# WORK INSTRUCTION
# FOR DPI 612 PRESSURE CALIBRATOR

GAM/WI-DPI 612/01

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## GALAXY AEROSPACE SDN. BHD

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# FRONT MATTERS

## 1 RECORDS OF AMENDMENTS

| No. | Issue No. | Revision No. | Date of Amendment | Affected Pages | Details of Amendment |
|---|---|---|---|---|---|
| 1 | 1 | 0 | 01 DECEMBER 2022 | All | Initial issue of GAM/WI/DPI 612 |

## AUTHORIZATION APPROVALS

Electronic authorization approval is the preferred method for approving quality system documents. Signed hardcopies are only available upon request.

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# 1.1 USING WORK INSTRUCTION

This Work Instruction contains instructions for use and setup of the ***Druck DPI 612 Portable Pressure Calibrator*** System. A table of contents and a table of illustrations are provided to make this Work Instruction easy to use.

Some of the information shown in text or illustrations is obtained using optional equipment.

## References

All information is referenced to the ***Druck DPI 612 Portable Pressure Calibrator*** **System User's Manual** – 109M4017 revision A.

## Equipment Damage

The possibility of damage to vehicles or equipment is introduced by a signal word indicating this condition.

Example:

***IMPORTANT***

***The pressure module transducer is a very sensitive equipment . Never attempt to remove the transducer during use. It is highly pressure.***

# SECTION 1

## 1. INTRODUCTION

The Druck DPI612 is a battery-powered instrument for performing pressure and electrical calibration operations. The Druck DPI612 also supplies the power and user interface functions for all optional items. The DPI612 uses the PM620 pressure module to allow user selection of the most suitable pressure range for the task.

### 1.1 EQUIPMENTS AND ACCESSORIES

A. **DPI 612-HFP Pressure Calibrator**

**B. 1/8" NPT & BSP pressure adaptors**

- A set of test point adaptors to connect the tool-less quick fit DPI612 pressure port or the extension hoses to the device under test.

i. P/N IO620-BSP: G1/8 male and G1/4 male, G1/4 female, G3/8 female and G1/2 female.

ii. P/N IO620-NPT: 1/8" male and ¼" male, ¼" female, 3/8" female and ½" female.

iii. P/N IO620-MET: 14mm female and 20mm female.

C. **Hydraulic Hose (PN IO620-HOSE-H1 / IO620-HOSE-H2)**

- high pressure Hydraulic hose rated to 750 bar (15000 psi). The hose connects directly to the DPI612 pressure port and replicates the quick fit connection for compatibility with the standard adaptors supplied and the other adaptor kits.

D. **Pressure Module (P/N IPM620-***)**

- Select the best pressure range for the job from an extensive list of high accuracy pressure ranges. Ranges available from 0 bar up to 700 bar (0 psi up to 10150 psi).

i. PM620-20A – range : 0 to 350 bar. (0 to 5000 psi)
ii. PM620-20G – range : 0 to 700 bar. (0 to 10150 psi)
iii. PM620-17G – range : 0 to 135 bar. (0 to 2000 psi)

### E. Pressure Relief Valve (PRV)

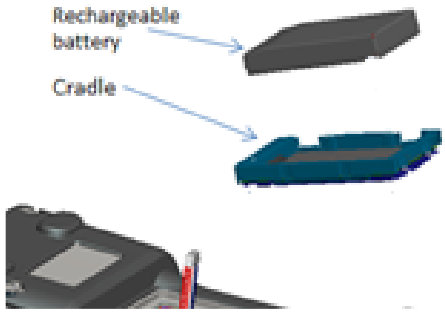
- To give your attached devices overpressure protection (device under test, PM 620 module).

### F. Rechargeable Battery Pack (P/N CC3800GE)

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

### G. Rechargeable Battery and Adaptor Kit (P/N IO61X-BAT-KIT)

- Kit contains 3.7V Li-ion battery, Cradle, Battery Cover and power adapter.



### H. Main Adaptor (P/N IO620-PSU)

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

## 1.2 OBSERVANCE OF THE USER "WORK INSTRUCTION"

- This work instruction contains safety and battery installation information for the Druck DPI612. It is the responsibility of the technician 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 work instruction and paying particular attention to all WARNINGS and CAUTIONS.

## 1.3 GENERAL SAFETY PRECAUTIONS

- Read and obey all the operator's local health and safety regulations and 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 touchscreen.
- 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.
- 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:

    - All work areas are clean and clear of unwanted tools, equipment and materials.
    - All unwanted consumable materials are disposed in accordance with local health and safety and environmental regulations.
    - All equipment is serviceable.

### 1.4 WARNINGS


- 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, vapour or dust. There is a risk of an explosion.

### 1.5 ELECTRICAL SAFETY


- The DC input to the DPI612 is rated at 5V (+/-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 30V 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 60Hz, 250mA, 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 DPI612. 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.

### 1.6 RECHARGABLE BATTERY WARNINGS


  - Do not disassemble or modify the battery pack. The battery pack can leak electrolyte, overheat, emit smoke, burst and/or ignite.
  - Do not short-circuit the battery.
  - Do not transport or store the battery pack together with metal objects. If short-circuiting occurs, over-current will flow, causing the battery pack to leak electrolyte, overheat, emit smoke, burst and/or ignite.
  - Do not discard the battery pack into fire or heat it.
  - Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
  - Do not use or leave the battery pack near a heat source (+80ºC or higher).
  - Do not immerse the battery pack in water. Do not allow it to get wet.
  - Do not recharge the battery pack near fire or in extremely hot weather.
  - To recharge the battery, use the DPI612 internal charging function or the CX6100GE desktop charger. Do not use any other charger.
  - Do not subject the battery pack to mechanical shock.
  - Do not use an apparently damaged or deformed battery pack.
  - Do not directly solder the battery pack.
  - Do not reverse the positive (+) and negative (-) terminals.
- Otherwise, during recharging, the battery pack will be reverse-charged, abnormal chemical reactions then may occur, or excessively high current can flow during discharging, leading to electrolyte leakage, overheating, smoke emission, bursting and/or ignition.
  - Do not force the connection if you cannot easily connect the battery pack terminals to the battery pack charger. Confirm that the terminals are correctly oriented.
  - Do not use the battery pack for a purpose other than powering either DPI612 products.
  - Do not use any battery which is not designed for use with the equipment.
  - Do not connect the battery pack to any other electrical outlet.
  - Do not mix batteries of different manufacture, capacity, size or type within the DPI612.
  - If recharging operation fails to complete even when a specified recharging time has elapsed, immediately stop further recharging.

