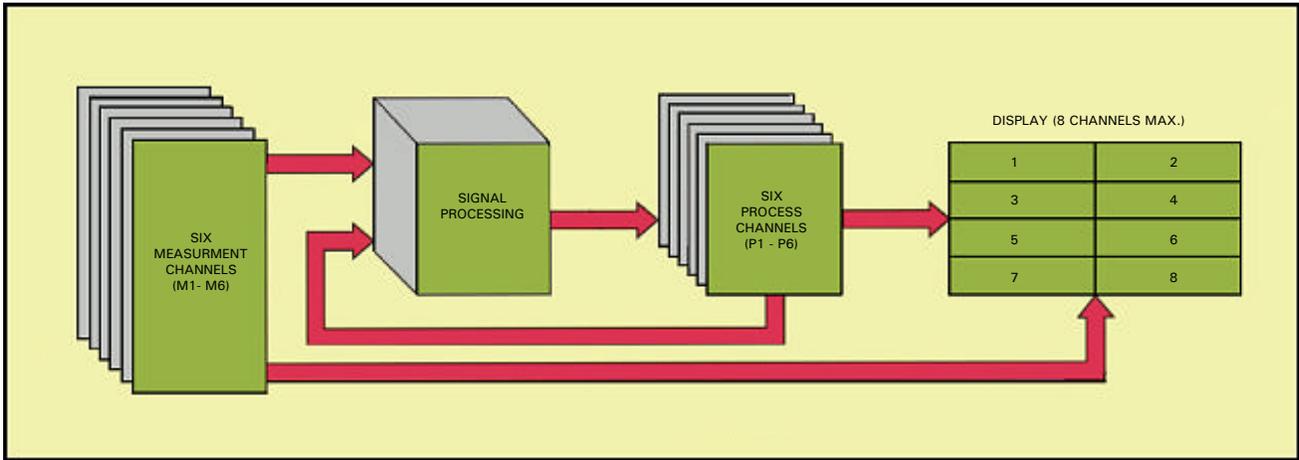
**PRINT** Prints the screen contents via the RS 232 interface.

## REAR PANEL LAYOUT



# DPI 145: Display and Processing

## DPI 145 SIGNAL FLOW



**Measurement channels**

- Any combination of up to four internal sensors and eleven external sensors.

**Process channels**

- Up to six process channels or maths operations if required.

**Display area**

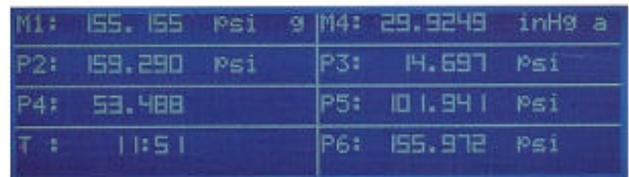
- Capable of displaying up to eight parameters, either direct or via the process channels.

**Display examples**

- The following examples illustrate the flexibility of the instrument's display and its processing capability.



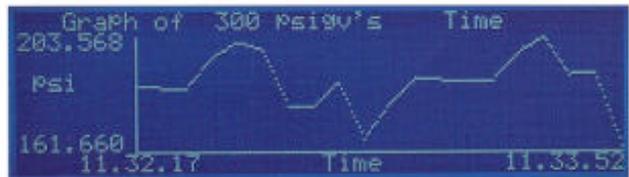
SINGLE CHANNEL



8 CHANNELS



BAROMETER



DATA LOG GRAPH



LEAK TEST



SWITCH TEST

# DPI 145: Multi-Function Pressure Indicator

## OPTIONS

### (A) IEEE 488 (GPIB)

Full computer control is available via a databus using the SCPI protocol. The standard IEEE connector is provided on the rear panel, the mating connector and lead are not provided. Full TALK and LISTEN capabilities are available. All standard front panel facilities are enabled by the databus.

### (B) External Transducers

In addition to the internal transducers the instrument can be configured with up to ten external piezo-resistive sensors 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 range 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 uni-directional calibrations only. For high line pressures refer to manufacturer.

Option B1 provides normal piezo-resistive transducer temperature error bands - see data sheets.

Option B2 provides enhanced temperature coefficient as detailed for internal sensors.

Option B3 Any other mV strain gauge bridge sensor.

### (C) Negative Calibration

Calibration of bi-directional channels is normally only provided in the positive direction. If negative direction calibrations are required this option should be requested and details of which channel.

### (D) Aeronautical Version

Extra software facilities for the calibration of altitude and airspeed instrumentation by conversion of linear pressure values into non-linear feet, meters, rate of climb and also knots, km/hr, Mach number.

Altitudes over the range -2000 to +100000 ft and airspeeds from 0 to 1000 knots can be measured.

### (E) Airfield Barometer Version

Software capability for providing barometric pressure displayed for QFE and QNH and QFF where datum heights and runway heights are given.

### (F) Rack Mount

A rack mounting kit which provides a 3U (5 1/4" - 133mm) high 19" plate into which the instrument is mounted and clamped

### (G) Connectors

If mating connectors are required the following should be requested:

- G1 - 12 way LEMO - external sensors
- G2 - 9 way 'D' type - RS 232
- G3 - BNC x 2 for I/V output + switch i/p
- G4 - 3 way LEMO for d.c. input

## ACCESSORIES

Supplied with the instrument:

- Power connector (a.c.) and integral lead.
- Handbook and calibration certificates.

## ORDERING INFORMATION

Please state the following (where applicable):

- (1) Type number.
- (2) Pressure range(s).
- (3) Gauge, sealed gauge, absolute or differential.
- (4) Preferred calibration scale (F1).
- (5) Options.
- (6) When external sensor is required:
  - (a) Pressure range and scaling
  - (b) Gauge, sealed gauge, absolute or differential
  - (c) Transducer type - see relevant data sheet for ordering.
  - (d) Temperature range for sensor
  - (e) Pressure connection
  - (f) Pressure media

*Unless otherwise stated above, the instrument will be delivered with scales of psi, ins.Hg, kPa, ft, H<sub>2</sub>O.*

*For non-standard requirements please specify in detail.*

*Continuing development sometimes necessitates specification changes without notice.*

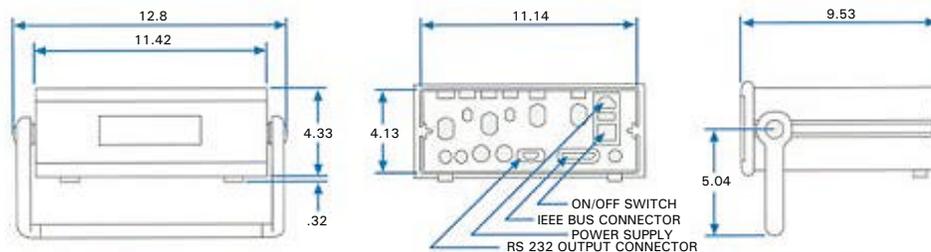
## RELATED PRODUCTS

Druck manufactures a comprehensive range of pressure indicators, controllers, calibrators, transducers and transmitters. Please refer to manufacturer for further information and data sheets.

## CALIBRATION STANDARDS

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

## INSTALLATION DRAWINGS Dimension : Inches



CUT OUT SIZE FOR PANEL MOUNTING 11.18 X 4.17



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