GE Digital Solutions

Druck DPI620 Genii
Intrinsically Safe Calibrator and Communicator Series

User Manual – 116M5464



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1 Overview

The Druck DPI 620 Genii Intrinsically Safe (DPI620G-IS) is a battery-powered instrument for use in a hazardous area. It is capable of electrical measure and source operations, HART®, Foundation Fieldbus and Profibus digital communications. It also supplies the power and user interface functions for all optional items. The touch-screen can display up to five different parameters simultaneously.

This version of the manual is applicable to software revisions DK420 V3.00 and above.

1.1 Equipment in the Box

The following items are supplied with the DPI620G-IS :

- Mains Adaptor for battery charger (IO620-PSU)
- Battery Charger Cradle (IO620G-IS-CHARGER)
- Li-Ion battery pack (IO620G-IS-BATTERY)
- Set of six test leads
- Intrinsic Safety and Quick Start Guide
- Stylus

1.2 Optional Items

The items that follow are optional items which can be used with the DPI620G-IS:

- **Pressure Module Carrier, MC 620-IS**: this attaches directly to the DPI620G-IS to make a fully integrated pressure instrument.
- **Pressure Module, PM 620-IS:** this attaches to the pressure module carrier (MC620-IS) or a Pressure Station (PV62X)-IS to enhance the pressure measurement functionality.
- **Pressure Stations, PV 62X-IS:** if the DPI620G-IS is installed in a Pressure Station, it becomes a fully integrated pressure calibrator.

1.3 Observance of the User Manual

This manual contains safety and battery installation information for the DPI620G-IS. It is the responsibility of the customer, to make sure that all personnel operating and maintaining the equipment are correctly trained and qualified. Before operating or using the equipment read and obey all sections, including all WARNINGS and CAUTIONS given in the sections below and in the Quick Start Guide.

1.4 Safety

1.4.1 General Safety Precautions

Read and obey all the operator's local Health and Safety regulations and Safe Working Procedures or Practices. When performing a procedure or task:

- Use only the approved tools, consumable materials and spares to operate and maintain the equipment.
- Read and obey all applicable WARNING signs.
- Make sure that:

  All work areas are clean and clear of unwanted tools, equipment and materials.

  All unwanted consumable materials are discarded in accordance with local health and safety and environmental regulations.

1.4.2 Operation in a Hazardous Environment

The DPI620G-IS can be operated in a Hazardous Area, subject to the restrictions specified in its classification:



II 1 G

Ex ib IIC T4 Gb (-10°C ≤ Ta ≤ +50°C).

For full details, refer to the 'Intrinsic Safety and Quick Start' guide.

Use only Druck battery pack part number IO620G-IS-BATTERY.

Special Conditions for Safe Use

1. The DPI620G-IS USB Client Connection must be connected to apparatus within a Safe Area with U_m = 254V.
2. When a remote sensor is powered using the Channel 2, 15V, U_o loop supply, the remote sensor must be disconnected from all other sources of power
3. The Channel 2, V terminals can be connected to a FISCO system if the power for the system is provided from the DPI620G-IS Channel 2, 15V, U_o loop supply and the electrical parameters of the field devices are compatible with those of the DPI620G-IS.
4. The DPI620G-IS should not be connected to a powered FISCO system unless its defined electrical parameters are compatible with the DPI620G-IS

5. The re-chargeable battery pack must be removed from the DPI620G-IS for recharging in a Safe Area using only the charging contacts and the GE charger with U_m = 254V. No connections must be made to the IS outputs.
6. The re-chargeable battery pack may be removed from, or replaced in, a DPI620G-IS within a Hazardous Area.
7. The ambient temperature is restricted to between -10°C and +50°C.
8. Both the MC620-IS Dual Pressure Module Carrier and the PV62X-IS Series Pressure Station have locations for one or two Pressure Modules to be screwed in. Before connection of the MC620-IS or PV62X-IS to the DPI620G-IS, a PM620-IS Pressure Module or a protection cap (Part No. 191-369) must be screwed into any vacant location, and must remain in position until the assembly is removed from the DPI620G-IS.
9. The lower ambient temperature is limited to -10°C.

1.4.3 General Warnings

- Do not use tools on the instrument that might cause incendive sparks – this could cause an explosion if used in a Hazardous Area.
- Provide additional protection for equipment that may be damaged in service.
- It is dangerous to ignore the specified limits for the instrument or its related accessories. This can cause injuries.
- Use equipment only for the purpose for which it is provided.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Make sure all equipment is serviceable.
- Wear all applicable Personal Protective Equipment (PPE).
- Do not use sharp objects on the touch-screen.

1.4.4 Electrical warnings

- 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). Any connection must be compliant with the terminal input/output parameters.
- External circuits should have appropriate insulation to the mains.
- This instrument uses a Lithium-Ion (Li-Ion) battery pack. To prevent an explosion or fire, do not short circuit, do not disassemble, and keep safe from damage.
- To prevent an explosion or fire, use only the GE specified battery (IO620G-IS-BATTERY), power supply (Part: IO620-PSU) and battery charger (Part: IO620G-IS-CHARGER).
- To prevent battery leakage or heat generation, only use:
  - the battery charger (IO620G-IS-CHARGER) and power supply IO620-PSU in the temperature range 0°C to 40°C (32°C to 104°F).
- The power supply IO620-PSU input range is 100 – 240Vac +/-10%, 50 to 60Hz, 250mA, installation category CAT II.
- Note that the operating and storage temperature range of the power supply (IO620-PSU) does not match that of the DPI620G-IS battery charger. (IO620-PSU operating temperature range 0°C to +40°C, storage temperature range -40°C to +70°C).
- Position the power supply so as not to obstruct the supply disconnecting device.

- The DC input to the DPI620G-IS battery charger is rated at 5V (+/-5%). Maximum current 2 Amps.
- Equipment is suitable for short-term and long-term TEMPORARY OVERVOLTAGES that may occur between the line conductor and earth in electrical installations.
- To make sure the display shows correct data, disconnect the test leads before power is set to on or changing to another measure or source function.
- Keep leads free from all contaminants.

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

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.*

1.4.5 Pressure Warnings

- 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.
- 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 DPI620G-IS, 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.
- Observe 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 filter is recommended.

1.5 Preparing the Instrument

On receipt of the instrument check the contents in the box, listed in Section 1.1. It is recommended to retain the box and packaging for future use.

1.6 Battery & Charger

1.6.1 Charging the Battery

With reference to Figure 1-1 Battery & Charger:

1. Connect the DC power supply/AC Adaptor to the +5V DC connection [1] on the side of the battery charger cradle.
2. Insert the battery [2] into the charger cradle at a slight angle, then push and click into place. Tighten the thumb screws [3] to prevent accidental disconnection.
3. Switch on the mains power supply.

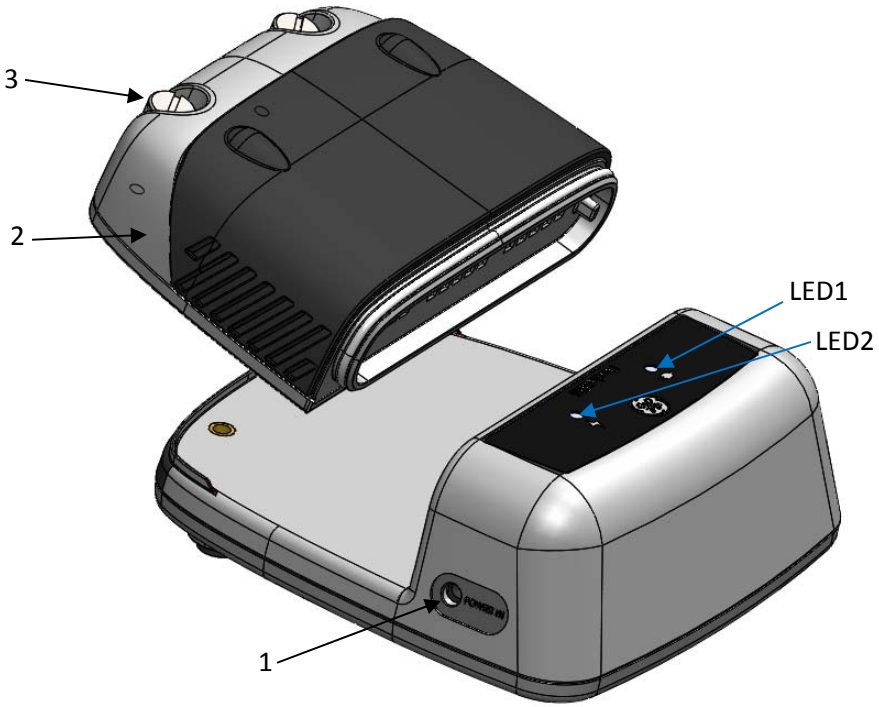


Figure 1-1 Battery & Charger

Battery Charge/Charger Status is shown by LED1, LED2 on the cradle (ref. Figure 1-1). Status definitions are shown in Figure 1-2.

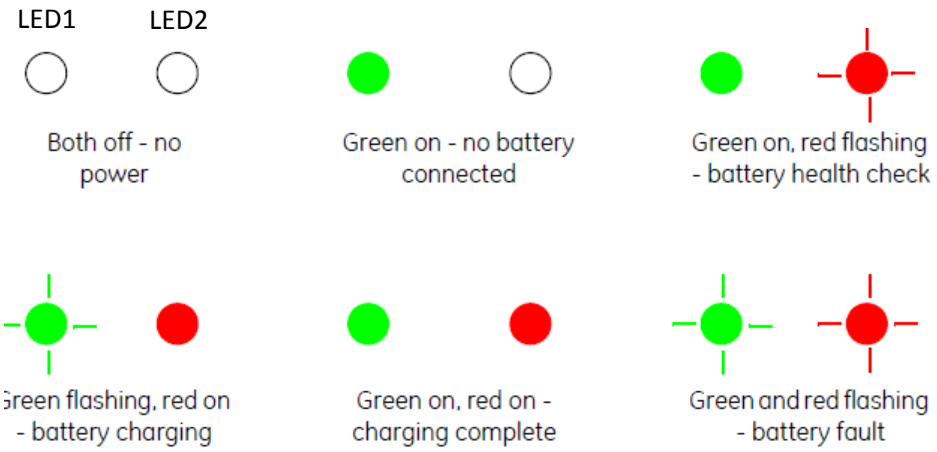


Figure 1-2 Battery Charge/Charger Status

Battery charge time is approximately 8 hours.

Note: To reset charger in fault condition it may be necessary to disconnect power.

1.6.2 Installing the Battery

With reference to Figure 1-3:

1. Slide the battery [1] onto the underside of the instrument [2].
2. Tighten the thumbscrews [3].

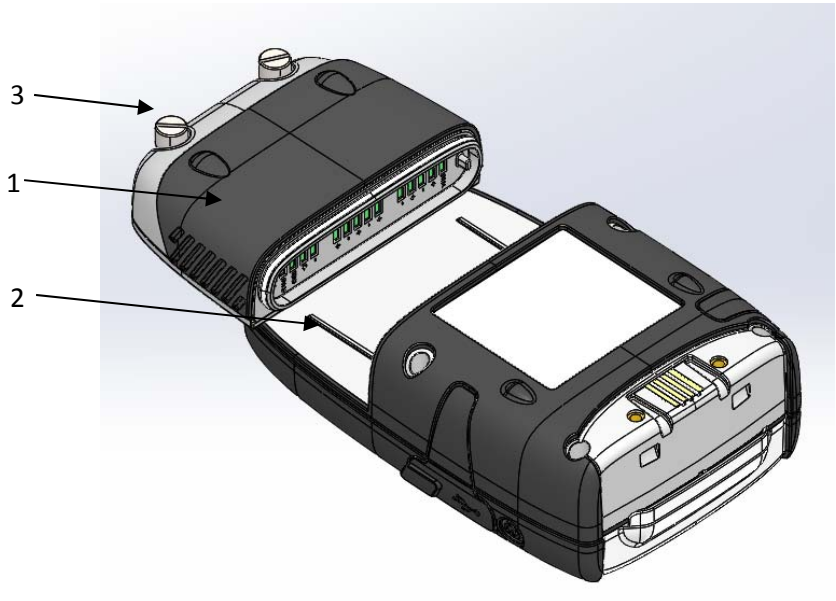


Figure 1-3 Installing the Battery

1.7 Power On/Off

1.7.1 Power On

With reference to Figure 1-4: From OFF – momentarily press the power button [1] until the display GE logo appears.