  - Do not put the battery pack into a microwave oven. Rapid heating or disrupted sealing can lead to electrolyte leakage, overheating, smoke emission, bursting and/or ignition.
  - If electrolyte leaks from the battery pack or gives off a bad odour, remove it from any exposed flame. Otherwise, the leaking electrolyte may catch fire and the battery pack may emit smoke, burst or ignite.
  - If the battery pack gives off an odour, generates heat, becomes discoloured or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the equipment or battery pack charger and stop using it. Otherwise, the problematic battery pack can develop electrolyte leakage, overheating, smoke emission, bursting and/or ignition.
- Remove the battery from the equipment when not in use.
  - 


- Do not remove the battery from its original packaging until required for use.
- Secondary batteries need to be charged before use. Always use the CX6100GE desktop charger for external charging and refer to the user manual for proper charging instructions.
- Do not leave a battery on prolonged charge when not in use.
- After extended periods of storage, it may be necessary to charge and discharge the battery several times to obtain maximum performance.
- Do not subject the battery pack to intense sunlight or hot temperatures, for example in a car during hot weather. Otherwise, electrolyte leakage, overheating and/or smoke emission can occur. Also, its guaranteed performance will be lost and/or its service life will be shortened.
- The battery pack incorporates built-in safety devices. Do not use it in a location where static electricity is present.
- The guaranteed recharging temperature range is 0°C to +45°C. A recharging operation outside this temperature range can lead to electrolyte leakage and/or overheating of the battery pack and may cause damage to it.
- In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Seek medical advice immediately if material or content from a battery has been swallowed.
- Keep the battery out of the reach of children.
- Keep batteries clean and dry.
- Wipe the battery terminals with a clean dry cloth if they become dirty.

- If you find rust, a bad odour, overheating and/or other irregularities when using the battery pack for the first time, return it to your supplier or vendor.
- For further information contact the nearest distributor or representative.
- Retain the original product literature for future reference.

## 1.7 PRESSURE WARNINGS


- It is dangerous to attach an external source of pressure to a DPI612 pressure station. Use only the internal mechanisms to set and control pressure in the pressure station.
- 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 DPI612 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.

## 1.8 OVERVOLTAGE CATEGORY

The following summary of installation and measurement overvoltage categories are derived from IEC61010-1. The overvoltage categories indicate the severity of overvoltage transients.

Table 1-1

| 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.* |

## 1.9 PREPARING THE INSTRUMENT

On receipt of the instrument check the contents in the box, listed in accessories See Section 1.11. Please retain the box and packaging for future use.

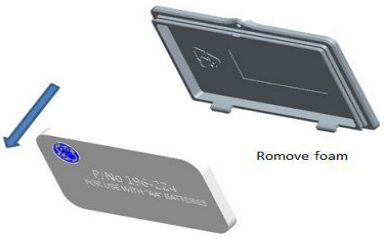
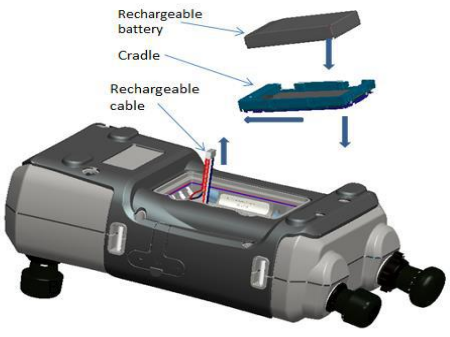
### 1.9.1 Initial Checks

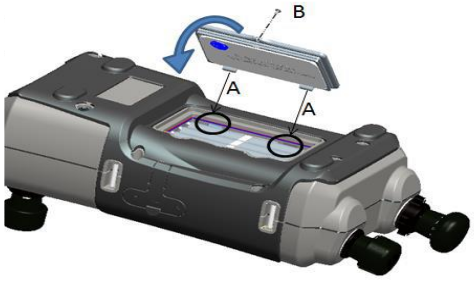
Before you use the instrument for the first time:

- Make sure that there is no damage to the instrument, and that there are no missing items; (*See Section 1.1. Equipment and Accessories)*
- Remove the plastic film that protects the display.

### 1.9.2 Install Rechargeable Battery and Cradle

Table 1-2

| Work Steps | Description | Pictrures/References |
|---|---|---|
| **Step 1** | Remove the battery cover by loosening the captive battery cover fixing screw and lifting the cover upwards. |  |
| **Step 2** | If fitted, remove white battery holder by pulling straight up to reveal charging cable. Remove foam block from battery cover. |  |
| **Step 3** | Connect the charging cable to the rechargeable battery cradle. | **As shown in step 4 pictures** |
| **Step 4** | Push the cradle firmly into the battery compartment. |  |

| | | |
|---|---|---|
| **Step 5** | Insert the rechargeable battery into the cradle. | **As shown in step 4 pictures** |
| **Step 6** | Replace the battery cover by pressing the lugs inside the slots (A) and bring down the cover, securing by tightening the fixing screw. |  |
| **Step 7** | The battery can be charged by connecting the wall adapter to the unit or by using the optional desktop charger. |  |

### 1.9.3 Install Dry Cell Batteries

1. Remove the battery cover by loosening the captive battery cover fixing screw and lifting the cover upwards.
2. If the rechargeable battery has been fitted, remove it.
3. If the rechargeable battery cradle has been fitted, remove it by gently pulling it straight up. Avoid touching the metal contacts on the cradle. Note the cradle is attached to the unit with the charging cable.
4. Disconnect the charging cable from the back of the cradle and keep it loose in the small compartment then fit battery holder.
5. Fit the foam block to the battery cover.
**6.** Place the batteries in the battery compartment with the correct **+/–** position.

**⚠ CAUTION**

**Incorrect Insertion of batteries can cause battery failure.**

7. Replace the battery cover by pressing the lugs inside the slots (A) and bring down the cover, securing by tightening the fixing screw (B). (See *Table 1-2, step 6*).

## 1.10 PARTS

### 1.10.1 DPI 612

**Figure 1.1 DPI 612 Pressure Calibrator**


Table 1-3

| ITEM NO | DESCRIPTION |
|---|---|
| 1 | **ON** or **OFF** button |
| 2 | Volume adjuster wheel with fold-in handle. |
| 3 | USB mini-type B connector for communication with a computer. |
| 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 Vo). |
| 8 | Liquid Crystal Display (LCD): Color display with touchscreen. 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 | Stylus Pen for LCD Screen. |
| 11 | Close it to seal off the device pressure and refill the pressure mechanism with fluid. |

### 1.10.2 Test Port

To attach the device under test, the test port uses "Quick fit" pressure adaptors: See Section 1.1 B. These are easy to remove, change and install: See Section 2.1.1 (attach/remove the device under test).

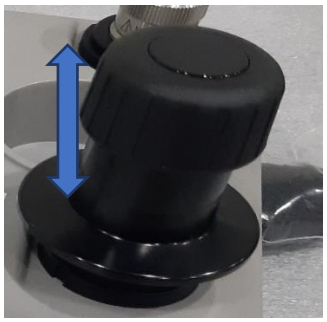
**Figure 1.2 ( Test Port)**

### 1.10.3 Pressure Release Valve

This is a needle point valve that lets you release the pressure or seal the system.


