

## DPI 605 SERIES

### Precision Portable Pressure Calibrators

- Range -1 to +20 bar gauge
- Accuracy  $\pm 0.025\%$  of reading
- ISO 9000 systems compatible
- Dual pressure and electrical readout
- Storage of test results
- Internal pressure/vacuum generation
- Energising outputs for sensors
- RS 232 digital interface
- Temperature measurement to 200°C
- Intrinsically safe version available



DPI 605 SERIES - 12/97

## DPI 605 SERIES: Precision Portable Pressure Calibrator

### Introduction

The DPI 605 precision pressure calibrator which combines Druck's expertise in micromachined integrated strain gauge and vibrating silicon pressure sensors, microprocessor technology and ergonomic styling, has an accuracy of 0.025% of reading. It is a portable battery powered instrument with an electrical measurement and supply capability providing simultaneous pressure and electrical displays, data storage and an RS 232 interface.

The standard range of the calibrator is -1 to +20 bar gauge but ranges up to 350 bar are available in the indicator version with integral transducers and 700 bar using an external transducer.

As an option a very high accuracy vibrating silicon transducer can be added to the instrument to measure barometric pressure. This enables the simulation of other absolute pressures by adding this barometric value to gauge measurements. A further option is a temperature probe for measurement to 200°C.

Microprocessor technology is used to compensate the sensors and permits a wide range of functions to be selected. These include peak readings, switch testing, data logging, leak testing and results' analysis.

Results obtained during test and calibration can be stored in the instrument memory for future analysis which may take place directly on the display or be transferred to a computer via the RS 232 interface. Linkpak-W and Intecal-W calibration management software support this feature for fully automated calibration.

The integral pressure generation and adjustment is carried out by a hand-pump and volume adjuster with a release valve for venting. Where it is important that maximum pressure for the device under test is not exceeded, a safety LIMITS function may be selected to automatically block the pumping action near the desired set pressure.

The DPI 605 is an ergonomically designed enclosure sealed to IP65 for field use. All main controls are via a membrane keypad and the L.C.D. graphics display is mounted behind a tough polycarbonate window. This versatile display provides a wide range of formats, including a "data recorder" style for trend indication.

It has protected electrical input and output connectors on the sides to minimise accidental damage, weighs only 4 kg and comes with a lightweight carrying case.

The instrument is also available as an indicator only. Indicator versions have all the features of the calibrator except internal pressure generation and may have integral transducers for ranges up to 350 bar and external transducers up to 700 bar.

An intrinsically safe version, the DPI 605 IS, powered by approved cells, offers all the features of the standard unit except for the electrical outputs and the backlit display.



Photograph courtesy of  
Mallinckrodt Speciality  
Chemicals



DPI 605 SERIES - 12/97



## DPI 605 SERIES: Specification

### DPI 605 CALIBRATOR

#### Pressure Measurement Specification

##### Operating Pressure Range

-1 to +20 bar gauge  
Option available for absolute pressures via Barometric Reference sensor.

See Option A. External see Option B.

##### Pressure Scale Units

Bar, psi, mH<sub>2</sub>O, kPa standard - 24 different scales under SET-UP, user selectable.

##### Overpressure

To 1.25x causing negligible calibration change.

##### Pressure Media

Compatible with most common dry non-corrosive gases.

##### Transduction Principle

Dual, integrated silicon strain gauge sensors. Optional Barometric Reference utilises vibrating silicon element.

##### Readout

±999999 capability on both pressure and electrical parameters.

±9999 for ranges below 100 mbar.

##### Display

39 mm x 132 mm L.C.D. graphics panel  
240 x 64 pixels. Backlight.

**Backlight not available on IS version.**

##### Display Overload

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

##### Resolution

17 bits (0.00075% F.S.)

Ensures resolution does not compromise the accuracy on any scaling or range.

##### Response

2 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

±0.05% of reading ± 1 digit between 1% and 100% F.S.