NOTE: The GE Logo will appear briefly and then the display will go blank for a number of seconds while the instrument initialises.

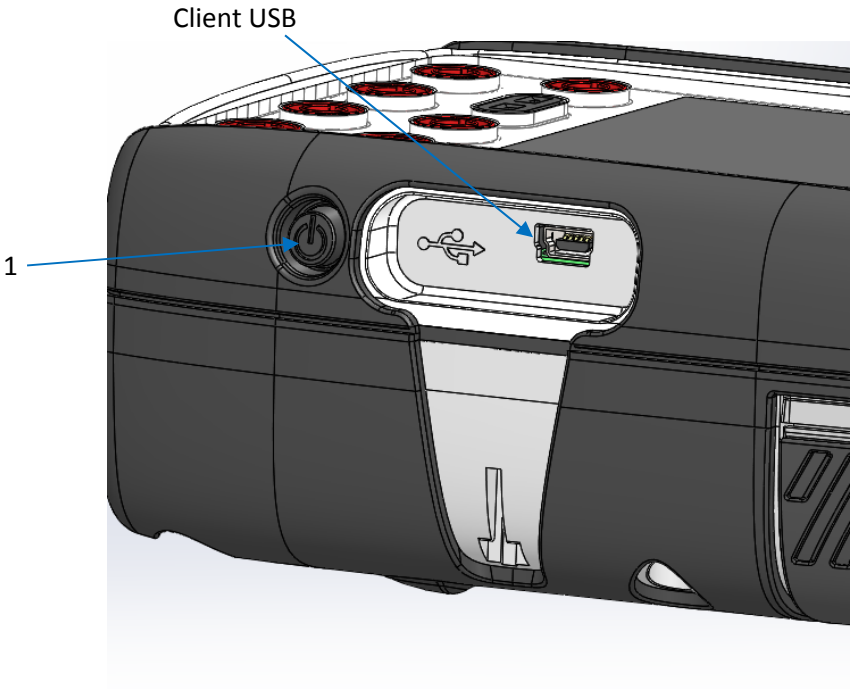


Figure 1-4 DPI620G-IS Side View

1.7.2 Power Off

Press and Release the Power Button:

The **POWERDOWN OPTIONS** window will be displayed.

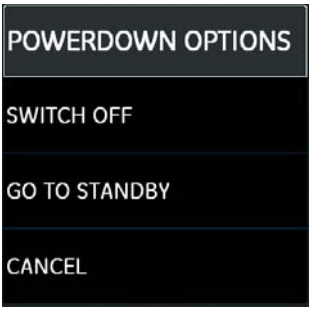


Figure 1-5 Power down Options

SWITCH OFF: Full power down of DPI620G-IS – recommended if the instrument is not going to be used for several hours (the instrument requires a full re-boot on next power up).

STANDBY: DPI620G-IS is placed in standby mode – reduced power consumption from operating mode – recommended if the instrument is to be inactive for short periods (the instrument has fast turn on from STANDBY mode).

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

1.7.3 Power up from Standby Mode

When powering up from standby mode the instrument always opens the last screen shown before it entered standby mode.

1.8 Operation

1.8.1 Dashboard Navigation

The Dashboard is navigated by swiping a finger from top to bottom while touching the screen. Functions screens are navigated by swiping a finger from right to left while touching the screen.



Figure 1-6 Dashboard

Note: *Fieldbus and Profibus are not installed on all units*

1.8.2 Set Date, Time and Language

To access Date, Time and Language menus select:

DASHBOARD >> SETTINGS >> DATE
>> TIME
>> LANGUAGE

1.8.3 Themes

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

DASHBOARD >> SETTINGS >> THEME

1.8.4 DPI620G-IS User Manual

All the information required to operate the Druck DPI620G-IS, is in the Help section of the Dashboard.

To access the User Manual::

DASHBOARD >> HELP >> MANUAL

1.8.5 Connection Diagrams

Connection diagrams are included in the User manual and are also located at:

DASHBOARD >> HELP >> CONNECTIONS

1.8.6 Alarm Status

An Alarm Status is indicated with a Red LED on the Status button in the DASHBOARD screen; and a Red LED on the Home button in other screens.



Figure 1-7 Alarm Indication

To View Alarms select:

DASHBOARD >> STATUS >> ALARM STATE

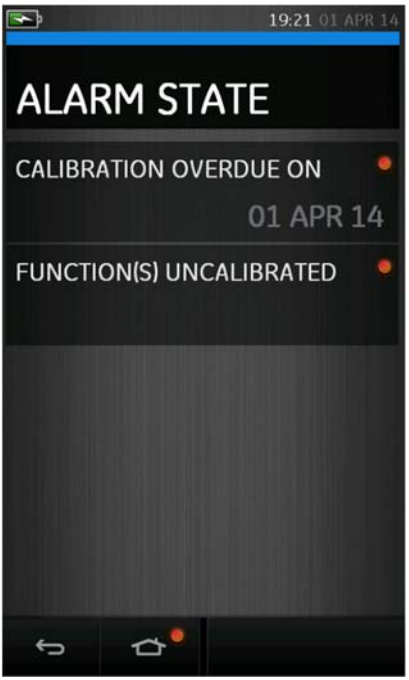


Figure 1-8 Alarm State

Selecting the Alarm will clear the indication until the next power down.

1.8.7 Operating Modes

The DPI620G-IS can be used as follows:

- Calibrator (with independent functions on each of five channels).
  - Data logging capabilities
  - Documenting capabilities
- HART® Communicator.
- Foundation Fieldbus Communicator.
- Profibus Communicator.

1.9 Software and Firmware Upgrades

1.9.1 Viewing Software Revision

The software revisions running on the DPI620G-IS can be viewed by selecting:

DASHBOARD >>  STATUS >> SOFTWARE BUILD

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

1.9.2 Upgrading the Unit Software

1. Go to the website **www.gemeasurement.com**

   The website contains .zip files for upgrading the Operating System (OS), Application, HART, and CH1 FPGA software. The software packages may be contained in one .zip file or may be in individual .zip files.

2. Follow the website instructions to download the .zip file(s) onto a PC local hard drive.

3. At the DPI620G-IS:
   - Select:

     DASHBOARD >>  DEVICES >> USB CLIENT PORT
   - Select 'Storage Device' & return to the DASHBOARD

4. Connect the DPI620G-IS Client USB port to the PC (Ref: Figure 1-4).

   A removable disk drive (for example 'F:') should appear at the PC, containing a folder named **'Install'** at the root level (e.g. **F:\Install**).

5. At the PC:
   - If the removable drive does not include the **'install'** folder, create one at the root level (e.g. **F:\Install)**.
   - Navigate to the downloaded .zip file(s).
   - For each .zip file, extract the contents to the removable drive **'Install':**

     (right click .zip file >> select 'Extract All' >> follow the on-screen instructions)

6. When extraction is complete, remove the USB lead (otherwise the instrument will not upgrade).

   NOTE: at the PC perform "Safely Remove Hardware and Eject Media" before removing the USB lead.

7. At the DPI620G-IS:
   - Select:

     DASHBOARD >>  ADVANCED
   - Enter the S/W upgrade PIN: 5487
   - Select the required S/W upgrade
   - Follow the on-screen instructions

8. On completion of S/W upgrade(s), switch the unit off and then on.
9. Check for successful upgrade by returning to the DASHBOARD and viewing the S/W revision.

1.9.3 Upgrading the HART Device Library

The HART device library is stored separately on the DPI620G-IS Storage.

1. Set the DPI620G-IS USB client port to Storage Device mode by selecting:

DASHBOARD >>  DEVICES >> USB CLIENT PORT

2. Locate the self-extracting file 'DPI620_DD_library_20**_*.exe'

3. Connect DPI620G-IS Client USB port to PC USB port. Device will connect to PC as a Removable Disk.

4. Run 'DPI620_DD_library_20**_*.exe' and extract files to the DPI620G-IS storage (this will take several minutes due to the large file size).

**_* indicates the DD release version from the HART foundation.

The required directory structure of the DPI620G-IS storage is shown in Figure 1-9 Hart DD Directory Structure.

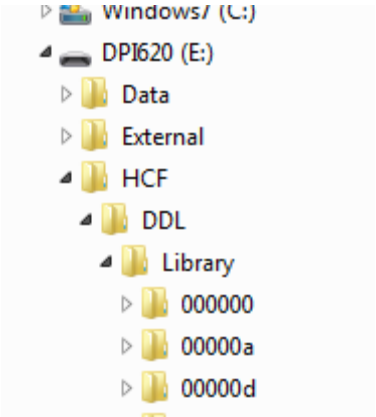


Figure 1-9 Hart DD Directory Structure

1.10 Maintenance

The DPI620G-IS instrument contains no user serviceable parts and should be returned to a GE service centre for repair (Ref: Section 1.11).

1.10.1 Cleaning

CAUTION

Do not use solvents or abrasive materials.

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

1.11 Instrument Return

1.11.1 Returned Material Procedure for USA

If the instrument is unserviceable and requires a repair, return to a GE Service Centre or Approved Service Agent.

Web site: **www.gemeasurement.com**

Contact the GE Service Centre, either by 'phone, fax or e-mail to obtain a Returned Material Authorization (RMA) number, providing the following information:

- Product (i.e. DPI620G-IS)
- Serial number
- Details of defect/work to be undertaken
- Operating conditions

Safety Precautions

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

Important notice

Do not use unauthorized sources to service this equipment as this will affect the warranty and may not guarantee future performance. When discarding used equipment and batteries, obey all the local health and safety procedures.

1.11.2 Returned Goods Procedure for Europe

If the instrument is unserviceable and requires a repair, return to a GE Service Centre or Approved Service Agent.

Web site: **www.gemeasurement.com**

Contact the GE Service Centre, either by 'phone, fax or e-mail to obtain a Returned Material Authorization (RMA) number, providing the following information:

- Product (i.e. Druck DPI620G-IS)
- Serial number
- Details of defect/work to be undertaken
- Operating conditions

Safety Precautions

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

Important Notice

Do not use unauthorized sources to service this equipment as this will affect the warranty and may not guarantee future performance. When discarding used equipment and batteries, obey all the local health and safety procedures.

1.11.3 Instrument Disposal in the European Union

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



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

For more information contact

- GE customer service department: www.gemeasurement.com
- Local government office.

1.12 Packaging for Storage or Transportation

To store the unit or to return the unit for calibration or repair carry out the following procedures:

1. Pack the Instrument.
2. To return the instrument for calibration or repair, complete the return goods procedure (Ref: Section 1.11).
3. Return the instrument to the manufacturer or an approved service agent for all repairs.

1.12.1 Environment

The following conditions apply for both shipping and storage:

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

1.13 Marks and Symbols

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

2 Electrical Operations

This section gives examples of how to connect and use the instrument. Before starting, read the safety precautions contained in Section 1.4 and the 'Intrinsic Safety & Quick Start Guide'.

2.1 Measure & Source Functions

The DPI620G-IS provides the following Functions:

- Current (measure & source).
- Voltage (measure & source).
- Thermocouple (measure & simulate).
- Frequency (measure & source).
- Resistance (measure & simulate).
- RTD (measure & simulate).
- Pulses (measure & source).
- Observed (source) (allows a value to be manually entered - e.g. the reading of a connected voltmeter).

2.2 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 2-1 Task Menu

2.2.1 Saving Tasks

At any point within the TASK MENU the currently active tasks can be saved to FAVOURITES (refer to Section 2.2.3) by selecting Save Task.