**Figure 1.3 ( Pressure Release Valve)**

### 1.10.4 Pump



When you have set the operation to pressure (*See Section 1.10.4*), seal the system (*See Section 1.10.3*) and use the pump to set the necessary pressure

You can then make the last adjustments with the volume adjuster (*See Section 1.10.6*).

**Figure 1.4 ( Pump)**

### 1.10.5 Volume Adjuster

**Figure 1.5 ( Volume Adjuster)**

This control increases or decreases the pressure.

Before you seal the system (*See Section 1.10.3*), 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 counterclockwise.

When you have set the necessary pressure with the pump (*See Section 1.10.5*), use the volume adjuster to make the fine adjustments.

### 1.10.6 Refill Valve

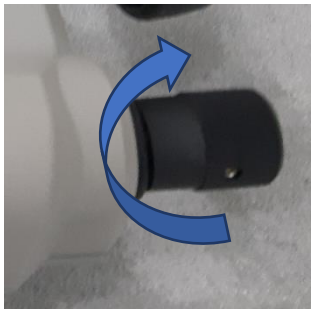


**Figure 1.6 ( Refill Valve)**

When pressurising large volumes this can be used to refill the pump without releasing pressure from the UUT (see Section 0)

### 1.10.7 Priming Pump

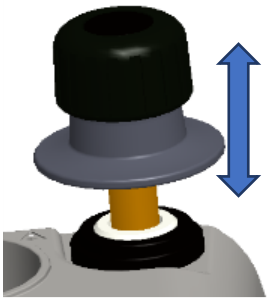


**Figure 1.7 ( Priming Pump)**

This control is used to fill and generate a priming pressure on the UUT (approx. 10 bar max)

## 1.11 DRUCK DPI612, MODES

### 1.11.1 Power 'ON'.

1. From **OFF** – momentarily press the power button until the GE Logo appears.

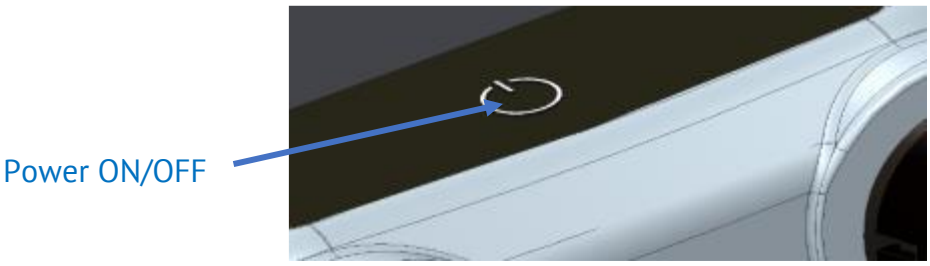



**Figure 1.8 ( Power Button)**

### 1.11.2 Power 'OFF'.

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

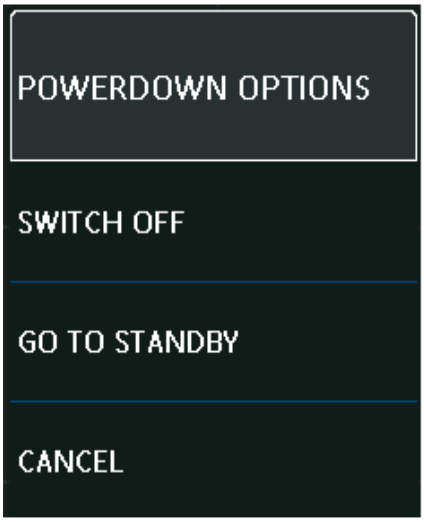



**Figure 1.9 ( Power Down Options)**

**SWITCH OFF** – Full power down of DPI612 – Recommended if unit is not going to be used for several hours (Requires full reboot on next power up).

**GO TO STANDBY**– DPI612 placed in standby mode – Reduced power consumption from operating mode – recommended if unit is to be inactive for short periods. (DPI612 has fast turn on from STANDBY mode).

**CANCEL** – Touch CANCEL option if you do not want to Switch Off or Standby the instrument.

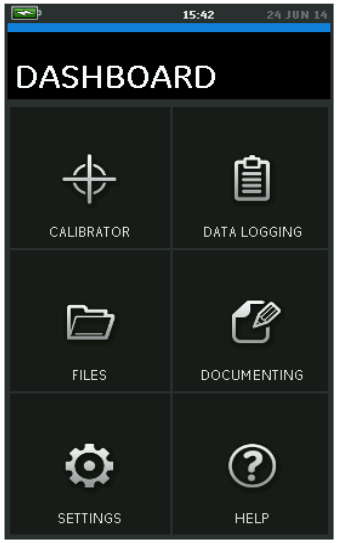
### 1.11.3 Power up from Standby Mode.

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

## 1.12 NAVIGATION

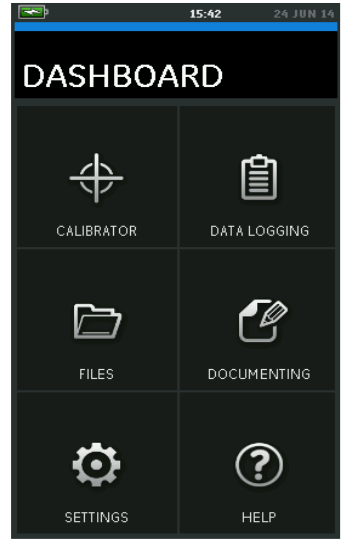
On power up the DPI612 displays the Dashboard. The user should select the desired option by touching the appropriate icon. Function screens are navigated by swiping a finger from right to left while touching the screen. List menus are navigated by swiping a finger up and down while touching the screen.