±0.1 mbar below 1% F.S.

Figure includes 90 days stability.  
Combined non-linearity, hysteresis and repeatability (included within the above accuracy figure) as follows:-

##### Positive Pressures

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

±0.05 mbar below 1% F.S.

##### Negative Pressures

±0.025% of reading between -1 bar to -200 mbar.

±0.05 mbar between 0 and -200 mbar.

##### Temperature Effects

-1 bar to +20 bar gauge calibrator, over -10° to +40°C the averaged temperature coefficient ±0.002% of reading per °C.

##### Position Effect

Negligible

#### Electrical Specification

##### Electrical Inputs

Voltage Measurement  
0 to ±50V d.c. (±30V d.c. on IS Units), auto ranging, resolution 10µV max.  
Input impedance 10MΩ.

Accuracy ±0.04% of reading ±1 digit.  
Figure includes 90 day stability

and traceability.

T.C. < 0.0075% of reading/°C.

##### Current Measurement

0 to ±55mA d.c. resolution 0.001 mA.  
Internal resistance nominally 10Ω.

Accuracy ±0.03% of reading ± 1 digit.

Figure includes 90 day stability

T.C. < 0.0075% of reading/°C.

##### Electrical Outputs

##### Voltage Output\* (Not IS version)

Programmable floating output in the range 0 to 24V d.c. max 50mA.

Accuracy: 0.025% of reading 0.01% F.S. ± 1 digit.

Suitable also for current loop energisation and switch testing.

##### Current Output\* (Not IS version)

Programmable output in the range

0 to 55mA d.c. for current display calibrations.

Accuracy : ±0.035% of reading ±0.01% F.S. ± 1 digit. Configured as source, voltage limit 19V.

Configured as sink, voltage limit maximum 30V, voltage minimum limit 5V.

##### Analogue Output Signal\* (Not IS version)

Proportional to displayed pressure or electrical reading.

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.

Accuracy: Rdg ±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. ± 1digit.

All 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.

##### On IS units for use only outside Hazardous Area.

##### Calibration Controls

Via instructions from the key-pad. 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 6 x D cells, alkaline.

##### On IS versions specific manufactures

alkaline cells are certified, life 20 hours.

Battery life: 20 hours nominal for Ni-Cad.

70 hours nominal for alkaline.

External PSU/charger unit supplied as

standard. (Not IS version)

#### Environmental Specification

##### Temperature

Operating - 10 to 40°C.

Storage - 20 to 60°C.

##### Sealing

Instrument IP54

Battery charger to laboratory standard.

##### Electro Magnetic Compatibility

Designed to meet EN50081-1 and EN50082-1

#### Physical Specification

##### Weight

4 kg nominal

##### Dimensions

140 mm x 280 mm x 370 mm.

\*These facilities are mutually exclusive.

##### Pressure Connections

G 1/8 (female)

1/8NPT (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:

- a) Hand-pump capable of generating -850 mbar gauge to + 20 bar gauge.
- b) Volume adjuster for fine control.
- c) Vent valve for pressure release.
- d) Solenoid valves for pressure/vacuum switchover and pump limiting for safety.

##### Options Available

See the details under the options listing on the rear 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 -55° to +200°C.
- d) Negative 1 bar calibrations for the Indicator version
- e) A rugged printer for results recording via the RS 232.
- b) Extra Ni-Cad battery pack for in field use.

**Not available on IS version.**

### DPI 605 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 utilised to enable an indicator to be configured as a calibrator.

Specification as for the Calibrator except:

##### Operating Pressure Range (Internal)

Any full-scale range can be supplied between the ranges listed below:

0 to 70 mbar to 0 to 70 bar gauge.

0 to 350 bar sealed gauge.

350 mbar to 350 bar absolute.

Gauge versions available with -1 bar gauge option.

External transducers, (see details under Option B for ranges available up to 700 bar).

##### Accuracy

Ranges 0 to 70 mbar to 0 to 70 bar

±0.05% of reading between 20% and 100% F.S.