Note: The saved function is what is currently active in the calibrator window. It is NOT a selected Task – refer to **COPY TASK** in Section 2.2.2.

2.2.2 Electrical Tasks

1. Select **ELECTRICAL TASKS** from the **TASK MENU**.

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

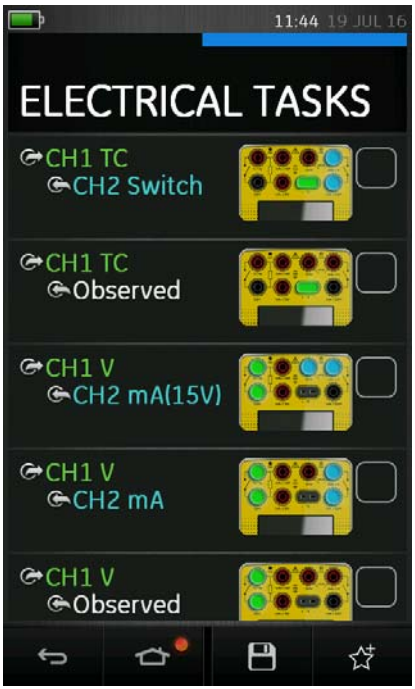


Figure 2-2 Electrical Tasks

2. Select the required function by selecting on either the appropriate text or diagram. The DPI620G-IS will set the functions and return to the **CALIBRATOR** screen.

3. Functions can be copied to **FAVOURITES** (refer to section 2.2.3) by selecting (tick) as shown in Figure 2-3 and selecting Copy Task .

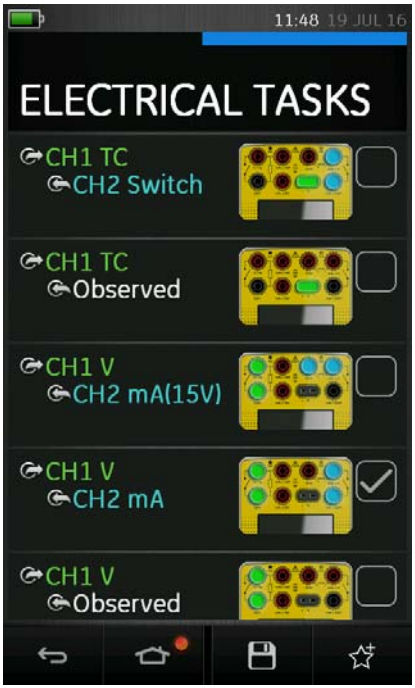


Figure 2-3 Selected Task

If the required task is not available as a Default, a new task should be created using **CUSTOM TASK.** Refer to Section 2.2.4.

2.2.3 Favourites

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



Figure 2-4 Favourites

2. Select the required function by selecting either the appropriate text or diagram. The DPI620G-IS will set the functions and return to the **CALIBRATOR** screen.
3. Tasks can be deleted by selecting (tick) and selecting **DELETE**.

2.2.4 Custom Task

1. Select **CUSTOM TASK** from the **TASK MENU.**

   The TASK SETTINGS menu will appear which will allow the user to set up Channels 1 & 2 in addition to the Pressure Channels, External (IDOS) and Communications (HART or Foundation Fieldbus).

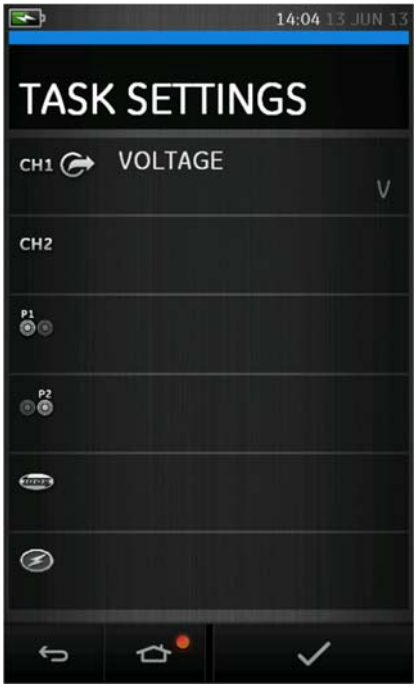


Figure 2-5 Task Settings Menu

2. Select **CH1** or **CH2** to enter the **CHANNEL SETTINGS** menu (ref: Figure 2-6).

   P1 and P2 are used for pressure measurements. (Refer to Section 3).

   IDOS is used for external IDOS sensors – This is not available on the DPI620G-IS

is used for Hart®, FOUNDATION™ Fieldbus and Profibus. (Refer to sections 6, 7 and 8).



Figure 2-6 Channel Settings Menu

3. Setup a channel for measurement.

   - **DIRECTION** selects source or measure for the selected function
   - **FUNCTION** selects the function required (eg 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. Hz, kHz), please note that there may only be 1 type of unit available in particular Functions.

- **UTILITY** selects the required utility (Refer to Section 2.3 for details).
- **CAPTION** allows the user to change the caption, if required.

4. Once all settings have been selected, press the ✓ button at the bottom of the screen to return to the **TASK SETTINGS** screen.
5. If another channel is required, repeat steps 2 to 4.
6. In the **TASK SETTINGS** menu press the ✓ button to invoke the settings.

2.3 Function Utility Options

Function Utility options are selected in the Custom Task procedure (ref: Section 2.2.4).

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.

2.3.1 Max/Min

This utility is only available with measure functions.

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



Figure 2-7 Max/Min Example

2.3.2 Switch Test

This utility is available with measure or source 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.

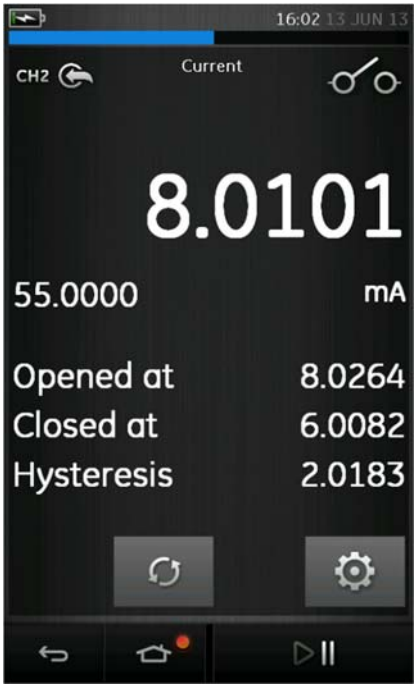


Figure 2-8 Switch Test Example

2.3.3 Relief Valve

This 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 2-9 Relief Value Example

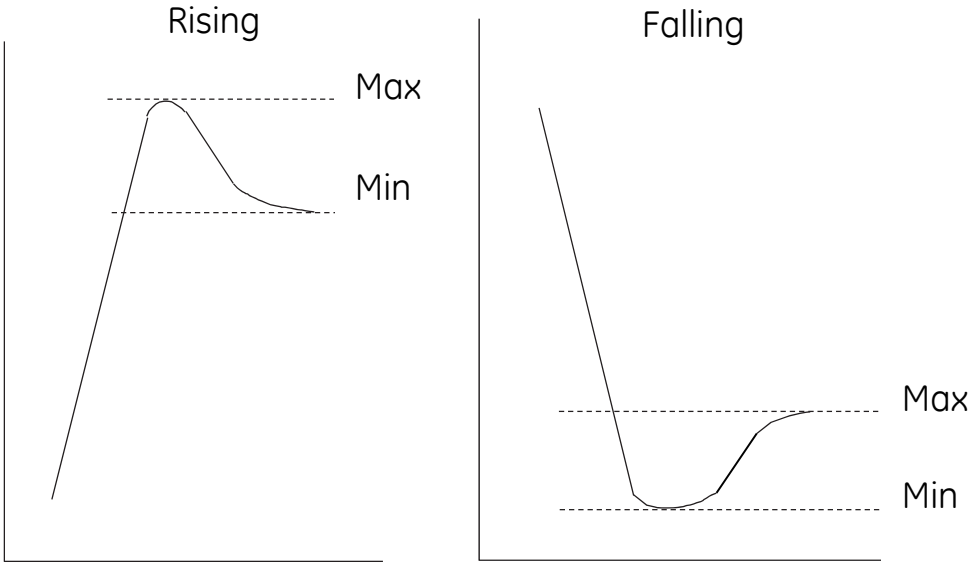


Figure 2-10 Relief Value Utility

2.4 Measurement Display Options

There are 2 display views in the CALIBRATOR screen when multiple channels are in use: 'reduced view' and 'expanded view'.

Reduced View

The display shows a reduced view of all the selected channels (ref. Figure 2-11).



Figure 2-11 Calibrator Window – Reduced View

Expanded View

The display shows an expanded view of the selected channel and minimizes the remaining channels (ref. Figure 2-12).



Figure 2-12 Calibrator Window – CH2 Expanded View

Switching Between Views

In Reduced View: Tap the required channel to be expanded.

In Expanded View: Tap  to restore reduced view

2.5 Measure and Source Operations

After setting the required measure and source functions on the display, additional features can be set for each displayed function

These features are selected by entering the function's expanded view and selecting 

Measure Function PROCESSES

Processes available depend on the function and include:

a) **Tare:** Used to set a temporary value for zero. This makes an adjustment to all subsequent readings on the display

b) **Alarm:** Used to indicate when a limit has been exceeded

c) **Filter:** Sets the Band and Time Constant for a low pass filter

d) **Flow:** When selected, the square root of the measured value is displayed.

e) **Scaling:** Absolute values are scaled

Source Function SETTINGS

Settings available depend on the function and include:

a) **AUTOMATION:** allows values on the display to be set and changed by the following PROCESSES:

- **Nudge:** value adjustment by up/down arrows
- **Span Check:** Alternately apply specified HIGH & LOW values under time control or up/down arrow control.

- **Percent Step:** Move between HIGH & LOW values in percentage steps under time control or up/down arrow control
- **Defined Step:** Move between HIGH & LOW values in absolute steps under time control or up/down arrow control
- **Ramp:** Ramp LOW – HIGH - LOW under time control .

b) SCALING: Absolute values are scaled.

2.6 Example Procedure: Measure or Source Current

The following examples show how to measure or source current on Channel 1 and Channel 2.

2.6.1 Example Procedure: Measure or Source Current, CH1

Figure 2-13 shows CH1 set-up to measure or source a current with external loop power.

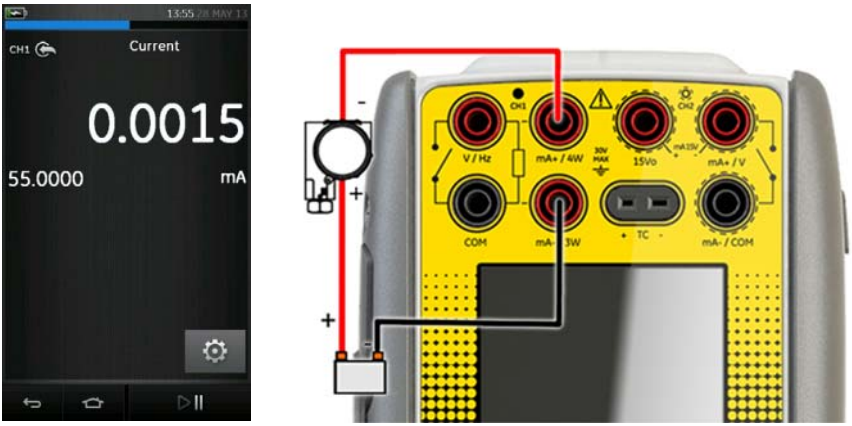


Figure 2-13 Measure Current on CH1, Range ± 55 mA

1. Set the applicable software option: CH1, Measure/Source, Current, mA.
2. Complete the electrical connections and continue with the measure or source operation.
3. Source only (Automation): Set the applicable output value.

2.6.2 Example Procedure: Measure or Source Current, CH2

Note: CH2 can be configured to measure or source current using internal or external loop power. For examples of internal loop power, refer to Section 2.7.