**Table 1-4**

| No | Setting | Description | Selection/Modes/Action | Pictures |
|---|---|---|---|---|
| **1** | **Date, Time, and Language** | To Access Date, Time, and Language menus. | DASHBOARD >> ⚙ SETTINGS >> DATE |  |
| ***Note:*** *The DPI612 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 DPI612 and keep it turned on for 50 hours to fully recharge the clock battery.* | | | | |
| **2** | **Themes** | Two themes are available: Dark and Light; select the correct theme for the light level. | DASHBOARD >> ⚙ SETTINGS >> THEME | |
| **3** | **DRUCK DPI612 Manual** | Select the Help icon on the Dashboard to access the manual. The manual can be downloaded onto a memory stick for viewing or printing on a remote PC. | DASHBOARD>> ? HELP | |

## 1.13 SOFTWARE AND FIRMWARE UPGRADES

**Table 1-5**

| No | Setting | Description | Selection/Modes/Action | Pictures |
|---|---|---|---|---|
| 1 | **Viewing Software Revision** | The software revisions running on the DPI612 can be viewed by selecting: | DASHBOARD >> ⚙ SETTINGS >> STATUS >>SOFTWARE BUILD |  |
| ***Note:*** *If the software revision number is highlighted* ***RED*** *then an upgrade is available.* | | | | |
| 2 | **Upgrading the Software** | Follow the website instructions to download the files onto a USB flash memory drive. www.gemeasurement.com | DASHBOARD >> ⚙ SETTINGS >> ADVANCED | |
| ***Note:*** Enter the calibration PIN: 5487; Select the ✓ button and continue upgrade with one of these operations. | | | | |
| 3 | **Upgrading the Application Software** | 1. Copy the 'AMC' application folder into the root of a USB flash memory device.<br>2. Put the USB flash memory drive into the USB type A connector.<br>3. Select: **APPLICATION**<br>4. Follow the on-screen instructions. | | |
| 4 | **Upgrade the Operating System and Boot Loader Software** | 1. Copy the 'OS' folder into the root of a USB flash memory device.<br>2. Put the USB flash memory drive in the USB type A connector.<br>3. Select: **OPERATING SYSTEM**<br>4. Follow the on-screen instructions. | | |

| No | Setting | Description | Selection/Modes/Action | Pictures |
|---|---|---|---|---|
| ***Note:*** *The boot loader can only be upgraded as part of an operating system upgrade.*<br>***Notes:***<br>• *If a mistake is made during upgrade and there are no files to upload, follow the on-screen instructions and complete the procedure.*<br>• *When an upgrade completes normally, the initial operation of the touch screen may be slower (a period of approximately 30 seconds).*<br>• To make sure the upgrade completed correctly, use the **Status menu** | | | | |

### 1.14 MAINTENANCE

2. The DPI612 instrument contains no user serviceable parts and should be returned to a GE service centre or an approved service agent for all repairs.
3. For more information, contact our customer service department at www.gemeasurement.com.

### 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 1.9.2*. Then re-attach the cover.
- All the configuration options stay in memory.

## 1.15 INSTRUMENT RETURN

### 1.15.1 Returned Material Procedure

If the instrument is unserviceable and requires a repair return to a GE Service Center or approved Service Agents.

Web site: www.gemeasurement.com Contact the GE Service Center, either by phone, fax or E-mail to obtain a Returned Material Authorization (RMA) number, providing the following information:

- Product (i.e., Druck DPI612)
- Serial number
- Details of defect/work to be undertaken
- 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 Europe Union

Do not dispose this product or its battery as household waste.

Use an approved organization that collects and/or recycles the applicable item.

## 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).

## 1.17 MARKS AND SYMBOLS ON THE EQUIPMENT

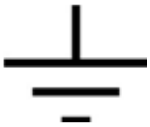
| | |
|---|---|
|  | USB ports: Type A; Mini Type B connector |
|  | Ground (Earth) |
|  | DC adaptor polarity: the Centre of the plug is negative |
|  | Complies with European Union directives |

**Figure 1.10 Marks and Symbols**

**SECTION 2**

# 2. OPERATIONS

## 2.1 Common Operations

### 2.1.1 Attach/Remove the device Under Test

**WARNING**

**Pressurized gases are dangerous. Before you attach or disconnect pressure equipment, safely release all the pressure**

**CAUTION**

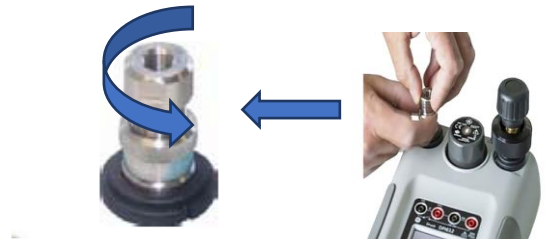
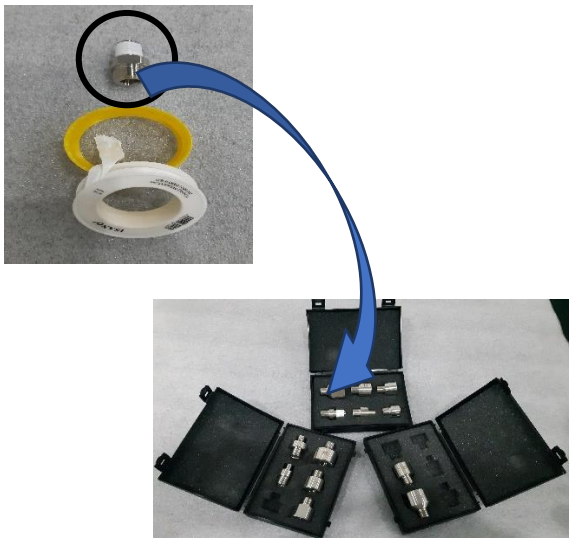
**To prevent damage to the instrument, do not let dirt get into the pressure mechanism. Before you attach equipment, make sure it is clean or use the applicable dirt trap.**

The test port uses "Quick fit" pressure adaptors; See Section *1.11* (Accessories). These are easy to remove, change and install (See 1.11.14).

**Figure 2-1 Pressure Port**

### a. Procedure (to Attach)

**Table 2-1**

| Step | Procedures | Pictures |
|---|---|---|
| **1** | Remove the adaptor |  **Pressure port** |
| **2** | Use an applicable seal for the pressure connection:<br>a. NPT type: Use an applicable sealant on the thread.<br>b. BSP (parallel) type: We recommend a bonded seal at the bottom.<br>c. BSP (parallel) type, 100 bar (1500 psi) or less: a bonded seal at the top is permitted. |  |
| **3** | Attach the adaptor to the device; if necessary, use one of the alternative adaptors listed in *Section 1.11* (Accessories), then tighten to the applicable torque. |  |
| **4** | Re-attach the adaptor to the test port and tighten it until it is hand tight only.<br>WARNING: Hand tight Only |  |

### b. Procedure (to Remove)

To remove a device, first release the pressure (*See Section 2.2.2*). You can then do steps 4, 3, and 1 mentioned in *Table 2-1*. But do the operations in the reverse order.

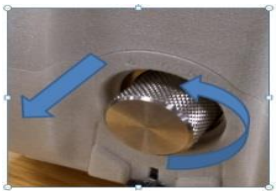
## 2.1.2 Attach a Pressure Relief Valve

Optional accessory; see Section 1.1 item E.
Use a Pressure Relief Valve (PRV) to set a limit to the pressure you can apply to the pressure devices attached to the pressure station. The PRV is set at the factory to operate at the maximum pressure specified on the label.
If the pressure in the instrument is more than the relief pressure set for the PRV, the PRV controls a slow release of the unwanted pressure. The correct PRV helps prevent overpressure and damage to the attached devices.

