DPI611

Portable Pressure Calibrator

Instruction Manual



druck.com

Introduction

The Druck DPI611 is a fully self-contained pressure test and calibration system that combines pressure generation, signal measurement and loop power. It provides all the convenience of the Druck DPI610/615 series with significantly improved generation capabilities, higher accuracy and simplified touch screen operation.

Safety

WARNING Do not apply pressure greater than the maximum safe working pressure.

It is dangerous to attach an external source of pressure to a DPI611 pressure calibrator. Use only the internal mechanisms to set and control pressure in the pressure calibrator.

The manufacturer has designed this equipment to be safe when operated using the procedures detailed in this manual. Do not use this equipment for any other purpose than that stated, the protection provided by the equipment may be impaired.

This publication contains operating and safety instructions that must be followed to make sure of safe operation and to maintain the equipment in a safe condition. The safety instructions are either warnings or cautions issued to protect the user and the equipment from injury or damage.

Use qualified technicians[1] and good engineering practice for all procedures in this publication.

Maintenance

The equipment must be maintained using the procedures in this publication. Further manufacturer's procedures should be done by an authorized service agents or the manufacturer's service departments.

Technical Advice

For technical advice contact the manufacturer.

EU Declaration of Conformity

For the EU Declaration of Conformity, full specification and user manual, refer to Druck website:

https://druck.com

Cyber Security

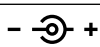
Cyber security support period is at least 5 years from date of purchase. For further detail and most current information, please see product web page at https://druck.com.

Please contact Druck using email address cyber-incident@druck.com to report any suspected or observed cyber-security issues with this product.

1. A qualified technician must have the necessary technical knowledge, documentation, special test equipment and tools to carry out the required work on this equipment.

Copyright 2014 by Druck Limited.

Symbols

Symbol	Description
CE	This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.
UKCA	This equipment meets the requirements of all relevant UK Statutory Instruments. The equipment carries the UKCA mark.
	This symbol, on the equipment, indicates that the user should read the user manual.
	This symbol, on the equipment, indicates a warning and that the user should refer to the user manual.
	USB ports: Type A; Mini Type B connector.
	Ground (Earth)
	DC adaptor polarity: the Centre of the plug is negative.
	Druck is an active participant in the UK and EU Waste Electrical and Electronic Equipment (WEEE) take-back initiative (UK SI 2013/3113, EU directive 2012/19/EU). The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems. If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. Please visit the link below for take-back instructions and more information about this initiative.  **https://druck.com/weee**

Copyright 2014 by Druck Limited.

Abbreviations

The following abbreviations are used in this manual. Abbreviations are the same in the singular and plural.

Abbreviation	Description
a	Absolute
ac	Alternating Current
avg	Average
CH	Channel
COSHH	Control of Substances Hazardous to Health
dc	Direct current
DPI	Digital Pressure Instrument
DUT	Device Under Test
etc.	And so on
e.g.	For example
FS	Full Scale
ft	Foot
g	Gauge
H_2O	Water
Hz	Hertz
IDOS	Intelligent Digital Output Sensor (Druck product)
i.e.	That is
in	Inch
kg	kilogram
m	Metre
mA	milliampere
max	Maximum
mbar	millibar
min	Minute or minimum
MSDS	Material Safety Data Sheet
NPT	National Pipe Thread
P/N	Part Number
psi	Pounds per square inch
RH	Relative Humidity
RS-232	Serial communications standard
USB	Universal Serial Bus
V	Volts
°C	Degrees Celsius
°F	Degrees Fahrenheit

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

Contents

1. Introduction 1
- 1.1 Equipment in the Box 1
- 1.2 Observance of the User Manual 1
- 1.3 General Safety Precautions 1
- 1.4 Warnings 2
- 1.5 Electrical Safety 2
- 1.6 Pressure Warnings 3
- 1.7 Overvoltage Category 3
- 1.8 Preparing the Instrument 3
  - 1.8.1 Initial Checks 3
  - 1.8.2 Install Dry Cell Batteries 3
- 1.9 Parts 5
  - 1.9.1 Overview 5
  - 1.9.2 Test Port 6
  - 1.9.3 Pressure Release Valve 6
  - 1.9.4 Selector 6
  - 1.9.5 Pump 7
  - 1.9.6 Volume Adjuster 7
- 1.10 Accessories 8
  - 1.10.1 Carry Case (P/N IO611-CASE-1) 8
  - 1.10.2 Rechargeable Battery Pack (P/N CC3800GE) 8
  - 1.10.3 Rechargeable Battery and Adaptor Kit (P/N IO61X-BAT-KIT) 8
  - 1.10.4 Mains Adaptor (P/N IO620-PSU) 9
  - 1.10.5 USB Cable (P/N IO620-USB-PC) 9
  - 1.10.6 IDOS to USB Converter (P/N IO620-IDOS-USB) 9
  - 1.10.7 USB to RS-232 Cable (P/N IO620-USB-RS232) 9
  - 1.10.8 Dirt Moisture Trap 20 bar (P/N IO620-IDT621) 9
  - 1.10.9 Pneumatic Hose (P/N IO620-HOSE-P1 / IO620-HOSE-P2) 10
  - 1.10.10 Low Pressure Pneumatic Hose (P/N IOHOSE-NP1 / IOHOSE-NP2) 10
  - 1.10.11 Pressure Adaptor Set 10
  - 1.10.12 Comparator Adaptor (P/N IO620-COMP) 11
- 1.11 DPI611 Power Modes 11
  - 1.11.1 Power ON 11
  - 1.11.2 Power OFF 11
  - 1.11.3 Power up from Standby Mode 12
- 1.12 Navigation 12
  - 1.12.1 Set Date, Time and Language 12
  - 1.12.2 Themes 12
  - 1.12.3 Help 12
- 1.13 Software and Firmware Upgrades 13
  - 1.13.1 Viewing Software Revision 13
  - 1.13.2 Upgrading the Software 13
  - 1.13.3 Upgrade the Application Software 13
  - 1.13.4 Upgrade the Operating System and Boot Loader Software 13
- 1.14 Maintenance 13
  - 1.14.1 Cleaning 13
  - 1.14.2 Replace the Batteries 13
- 1.15 Instrument Return 14
  - 1.15.1 Returned Material Procedure 14
  - 1.15.2 Safety Precautions 14

Copyright 2014 by Druck Limited.

1.15.3 Important Notice 14
1.15.4 Instrument Disposal in the European Union 14
1.15.5 For More Information Contact 14
1.16 Environment 14

2. Operations 15
2.1 Pneumatic Operations 15
2.1.1 Introduction 15
2.1.2 Release the Pressure 15
2.1.3 Attach/Remove the Device Under Test 16
2.1.4 Vacuum or Pressure Operation 17
2.2 Calibrator Operations 17
2.2.1 Basic Calibrator Operation 17
2.2.2 Set the Function Utility Options 21
2.2.3 Measurement Display Options 23
2.2.4 Example Procedures 24
2.3 Pressure Calibration 28
2.3.1 Set up a Leak Test 29
2.3.2 Set the Pressure Module to Zero 30
2.3.3 Error Indications 30
2.4 Measure Pressure: IDOS Option 30
2.4.1 IDOS Option Assembly Instructions 31
2.4.2 IDOS Function Procedures 31

3. Data Logging 33
3.1 Set-up 33
3.2 Operation 34
3.3 File Review 35
3.4 File Management 35
3.4.1 Transfer 35
3.4.2 Erase 35
3.4.3 Memory Status 35
3.4.4 Data Format 36

4. Documentation 37
4.1 Analysis 37
4.2 Set-up 37
4.2.1 Define the Reference Channel 38
4.2.2 Define Each Input Channel 39
4.3 Analysis Function 39
4.4 Run Procedure 40
4.4.1 Sequence to Upload and Download File 40

5. Calibration 43
5.1 General 43
5.2 Calibration Check 43
5.3 Calibration Adjustments 43
5.4 Before Starting 43
5.5 Procedures: Current (Measure) 44
5.6 Procedures: Current (Source) 45
5.7 Procedures: DC mV/Volts (Measure) 45

Copyright 2014 by Druck Limited.

5.8 Procedures: DC Volts (Source) 46
5.9 Procedures: Pressure Indicator 47
5.10 Procedures: IDOS UPM 47

6. Accessory Instructions 49
6.1 Dirt Moisture Trap 20 bar (P/N IO620-IDT621) 49
6.1.1 Specification 49
6.1.2 Pressure Connections 49
6.1.3 Operation 49
6.1.4 Cleaning 50

7. Leak Test Procedure 51
7.1 Pressure 51
7.2 Vacuum 52

8. General Specification 53

9. Troubleshooting 55
9.1 Pressure Generation 55
9.2 General 55

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

1. Introduction

The Druck DPI611 is a battery-powered instrument for performing pressure and electrical calibration operations. The Druck DPI611 also supplies the power and user interface functions for all optional items.

1.1 Equipment in the Box

The following items are supplied with the Druck DPI611:

- Standard AA size batteries.
- 1/8″ NPT & BSP pressure adaptors.
- Set of four test leads.
- Safety and Quick Start Guide.
- Stylus

Refer to DPI611 datasheet for full list of accessories supplied with each DPI611 model.

1.2 Observance of the User Manual

This manual contains safety and battery installation information for the Druck DPI611. It is the responsibility of the customer to make sure that all personnel operating and maintaining the equipment are correctly trained and qualified. Before using the equipment, read all sections of this User Manual paying particular attention to all WARNINGS and CAUTIONS given in the Quick Start Guide.

1.3 General Safety Precautions

Read and obey all the operator's local health and safety regulations and safe working procedures or practices when doing a procedure or task.