Figure 2-14 shows CH2 set-up to measure or source a current with external loop power.

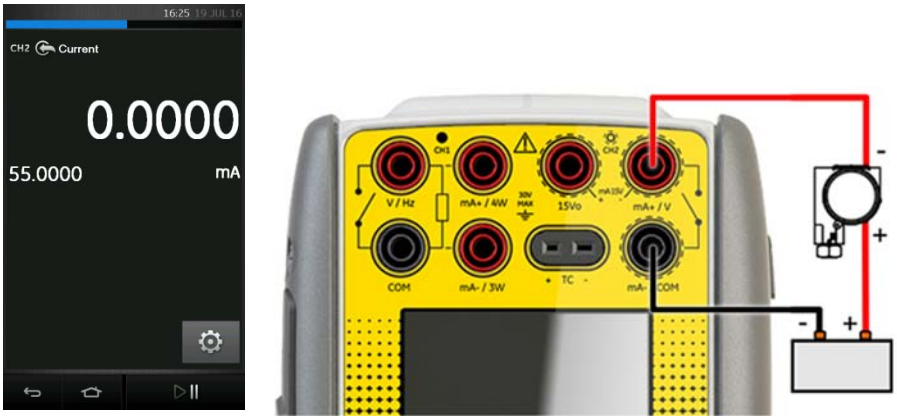


Figure 2-14 Measure Current on CH2, Range ± 55 mA

1. Set the applicable software option: CH2, Measure/Source, Current, mA.
2. Complete the electrical connections and continue with the measure or source operation.
3. Source only (Automation): Set the applicable output value.

2.7 Example Procedure: Measure or Source Current with Internal 15V Loop Power, CH2

Note: CH2 can be configured to measure or source current using internal or external loop power. For an example of external loop power, refer to Section 2.6.2.

Safety Note: Internal 15V loop power is activated for CH2 functions measure and source current with internal 15V loop power. With these set-ups an unregulated 15V supply is presented across terminals '15Vo' and 'mA-/COM' as shown in Figure 2-15.



Figure 2-15 Connection Details for 15Vo Unregulated Current Loop Output

2.7.1 Example Procedure: Measure Current, Internal Loop Power, CH2

Figure 2-16 shows CH2 set up to measure current (±55mA) with internal loop power (15V).

Note: An internal sense resistor (10 ohms) is located between the 'mA+/V' and 'mA-/COM' terminals.

Note: The current limit of the Loop power is 40mA.



Figure 2-16 Measure Current on CH2 with Internal 15V Loop Power, Range ± 55 mA

1. Set the applicable software option: CH2, Measure, Current (15V), mA.
2. Complete the electrical connections and continue with the measure or source operation.

2.7.2 Example Procedure: Source Current with Internal Loop Power, CH2

Figure 2-17 shows CH2 set up to source current (0 to 24mA) with internal loop power (15V).

Note: An internal resistor (10 ohms) and series current source MOSFET are located between the 'mA+/V' and 'mA-/COM' terminals.

Note: The current limit of the Loop power is 40mA.



Figure 2-17 Source Current on CH2 with Internal 15V Loop Power, Range 0 to 24 mA

1. Set the applicable software options: CH2, Source, Current (15V), mA.
2. Complete the electrical connections and continue with the measure or source operation.
3. Source only (Automation): Set the applicable output value.

2.8 Example Procedure: Measure DC Voltage

The following examples show how to measure DC voltage on Channel 1 and Channel 2.

2.8.1 Example Procedure: Measure DC Voltage, CH1

Figure 2-18 shows CH1 set-up to measure a DC voltage (0 to ±30 V) or DC mV (0 to ±2000 mV)



Figure 2-18 Measure DC Volts or DC mV on CH1, Range ±30 V

1. Set the applicable software options: CH1, Measure, Voltage/Millivolts, V/mV.
2. Complete the electrical connections and continue with the measure operation

2.8.2 Example Procedure: Measure DC Voltage, CH2

Figure 2-19 shows CH2 set-up to measure a DC voltage (0 to ±30 V) or DC mV (0 to ±2000 mV)



Figure 2-19 Measure DC Volts or DC mV on CH2, Range ±30 V

1. Set the applicable software options: CH2, Measure, Voltage/Millivolts, V/mV.
2. Complete the electrical connections and continue with the measure operation

2.9 Example Procedure: Source DC Voltage, CH1

Figure 2-20 shows CH1 Set-up to source a DC voltage (0 to 12V), or DC mV (0 to 2000mV).

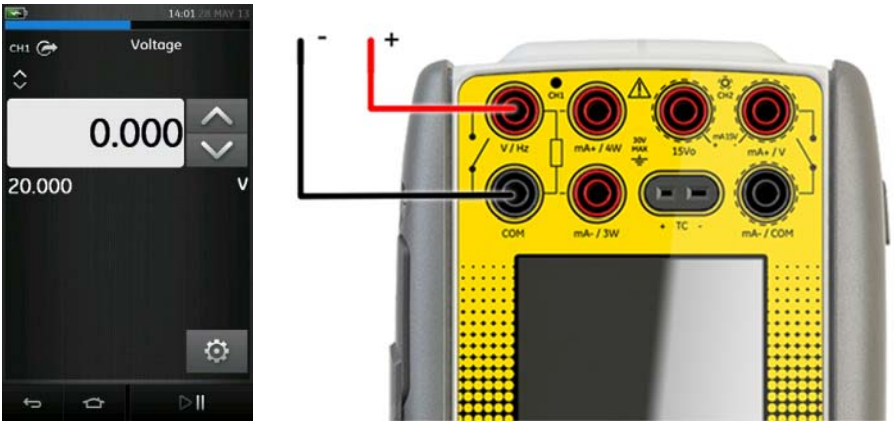


Figure 2-20 Source Voltage on CH1, Range 0 to 12V.

1. Set the applicable software options: CH1, Source, Voltage/Millivolts, V/mV.
2. Complete the electrical connections.
3. To continue, set the applicable output value.

2.10 Example Procedures: Measure or Source Frequency Signals

2.10.1 Example Procedure: Measure Frequency Signals

Figure 2-21 shows CH1 set-up to measure frequency. The units can be Hz, kHz or counts (cpm or cph).

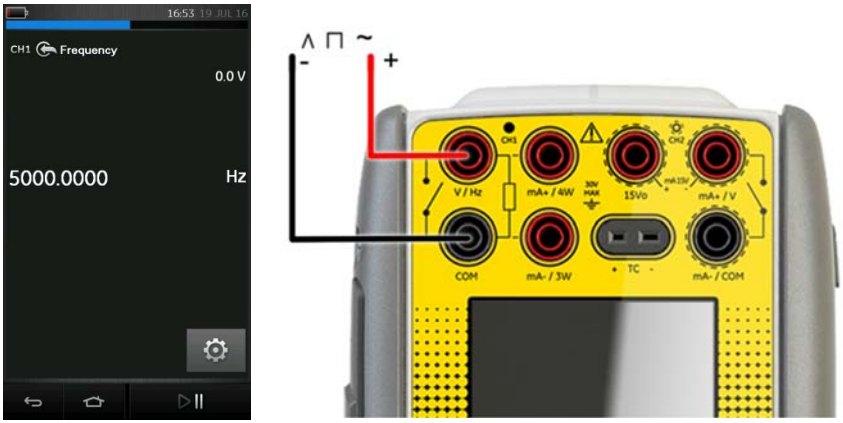


Figure 2-21 Measure Frequency on CH1 (Range 0 to 5 kHz, Trigger Level 2.5V)

1. Set the applicable software options: CH1, Measure, Frequency, Units
2. Complete the electrical connections
3. If necessary, change the Trigger Setup:

   ⚙SETTINGS >> AUTO TRIGGER

4. Set the values that follow:
   - AUTO TRIGGER: (Enabled / Disabled)
   - MANUAL LEVEL: Trigger Level for Manual Trigger only.

2.10.2 Example Procedure: Source Frequency Signals

Figure 2-22 shows CH1 set-up to source a frequency. The units can be Hz, kHz or counts (cpm or cph).



Figure 2-22 Source Frequency CH1 (Range 0 to 5 kHz, Waveform: Square, Amplitude 5.0V)

1. Set the applicable software options: CH1, Source, Frequency, Units
2. Complete the electrical connections
3. If necessary, change the Waveform Setup:

   ⚙ SETTINGS

4. Set the values that follow:
   - WAVEFORM: Square / Triangle / Sine
   - AMPLITUDE: Peak to Peak Amplitude
   - OFFSET: Only Applies to Sine and Triangle

2.11 Example Procedure: Measure/Simulate RTD

The following examples describe how to measure or simulate an RTD.

Note: The same configurations are used to measure or simulate **resistance Ω**. In each case, at the DPI620G-IS, select the Resistance function (Range 0 to 4000 Ω) rather than the RTD function.

Note: A 4-wire configuration provides the best accuracy, a 2-wire configuration the lowest accuracy.

2.11.1 Example Procedure: Measure/Simulate a RTD, 4-Wire Method

Figure 2-23 and Figure 2-24 show CH1 set-up to measure or simulate an RTD using the 4 wire method.

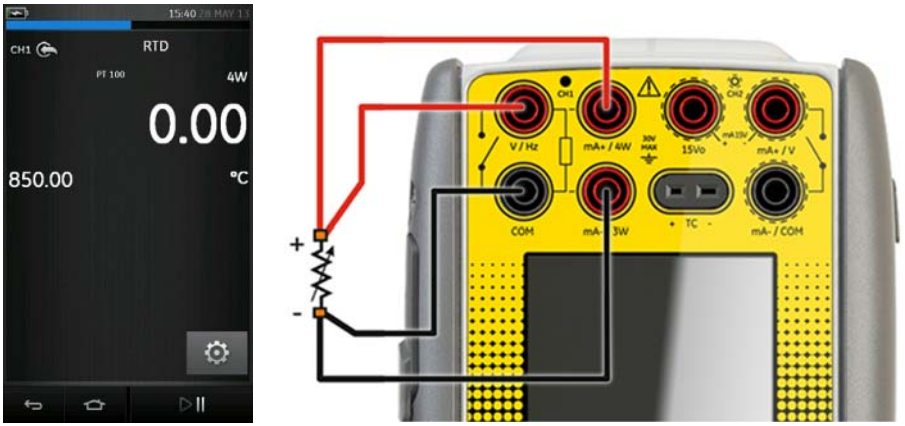


Figure 2-23 PT100 RTD Measure CH1 4-Wire (Range -200 to 850°C)

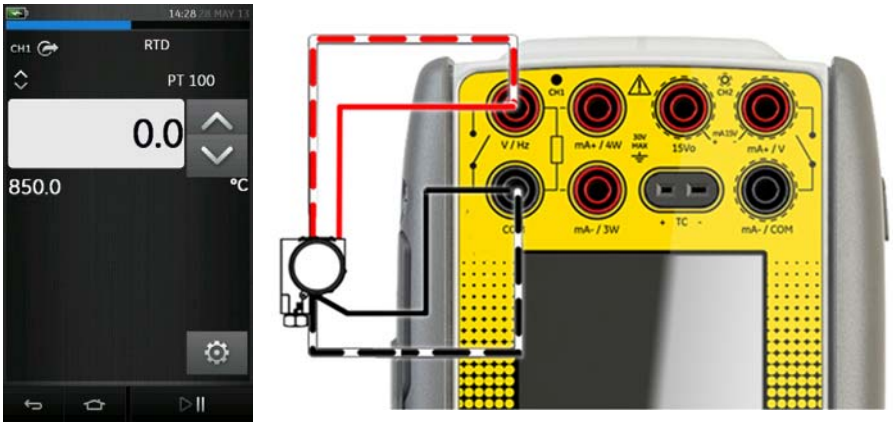


Figure 2-24 PT100 RTD Source CH1 4-Wire (Range -200 to 850 °C)

1. Set the applicable software options: CH1, Measure/Source, RTD, Units
2. Complete the electrical connections.
3. If necessary change the RTD Type.