±0.01% of F.S. between 0 and 20% F.S.

For -1 bar calibrations full-scale range is defined as the compound range.

Ranges 0 to 71 to 0 to 350 bar

±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

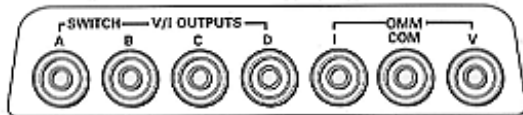
70 mbar to 350 bar internal sensors

±0.003% of reading/°C.

## DPI 605 SERIES: Precision Portable Pressure Calibrator

### DPI 605 INTERFACING

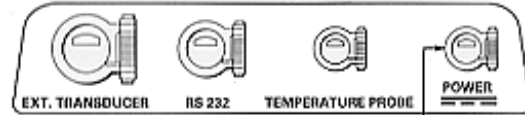
The DPI 605 is both a versatile calibrator and flexible instrumentation system capable of interfacing with numerous options, inputs and outputs. Connections are located in protected areas at the two sides of the case. Details pointing out the variety of testing configurations are shown here..



**Note: Voltage and current outputs not available on IS version.**

Located in the left-hand side of the instrument, the 4mm 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 instruments' built-in digital multimeter (DMM). Current inputs, up to a maximum of  $\pm 55\text{mA}$ , are applied between the common (COM) and I terminals. Voltage inputs (max  $\pm 50\text{V}$ ) are applied between the (COM) and (V) terminals.

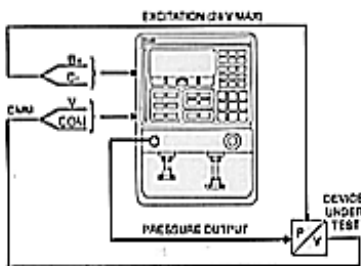


**Note: Not available on IS version.**

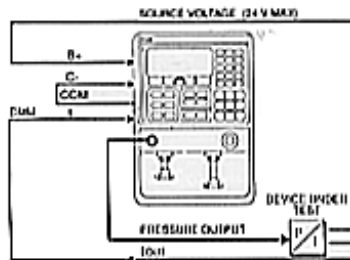
Located on the right-hand side of the instrument, the multi-way connections made via this panel are shown above. These connectors are all of a splash proof pattern with spring closed covers for protection. Each connector has a different pattern and will only mate with a corresponding plug. The sockets are allocated as follows:

|  |         |
|--|---------|
| Power adaptor/battery charger (POWER) (Not IS) | 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