- Use only the approved tools, consumable materials and spares to operate and maintain the equipment.
- Use equipment only for the purpose for which it is provided.
- Wear all applicable Personal Protective Equipment (PPE).
- Do not use sharp objects on the touch-screen.
- Observe absolute cleanliness when using the instrument.
- Severe damage can be caused if equipment connected to this instrument is contaminated.
- Connect only clean equipment to the instrument. To avoid any contamination, an external Dirt Moisture Trap (See Section 1.10.8) is recommended
- Some liquid and gas mixtures are dangerous. This includes mixtures that occur because of contamination. Make sure that the equipment is safe to use with the necessary media.
- Read and obey all applicable WARNING and CAUTIONS signs.
- Make sure that:
    i. All work areas are clean and clear of unwanted tools, equipment and materials.
    ii. All unwanted consumable materials are disposed in accordance with local health and safety and environmental regulations.
    iii. All equipment is serviceable.

Copyright 2014 by Druck Limited.

1.4 Warnings



WARNING **Do not use with media that has an oxygen concentration > 21 % or other strong oxidizing agents.**

This product contains materials or fluids that may degrade or combust in the presence of strong oxidizing agents.

Do not ignore the specified limits for the instrument or its related accessories. This can cause injuries.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the instrument in locations with explosive gas, vapor or dust. There is a risk of an explosion.

1.5 Electrical Safety



WARNING **The DC input to the DPI611 is rated at 5 Vdc ± 5% 4 Amps.**

External circuits should have appropriate insulation to the mains.

To prevent electrical shocks or damage to the instrument, do not connect more than 30 V CAT I between the terminals or between the terminals and the ground (earth).

This instrument uses a rechargeable battery pack or standard AA size batteries. To prevent an explosion or fire do not short circuit.

The power supply input range to the optional power supply unit is 100 – 260Vac, 50 to 60 Hz, 250 mA, installation category CAT II.

When using the optional power supply unit, position the power supply so as not to obstruct the supply disconnecting device.

Note that the operating and storage temperature range of the optional PSU does not match that of the DPI611. Mains PSU operating temperature range 0°C to +40°C, storage temperature range -40°C to +70°C.

To make sure the display shows the correct data, disconnect the test leads before power is set to ON or changing to another measure or source function.

Keep the leads free from all contaminants.

Copyright 2014 by Druck Limited.

1.6 Pressure Warnings

WARNING It is dangerous to attach an external source of pressure to a DPI611 pressure calibrator. Use only the internal mechanisms to set and control pressure in the pressure calibrator.

To prevent a dangerous release of pressure, isolate and bleed the system before disconnecting a pressure connection.

To prevent a dangerous release of pressure, make sure that all the related pipes, hoses and equipment have the correct pressure rating, are safe to use and are correctly attached.

To prevent damage to the DPI611 calibrator, only use it within the specified pressure limits.

Do not exceed the maximum pressures stated in the appropriate component manual for the unit under test.

Reduce pressure at a controlled rate when venting to atmosphere.

Carefully de-pressurize all pipes to atmospheric pressure before disconnecting and connecting to the unit under test.

Always wear appropriate eye protection when working with pressure.

1.7 Overvoltage Category

The following summary of installation and measurement overvoltage categories are derived from IEC 61010-1. The overvoltage categories indicate the severity of overvoltage transients.

Table 1-1: Overvoltage Categories

Overvoltage Category	Description
CAT I	Overvoltage category I has the least severe overvoltage transients. Generally CAT I equipment is not designed to be directly connected to the mains supply. Examples of CAT I equipment are process loop powered devices.
CAT II	Overvoltage category II describes an electrical installation where typically single phase equipment is connected. Examples of such equipment are appliances and portable tools.

1.8 Preparing the Instrument

On receipt of the instrument check the contents in the box and its optional accessories (See Section 1.10). It is recommended to retain the box and packaging for future use.

1.8.1 Initial Checks

Before using the instrument for the first time:

- Make sure that there is no damage to the instrument, and that there are no missing items; See Section 1.10.
- Remove the plastic film that protects the display.

1.8.2 Install Dry Cell Batteries

CAUTION Incorrect Insertion of batteries can cause battery failure.

1. Remove the battery cover by loosening the captive battery cover fixing screw and lifting the cover upwards.

Copyright 2014 by Druck Limited.

2. Place the batteries (c) in the battery compartment with the correct polarity.
3. Replace the battery cover by pressing the lugs (b) inside the slots (d) and bring down the cover, securing by tightening the fixing screw. (See Figure 1-1).

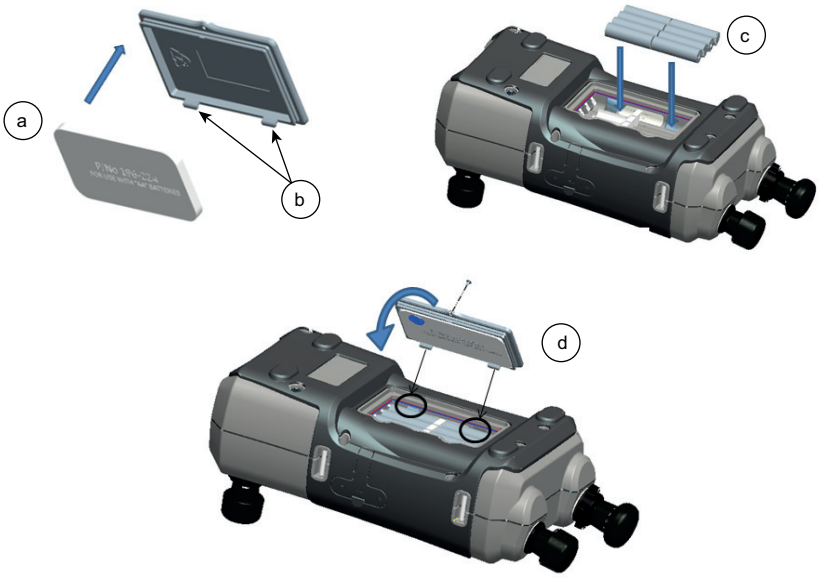


Figure 1-1: Fit Dry Cell Batteries

Copyright 2014 by Druck Limited.

1.9 Parts

1.9.1 Overview

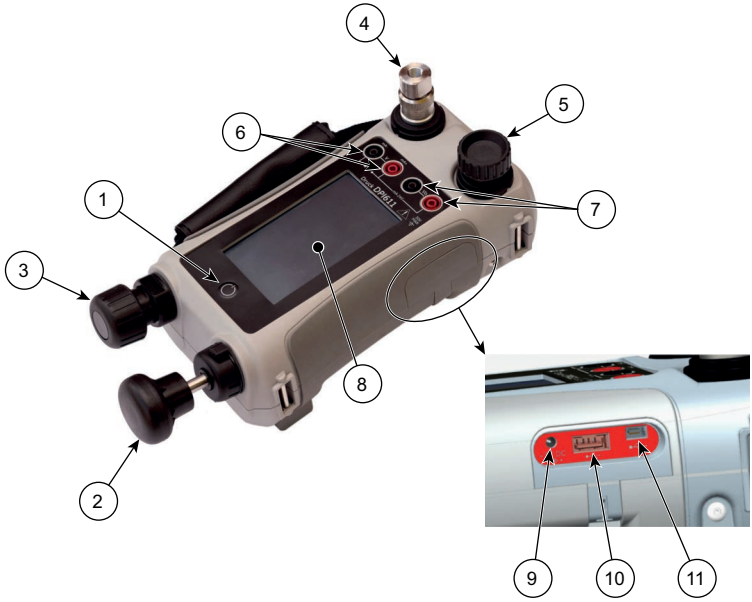


Figure 1-2: DPI611 Pressure Calibrator

Item	Description
1	On/Off button.
2	Pump mechanism and pressure/vacuum selector.
3	Pneumatic volume adjuster.
4	Test port: To attach the device under test.
5	Pneumatic pressure release valve to release pressure in the system.
6	CH1 connectors for: Voltage (V); Current (mA+, mA-); Switch operation.
7	Isolated CH2 connectors for: Voltage (V); 24 V loop power supply (24 V).
8	Liquid Crystal Display (LCD): Color display with touch-screen. To make a selection, lightly tap on the applicable display area.
9	+5 V DC power input socket. This supply also charges the optional battery pack.
10	USB type A connector for connections to external peripherals (USB flash memory or optional external modules).
11	USB mini-type B connector for communication with a computer.

Copyright 2014 by Druck Limited.

1.9.2 Test Port



Figure 1-3: Test Port

To attach the device under test, the test port uses “Quick fit” pressure adaptors; See Section 1.10.11. These are easy to remove, change and install; See Section 2.1.3.

1.9.3 Pressure Release Valve



Figure 1-4: Pressure Release Valve

This is a needle point valve that allows the release of pressure or vacuum, or seal the system. Turn clockwise to close, counter-clockwise to open.

1.9.4 Selector

CAUTION Before turning the pressure/vacuum selector to + or -, release all the pressure. Sudden high pressure in the pump mechanism can cause damage.

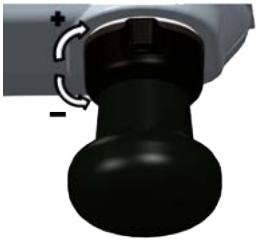


Figure 1-5: Selector

This control sets the operation of the instrument (pressure or vacuum). To prevent a pressure leak, turn it fully clockwise or counter-clockwise. (+ : Pressure, - : Vacuum)

Copyright 2014 by Druck Limited.

1.9.5 Pump



Figure 1-6: DPI611 Pump

After the Selector has been set to pressure or vacuum (See Section 1.9.4), seal the system (See Section 1.9.3) and use the pump to set the necessary pressure or vacuum.

Fine adjustments of pressure can be made using the volume adjuster (See Section 1.9.6).

1.9.6 Volume Adjuster



Figure 1-7: DPI611 Volume Adjuster

This control increases or decreases the pressure/vacuum.

Before sealing the system (See Section 1.9.3), turn this control to the necessary position:

- For equal adjustment, turn it to the middle of its range.
- For maximum adjustment, turn it fully clockwise or counter-clockwise.