   SETTINGS >> RTD TYPE

2.11.2 Example Procedure: Measure a RTD, 3-Wire Method

Figure 2-25 shows CH1 set-up to measure an RTD using the 3 wire method.

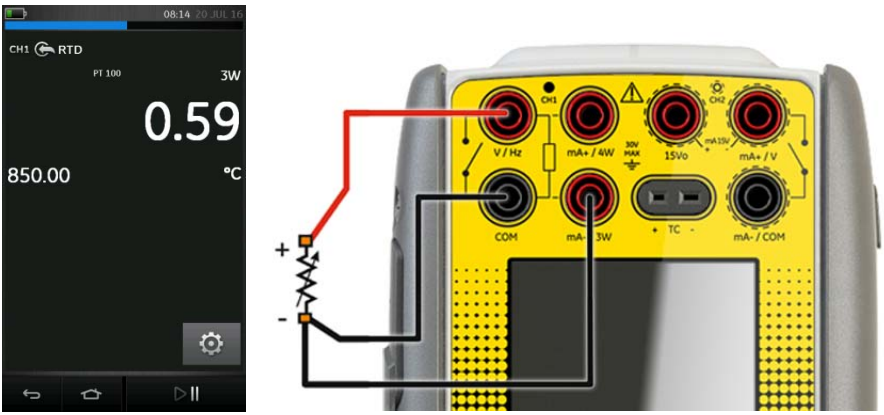


Figure 2-25 PT100 RTD Measure CH1 3-Wire (Range -200 to 850°C)

1. Set the applicable software options: CH1, Measure, RTD, Units
2. Complete the electrical connections.
3. If necessary change the RTD Type.

   SETTINGS >> RTD TYPE

2.11.3 Example Procedure: Measure a RTD, 2-Wire Method

Figure 2-26 shows CH1 set-up to measure an RTD using the 2 wire method.

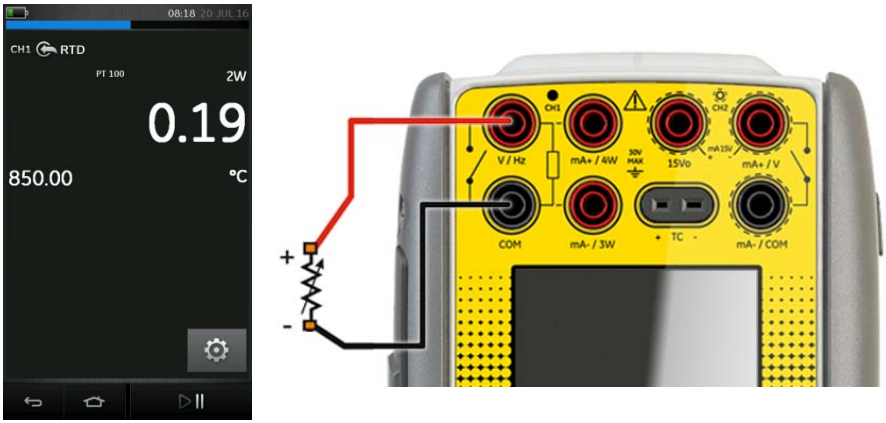


Figure 2-26 PT100 RTD Measure CH1 2-Wire (Range -200 to 850°C)

1. Set the applicable software options: CH1, Measure, RTD, Units
2. Complete the electrical connections.
3. If necessary change the RTD Type.

   SETTINGS >> RTD TYPE

2.12 Example Procedure: Measure or Simulate a Thermocouple (TC)

Note: The configurations below are also used to measure or simulate **TC millivolts**. In each case, at the DPI620G-IS, select the TC mV function rather than TC.

Figure 2-27 and Figure 2-28 show CH1 set-up to measure or simulate a TC temperature.

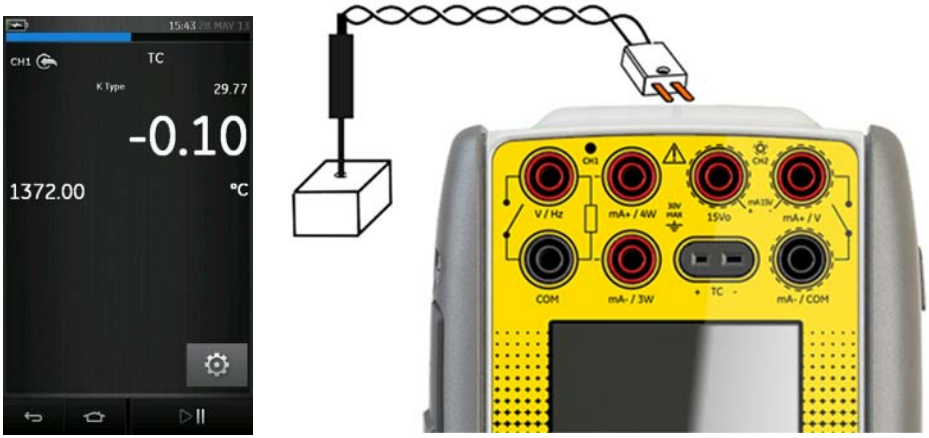


Figure 2-27 K-Type Thermocouple Measure CH1 (Range -270 to 1372 °C)

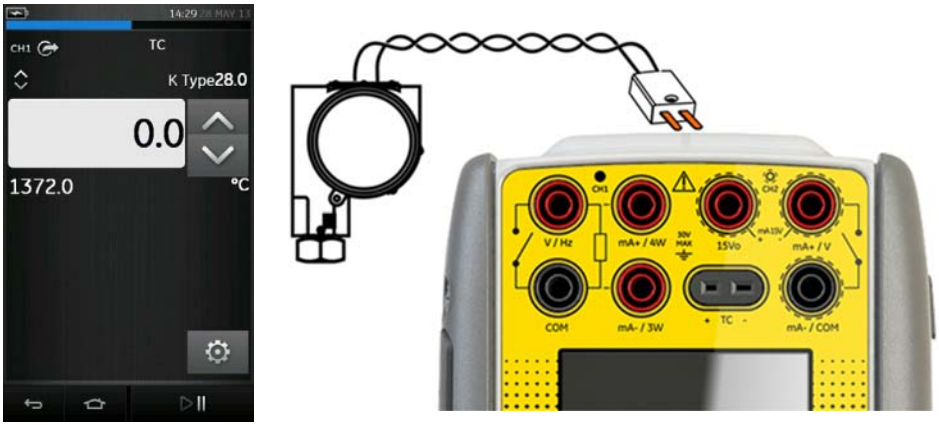


Figure 2-28 K-Type Thermocouple Source CH1 (Range -270 to 1372 °C)

1. Set the applicable software options.
2. Complete the electrical connections.
3. If necessary change the thermocouple type.

   SETTINGS >> TC TYPE

4. Set CJ Compensation mode.

   SETTINGS >> MANUAL CJ COMPENSATION

   If Manual CJ compensation is not selected, the internal cold junction is used to calculate the thermocouple value.

   If using an external cold junction, select check box on **MANUAL CJ COMPENSATION** and enter value for cold junction temperature.

2.13 Example Procedure: Switch Test

CH1, P1, P2 and IDOS functions use the CH2 switch connections. CH2 functions use the CH1 switch connections.

Switch operation

When setting the Switch Test utility on one channel, the software automatically sets-up the other channel for the switch connections.

Note: *If there is a measure or source function on the switch connection channel it is automatically disabled. The display will show a screen message:*



Figure 2-29 below shows a thermocouple switch test.



Figure 2-29 CH1 Thermocouple Source, CH2 Switch Test

1. Set the applicable software options:
   - The TC is set to source a temperature
   - The **UTILITY** is set to **SWITCH TEST**. The AUTOMATION is set to **RAMP**
2. Complete the electrical connections.
3. It is a CH1 function, the switch connections must be on CH2.
4. For the Ramp process, set **START** and **STOP** values that are applicable to the switch value.
5. To get an accurate switch value, set a long **TRAVEL** period.

6. Use  to start the “Ramp” cycle.

7. Use  to stop the “Ramp” cycle.

8. If necessary, supply the output values in the opposite direction until the switch changes condition again.

9. The display will show the following:
   - Values for switch Open and switch Close Points
   - Hysteresis value

Opened at	8.0264
Closed at	6.0082
Hysteresis	2.0183

10. To do the test again press the button.

2.14 Error Indications

Under range: **<<<<**

The display shows the **<<<<** symbol for the condition:

Reading < 102% Negative Full Scale

Over range: >>>>

The display shows the **>>>>** symbol for the condition:

Reading > 102% Positive Full Scale

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.

3 Pressure Indicator Operation (MC620-IS)

This section gives examples of how to connect and use the instrument to measure pressure with the module carrier (MC 620-IS) and the applicable pressure modules (PM 620-IS).



Figure 3-1 MC620-IS and PM 620-IS

To make a fully integrated pressure calibrator instrument with one of the three Pressure Stations, refer to the User Manual for the PV62x-IS Series of Pressure Stations (K0462).

Figure 3-2 PV62x-IS



3.1 Parts and Assembly

This section shows the parts of the module carrier (MC 620-IS) and pressure module (PM 620-IS). (Ref: Figure 3-3).

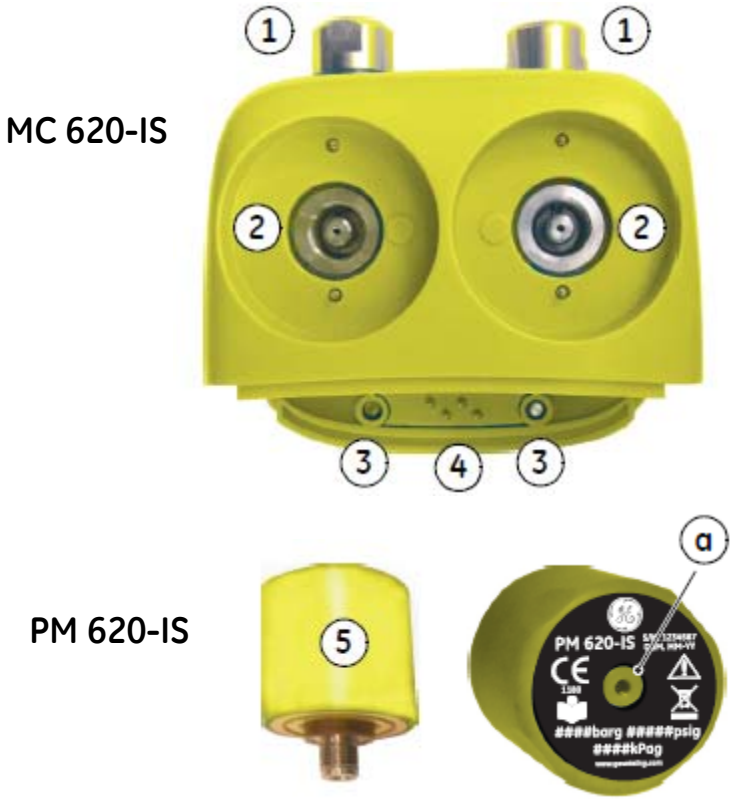


Figure 3-3 MC 620-IS and PM 620-IS Part Identification

Part Reference	Description (ref. Figure 3-3)
1	Pressure connection (G1/8 or 1/8 NPT) to attach external pressure equipment.

Part Reference	Description (ref. Figure 3-3)
2	Pressure and electrical connections for a pressure module (PM 620-IS). These are self- sealing pressure connections.
3	Two screws to attach the calibrator (Druck DPI620G-IS).
4	Electrical connections for the calibrator (Druck DPI620G-IS).
5	Pressure module (PM 620-IS) with a pressure connection and reference port (**a**). The PM620 Label identifies: Type: g: gauge a: absolute Pressure Range Serial Number Manufacturer

CAUTION

To prevent damage to the PM620 module, only use it within the specified pressure limit on the label.