**⚠ CAUTION**

**In its normal condition, the DPI 612 hFlexPro contains fluid. To make sure it does not spill out, seal the system and put it on its side before you install a PRV.**

**Table 2-2**

| Step | Procedures | Pictures |
|---|---|---|
| 1 | Seal the system. |  |
| **2** | Put the instrument on its side. |  |
| **3** | Remove the blanking plug or, if applicable, the PRV you are using. To collect possible drops of hydraulic fluid, put it in a container.<br>*Note: Before you put it into storage, make sure it is clean and dry.* |  |
| **4** | Choose a clean, dry PRV with the correct pressure value for the devices you are using and tighten it into position (hand tight only). |  |

### 2.1.3 Setting a Pressure Relief Valve

The PRV is set at the factory to operate at the maximum pressure specified on the label (on the plastic cap). For the adjustable range, refer to data sheet.

**Table 2-3**

| Step | Procedures | Pictures |
|---|---|---|
| 1 | Attach an applicable PM 620 module. |  |
| **2** | Remove the plastic cap from the end of the PRV. |  |
| **3** | Set the necessary pressure with the pressure station. |  |
| **4** | When the pressure in the pressure station is at the new PRV pressure, turn the adjustment screw until the PRV operates: *counterclockwise* decreases the operating pressure *clockwise* increases the operating pressure |  |
| **5** | Do steps 3 and 4 until the PRV operates at the correct pressure. Then press the plastic cap back into position. |  |

## 2.2 DPI 612 HFLEXPRO (750 BAR) OPERATIONS


**PRESSURIZED GASES AND FLUIDS ARE DANGEROUS. BEFORE CONNECTING OR DISCONNECTING PRESSURE EQUIPMENT, SAFELY RELEASE ALL THE PRESSURE.**

**ENSURE THAT THE SYSTEM IS BLED OF EXCESS AIR BEFORE OPERATION. (IF THE ITEM UNDER TEST HAS A LARGE VOLUME, PRE-FILL WITH THE PRESSURE FLUID TO ENSURE THAT TRAPPED AIR IS KEPT TO A MINIMUM).**


**To prevent damage to the pressure station, do not let dirt get into the pressure mechanism. Before connecting equipment, make sure it is clean.**

**Ice in the pressure mechanism can cause damage. If the temperature is less than 4°C (39°F), drain all water from the instrument.**

### 2.2.1 First Use

When using the DPI 612 hFlexPro pressure calibrator for the first time, we choose to fill the reservoir with the Disterile water (recommended ISO Viscosity grade $\leq$ 2.2). Fill and prime the pressure station.

### 2.2.2 Filling and Priming the Pump

Ensure the sensor and test ports are clear before starting this procedure.

**Table 2-4**

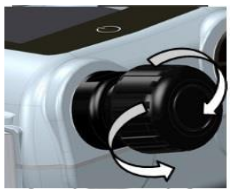
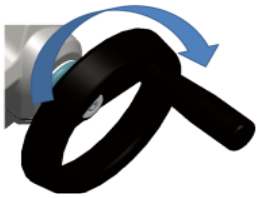
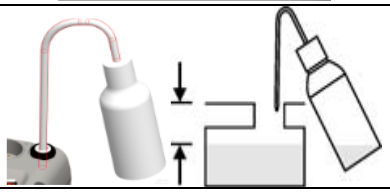
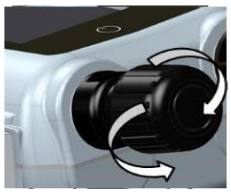
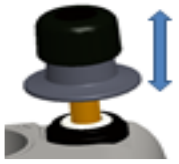
| Step | Procedures | Pictures |
|---|---|---|
| 1 | Turn the Refill valve fully counterclockwise. |  |
| **2** | Turn the Volume adjuster fully clockwise. |  |
| **3** | Turn the Release Valve Stem fully counterclockwise. |  |
| **4** | Remove the Priming pump piston/Release valve stem assembly. |  |
| **5** | Fill the reservoir with the recommended fluid, to ≈25mm from the top. |  |
| **6** | Re-fit the Priming pump piston/Release valve stem assembly. |  |
| **7** | Turn the Release Valve Stem fully clockwise. |  |

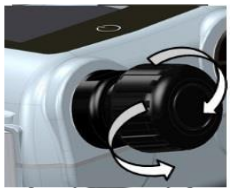
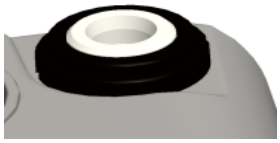
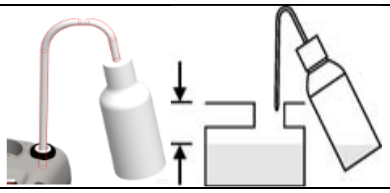
**Table 2-4 (Continue....)**

| Step | Procedures | Pictures |
|---|---|---|
| 8 | Turn the Refill valve fully clockwise, until finger tight. |  |
| **9** | Turn the Volume adjuster fully counterclockwise. . |  |
| **10** | Turn the Volume adjuster 5 turns clockwise. |  **x 5 times** |
| **11** | Operate the Priming pump until the air is expelled and fluid is visible at the Test port. |  |
| **12** | Fit the "Item under test" to the Test port use the existing adaptor or the applicable AMC adaptor and applicable seals. |  |
| **13** | Operate the Priming pump and prime the system to a maximum pressure of 10 bar. |  |

### 2.2.3 Topping Up the Fluid

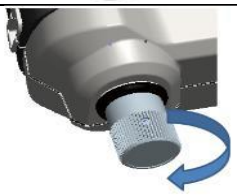
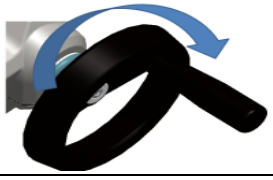
It will be necessary to top up the **Distilled water** fluid from time to time or if the device under test has a large fluid capacity. The DPI612 allows this to be done at any time.

**Table 2-5**

| Step | Procedures | Pictures |
|---|---|---|
| 1 | To seal off all the pressure in the test port and the pressure module connection, close the refill valve. |  |
| **2** | Remove the hydraulic pressure release valve. |  |
| **3** | Fill the reservoir with the recommended fluid, to ≈25mm from the top. |  |
| **4** | Seal the system and continue with the normal pressure procedure. |  |

### 2.2.4 Priming sequence

**Table 2-6**

| Step | Procedures | Pictures |
|---|---|---|
| 1 | Turn the Volume Adjuster counterclockwise. (See Section 1.9.7) |  |
| 2 | Turn the Volume Adjuster 10 turns clockwise. |  |
| 3 | Close Release Valve. |  |
| 4 | Close Refill Valve clockwise, finger tight (See Section 1.9.8). |  |
| 5 | Operate Priming Pump until liquid is seen coming from the open test port / end of hose. |  |
| 6 | Connect IUT to open test port / end of hose. |  |
| 7 | Operate Priming Pump until pressure is indicated (max 10 bar) |  |
| 8 | Operate Volume Adjuster & Refill Valve to achieve required pressure. (See Section 2.3.5) |  |

Note:
If priming a long hose keep the open end of hose vertical to reduce trapping air.