Once the necessary pressure or vacuum has been set with the pump (See Section 1.9.5), use the volume adjuster to make the fine adjustments.

Copyright 2014 by Druck Limited.

1.10 Accessories

1.10.1 Carry Case (P/N IO611-CASE-1)



A tailored fabric carry case with carrying strap allows the DPI611 to be used without removing it from the case.

1.10.2 Rechargeable Battery Pack (P/N CC3800GE)



Use in place of AA cells. The battery pack is charged within the instrument.

Note: The IO61X-BAT-KIT adaptor kit is required to use the rechargeable battery pack in the DPI611, see Section 1.10.3.

1.10.3 Rechargeable Battery and Adaptor Kit (P/N IO61X-BAT-KIT)



Kit contains 3.7 V Li-ion battery, Cradle, Battery Cover and Power Adapter.

Copyright 2014 by Druck Limited.

1.10.4 Mains Adaptor (P/N IO620-PSU)



A universal input mains adaptor (Input voltage 100-240 Vac (50/60Hz)) and Mains socket adaptors are provided.

1.10.5 USB Cable (P/N IO620-USB-PC)

It connects the DPI611 to a PC via a USB port.

1.10.6 IDOS to USB Converter (P/N IO620-IDOS-USB)



It allows connection of an IDOS universal pressure module to the DPI611. USB Cable (P/N IO620-USB-PC) is also required to connect the converter to the DPI611 USB port.

1.10.7 USB to RS-232 Cable (P/N IO620-USB-RS232)

It connects the DPI611 to an RS-232 interface.

1.10.8 Dirt Moisture Trap 20 bar (P/N IO620-IDT621)



It prevents contamination of the DPI611 pneumatic system and cross contamination from one device under test to another. The trap connects directly to the pressure port and replicates the quick fit connection for compatibility with standard adaptors, adaptor kits and hoses. User instructions are in Section 6.1.

Copyright 2014 by Druck Limited.

1.10.9 Pneumatic Hose (P/N IO620-HOSE-P1 / IO620-HOSE-P2)



A high pressure pneumatic hose rated to 400 bar (5800 psi). The hose connects directly to the DPI611 pressure port and replicates the quick fit connection for compatibility with the standard adaptors supplied and the other adaptor kits.

Part Number	Description
IO620-HOSE-P1	1 m / 3.2 ft Pneumatic Hose - 400 bar (5800 psi)
IO620-HOSE-P2	2 m / 6.4 ft Pneumatic Hose - 400 bar (5800 psi)

1.10.10 Low Pressure Pneumatic Hose (P/N IOHOSE-NP1 / IOHOSE-NP2)

A low pressure pneumatic hose rated to 20 bar (300 psi). The hose connects directly to the DPI611 pressure port and replicates the quick fit connection for compatibility with the standard adaptors supplied and the other adaptor kits.

Part Number	Description
IOHOSE-NP1	1 m / 3.2 ft Pneumatic Hose - 20 bar (300 psi)
IOHOSE-NP2	2 m / 6.4 ft Pneumatic Hose - 20 bar (300 psi)

1.10.11 Pressure Adaptor Set



A set of test point adaptors to connect the tool-less quick fit DPI611 pressure port or the extension hoses to the device under test.

Part Number	Description
IO620-BSP	G1/8 male and G1/4 male, G1/4 female, G3/8 female and G1/2 female.
IO620-NPT	1/8″ male and ¼″ male, ¼″ female, 3/8″ female and ½″ female.
IO620-MET	14 mm female and 20 mm female.

Copyright 2014 by Druck Limited.

1.10.12 Comparator Adaptor (P/N IO620-COMP)



For greater efficiency, two test devices can be connected at the same time. The adaptor connects to the pressure port of the DPI611 and provides two outlet ports. It is compatible with the standard adaptors supplied and the adaptor kits.

1.11 DPI611 Power Modes

1.11.1 Power ON

1. From OFF – momentarily press the power button until the logo appears.



Figure 1-8: Power Button

1.11.2 Power OFF

1. Press and Release the Power Button:
2. Select SWITCH OFF from the POWERDOWN OPTIONS window displayed.

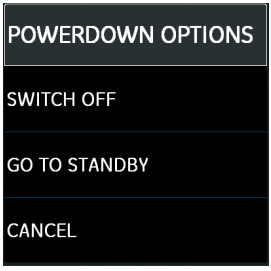


Figure 1-9: Powerdown Options

Note: SWITCH OFF can also be achieved by pressing and holding the power button until the screen is blank.

Use SWITCH OFF to preserve the battery capacity when the instrument is not in use for extended periods of time.

1.11.2.1 Standby Mode

Use GO TO STANDBY between jobs to provide a quick start-up.

1. Press and Release Power button:

Copyright 2014 by Druck Limited.

2. Select GO TO STANDBY from the POWERDOWN OPTIONS window displayed.

1.11.3 Power up from Standby Mode

When powered up from the standby mode, instrument always opens the last screen shown before going to standby mode.

1.12 Navigation

The application DASHBOARD allows quick selection of a function without menus or special keys. The DASHBOARD icons represent the functional applications of the DPI611, for example, the CALIBRATOR application. Touch the appropriate icon to start the application.

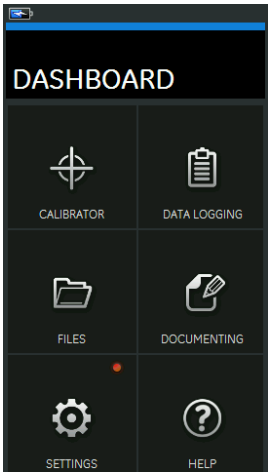


Figure 1-10: Dashboard

1.12.1 Set Date, Time and Language

To access Date, Time and Language menus:

DASHBOARD >> SETTINGS >> DATE

Note: The DPI611 will maintain the date and time for 30 days after being left without batteries. In case of loss of date and time, replace the batteries, connect the mains adaptor to the DPI611 and keep it turned on for 50 hours to fully recharge the clock battery.

1.12.2 Themes

Two themes are available: Dark and Light; select the correct theme for the light level using:

DASHBOARD >> SETTINGS >> THEME

1.12.3 Help

Select the HELP icon on the Dashboard to access the manual. All the information required to operate the Druck DPI611 is in the HELP section of the Dashboard which is accessed by selecting:

DASHBOARD >> HELP

Copyright 2014 by Druck Limited.

1.13 Software and Firmware Upgrades

1.13.1 Viewing Software Revision

The software revisions running on the DPI611 can be viewed by selecting:

DASHBOARD >> ⚙ SETTINGS >> STATUS >> SOFTWARE BUILD

Note: If the software revision number is highlighted red then an upgrade is available.

1.13.2 Upgrading the Software

Follow the website instructions to download the files onto a USB flash memory drive.

https://druck.com/software

DASHBOARD >> ⚙ SETTINGS >> ADVANCED

Enter the calibration PIN: 5487; Select the ✓ button and continue upgrade with one of these operations.

1.13.3 Upgrade the Application Software

1. Copy the ‘AMC’ application folder into the root of a USB flash memory device.
2. Put the USB flash memory drive into the USB type A connector.
3. Select: APPLICATION
4. Follow the on-screen instructions.

1.13.4 Upgrade the Operating System and Boot Loader Software

1. Copy the ‘OS’ folder into the root of a USB flash memory device.
2. Put the USB flash memory drive in the USB type A connector.
3. Select: OPERATING SYSTEM
4. Follow the on-screen instructions.

Note: The boot loader can only be upgraded as part of an operating system upgrade.

- If a mistake is made during upgrade and there are no files to upload, follow the on-screen instructions and complete the procedure.
- When an upgrade completes normally, the initial operation of the touch screen may be slower (a period of approximately 30 seconds).
- To make sure the upgrade completed correctly, use the Status menu.

1.14 Maintenance

The DPI611 instrument contains no user serviceable parts and should be returned to a Druck service center or an approved service agent for all repairs.

For more information, contact our customer service department at: **https://druck.com/service**.

1.14.1 Cleaning



CAUTION Do not use solvents or abrasive materials.

Clean the case and display with a lint-free cloth and a weak detergent solution.

1.14.2 Replace the Batteries

To replace the batteries, see Section 1.8.2. Then re-attach the cover.

All the configuration options stay in memory.

Copyright 2014 by Druck Limited.

1.15 Instrument Return

1.15.1 Returned Material Procedure

If the unit requires calibration or is unserviceable, return it to the nearest Druck Service Centre listed at: **https://druck.com/service**.

Contact the Service Department to obtain a Return Goods/Material Authorization (RGA or RMA). Provide the following information for a RGA or RMA:

- Product (e.g. DPI611)
- Serial number.
- Details of defect/work to be undertaken.
- Calibration traceability requirements.
- Operating conditions.

1.15.2 Safety Precautions

Provide information if the product has been in contact with any hazardous or toxic substances and, the relevant MSDS and or COSHH references and precautions to be taken when handling.

1.15.3 Important Notice

Do not use unauthorized sources to service this equipment as this will affect the warranty and may not guarantee further performance.

When discarding used equipment and batteries, obey all the local health and safety procedures.

1.15.4 Instrument Disposal in the European Union



Druck is an active participant in the UK and EU Waste Electrical and Electronic Equipment (WEEE) take-back initiative (UK SI 2013/3113, EU directive 2012/19/EU).

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

Please visit the link below for take-back instructions and more information about this initiative.

https://druck.com/weee

1.15.5 For More Information Contact

Druck customer service department: **https://druck.com/service**

1.16 Environment

The following conditions apply for both shipping and storage:

- Temperature Range -20°C to +70°C (-40°F to +158°F)
- Altitude up to 15,000 feet (4,570 meters).

Copyright 2014 by Druck Limited.

2. Operations

2.1 Pneumatic Operations

WARNING Pressurized gases are dangerous. Before connecting or disconnecting pressure equipment, safely release all the pressure.