When the items are attached to the DPI620G-IS it becomes a fully integrated pressure indicator, measuring pneumatic or hydraulic pressure.

3.1.1 Assembly Instructions

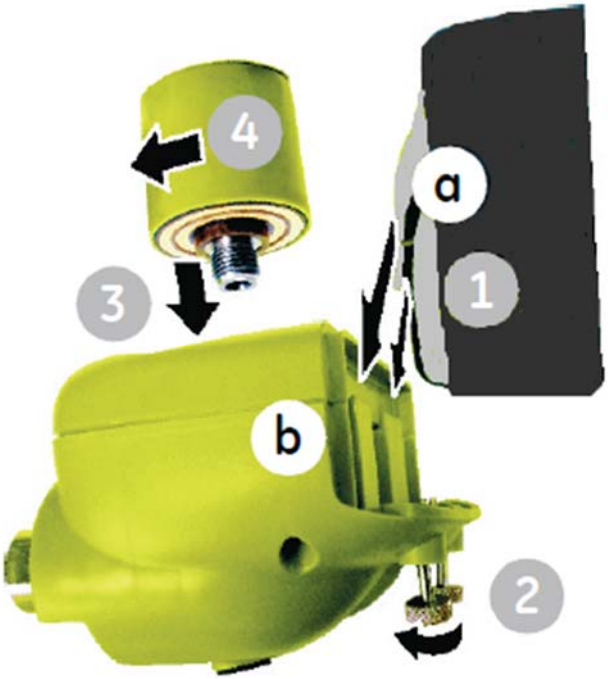


Figure 3-4 MC 620-IS Assembly Procedure

Step	Procedure
1	Align the two slots **(a)** on the calibrator with the two posts **(b)** on the module carrier.
2	When the posts are fully engaged in the slots, tighten the two screws **(2)** hand-tight.
3	Attach one or two PM 620-IS modules **(4)** with the correct range and type.
4	Tighten each PM 620-IS module **(4)** hand-tight only.
5	When the ◎◎ symbol flashes at the top of the display, there is communication between the module and the calibrator.

3.2 Pressure Connections

WARNING

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

The pressure ports for external equipment use “Quick fit” pressure adaptors.



Figure 3-5 Quick Fit Pressure Adaptor

3.2.1 Procedure (Attaching External Equipment)

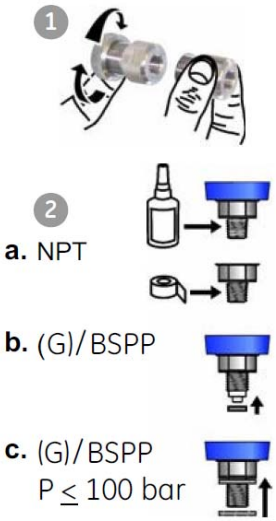


Figure 3-6 Pressure Connections

Step	Procedure
1	Remove the adaptor from the pressure port.
2	Use an applicable seal for the pressure connection: a. NPT type: Use an applicable sealant on the thread. b. BSP (parallel) type: Use the applicable bonded seal at the bottom. c. BSP (parallel) type, 100 bar (1500 psi) or less: a bonded seal at the top is permitted.
3	Attach the adaptor to the external equipment. If necessary use an alternative adaptor.
4	Tighten to the applicable torque.
5	Attach the adaptor to the MC 620-IS carrier and hand- tighten.

When the pressure indicator assembly is complete use the menus to set-up the necessary operations. (refer to Section 3.3).

3.3 Procedure Overview



Figure 3-77 Task Menu

When PM 620-IS Pressure modules are fitted, **PRESSURE TASKS**, are available in the **TASK MENU**. Refer to Section 2.2 Basic Calibrator Operation for details.



Figure 3-8 Pressure Tasks

Select the required function by selecting on either the appropriate text or diagram. The DPI620G-IS will set the functions and return to the **CALIBRATOR** screen.

Pressure Functions can also be selected through the **CUSTOM TASK** function. Refer to Section 2.2.4 for details.

Tasks can be **SAVED** or **COPIED** into the **FAVOURITES.** Refer to Section 2.2.1 for details.

If required, change the Units of the function.

If necessary, set a Utility for the function:

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

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



Figure 3-9 Channel Settings

3.4 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.



Figure 3-10 Leak Test Example

To configure leak test:

1. Set the Utility to Leak Test.
2. Select:

   SETTINGS >> LEAK TEST
3. 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)
4. Use  to start the Leak Test
5. Use  to stop the “Ramp” cycle

Note: To set the Leak Test options, a pressure module must be correctly installed.

3.5 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.

3.6 Error Indications

Under range: **<<<<**

The display shows the **<<<<** symbol for the condition:

Reading < 110% Negative Full Scale

Over range: >>>>

The display shows the **>>>>** symbol for the condition:

Reading > 110% Positive Full Scale

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.

4 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.

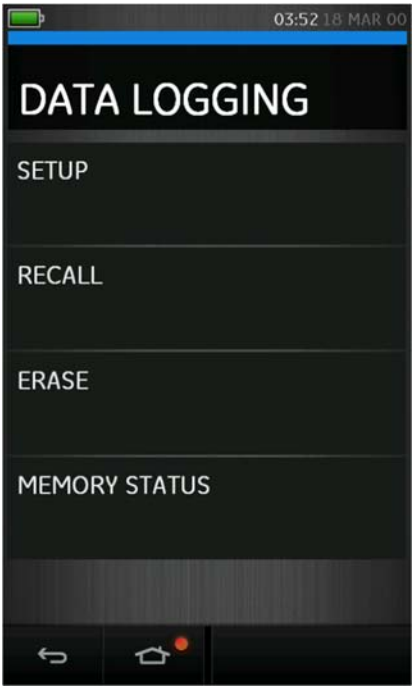


Figure 4-1 Data Logging

The data file can be reviewed by using the following:

- Recall

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 on the DPI620G-IS until the Data Logging is stopped.

4.1 Set-up

Before starting, set all channels to the correct functions. (Refer to Section 2.2). To access the Data logging function do the following:

DASHBOARD >> DATA LOGGING >> SETUP

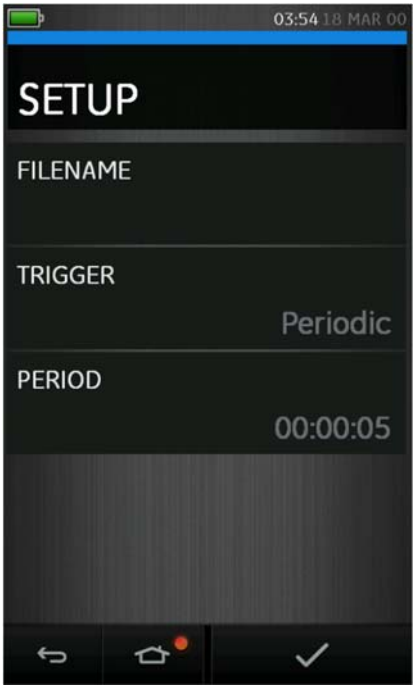


Figure 4-2 Datalogging Setup

- FILENAME

  Enter the filename (10 characters maximum)

- TRIGGER

  Select one of the following:

  - Key Press (logs one data point each time the button is pressed)
  - Periodic (logs one data point at a set time interval)

- PERIOD

  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.
2. Select the ✓ button.

4.2 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.

4.3 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.

4.4 Chart View

DASHBOARD >> DATA LOGGING >> RECALL

To view a data file on a chart do the following:

1. Tap the Filename button to display the list of data files.
2. Select the file to be displayed.
3. Select VIEW CHART

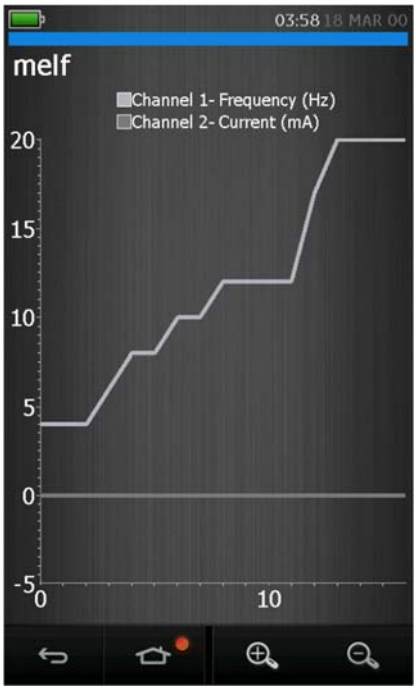


Figure 4-3 Datalog Chart

4.5 File Management

The data log file management options are as follows:

- ERASE: Delete data log files.
- MEMORY STATUS: Displays amount of free memory.

4.5.1 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.

4.5.2 Memory Status

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

- Internal
- Storage Area

4.5.3 Download Files

The Data log Files stored separately on the DPI620G-IS Storage.

Directory *LoggingData*\

To access set the DPI620 Genii USB client port to Storage Device mode by selecting:

DASHBOARD >>  DEVICES >> USB CLIENT PORT

Connect the DPI620G-IS to a PC via the USB Client Port. The DPI620G-IS should be available as a removable disk.

4.6 Data Format

The data files are produced in a Comma Separated Variable (csv) format (refer to Figure 4-4). 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 - Datalog 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,5
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 4-4 Example .csv Datalog File

5 Documentation

This chapter describes the Documenting functions available with the DPI620G-IS calibrator and are as follows:

- ANALYSIS
- RUN PROCEDURE

5.1 Analysis

The Analysis function takes readings from two or more DPI620G-IS channels to calibrate the transfer characteristic of the device being tested. One channel is the Reference channel and is used as follows:

- Provides a measure of the input signal to the device.
- If calibrating a temperature transmitter the Reference channel could be CH1 in either RTD or TC source mode.
- If the device is a pressure transmitter the Reference channel would be P1 or P2 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 CH2 in Current Measure mode.

A second input channel can also be used, to calculate the transfer characteristic between three points in the signal path and may be calibrated at the same time, as in the example that follows.

- When calibrating a process transmitter that is HART® enabled the second input channel could be the HART® channel. The HART® channel reads the Primary Variable (PV) value from the sensor in the process transmitter this would allow the pressure sensor to be calibrated at the same time as the current loop output.

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 as a Pass  or Fail  icon.

5.2 Set-up

1. Set the Druck DPI620G-IS channels in the Calibrator function. (Refer to section 2.2).
2. Connect the calibrator to the device under test.
3. Enter the Documenting function.

DASHBOARD >>  DOCUMENTING

4. Tap the **ANALYSIS** button.

5.2.1 Define the Reference Channel

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

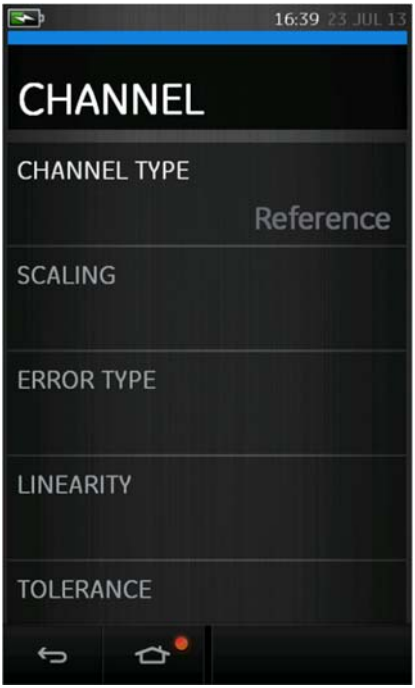


Figure 5-1 Select Reference Channel

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

5.2.2 Define each Input Channel

Tap each Input channel button to set the Input options.