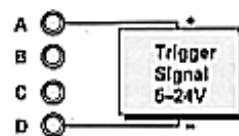
#### Two Wire Transmitter Testing



#### Connections for Switch test

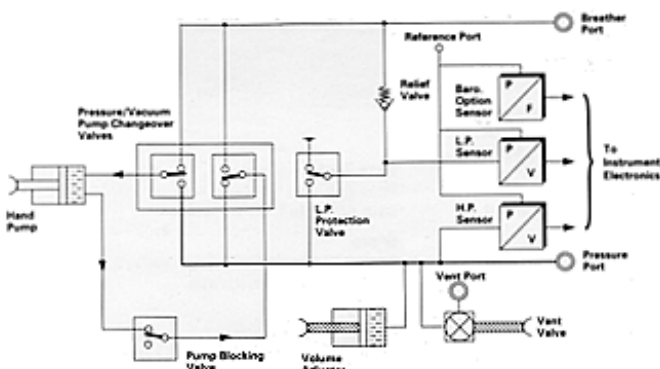


#### Connections for Trigger input



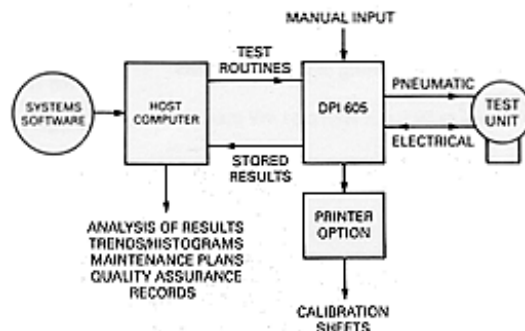
### PNEUMATIC CIRCUIT

The calibrator Version of the DPI 605 has a built-in hand-pump to generate either pressure up to 20 bar gauge or vacuums to -800mbar gauge. Latching solenoid valves provide pressure limiting features, pressure/vacuum change-over of the hand-pump and low range transducer protection.



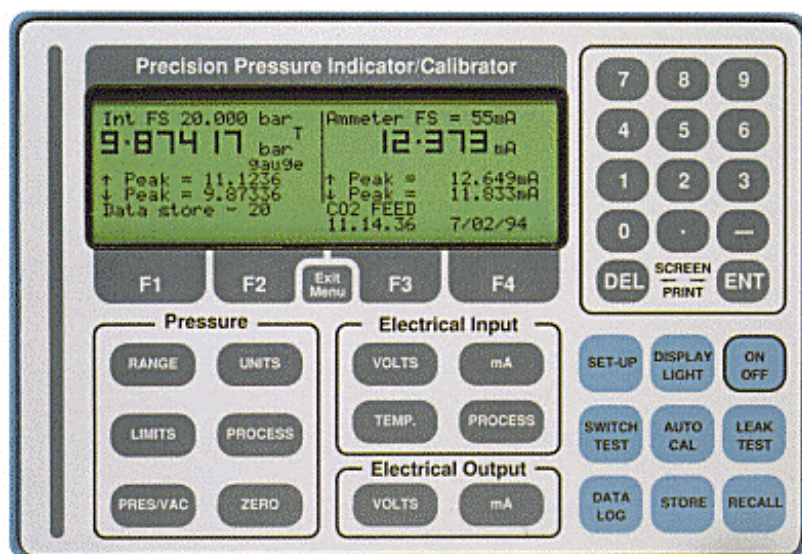
### TOTAL QUALITY MANAGEMENT

The DPI 605 is a powerful tool in the support of 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 down loaded to update records, analysis and histograms etc. The complete system permits audit trail compliance with all of the major quality management standards such as ISO 9000.





## DPI 605 SERIES: Precision Portable Pressure Calibrator



The pressure measurement capabilities of the DPI 605 permit a wide range of features to be provided by ranges, scale units, safety limits and a variety of processed data.

### Range

Selection of internal or external transducer, barometric pressure and absolute values.

### Units

Function keys provide 4 pressure scales-variable under SET-UP.

### Limits

Selection and setting of Safety and Alarm limits to prevent over pressurising.

### Process

Selection of computed values such as :

TARE - large values offsets

PEAK - capture of maximum and minimum excursions.

%F.S. - display in %F.S. values instead of pressure.

FILTER - introduction of digital display filter for unstable readings.

FLOW - computes flow from differential pressures across orifice plates.

### ZERO

Press key or removal of display offset.

### Press/Vac

Changeover on Calibrator versions from pressure pump to vacuum pump.

### Electrical Inputs

Electrical inputs and outputs are measured and displayed alongside the pressure data.

Numerous capabilities are provided such as current and voltage measurement and supply and processing of test unit outputs.

### Volts

Range 0 to 50 V d.c. with 0.01 mV max. resolution.

### mA

Range 0 to 55 mA d.c. with 0.001mA resolution.

### Temp

Scaled -55° to +200°C (or °F equivalent).

### Process

As described under pressure but additionally: Deviations from desired error tolerance, e.g. %F.S., % of reading, mA/mV or pressure units.

### Electrical Outputs

Not available on IS version

### Volts

Selection and setting of voltage output value.

### mA

Selection and setting of mA output.

### Analogue Output

As an alternative to volts and current output, a programmable voltage or current output signal proportional to the pressure or electrical display can be provided.