It is dangerous to attach an external source of pressure to a DPI611 pressure calibrator. Use only the internal mechanisms to set and control pressure in the pressure calibrator.

2.1.1 Introduction

This section gives examples of how to connect and use the DPI611 pressure calibrator for the necessary pressure or vacuum operations.

Before you start:

- Read and understand the “Safety” section.
- Make sure that there is no damage to the instrument and there are no missing items.

Note: Use only original parts supplied by the manufacturer.



Figure 2-1: DPI611 Pressure Calibrator

2.1.2 Release the Pressure

To release all the pressure in this instrument, open the pressure release valve counter-clockwise (1 turn).



Figure 2-2: Pressure Release Valve

Copyright 2014 by Druck Limited.

2.1.3 Attach/Remove the Device Under Test

WARNING **Pressurized gases are dangerous. Before attaching or disconnecting pressure equipment, safely release all the pressure.**

CAUTION **To prevent damage to the instrument, do not let dirt get into the pressure mechanism. Before attaching equipment, make sure it is clean or use the applicable dirt trap.**



Figure 2-3: Pressure Port

The test port uses “Quick fit” pressure adaptors; See Section 1.10.11. They are easy to remove, change and install.

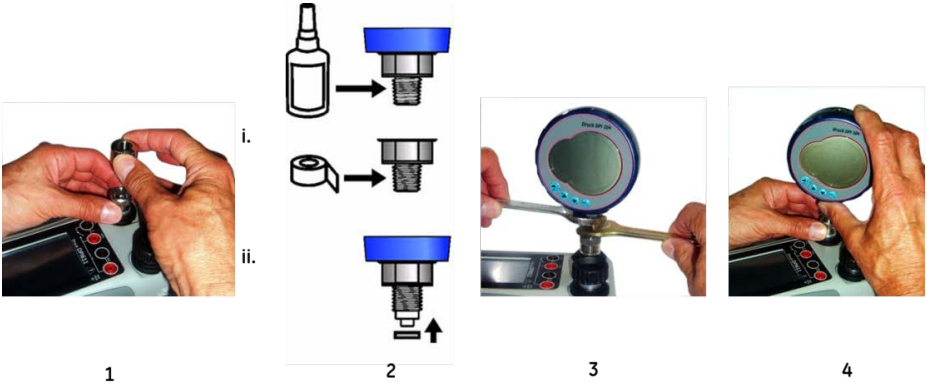


Figure 2-4: Attach / Remove Pressure Connections

2.1.3.1 Procedure to Attach

1. Remove the adaptor.
2. Use an applicable seal for the pressure connection:
   i. NPT type: Use an applicable sealant on the thread.
   ii. BSP (parallel) type: We recommend a bonded seal at the bottom.
3. Attach the adaptor to the device; if necessary use one of the alternative adaptors listed in Section 1.10, then tighten to the applicable torque.
4. Re-attach the adaptor to the test port and tighten it until it is hand-tight only.

2.1.3.2 Procedure to Remove

1. To remove a device, first release the pressure (See Section 2.1.2).

Copyright 2014 by Druck Limited.

2. Remove the adaptor from the test port.
3. Remove the adaptor from the device.
4. Store the adaptor to protect the threads.

2.1.4 Vacuum or Pressure Operation



1 2 3 4 5

2.1.4.1 Vacuum Procedure

1. Set to vacuum operation (-).
2. To do equal adjustments (up or down) at the end of the procedure, turn the volume adjuster to the middle of its range of operation.
3. Seal the system.
4. Use the pump to set the maximum vacuum or set the vacuum you want to adjust.
5. Adjust the vacuum. Clockwise to decrease; counter-clockwise to increase.

2.1.4.2 Pressure Procedure

1. Set to pressure operation (+).
2. To do equal adjustments (up or down) at the end of the procedure, turn the volume adjuster to the middle of its range of operation.
3. Seal the system.
4. Use the pump to set the maximum pressure or set the pressure you want to adjust.
5. Adjust the pressure. Clockwise to decrease; counter-clockwise to increase.

2.2 Calibrator Operations

2.2.1 Basic Calibrator Operation

1. Select:

   DASHBOARD >> CALIBRATOR

Copyright 2014 by Druck Limited.

2. To change the measure and source functions select the button from the calibrator application screen to enter the TASK menu. Select CALIBRATOR in the TASK menu to choose from a library of pre-configured TASKs appropriate for common tests.

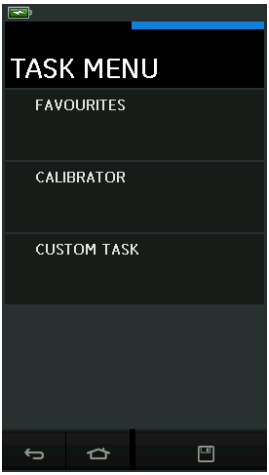


Figure 2-5: Task Menu

2.2.1.1 Saving Tasks

At any point within the TASK MENU the currently active tasks can be saved to FAVOURITES by selecting Save Task.

Note: Saved Function is what is currently active in the calibrator window. It is NOT a selected Task - refer to COPY TASK to copy selected Task to the Favourites.

2.2.1.2 Calibrator

1. Select CALIBRATOR from the TASK MENU.

Copyright 2014 by Druck Limited.

This will allow the user to select from commonly used combinations of functions.

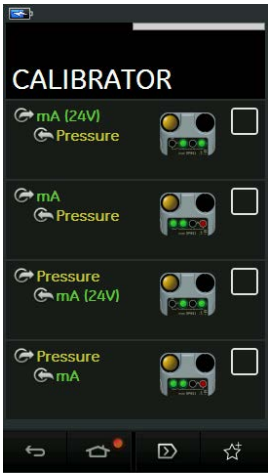


Figure 2-6: Calibrator

2. Select the required function by touching either the appropriate text or diagram. The DPI611 will set the functions and return to the main Calibrator screen.



Figure 2-7: Calibrator with Selected Option

3. Functions can be copied to FAVOURITES by selecting as shown in Figure 2-7 and selecting Copy Task.

   If the required task is not available as a Default, a new task should be created using CUSTOM TASK.

Copyright 2014 by Druck Limited.

2.2.1.3 Favourites

1. Selecting FAVOURITES from the TASK MENU allows selection of all SAVED and COPIED tasks.



Figure 2-8: Favourites

2. Select the required function by touching either the appropriate text or diagram. The DPI611 will set the functions and return to the main calibrator screen.
3. Task can be deleted by selecting DELETE.

2.2.1.4 Custom Task

1. Select the CUSTOM TASK option from TASK MENU.

   This will allow you to set up the Electrical, Pressure and USB (IDOS) channels.

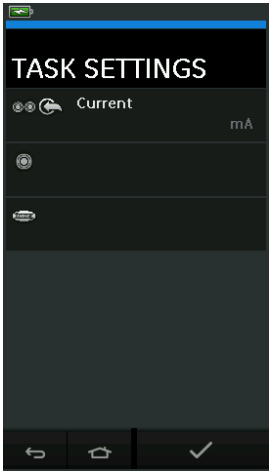


Figure 2-9: Task Settings Menu

Copyright 2014 by Druck Limited.

2. Select  to enter the CHANNEL SETTINGS menu.

    is used for pressure measurements. (See Section 2.3)

    is used for external IDOS sensors. (See Section 2.4)

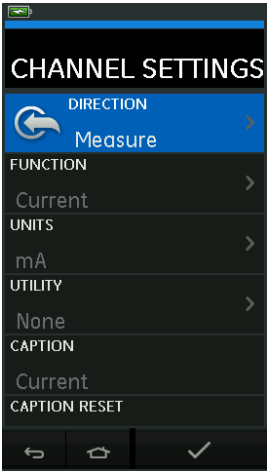


Figure 2-10: Channel Settings Menu

3. Setup a channel for measurement.

   - DIRECTION selects Source or Measure for the selected function.
   - FUNCTION selects the function required.

     (e.g.: Current or Voltage). For more options, scroll down the menu by swiping the display from bottom to top.
   - UNITS selects the type of unit required, (e.g.: Volts, Amps), please note that there may only be one type of unit available in particular Functions.
   - UTILITY selects the required utility (See Section 2.2.2 for details).
   - CAPTION allows the user to change the caption, if required.
   - CAPTION RESET allows the user to reset the caption.
   - Once all settings have been selected, press the ✓ button at the bottom of the screen to return to the TASK SETTINGS screen.
   - Please note for the settings to be set the user must also press the ✓ button in the TASK SETTINGS menu.
   - Repeat the above if another channel is required.

2.2.2 Set the Function Utility Options

For each function only one utility may be active. Not all source and measure functions have associated utilities. For all options, the ↻ button resets the additional readings.

2.2.2.1 Max/Min/Avg

The Max/Min/Avg utility is only available with measure functions.

Copyright 2014 by Druck Limited.

The additional values displayed show the maximum, minimum and average (mean) values of the input signal.



Figure 2-11: Max/Min/Avg Example

2.2.2.2 Switch Test

The Switch Test utility is available with pressure functions.

The additional values displayed show signal values (measure or source) when the instrument detects a switch opening and closing. The difference between the two values is displayed as hysteresis value for the switch. This utility can be used with Ramp Automation, where the rising signal causes the switch to change state and the falling signal causes the switch to resume its' original state.



Figure 2-12: Switch Test Example

Copyright 2014 by Druck Limited.

2.2.2.3 Relief Valve

The Relief Valve utility is only available with measure functions.

This utility tests circuits or mechanisms that have a cut-out response when an input reaches a defined threshold value. The utility allows the user to select a mode of operation which can be rising or falling. The utility displays additional values that represent the maximum and minimum values achieved by the input signal.