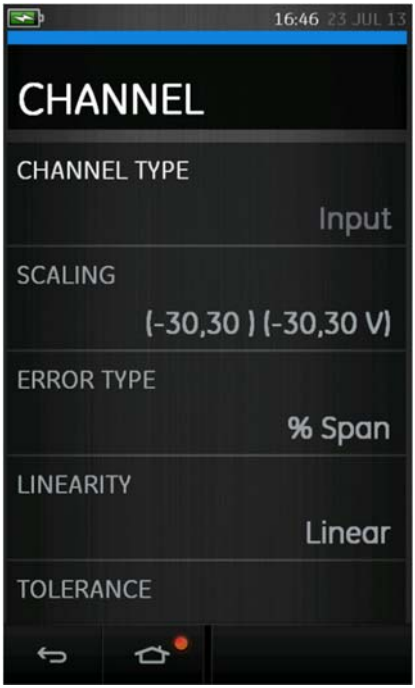


Figure 5-2 Select Input Options

- SCALING - The scaling values are four set values:

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

  The Input signal values (Input High and Input Low).

  The Input signals should relate to the Reference signal values with a linear or square root transfer characteristic.

- ERROR TYPE – The deviation from which the transfer characteristic is to be calculated. 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.

5.3 Analysis Function

Set Input channel parameters (refer to section 5.2), and return to **CHANNEL SETUP** screen.

Select the Start button ⊙

The Analysis window displays the following:

- 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 ⊗.

5.4 Run Procedure

The purpose of the Run procedure is to do calibration procedures which have been downloaded from 4Sight or Intecal v10 software. The calibration procedure contains all the values to calibrate a device under test (test points, ramp time).

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 4Sight or Intecal v10 Calibration Software.
- Standard USB lead (as supplied).
- A Druck DPI620G-IS calibrator device driver available as a download from the website **www.gemeasurement.com**.

5.4.1 Sequence to Upload and Download File

Step	Procedure
1.	Connect Standard USB lead (as supplied) to the Druck. DPI620G-IS calibrator.
2.	Connect the lead to the USB port on the computer that has the calibrator manager installed.
3.	Use 4 Sight / Intecal v10 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 DPI620G-IS 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.
9.	Use the Take Reading button at each point specified by the procedure. A prompt shows 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 4 Sight / Intecal v10 database

6 HART® Operations

The Druck DPI620G-IS can communicate with devices that use the HART® protocol as follows:

- The Universal and Common Practice commands specified in HART® revision 5 to 7.
- Devices that support Device Descriptions (DD).

This section includes procedures to use the HART® functions available in the calibrator.

6.1 HART® Menu Operations

The HART® application is started from the Dashboard. The HART® uses a digital signal on top of a standard 4 - 20 mA current loop to get data to and from a HART® enabled field device. Typical operations include the following:

- Read the primary variable and the analogue output.
- Read the device serial number, type and supplier.
- Get calibration data (upper and lower range values, sensor limits, calibration date).
- Do status and fault finding checks.
- Change the device configuration (range, units, damping).

The Druck DPI DPI620G-IS can be used to communicate with other HART® field devices as follows:

- As a **Primary Master** the Druck DPI620G-IS starts and controls all communications. The field device (slave) uses each command from the master device to make a change and/or send data back.
- As a **Secondary Master** the Druck DPI620G-IS is connected into an existing HART® communications network. The Secondary Master communicates with the field device in between Primary Master messages.

6.2 Start-up

HART® communication is started by selecting:

DASHBOARD >> HART

Task can be selected for CH1, CH2, P1 and P2. Refer to Section 2.2.

HART® can also be selected from the **CALIBRATOR** function.

Select: **COMMUNICATOR** channel from **TASK SETTINGS**

FUNCTION >> HART

6.3 HART® Connections

Before setting-up the electrical connections between the HART® device and the Druck DPI620G-IS get the correct connection scheme (Ref: **DASHBOARD >> HELP**).

6.4 Power Supply from the Calibrator

A 15 V loop power can be supplied using the CH2 Current (15V) measure function.

In the example that follows, the DPI620G-IS supplies the loop power and a 250 Ω HART® resistor.



Figure 6-1

6.5 External Loop Power

In the example that follows, there is an external power supply.



Figure 6-2

Measure current on CH2 without 15V loop power.

HART® function is enabled and 250 Ω resistor is enabled.

6.6 Communicator Attached to a Network

In the example that follows, the calibrator connects directly to a network. There must be a 250 Ω resistor in series with the loop power supply and the HART® device.

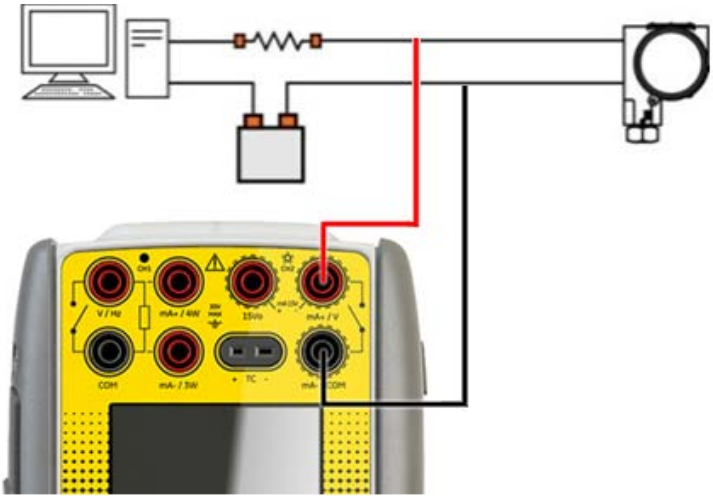


Figure 6-3

CH2 function is set to **None**. HART® function is enabled and 250 Ω resistor is set to Off.

6.7 Use of Test Connections

Use the test connection with a HART® transmitter. Use CH1 to measure current and CH2 to communicate with the HART® device. CH2 must be set to **None**, and CH1 must be placed into current measure mode. There must be an external HART® resistor in the loop.

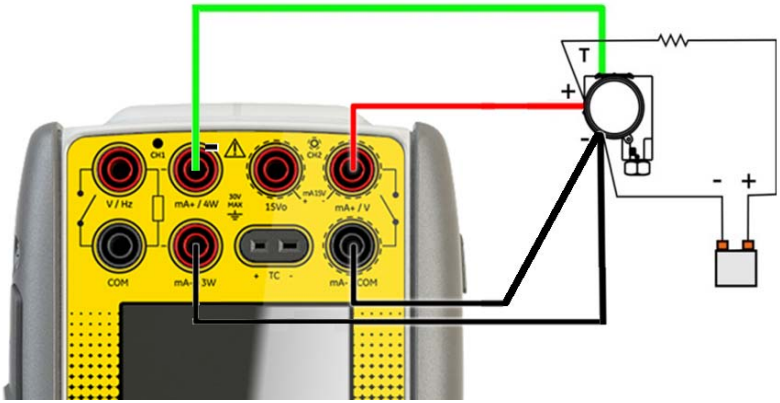


Figure 6-4

6.8 Viewing Primary Variables

When connected to a HART® device, the Primary Variable value and PV units will be displayed in the channel window.



Figure 6-5 Primary Variables

6.8.1 Device Polling

The connected HART® device may be configured with a unique Poll Address. If the PV is not displayed then the Device Polling Scheme should be set as follows:

1. Select the HART® channel so that it is in its expanded view (refer to Section 2.4)

2. Select HART button 

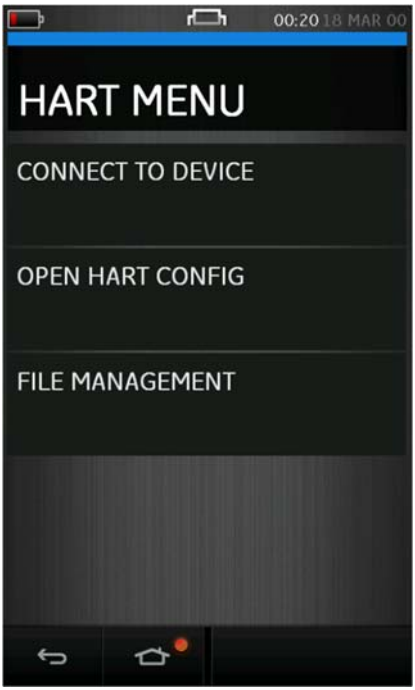


Figure 6-6 HART menu

3. Select CONNECT TO DEVICE

4. Select SCAN FOR DEVICES

   CONNECT TO LAST DEVICE – This connects using the poll address of the last connected device
   SELECT DEVICE FROM LIST – Select Device from list of connected devices. Poll address is indicated by the first number in the device identifier

5. Select SCHEME

6. Select from the following options
   - Use Address 0 Only
   - Find First Device
   - Use Poll Address
   - Search Address 0-15
   - Search Address 0-31
   - Search Address 0-63
   - Search Range

7. Select the Search Button  to initiate search

8. Select appropriate device to Connect to the DPI620G-IS

6.8.2 Viewing HART® Configuration

To view an overview of the HART® configuration (e.g. Tag, URV, LRV, etc.), when a device is connected select:

HART button  >> VIEW DEVICE SUMMARY

6.9 Start HART® SDC Application

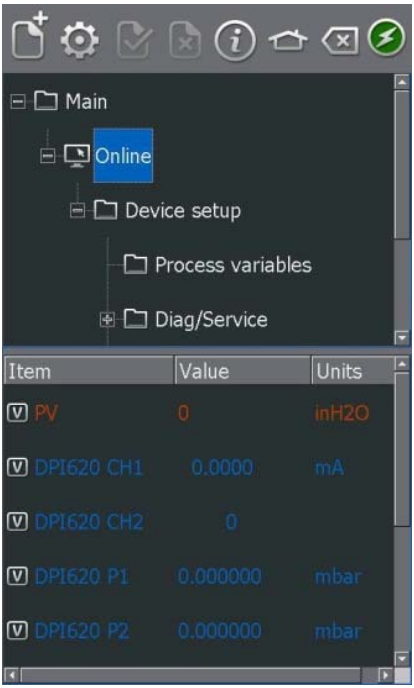
1. Select the HART® channel so that it is in its expanded view (refer to Section 2.4)
2. Select HART button



Figure 6-7 Hart Channel Window

The Main HART® SDC application will now open.

The DPI620G-IS displays the HART® SDC application screen in light or dark mode.



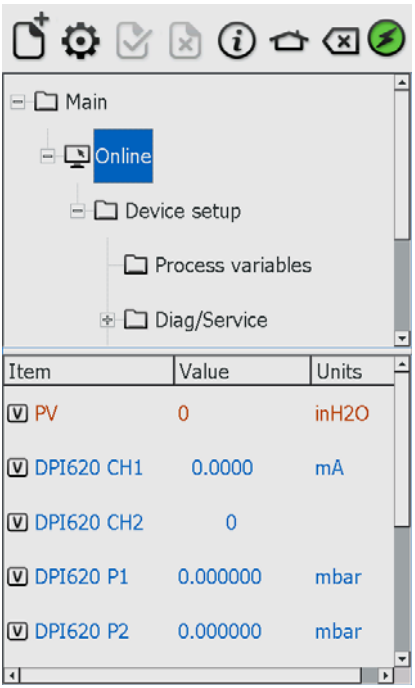


Figure 6-8 HART® Application Main Screen

6.10 HART® Toolbar



Figure 6-9 HART® Toolbar

On entering the HART® SDC application, the toolbar is displayed. The ICONs are greyed out when they are not active.

The ICON functions are described below:

OPEN NEW CONNECTION – Requires HART® application to Exit and Restart from Dashboard.

CLOSE – Closes down connection and returns to Channel Window

PREFERENCES – Selection of Search Options (Poll Address / Short and Long Tags)

COMMIT – Commit updated values back to the device (refer to Section 6.12)

ABORT – Abort Update of parameters, reverts to previous values (refer to Section 6.12)

STATUS – Field Device Status and HART® operations summary.

HOME – Return to Dashboard. Minimizes HART® application.

 DEVICE COMMUNICATIONS ON.

 DEVICE COMMUNICATIONS STARTING.

 *DEVICE* COMMUNCATIONS FAILED.