### 2.2.5 Applying High Pressure (750 bar)

**Table 2-7**

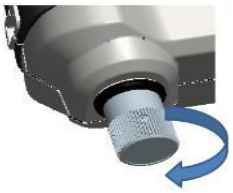
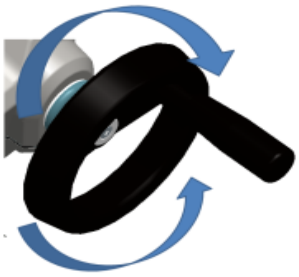
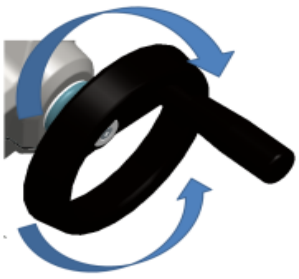
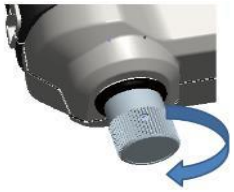
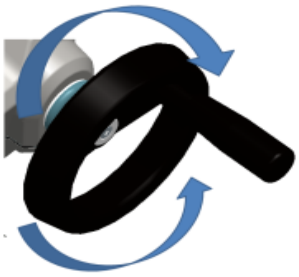
| Step | Procedures | Pictures |
|---|---|---|
| 1 | To seal the system |  |
| **2** | Close the refill valve and then wind the volume adjuster fully clockwise and counterclockwise until the pressure starts to increase.<br><br>Continue the clockwise/counterclockwise sequence until you get the necessary pressure OR for full control, go to step 3.<br><br>The counterclockwise operation refills the pressure mechanism but there is no change in pressure to the device under test or the PM 620 module (if applicable).<br><br>***Note:*** *At higher pressures, it is easier to turn the wheel if you fold in the handle; see Section 1.4.5.* |  <br>  |
| **3** | For full control, open the refill valve (1 turn). You can now increase (+) or decrease (-) the pressure with the volume adjuster. |  <br>  |

**Table 2-7 Continue...**

| Step | Procedures | Pictures |
|---|---|---|
| **4** | If you increase pressure and get to the limit of travel, close the refill valve again and wind the volume adjuster fully counterclockwise. |   |
| **5** | Continue to do steps 2 to 4 until you get the necessary pressure. | |

### 2.2.6 Release Hydraulic Pressure (750 Bar Pump)

**Table 2-8**

| Step | Procedures | Pictures |
|---|---|---|
| **1** | Open the refill valve fully counterclockwise. |  |
| **2** | Open the pressure release valve counterclockwise (1 turn) |  |

### 2.2.7 Drain Excess Fluid

If you add more Distilled water fluid during the pressure procedure, drain this fluid out of the device when the pressure procedure is complete.

**Note:**
**Please do not leave the distilled water inside the device after pressure procedure is complete to avoid risk of contamination.**

***Preparation***
To drain the device, we recommend these items:

- the applicable skin and eye protection
- a container that is large enough to hold the Distilled water fluid and prevent contamination of the work surface.
- applicable materials to make sure the instrument and the area stay clean; see Chapter 6 (Maintenance procedures)

***Procedure***
1 Release the pressure (Section 2.3.6 Release Hydraulic Pressure (750 bar pump)).

2 Remove the device (Section2.1.1) but do not let fluid spill onto the DPI 612 hFlexPro.

3 If necessary, drain the Distilled water fluid from the device under test.

***Note**: To discard the hydraulic fluid, obey all the local health and safety procedures.*

### 2.2.8 Drain all the Hydraulic Fluid

In some conditions, it is necessary to fully drain the Distilled water fluid from your DPI 612 hFlexPro pressure calibrator; for example:

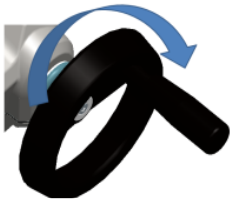
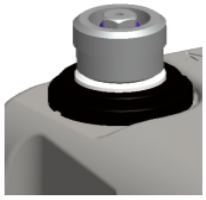
- if you are using water and the storage or operating temperature is going to be less than 4°C (39°F)
- if there is a long period of storage
- if there is unwanted material in the Distilled water fluid

***Preparation***
To drain the instrument, we recommend these items:

- the applicable skin and eye protection
- a container that is large enough to hold the Distilled water fluid and prevent contamination of the work surface.
- applicable materials to make sure the instrument and the area stay clean;

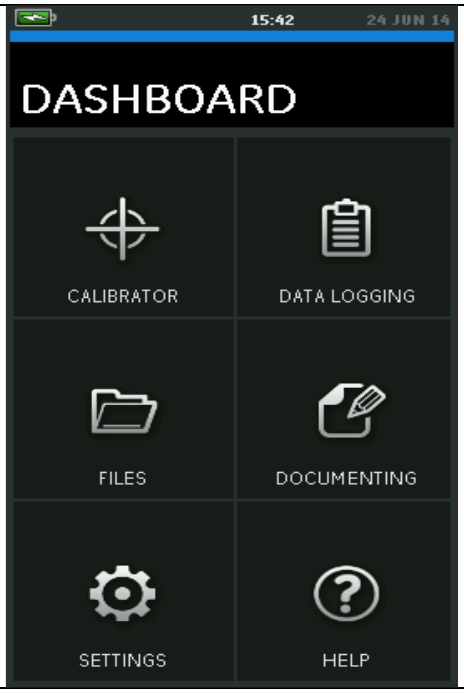
*Procedure*

**Table 2-9**

| Step | Procedures | Pictures |
|---|---|---|
| 1 | If applicable, release the pressure (Section 2.3.6) and remove the device (Section 2.1.1). |  |
| **2** | Remove the hydraulic pressure release valve. |  |
| **3** | Wind the volume adjuster wheel fully clockwise; this moves the fluid out of the pressure mechanism. |  |
| **4** | Put a container below the instrument then tilt the instrument up until all the fluid has come out. To discard the hydraulic fluid, obey all the local health and safety procedures.<br>***Note:*** *Fluid comes out of the test port and the connection for the pressure release valve.* |  <br>  |
| **5** | To flush out fluids that contain unwanted material, refill the system, and repeat steps 3 and 4.<br>***Note:*** *To prevent contamination use only one type of fluid in the instrument.* | |