Figure 2-13: Relief Valve Example

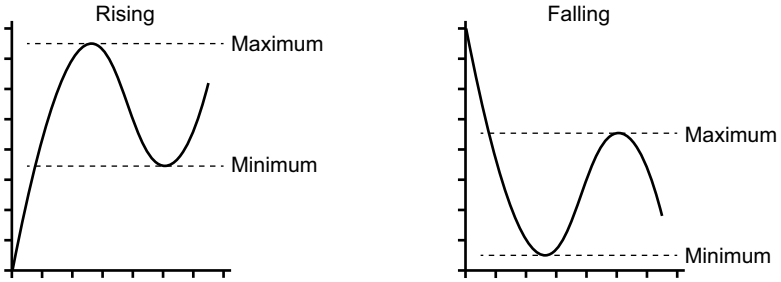


Figure 2-14: Relief Valve Utility

2.2.3 Measurement Display Options

There are two display views in the CALIBRATOR screen when multiple channels are in use:

Copyright 2014 by Druck Limited.

- Figure 2-15 displays a reduced view of all the selected channels.



Figure 2-15: Calibration Window - Reduced View

- Figure 2-16 displays an expanded view of the selected channel and minimizes the remaining channels.



Figure 2-16: Calibration Window - Expanded View

The display options can be changed by pressing the channel the user wants to display in expanded view.

Selecting  displays all channels in the reduced view.

2.2.4 Example Procedures

2.2.4.1 Example Procedure: Measure or Source Current with Internal Loop Power

Figure 2-17 shows CH1 set-up to measure or source a current with internal loop power.

Copyright 2014 by Druck Limited.

Note: Loop drive is provided by connecting to the two red terminals on the front of the DPI611 and enabling Current (24V) as the electrical function.

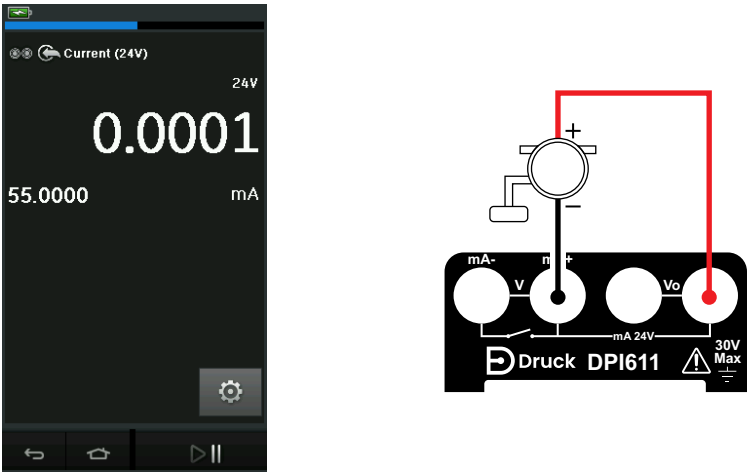


Figure 2-17: Measure Current on CH1. Range ± 55 mA

1. Set the applicable software options.
2. Complete the electrical connections and continue with the measure or source operation.
3. Source only (Automation). Set the applicable output value.

2.2.4.2 Example Procedure: Measure Voltage

Figure 2-18 shows CH1 set-up to measure a DC voltage (± 30 V) or DC mV (± 2000 mV).

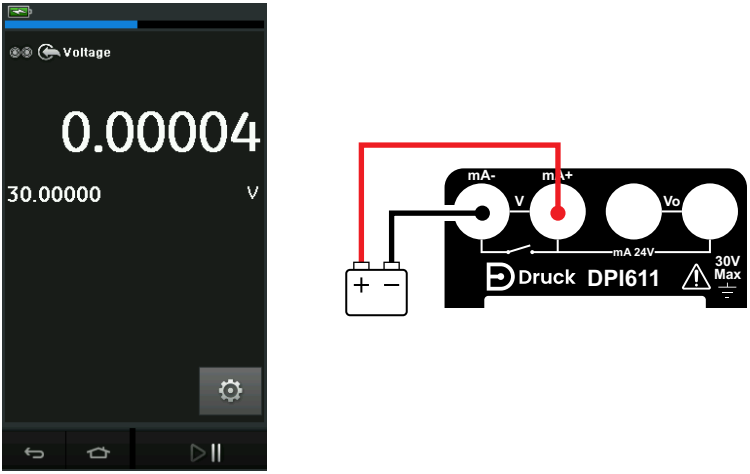


Figure 2-18: Measure DC Volts or DC mV on CH1.

1. Set the applicable software options.
2. Complete the electrical connections and continue with the measure operation.

Copyright 2014 by Druck Limited.

2.2.4.3 Example Procedure: Measure or Source Current with External Loop Drive

Figure 2-19 and Figure 2-20 show how to set-up to measure (± 55 mA) or source (0 to 24 mA) a current with external loop power.

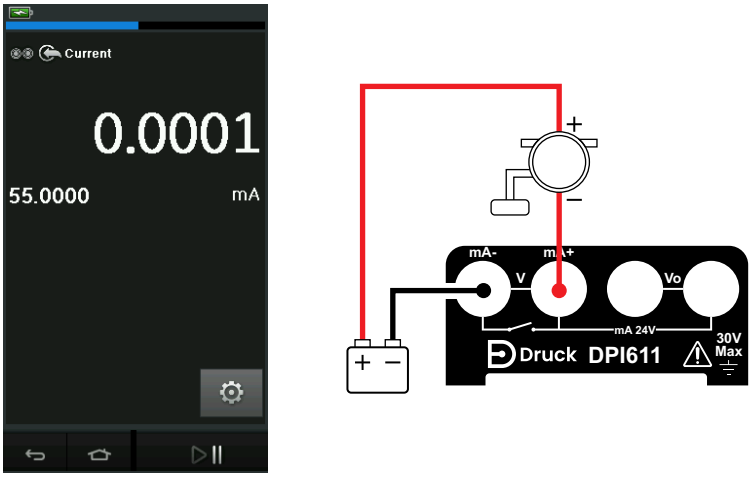


Figure 2-19: Measure Current with External Loop Power (Range: ± 55 mA)



Figure 2-20: Source Current with External Loop Power. (Range: 0 to 24 mA)

1. Set the applicable software options.
2. Complete the electrical connections and continue with the measure or source operation.
3. Source only (Automation): Set the applicable output value.

2.2.4.4 Example Procedure: Switch Test

Switch Test is only valid when a Pressure Function is selected.

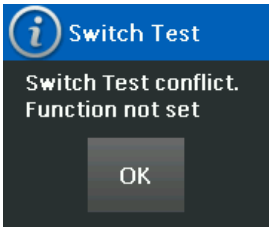
Copyright 2014 by Druck Limited.

When setting the Switch Test, the software automatically sets the electrical channel to the switch test function.



Figure 2-21: Switch Test

Note: If there is an electrical function already selected it will automatically be disabled. The display will show a screen message.



2.2.4.5 Example Procedure: Measure Voltage with Internal Voltage Source

Figure 2-22 shows CH1 set-up to measure a DC voltage.

(± 30 V) or DC mV (± 2000 mV) with Internal Voltage Source (e.g. for use with Resistive bridge).

Copyright 2014 by Druck Limited.

Note: Internal Voltage is provided by connecting to the Vo terminals on the front of the DPI611 and enabling Voltage (10V) or Millivolts (10V) as the electrical function.



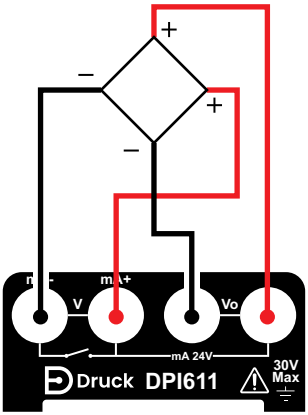


Figure 2-22: Measure DC Volts (10V) or DC mV (10V) on CH1

1. Set the applicable software options.
2. Complete the electrical connections and continue with the measure operation.

2.3 Pressure Calibration

PRESSURE TASKS are available in the TASK MENU. See Section 2.2.1 for details.

Select the required function by touching either the appropriate text or diagram. The DPI611 will set the functions and return to the CALIBRATOR screen.

Pressure Functions can also be selected through the CUSTOM TASK function. See Section 2.2.1.4 for details.

If required, change the Units or the function. If necessary, set a Utility for the function:

- Max/Min/Avg
- Switch Test
- Relief Valve

Copyright 2014 by Druck Limited.

- Leak Test



Figure 2-23: Channel Settings

Note: UNITS and UTLILITIES are accessed through selecting the function through CUSTOM TASK.

2.3.1 Set up a Leak Test

The Leak Test utility is only available in Pressure Measurement modes.

This utility provides a test to calculate the leak of a system.



Figure 2-24: Leak Test Example

To configure leak test:

1. Set the Utility to Leak Test.

   Select:

   SETTINGS >> LEAK TEST

Copyright 2014 by Druck Limited.

2. Set the following periods.
   WAIT TIME: The time before the test starts in hours:minutes:seconds (hh:mm:ss).
   TEST TIME: The period of the leak test in hours:minutes:seconds (hh:mm:ss).
3. Use  to start the Leak Test.
4. Use  to stop the Leak Test.

2.3.2 Set the Pressure Module to Zero

SETTINGS >> ZERO >> ZERO

Use this option to write a new zero pressure value to the pressure module in use. The sensor adjustment is permitted if it obeys the condition that follows:

- Adjustment ≤ 10% FS positive pressure value (for the Sensor).

Note: To make a temporary adjustment for zero, use the Tare function.

2.3.3 Error Indications

Display	Condition
<<<<<	Under Range: The display shows this symbol for this condition: Reading < 110% Negative Full Scale (Pressure) Reading < 102% Negative Full Scale (Electrical)
>>>>>	Over Range: The display shows this symbol for this condition: Reading > 110% Positive Full Scale (Pressure) Reading > 102% Positive Full Scale (Electrical)

If the display shows <<<<< (under range) or >>>>> (over range):

a. Make sure that the range is correct.
b. Make sure that all the related equipment and connections are serviceable.