### Operational Features

#### SET-UP

Enables the selection of variable associated with:

Units - up to 24 different scales onto the F1/F2/F3/F4 function keys.

Temperature - displays in °C or °F.

RS 232 - printer or communications format output, baud rate.

Time/Date - setting of current values.

Test - check out capabilities for maintenance.

Calibration - updates to the calibration via protected system.

Battery check - POOR/OK/GOOD.

Backlight Light

For backlight-programmable "on" time under SET-UP

(Not available on IS version)

On/Off

Power switch - programmable time out.

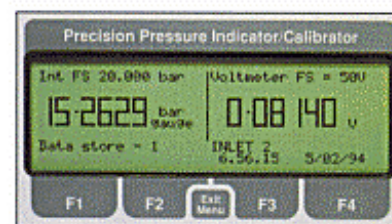
#### Switch Test

Enables pressure switch testing with display of trigger point.

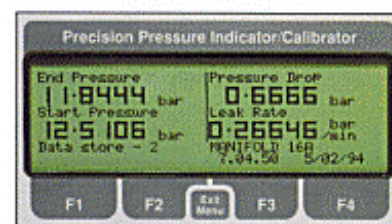
#### Data Log

Enables repetitive storage of complete displayed values. Maximum capability of 10000 readings (data log or auto cal) where of display consists of between 3 and 8 readings dependent on screen presentation. Also analogue display capability of stored data as "chart recorder".

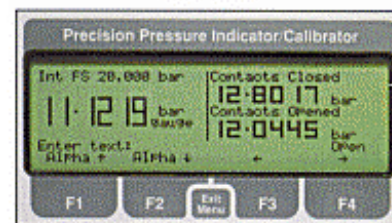
Number of transferred readings over RS232 may be limited by file size.



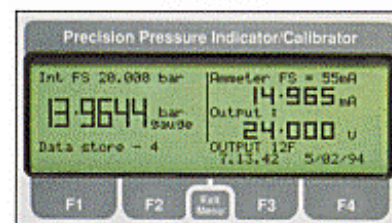
Standard Calibration



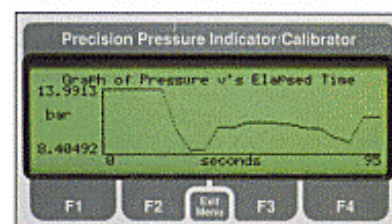
Leak Test



Switch Test



Powered Transmitter Test (not IS)



Data Log Plot

### Leak Test

Provides unit per time pressure drop data user settable time periods.

### Store

Commits displayed screen values into store.

Up to 20 named displays.

### Recall

Replay of last stored screen values to display.

### Auto Cal

Permits the storage of multiple calibrations along with TAG number relevant to the particular devices under test. More than 40 independent 20 point calibrations can be stored.

## DPI 605 SERIES: Precision Portable Pressure Calibrator

### OPTIONS

#### (A) Barometric Reference

A precision resonant pressure transducer (R.P.T.) monitors barometric pressure and, when used in conjunction with the normal gauge sensors, absolute ranges can be derived.

The R.P.T. provides an accuracy of  $\pm 0.15$  mbar absolute over the range 800 to 1150 mbar absolute and over a temperature range of  $10^{\circ}$  to  $30^{\circ}\text{C}$ . Over extended -  $10^{\circ}$  to  $+40^{\circ}\text{C}$  error  $\pm 0.3$  mbar over 1 year.

#### (B) 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.

0-70 mbar to 70 bar gauge

0-71 bar to 0-700 bar sealed gauge

0-350 mbar to 0-700 bar absolute

0-175 mbar to 0-40 bar differential

Maximum line pressure 35 bar.

Differential ranges uni-directional calibrations only. For high line pressures, refer to manufacturers

#### Accuracy

For external transducers range

0 to 70 mbar to 0 to 70 bar.