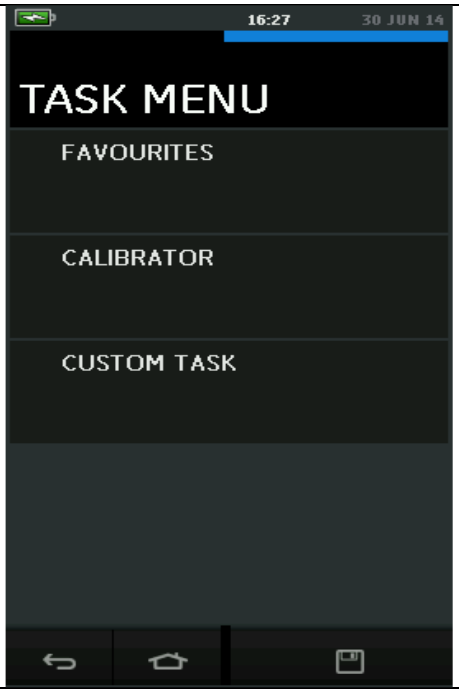
## 2.3 CALIBRATOR OPERATIONS

### 2.3.1 Basic Calibrator Operation




1. Select:

**DASHBOARD >>** **CALIBRATOR**




2. Select the channel by performing the following tasks.
   - Swipe to the TASK MENU by swiping the display from right to left.

**Figure 2.2 Calibrator Menu**

## 2.4 PRESSURE CALIBRATION

PRESSURE TASKS are available in the TASK MENU. See Section *2.4.1* Basic Calibrator Operation for details.

Select the required function by touching either the appropriate text or diagram. The DPI612 will set the functions and return to the CALIBRATOR screen.

Pressure Functions can also be selected through the CUSTOM TASK function. *See Section 2.4.1* for details.


**Figure 2.3 Channel Setting**

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

- Leak Test
- Max/Min/Avg
- Switch Test
- Relief valve

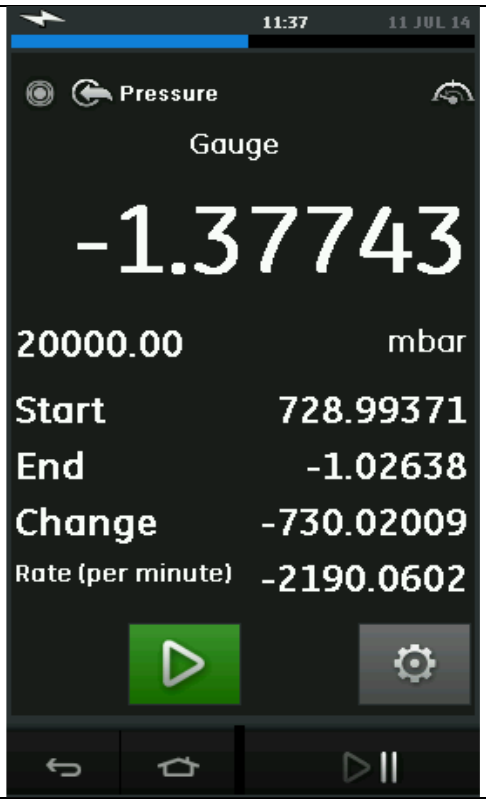
***Note:***

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

### 2.4.1 Set Up a Leak Test

 This utility is only available in Pressure Measurement modes.

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


1. Set the Utility to Leak Test.
Select:

**SETTING >> LEAK TEST**

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.

**Figure 2.4 Set Up Leak Test**

### 2.4.2 Set the Pressure Module to Zero

## SETTING >>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.*

### 2.4.3 Error Indications

**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)

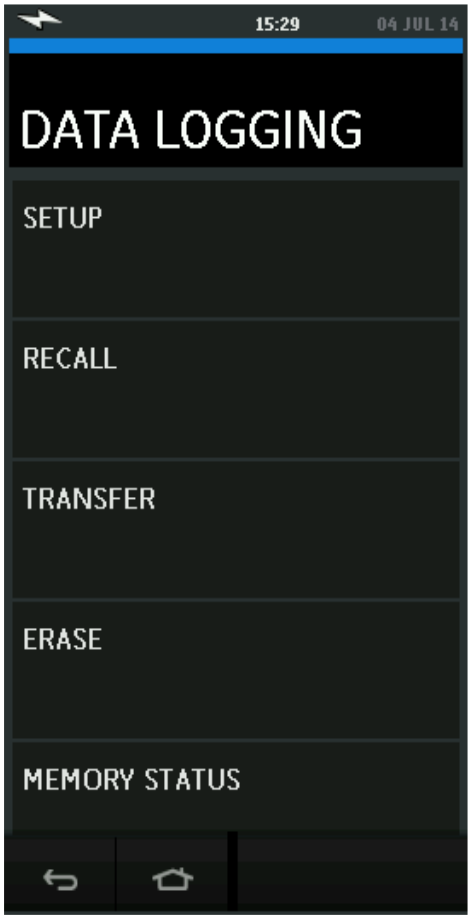
If the display shows <<<< (under range) or >>>> (over range):

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

**SECTION 3**

## 3. DATA LOGGING OPERATION

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

| DASHBOARD | DATA LOGGING FUNCTION |
|---|---|
|  | **>> RECALL**<br><br>The data file can be reviewed. |
| | **>> TRANSFER**<br><br>The data file can be processed externally by using the following:<br>4. Transfer to a USB Flash Drive<br>5. Transfer to a Computer via serial port |

**Notes:**
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:

- Periodically
- Key press

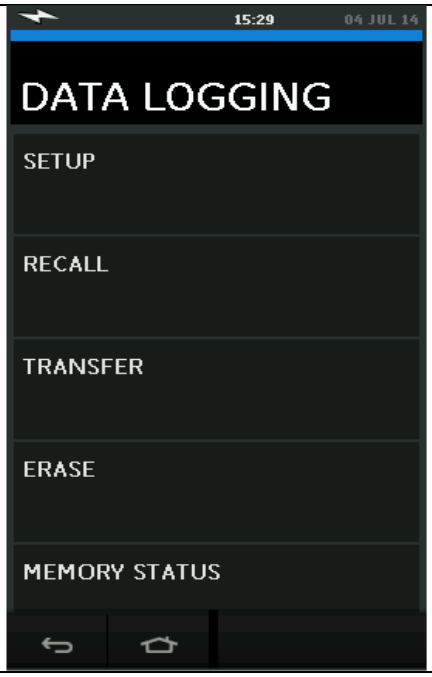
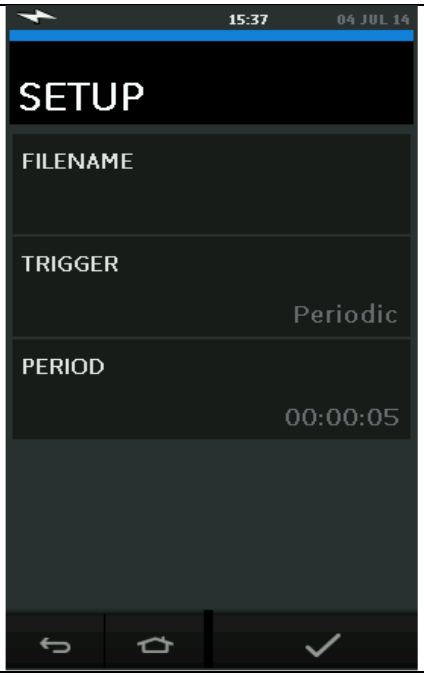
The data is stored in the internal memory or on a USB Flash Drive connected to the Unit until the Data Logging is stopped.