2.4 Measure Pressure: IDOS Option

Optional item. An IDOS Universal Pressure Module (UPM) uses Intelligent Digital Output Sensor (IDOS) technology to measure the applied pressure and supply the data to an IDOS instrument. Before using an IDOS module, refer to instruction manual K0378.

Copyright 2014 by Druck Limited.

To attach an IDOS module to the Druck DPI611 use an IO620-IDOS-USB adaptor.

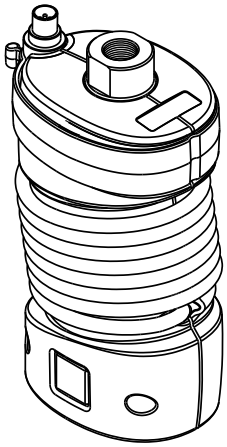


Figure 2-25: IDOS Module

2.4.1 IDOS Option Assembly Instructions

1. Attach one end of the adaptor IO620-IDOS-USB to the IDOS module.
2. Push the Type A end of USB Cable into the USB socket on the instrument and the Type B end into the adaptor (IO620-IDOS-USB).
3. Set the instrument power on.
4. When the IDOS symbol flashes at the top of the display, it shows there is communication between the IDOS module and the calibrator.

2.4.2 IDOS Function Procedures

The procedures for an IDOS module are the same as for the internal pressure sensor.

Enable the IDOS module from the TASK menu:

1. IDOS function (Measure or Differential)
2. If necessary, change the Units for the function
3. If necessary, set a Utility for the function:
   - Max/Min/Avg
   - Switch Test
   - Leak Test
   - Relief Valve

The Settings menu for the IDOS module contains the following options:

- Units
- Process (Tare, Alarm, Filter, Flow, Scaling).
- Zero. The procedure is the same for an IDOS module or the internal pressure sensor. Zero the gauge sensor before use.
- Resolution. Select the number of digits to be displayed.

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

3. Data Logging

Select the DATA LOGGING option on the Dashboard. The Data Logging function records instrument readings so they can be reviewed or analyzed.

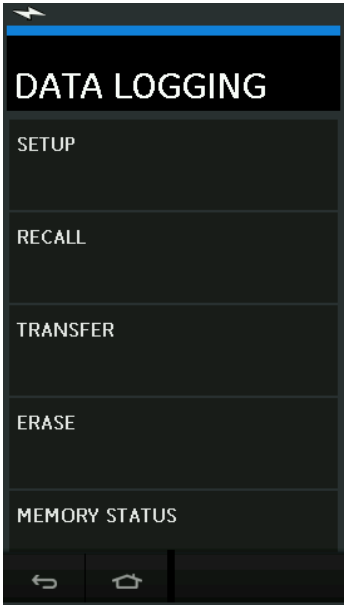


Figure 3-1: Data Logging

The data file can be reviewed by using the following:

- RECALL

  The data file can be processed externally by using the following:

- TRANSFER
  a. Transfer to a USB Flash Drive.
  b. Transfer to a Computer via serial port.

This chapter describes how to use the Data Logging function to log data to a file.

In Data Logging mode the display data from all active channels is stored at each data point.

The data can be stored:

a. Periodically
b. Key press

The data is stored in the internal memory or on a USB Flash Drive connected to the Unit until the Data Logging is stopped.

3.1 Set-up

Before starting, set all channels to the correct functions. (See Chapter 2). To access the Data logging function do the following:

Copyright 2014 by Druck Limited.

DASHBOARD >> DATA LOGGING >> SETUP

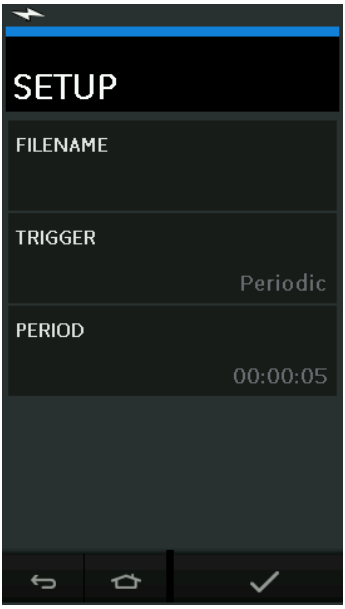


Figure 3-2: Data Logging Setup

- FILENAME

  Enter the filename (10 characters maximum).
- TRIGGER

  Select one of the following:

  a. Key Press (logs one data point each time the button is pressed).

  b. Periodic (logs one data point at a set time interval).
- PERIOD

  This option is used to set the time interval for periodic data logging.

  To start Data Logging Mode:

  1. Select appropriate options and enter filename for Data Log file.

     Note: When entering filename it is first necessary to select destination (INTERNAL or USB FLASH DRIVE)

  2. Select the ✓ button.

3.2 Operation

In periodic mode, to begin data logging tap 'Start Logging' button.

In Key press mode, a data point is taken every time the user taps the log button ↵.

To stop Data Logging select ✕.

The data logging indicator ● flashes to indicate whenever a reading is logged.

Copyright 2014 by Druck Limited.

3.3 File Review

DASHBOARD >> DATA LOGGING >> RECALL

To view a data file point by point do the following:

1. Tap the Filename button to display the list of data files.
2. Select the file to be displayed.
3. Tap ✓ to see the data display.
4. To step the display one data point, tap the Next Log button.

   Note: The data point number sequence is displayed in the top right-hand corner (e.g. 4 of 100).
5. To go back one data point, press the Previous Log button.
6. Exit the screen.

3.4 File Management

The data log file management options are as follows:

- TRANSFER

  Upload data log files to another computer.
- ERASE

  Delete data log files.
- MEMORY STATUS

  Displays amount of free memory.

3.4.1 Transfer

Data may be transferred as follows:

- USB Flash Drive: Selected files are written in the root folder of the USB Flash Drive.
- USB Serial Port: Transfers data as a text file to a computer. A communications program can be used to receive the data (e.g. Microsoft® Hyper Terminal). The serial set-up is as follows:

Parameter	Value
Baud rate:	19,200 bits/sec
Data bits:	8
Parity:	none
Stop bits:	1

3.4.2 Erase

The Erase options are as follows:

- ERASE ONE FILE

  Select file and tap tick bottom right on the screen to erase.
- CLEAR INTERNAL

  Clears all internal files.

3.4.3 Memory Status

The MEMORY STATUS button will show the amount of available memory in the areas that follow:

- Internal

Copyright 2014 by Druck Limited.

- USB Flash Drive (if fitted)

3.4.4 Data Format

The data files are produced in a Comma Separated Variable (csv) format (See Figure 3-3). This allows the data to be imported into a spreadsheet (e.g. Microsoft ® Excel). The first section of the data file contains the following:

Field	Description
FILENAME	The data file name.
COLUMNS	Information for internal use.
START	Data log start time.
VERSION	Data format version.
CHANNEL	The function setting of each active channel.

The second section of the data file contains the following:

- Individual headings
- Data point data

```
FILENAME,P080821A
COLUMNS,3,9
START,10 Aug 2021, 10:00:00
CHANNEL 001, Current (24V),In,mA,55
CHANNEL 005, HART,In,,0
DATA,START
ID,Date,Time,Main Reading,Secondary Reading,
0, 10 Aug 2021, 10:00:00,8.7525,24V,4,0,False
1, 10 Aug 2021, 10:00:15,8.5711,24V,4,0,False
2, 10 Aug 2021, 10:00:30,8.4080,24V,4,0,False
3, 10 Aug 2021, 10:00:45,8.2475,24V,4,0,False
4, 10 Aug 2021, 10:01:00,8.0733,24V,4,0,False
5, 10 Aug 2021, 10:01:15,7.9288,24V,4,0,False
```

Figure 3-3: Example ‘csv’ Data Log File

Copyright 2014 by Druck Limited.

4. Documentation

This chapter describes the Documenting functions available with the Druck DPI611 calibrator as follows:

- ANALYSIS
- RUN PROCEDURE

4.1 Analysis

The Analysis function takes readings from two or more DPI611 channels to calibrate the transfer characteristic of the device being tested. One channel is the Reference channel and is used as follows:

- It provides a measure of the input signal to the device.
- If the device is a pressure transmitter the Reference channel would be Pressure, measuring the input pressure to the device.

The other channel is the Input channel and is used as follows:

- Measures the output signal from the device.
- If calibrating a process transmitter it could be the electrical channel in Current Measure mode.

Any active channel that is not defined as Reference is Input by default.

There must be one Reference channel and at least one Input channel defined for the Analysis function set-up to be correct.

At each value the Analysis function calculates the difference of each Input channel to the ideal transfer characteristic and compares this to a tolerance limit.

- The deviation is shown in %Span or %Rdg
- The tolerance test result is shown a Pass or Fail icon.

4.2 Set-up

1. Set the Druck DPI611 channels in the Calibrator function. (See Section 2.1.1).
2. Connect the calibrator to the device under test.
3. Enter the Documenting function.

   DASHBOARD >> DOCUMENTING
4. Tap the ANALYSIS button.

Copyright 2014 by Druck Limited.

4.2.1 Define the Reference Channel

1. Tap the channel button that is to be used as the Reference channel for the analysis.

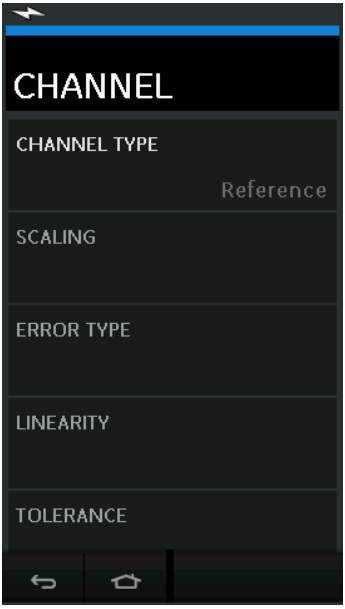


Figure 4-1: Select Reference Channel

2. Set the channel type to Reference.
3. All other channel settings for that channel are canceled. All other active channels are set to Input.