$\pm 0.05\%$  of reading between 20% and 100% F.S.

$\pm 0.01\%$  of F.S. between 0 and 20% F.S.

For ranges 0 to 70 to 0 to 700 bar.

$\pm 0.08\%$  of reading between 20% and 100% F.S.

$\pm 0.016\%$  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 2 metres as standard. Please refer to the relevant transducer data sheets for specification details, or manufacturer.

#### (C) Temperature Probe

A platinum resistance temperature probe (PT 100 to BS 1904:1984 Class A) can be supplied to give a digital display in desired units ( $^{\circ}\text{F}$  or  $^{\circ}\text{C}$ ).

Range  $-55^{\circ}$  to  $+200^{\circ}\text{C}$

Resolution  $0.01^{\circ}\text{C}$  or  $0.01^{\circ}\text{F}$

Accuracy  $\pm 0.1^{\circ}\text{C}$  (including 90 day stability)

Temperature effects

$\pm(0.0009\% \text{ Reading}/^{\circ}\text{C}$

$+0.0022^{\circ}\text{C})$  per  $^{\circ}\text{C}$

PT 100 probe not included in above figures

#### (D) -1 Bar Calibration

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

#### (E1) or (E2) printer

An IP33 rated 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.

Two voltage ranges are provided

(E1) 110 volts version

(E2) 240 volts version.

Please refer to manufacturer for further details

#### (F) Ni-Cad Battery Pack

**Not available on IS version.**

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

#### (H1) or (H2) Dirt/Moisture Trap

Where a clean/dry pressure media cannot be guaranteed 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 35 bar.

(H1) G1/8B(male) G1/8(female) version

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

#### Calibrator management software

Linkpak-W and Intecal-W calibration software support the documents capabilities of the DPI 605 allowing fully automated calibrations to be performed on site. These systems reduce calibrator and maintenance times, eliminate errors and reduce the burden imposed by quality systems such as ISO 9000.

Please refer to Linkpak-W and Intecal-W data sheets.

#### Intrinsic Safety

For requirements in hazardous areas, we can supply our DPI 605IS which is certified to EEx ib gas group IIC with a T4 temperature rating to EN50 014 (BS 5501 part 1) and EN50 020 Part 7 (BS 5501 part 7).

### ACCESSORIES

Carrying case.

Electrical test probes.

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

Handbook and calibration certificates.

Battery charger eliminator-

Not available on IS version

Part No. 191-075, 90-130V input

Part No. 191-077, 180-260V input

### ORDERING INFORMATION

Please state the following (where applicable):

(1) Type number.

(2) Calibrator version or Indicator version.

(3) Pressure range - gauge, absolute

(4) Options, including external pressure transducer. (Refer to relevant transducer data sheets).

(5) Battery charger - part number and type.

**Not available for IS version.**

For non-standard requirements please specify in detail.

*Continuing development sometimes necessitates specification changes without notice.*

### DIGITAL INSTRUMENTS

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

### CALIBRATED STANDARDS

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

### ASSOCIATED PRODUCTS

#### Intecal Software

Druck Integrated Calibration Management System is available for those users with ISO 9000 interests. This software provides an extensive data base with full control of records, calendar re-calibration dates and many other features associated with overall calibration management.



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Agent

DPI 605 SERIES - 12/97

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更多产品请看本公司产品专用销售网站：

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商斯达工控安防网：<http://www.pc-ps.net/>

商斯达电子元器件网：<http://www.sunstare.com/>

商斯达微波光电产品网：[HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达消费电子产品网：<http://www.icasic.com/>

商斯达实业科技产品网：<http://www.sunstars.cn/>

传感器销售热线：

地址：深圳市福田区福华路福庆街鸿图大厦 1602 室

电话：0755-83370250 83376489 83376549 83607652 83370251 82500323

传真：0755-83376182 (0) 13902971329 MSN: [SUNS8888@hotmail.com](mailto:SUNS8888@hotmail.com)

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