**Figure 3-1 Data logging Operation**

### 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:

**DASHBOARD >>** **DATA LOGGING >> SETUP**

| DASHBOARD | | DASHBOARD |
|---|---|---|
|  | >> |  |

**DATA LOGGING FUNCTION**

**>> 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.

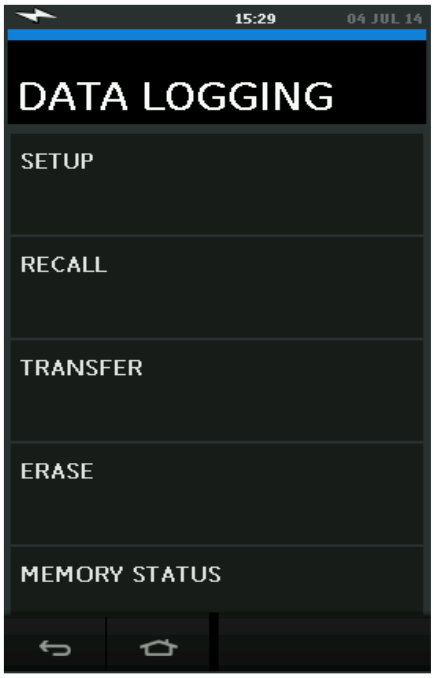
**Figure 3-2 Data logging Set-up**

### 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.

### 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.

**Figure 3-3 Data logging Recall**

### 3.4 FILE MANAGEMENT

The data log file management options are as follows:

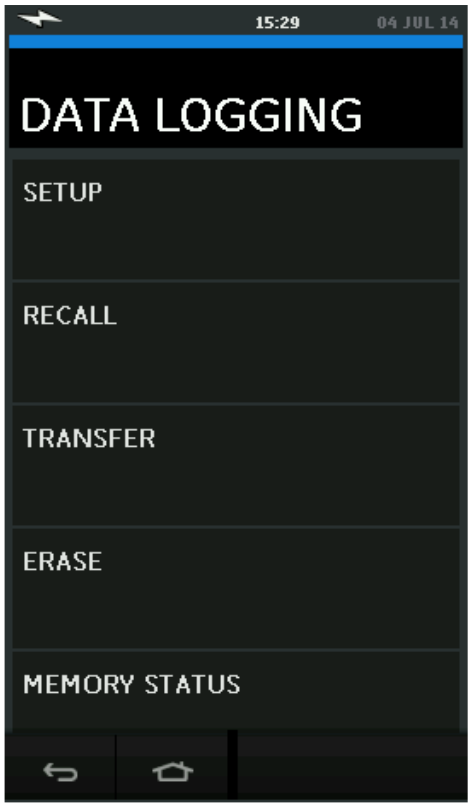
| DASHBOARD | DATA LOGGING FUNCTION |
|---|---|
|  | **TRANSFER**<br>1. Upload data log files to another computer.<br>2. Data may be transferred as follows:<br>• USB Flash Drive: Selected files are written in the root folder of the USB Flash Drive.<br>• USB Serial Port: Transfers data as a text file 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:<br>Baud rate: 19,200 bits/sec<br>Data bits: 8 Parity: none<br>Stop bits: 1 |
| | **ERASE**<br>1. Delete data log files.<br>2. The Erase options are as follows:<br>• ERASE ONE FILE: Select file and tap tick bottom right on the screen to erase.<br>• CLEAR INTERNAL: Clears all internal files. |
| | **MEMORY STATUS**<br>1. Displays amount of free memory.<br>2. The MEMORY STATUS button will show the amount of available memory in the areas that follow:<br>• Internal<br>• USB Flash Drive (if fitted) |

**Figure 3-4 Data logging File Management**

### 3.5 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:

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,21 Aug 2008, 21:38:59
CHANNEL 001, Current (24V),In,mA,55
CHANNEL 005, HART,In,,0
DATA,START
ID,Date,Time,Main Reading,Secondary Reading,
0,21 Aug 2008, 21:39:14,8.7525,24V,4,0,False
1,21 Aug 2008, 21:39:29,8.5711,24V,4,0,False
2,21 Aug 2008, 21:39:44,8.4080,24V,4,0,False
3,21 Aug 2008, 21:39:59,8.2475,24V,4,0,False
4,21 Aug 2008, 21:40:14,8.0733,24V,4,0,False
5,21 Aug 2008, 21:40:29,7.9288,24V,4,0,False
```

**Figure 3-5 Example .csv Data log File**

**SECTION 4**

## 4 TROUBLESHOOTING

This section describes the troubleshooting procedures for DPI 612 HFlexPro.

**Table 4-1**

| Fault Symptom | Possible Cause | Check |
|---|---|---|
| Unit will not generate pressure with integral priming pump/hydraulic ram | Insufficient hydraulic fluid in reservoir. | Verify reservoir has sufficient fluid to generate pressure, (at least 75% of capacity). |
| | System not primed correctly. | Follow priming instructions to ensure air is removed from the system. |
| | 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. | System not primed correctly. | Follow priming instructions to ensure air is removed from the system. |
| | Incorrectly connected system (DPI612 to DUT). | Check connecting accessories are fitted in accordance with instructions & correct sealing method is in use. |
| | DUT has leak. | Isolate DUT from DPI612 & check for leaks in DPI612 & DUT independently. |
| | Worn pressure seal on outlet port ('O' ring & backup ring). | Inspect seal on pressure port for signs of wear & replace as necessary. |
| | Release Valve not closed. | Ensure Release valve is firmly closed. |
| Pressure remains trapped in system. | Refill/Release valve closed. | Check Refill valve is open, (minimum 1 turn counterclockwise), & release valve is open, (minimum 1 turn counterclockwise. |

| Fault Symptom | Possible Cause | Check |
|---|---|---|
| Unit will not reach desired pressure. | PRV (if fitted) operating at lower pressure than required. | Check PRV range (if fitted) & adjust PRV if range is suitable. Fit correct range PRV. Re-fit PRV blanking plug supplied with unit. |
| 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. |