Copyright 2014 by Druck Limited.

4.2.2 Define Each Input Channel

Tap each Input channel button to set the Input options.

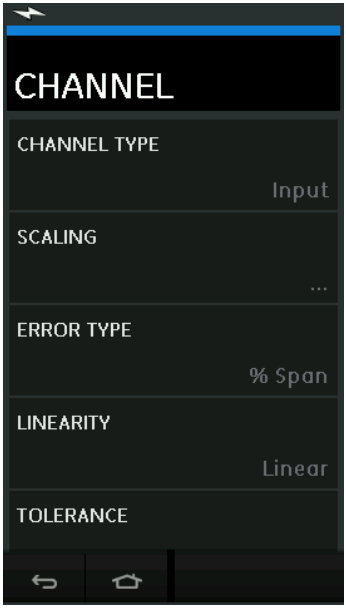


Figure 4-2: Select Input Options

- SCALING

  The scaling values are two pairs of values that define the ideal transfer characteristic:

  The maximum and minimum Reference signal values (Reference High and Reference Low) and the corresponding Input signal values (Input High and Input Low).

- ERROR TYPE

  Selects how the deviation from the ideal transfer characteristic is to be displayed. This can be one of the following:

  % Span - a percentage of the Input signal span.

  % Rdg - a percentage of the Input signal reading.

- LINEARITY

  The transfer characteristic from Reference to Input signal. This can be one of the following:

  Linear - a proportional response.

  Square Root - often found in flow sensors.

- TOLERANCE

  The test limits for the deviation from the transfer characteristic.

4.3 Analysis Function

Set Input channel parameters (See Section 4.2), and return to CHANNEL SETUP screen.

Select the Start button ▶.

The Analysis window displays the following:

Copyright 2014 by Druck Limited.

- The deviation of each Input channel from the ideal transfer characteristic.
- A tolerance limit test icon:

  Pass (within tolerance test limit)

  Fail (outside tolerance test limit)

To check the full range of the device do the following:

1. Step the Reference signal value through its range.
2. Check the Analysis window at each step.
3. If the Reference is sourced from the calibrator, move to the channel window to change the Reference value.
4. Return to the Analysis window.
5. When the analysis is complete exit the window by selecting exit.

4.4 Run Procedure

The purpose of the Run procedure is to do calibration procedures which have been downloaded from 4Sight2™ software. The 4Sight2™ calibration procedures contain all the values to calibrate a device under test, including test points and ramp times.

The same calibration procedure can be used for all the applicable devices under test. To use the Run Procedure function, the following items are required:

- A copy of the 4Sight2™ Calibration Software.
- Standard USB lead (as supplied).
- A Druck DPI611 calibrator device driver available as a download from the website: **https://druck.com/software**.

4.4.1 Sequence to Upload and Download File

Table 4-1: File Upload and Download Sequence

Step	Procedure
1	Connect the USB cable (See Section 1.10) to the Druck DPI611 calibrator.
2	Connect the lead to the USB port on the computer that has the calibrator manager installed.
3	Use 4 Sight to set-up the procedure and create a work order for the device. The procedure includes the parameters for the calibration, the number of test points, the relationship and pass/fail tolerance.
4	Use the Download button in calibrator manager to Download the file to the Druck DPI611 calibrator. A communications symbol will be displayed at the bottom of the screen.
5	Select: DASHBOARD >> DOCUMENTING >> RUN PROCEDURE
6	In the Results window, select the filename specified in calibrator manager.
7	Enter the User ID and the DUT Serial Number.
8	Tap on the Start button ⓟ. The procedure sets up the necessary Channel options e.g. mA and Volts.

Copyright 2014 by Druck Limited.

Table 4-1: File Upload and Download Sequence

Step	Procedure
9	Use the Take Reading button at each point specified by the procedure. A prompt show for each point.
10	When all the readings are complete, tap on the Exit Button ⊗. Look at the results on the display (As found/As Left).
11	To complete the process, use the calibrator manager to Upload the file back into the 4Sight2™ database.

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

5. Calibration

5.1 General

The instrument is supplied by the manufacturer, complete with calibration certificate(s). A calibration period of 12 months is recommended. The actual calibration interval depends on instrument usage and the total measurement uncertainty acceptable for the specified application.

The DPI611 is a very precise measuring instrument and the test equipment and conditions of test must be suitable for the type of work. The calibration check and calibration adjustment should be carried out in a controlled environment by a calibration technician.

Note: A calibration technician must have the necessary technical knowledge, documentation, special test equipment and tools to carry out the calibration work on this equipment.

Note: Druck can provide a calibration service that is traceable to international standards.

Note: Druck recommend returning the instrument to the manufacturer or an approved service agent for calibration. If using an alternative calibration facility, check that it uses the standards that follow.

5.2 Calibration Check

At the chosen calibration interval, the instrument readings should be compared with a known pressure standard.

The recommended method starts at 0, increasing in 20% steps to 100% full-scale and then decreasing in 20% steps to 0.

Note any deviations between the instrument and the pressure standard and consider traceability (accuracy to a National Standard).

If, after a calibration check, the results exceed the tolerance in the specification (or other suitable performance standard), carry out a calibration adjustment.

5.3 Calibration Adjustments

If the instrument is operating correctly, only zero and full-scale calibration will vary. Any excessive non-linearity or temperature effects indicate a fault. The instrument should be returned to a qualified service agent.

5.4 Before Starting

Use only original parts supplied by the manufacturer. To do an accurate calibration, use the following:

- Calibration equipment specified in Table 5-1.
- Stable temperature environment: 21 ± 1°C (70 ± 2°F).

Copyright 2014 by Druck Limited.

Before starting a calibration procedure, it is recommended leaving the equipment in the calibration environment for a minimum of two hours.

Table 5-1: Calibration Equipment

Function	Calibration Equipment
Current	Current (mA) calibrator. Accuracy - Current measure/source. See Table 5-2 and Table 5-3.
Voltage	Volts calibrator. Accuracy - Voltage measure/source. See Table 5-5 or Table 5-6.
Millivolts	mV calibrator. Accuracy - Millivolts measure/source. See Table 5-4.
Pressure (P1)	All Ranges total uncertainty of 0.025% reading or better.
IDOS	UPM only. Refer to the user manual for the IDOS UPM.

Before starting the calibration, check the time and date on the instrument are correct.

To do a calibration on a measure or source function, use the advanced menu option.

1. Select: DASHBOARD >> SETTINGS >> ADVANCED
2. Enter the calibration PIN: 4321
3. Select the ✓ button.
4. Select: PERFORM CALIBRATION

Then select a function and start the calibration:

1. Select channel.
2. Select function.
3. Select range (if applicable).
4. Follow on-screen instructions.

When the calibration is complete, set the next calibration date.

5.5 Procedures: Current (Measure)

Do the procedure as follows:

1. Connect the applicable calibration equipment (See Table 5-1).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (See Section 5.4) to do a three-point calibration (-FS, Zero and +FS) for each range: 20 mA and 55 mA.
4. Check the calibration is correct.
   a. Select the applicable Current (measure) function.
   b. Apply the values that follow:
      mA: -55, -25, -20, -10, -5, 0 (open circuit)
      mA: 0, 5, 10, 20, 25, 55

Copyright 2014 by Druck Limited.

c. Check the error is in the specified limits (See Table 5-2).

Table 5-2: Current (Measure) Error Limits

Applied mA	Calibrator Uncertainty (mA)	Permitted DPI611 Error (mA)
± 55	0.0030	0.0057
± 25	0.0025	0.0043
± 20	0.00063	0.0022
± 10	0.00036	0.0016
± 5	0.00025	0.0013
0 (open circuit)	0.0002	0.0010

5.6 Procedures: Current (Source)

When recalibrating measure and source functions for this range, the measure function must be adjusted before the source function.

Do the procedure as follows:

1. Connect the applicable calibration equipment (See Table 5-1).
   - CH1 (24 mA range): (See Table 5-3).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (See Section 5.4) to do a two-point calibration (0.2 mA and FS):
   - CH1: 24 mA.
4. Check the calibration is correct:
   a. Select the applicable Current (source) function.
   b. Apply the values that follow:
      mA: 0.2, 6, 12, 18, 24
   c. Check the error is within limits (See Table 5-3)

Table 5-3: Current (Source) Error Limits

Applied mA	Calibrator Uncertainty (mA)	Permitted DPI611 Error (mA)
0.2	0.00008	0.0013
6	0.00023	0.0017
12	0.00044	0.0020
18	0.0065	0.0024
24	0.0012	0.0028

5.7 Procedures: DC mV/Volts (Measure)

Do the procedure as follows:

1. Connect the applicable calibration equipment (See Table 5-1).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

Copyright 2014 by Druck Limited.

3. Use the calibration menu (See Section 5.4) to do a three-point calibration. (-FS, Zero and +FS) for the applicable set of ranges:

mV (Measure) Ranges	Volts (Measure) Ranges
200 mV	20 V
2000 mV	30 V

4. Check the calibration is correct:
   a. Select the applicable Millivolts or Voltage (measure) function.
   b. Apply the input values that are applicable to the Calibration:
      mV: -2000, -1000, -200, -100, 0 (short circuit)
      mV: 0, 100, 200, 1000, 2000
      Volts (V): -30, -21, -20, -10, -5, 0 (short circuit)
      Volts (V): 0, 5, 10, 20, 21, 30
   c. Check that the error is within limits (See Table 5-4 and Table 5-5).

Table 5-4: Millivolts (Measure) Error Limits

Applied mV	Calibrator Uncertainty (mV)	Permitted DPI611 Error (mV)
± 2000	0.051	0.1280
± 1000	0.040	0.0940
± 200	0.051	0.0148
± 100	0.0040	0.0110
0 (short circuit)	0.0036	0.0070

Table 5-5: Voltage (Measure) Error Limits

Applied V	Calibrator Uncertainty (V)	Permitted DPI611 Error (V)
± 30	0.00052	0.00180
± 21	0.00040	0.00154
± 20	0.00031	0.00118
± 10	0.00016	0.00089
± 5	0.00008	0.00075
0	0.000024	0.00060

5.8 Procedures: DC Volts (Source)

Do the procedure as follows:

1. Connect the applicable calibration equipment (See Table 5-1).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

Copyright 2014 by Druck Limited.

3. Use the calibration menu (See Section 5.4) to do a two-point calibration for the applicable range:

Volts (Source) Range
10 V
24 V

4. Check the calibration is correct:
   a. Select the applicable Voltage (10V) or Current (24V) (measure) function (See Section 5.7).
      10V
      24V
   b. Check the error is within limits (See Table 5-6).

Table 5-6: Voltage (Source) Error Limits

Source V	Calibrator Uncertainty (V)	Permitted DPI611 Error (V)
10	0.0001	0.0015
24	0.0004	0.0036

5.9 Procedures: Pressure Indicator

Do the procedure as follows:

1. Connect the instrument to the pressure standard.
2. Let the equipment get to a stable temperature (minimum: 60 minutes since the last power on).
3. Use the calibration menu (See Section 5.4) to do a two-point calibration.
   - Zero and +FS for gauge sensors.
4. Check the calibration is correct:
   a. Select the applicable pressure function.
   b. Apply the following pressure values.
      0, 20, 40, 60, 80, 100, 80, 60, 40, 20 (%FS).
   c. Apply the following pressure values.
      -200, -400, -600, -800, -600, -400, -200, 0 mbar
   d. Check the error is within limits. From the datasheet use the values in the Accuracy column.

5.10 Procedures: IDOS UPM

(Refer: User Manual IDOS UPM).

When the calibration is complete, the instrument automatically sets a new calibration date in the UPM.

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

6. Accessory Instructions

6.1 Dirt Moisture Trap 20 bar (P/N IO620-IDT621)



6.1.1 Specification

Specification	
Maximum working pressure:	20 bar / 300 psi pneumatic.
Orientation:	Use only in the vertical position.

6.1.2 Pressure Connections

Pressure Connections	
Lower:	To DPI611 test port.
Upper:	'Quick Fit' connector (for use with all DPI611 adaptor sets)
Materials of Construction:	316L and 303 Stainless steels, Acrylic, Nitrile seals, PTFE.

6.1.3 Operation

INFORMATION **This device is designed for use on the DPI611 pressure calibrator.**

1. Fit the Dirt Moisture Trap to the Test Station of the DPI611.
2. If moisture or particles are seen within the transparent chamber during use, dismantle and clean the trap. (See Section 6.1.4).

Copyright 2014 by Druck Limited.

6.1.4 Cleaning



CAUTION **Do not use solvents - this will damage the acrylic chamber and seals.**

1. Unscrew the top section, releasing the transparent chamber.
2. Clean the components.
3. Wipe clean with a soft cloth or tissue paper.
4. Re-assemble ensuring that all seals are in the correct location.

Copyright 2014 by Druck Limited.

7. Leak Test Procedure

This section describes the leak test procedures for the following DPI611 pressure ranges:

DPI611 Pressure Range
20 bar (300 psi / 2 MPa)
10 bar (150 psi / 1 MPa)
7 bar (100 psi / 700 kPa)
2 bar (30 psi / 200 kPa)
1 bar (15 psi / 100 kPa)

7.1 Pressure

1. Connect external power supply and switch on.
2. From menu, select Pressure display with the units in bar.
3. Blank off Test Station connection with Blanking Plug (P/N 111M7272-1).
4. Set the Volume Adjuster to approximately mid-range.
5. Firmly close Pressure Release Valve.
6. Set Pump to Pressure (+) and generate the approximate pressure as indicated below:

DPI611 Pressure Range	Test Pressure
20 bar (300 psi / 2 MPa)	18 bar
10 bar (150 psi / 1 MPa)	8 bar
7 bar (100 psi / 700 kPa)	5 bar
2 bar (30 psi / 200 kPa)	1 bar
1 bar (15 psi / 100 kPa)	0.5 bar

7. Using the Volume Adjuster, increase the pressure to the value as indicated below:

DPI611 Pressure Range	Test Pressure
20 bar (300 psi / 2 MPa)	20 bar
10 bar (150 psi / 1 MPa)	10 bar
7 bar (100 psi / 700 kPa)	7 bar
2 bar (30 psi / 200 kPa)	2 bar
1 bar (15 psi / 100 kPa)	1 bar

8. From Menu, select “Leak Test” with the units in bar and a duration of 1 minute.
9. Allow the pressure to stabilize for 1 minute.
10. Start the Leak Test noting the Leak Rate after one more minute.

DPI611 Pressure Range	Allowable Leak Rate
20 bar (300 psi / 2 MPa)	0.010 bar/min
10 bar (150 psi / 1 MPa)	0.010 bar/min

Copyright 2014 by Druck Limited.

DPI611 Pressure Range	Allowable Leak Rate
7 bar (100 psi / 700 kPa)	0.010 bar/min
2 bar (30 psi / 200 kPa)	0.005 bar/min
1 bar (15 psi / 100 kPa)	0.005 bar/min

7.2 Vacuum

1. Release pressure by opening Pressure Release Valve.
2. Screw Volume Adjuster fully in.
3. Firmly close Release valve.
4. Set Pump to Vacuum (-) and generate maximum vacuum possible with Pump.
5. Screw out Volume Adjuster to achieve -0.950 bar.
6. Allow the vacuum to stabilize for 1 minute.
7. Start the Leak Test, noting the leak rate indicated after test complete.
8. The Leak Rate over 1 minute should not exceed 0.005 bar/min.

Copyright 2014 by Druck Limited.

8. General Specification

For a full specification of the Druck DPI611 calibrator and its related accessories refer to the relevant product datasheet.

The DPI611 is suitable for indoor use with the following environmental requirements. It is permitted to use the DPI611 outdoors as a portable instrument if the environmental requirements are met.

Parameter	Value
Display	Size: 110 mm (4.3 in) diagonal. 480 × 272 pixels. LCD: Color display with touch-screen
Languages	English (default), Chinese, Dutch, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish.
Operating Temperature	-10°C to 50°C (14°F to 122°F), 0°C to 40°C (32°F to 104°F) when powered from optional mains adaptor IO620-PSU.
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Ingress Protection	IP54. Protected against dust and splashing water from any direction.
Humidity	0 to 90% RH none condensing. To Def Stan 66-31, 8.6 cat III.
Shock / Vibration	BS EN 61010-1:2010 / MIL-PRF-28800F Class 2
Altitude	Up to 2000 m
EMC	BS EN 61326-1:2013
Electrical Safety	BS EN 61010-1:2010
Pressure Safety	Pressure Equipment Directive - Class: Sound Engineering Practice (SEP)
Enclosure Materials	Polycarbonate, polyamide, polypropylene, acrylic, cotton
Approved	CE Marked
Size (L:W:H)	270 × 130 × 120 mm (10.6 × 5.1 × 4.7 in)
Weight	1.96 kg (4.3 lb) including batteries
Power Supply	8 × AA alkaline batteries Optional Li-ion rechargeable battery pack. Optional mains adaptor P/N IO620-PSU 100-260V ± 10%, 50/60 Hz AC, Output = 5 Vdc, 1.6 A.
Battery Life	18 to 26 hours depending on functions.
Connectivity	USB type A, USB type mini B.

Note: The DPI611 has been assessed to the European IEC 60529 standard as having an ingress protection rating of IP54, but this is for reliability purposes and not for safety reasons.

Note: To meet the immunity requirements of annex A of EN 61326-1:2013, when used in an industrial environment, the unit must be battery powered to guarantee measurement specification.

Note: The case of the DPI611 is not suitable for prolonged exposure to UV.

Note: The DPI611 is not suitable for permanent installation in an outdoor environment.

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

9. Troubleshooting

9.1 Pressure Generation

Fault Symptom	Possible Cause	Check
Unit will not generate pressure with integral pump.	Mode selector incorrectly set.	Mode selector is in (+) position.
	Output port not connected.	Output port connected to DUT or fitted with suitable blanking plug.
	Release Valve not closed.	Ensure Release valve is firmly closed.
Unit will not generate vacuum with integral pump.	Mode selector incorrectly set.	Mode selector is in (-) position.
	Output port not connected.	Output port connected to DUT or fitted with suitable blanking plug.
	Release Valve not closed.	Ensure Release valve is firmly closed.
Excessive leak rate, (pressure or vacuum).	Incorrectly connected system (DPI611 to DUT).	Check connecting accessories are fitted in accordance with instructions and correct sealing method is in use.
	DUT has leak.	Isolate DUT from DPI611 and check for leaks in DPI611 and DUT independently.
	Worn pressure seal on outlet port (o-ring & backup ring).	Inspect seal on pressure port for signs of wear and replace as necessary.
	Release Valve not closed.	Ensure Release valve is firmly closed.

9.2 General

Fault Symptom	Possible Cause	Check
Unit will not connect / write to USB Memory Stick	USB flash drives with a capacity of 1 GB can take a few seconds to fully connect.	Try with smaller capacity USB Drive.
Unit will not connect to calibration management software	Communications mode set to storage.	From the DASHBOARD select SETTINGS then DEVICES; the USB client port should be set to Communications.
Unit will not Switch On	Faulty / Flat battery	Try using External Power Supply. Remove Battery and replace.
Unresponsive Unit	Processor Lock-up	Press and hold power switch. Remove Battery / Power and replace.

Copyright 2014 by Druck Limited.

Copyright 2014 by Druck Limited.

Office Locations

druck.com/contact

Services and Support Locations

druck.com/service

Copyright 2014 by Druck Limited. ALL RIGHTS RESERVED. This material contains one or more registered trademarks of Druck Limited and/or its subsidiaries. All third-party products and company names are trademarks of their respective holders.

K0571 Revision E | English

Druck

druck.com