6.11 Data Display

The display data is colour coded as follows:

- Red - HART® transmitter data
- Blue - Druck DPI620G-IS channel data
- Black/White - can be edited

Common acronyms used are as follows:

- PV - Primary Variable
- AO - Analogue Output
- URV - Upper Range Value
- LRV - Lower Range Value
- USL - Upper Sensing Limit
- LSL - Lower Sensing Limit

The data display also shows the current readings of the DPI620G-IS instrument channels. This is used in calibration procedures.

6.12 Editing Values

Any value displayed in white/black with a [V] or [E] icon can be edited. Edit variables as follows:

1. Select the variable
2. If a selection window is opened select the variable (or select **Edit** button).

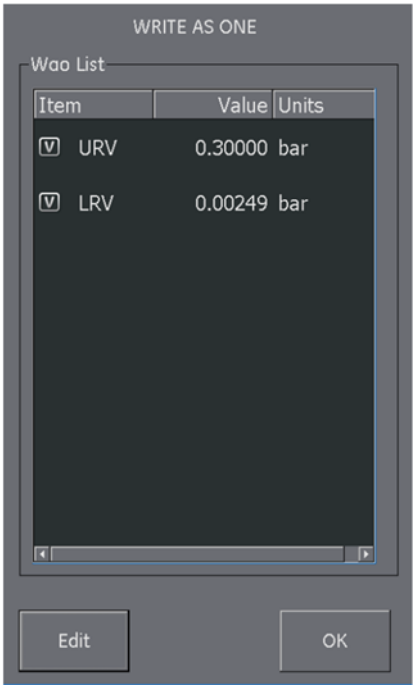


Figure 6-10 Hart Write Variable Selection

3. Enter a new value
4. Select the Set button
5. Select OK button to return to main application screen.

6. The new value is highlighted in yellow

   Note: *To go back to the original value, select the Abort button*  *in the menu bar.*

7. Select Commit button  in the menu bar to implement a new value

8. The yellow highlight will disappear.

6.13 Executing Methods

Not all HART® devices have the same methods available.

The function, purpose and execution of each method can be different. Methods may include the following:

- Self-test
- Loop test
- Sensor trim
- D/A trim

Execute a method as follows:

1. Select the method name. A screen opens with information about the selected method. Four buttons are displayed on the screen:

HELP	Displays a description of the method.
ABORT	Exits from the procedure.
OK	Accepts inputs and proceeds to the next step.
SWITCH APP:	Returns to DPI620G-IS screen (to change channel function settings without interrupting the method procedure).

Note: Some methods may make the HART® device output a certain current.

A warning will appear on the screen before the device enters this mode.

2. Some methods need values to be entered. Use the alpha/numeric keypads.

3. A drop down menu can be used for method selection options.

4. Some methods require input from the DPI620G-IS instrument channels. A drop down menu displays the channels as follows:

    - CH1
    - CH2
    - P1
    - P2
    - IDOS

5. On completion the procedure will return to the HART® application. If required use the Abort button.

6.13.1 Method Example - Self-test

1. To confirm that the transmitter is functioning correctly, navigate to the Test device folder.

2. Select the Test device folder.

3. Select OK.

The self-test executes.

6.13.2 Method Example - Analog Trim

The Druck DPI620G-IS can perform an analogue trim on the 4 to 20 mA loop without connecting to any external reference meters.

1. Navigate to the calibration folder

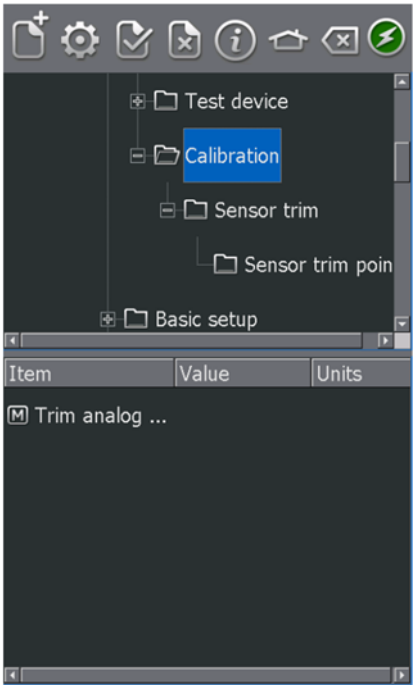


Figure 6-11 Calibration Folder

2. Select Trim analog method.
3. Follow the on-screen instructions. If channel 2 is set to Measure Current (15V), this can be used to supply the reference meter value.

4. Read the CH2 value and enter this in the meter value text box using the keypad.



Figure 6-12 Enter Calibration Point

5. Select **SET**.

6. Repeat steps 3 and 4 with 20 mA selected. This will calibrate the transmitter's output current.

6.14 Preferences

Select the Preferences icon ⚙ to setup the HART ® device search method.

The application allows searching by:

- Poll Address - when each transmitter has a unique address.
- Short tag - if the transmitter supports 8 character tags.
- Long tag - if the transmitter supports 32 character tags.

Transmitters with a non-zero poll address are in multi-drop mode and default to a fixed loop current of 4 mA.

By default, the DPI620G-IS polls address 0 (zero) only. Change the Poll Address by selecting the appropriate search radio button or entering the tag name in the search field.

6.15 Failed to find Device

Fault	Possible Cause	Action
Failed to find device	Power Supply	Check device is turned on. Check applicable fuses. Check the supply voltage is within limits.
	Device under test	Check device is HART® compatible. Connect multiple devices one at a time.
	Circuit	Check circuit connections. Check circuit Continuity. Check correct polarity of supply to the transmitter. Check the HART® resistor is in the correct place in the loop. Check the HART® resistor has the correct value. Check the loop current is in the range 3.5mA to 24mA.
	Druck DPI620G-IS	Check the Druck DPI620G-IS is connected to the correct points in the loop. No external HART® resistor present, check the internal resistor setting. External HART® resistor present, check the DPI620G-IS resistor setting is OFF. Check that the CH 2 function is set to 'NONE' if the Druck DPI620G-IS is used as a secondary master (in parallel with an external supply.
	Preferences	Select the 'search 0-63' option to scan all possible Poll Addresses to get the Poll Address and Tag details of the connected device.

7 HART® Offline

7.1 Introduction

The HART® Offline feature sits alongside the existing HART® application to provide extended offline capabilities. Typical operations include the following:

- Connect to a HART enabled device to view its configuration and save to file.
- Amend configuration files
- Work offline to create configuration files
- Upload configuration files to HART devices)
- Import and Export configuration files to and from PC for viewing offline

Full configuration is supported for all commands (universal/common & device specific). All devices available in HART library are supported

7.2 Start-up

Refer to Sections 6 for details of configuring the HART® function settings.

7.3 Start HART® Offline

1. Select the HART® channel so that it is in its expanded view (refer to Section 2.4)
2. Select HART button 



Figure 7-1 Hart Channel Window

The HART® Menu will be opened. The options available will be dependent on whether a HART® device is connected.

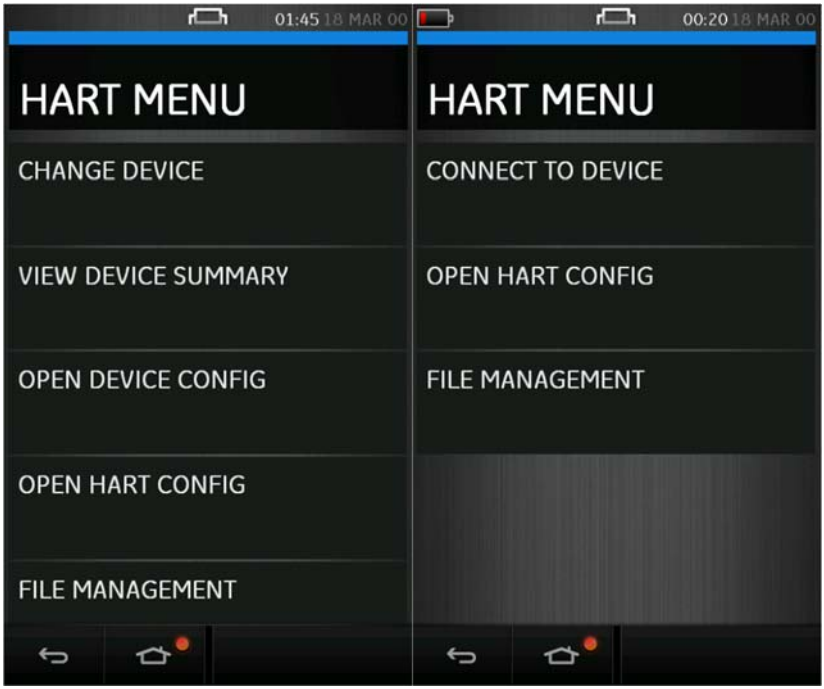


Figure 7-2 - Device Connected - Device Disconnected

Once Offline Configurations have been created, they can be listed and opened by selecting: **OPEN HART CONFIG**

7.4 Create an Offline Configuration

An offline configuration can only be created either when *connected* to a device.

Once a device is connected the configuration can be viewed by selecting: OPEN DEVICE CONFIG



Figure 7-3 Offline Device Config

7.5 Browse an Offline Configuration

The Variables are grouped according the device's device description.

Entries in White, signify folders containing lower level variables. (Equivalent to the folders in the tree view of SDC).

Entries in Red are read only.

Entries in Green are available for editing.

Entries in Yellow are values that have been edited but not yet saved.

7.6 Edit an Offline Configuration



Figure 7-4 Variables

When connected, the Variables will be populated with values from the device.

When a Variable value has been edited it will be displayed in yellow.

Pressing the Back button will return to the previous level.

7.7 Saving the Configuration

From the Offline menu, the configuration may be saved, or uploaded by pressing the Save Button

The device name will be used as the default file name.

Having saved the configuration, selecting **OPEN HART CONFIG** will display the stored offline configurations which can be selected for viewing, editing and uploading.



Figure 7-5 Main Menu with Configuration File

7.8 Uploading the Configuration

To upload configuration to the connected device, select the Save  Button

Select **SEND TO DEVICE**

7.9 Working with Saved Configurations

All HART® configurations are saved in the *\Data\HartOfflineData* folder of the DPI620G-IS as .xml files.

7.10 Delete HART Configuration

Select **FILE MANAGEMENT** from the main **HART MENU**.

8 Foundation™ Fieldbus

8.1 Introduction

The DPI620G-IS can communicate with devices that use the FOUNDATION Fieldbus H1 implementation. This is achieved via an integrated H1 modem.

Note: The H1 modem hardware is only included in DPI620G-IS-FF or DPI620G-IS-FFPB.

This section provides detail of how to connect a FOUNDATION Fieldbus device to the DPI620G-IS.

8.2 FOUNDATION Fieldbus Configurations

Before setting-up the electrical connections between the FOUNDATION Fieldbus device and the DPI620G-IS, the correct configuration should be established.

A FOUNDATION Fieldbus network at its simplest consists of a field device, 2 terminators and a power supply. The terminators and power supply are available within the DPI620G-IS.

This allows the connection of the DPI620G-IS to:

- Already existing networks where the power supply and termination are already present.
- Stand-alone FOUNDATION fieldbus devices.
- Any network configuration in between.

Note: The DPI620G-IS internal power supply is current limited to approximately 30mA.

8.3 Start up

FOUNDATION™ Fieldbus is started by selecting:

DASHBOARD >> FIELDBUS

Tasks can be selected for CH1, P1 and P2 (refer to Section 2.2).

CH2 is locked into Volts measure mode. Trying to select a function on CH2 will result in an information message and the selected function not being set.



Figure 8-1 CH2 Function Not Set

FOUNDATION™ Fieldbus can also be selected from the CALIBRATOR function.

Select:



COMMUNICATOR channel from TASK SETTINGS

FUNCTION >> FIELDBUS

Note: Volts measure or none are the only valid mode for channel 2 when Fieldbus is operational.

8.3.1 FOUNDATION™ Fieldbus Connections

To start the FOUNDATION™ Fieldbus application and connect to a network:

1. Connect DPI620G-IS to a H1 FOUNDATION™ Fieldbus network.

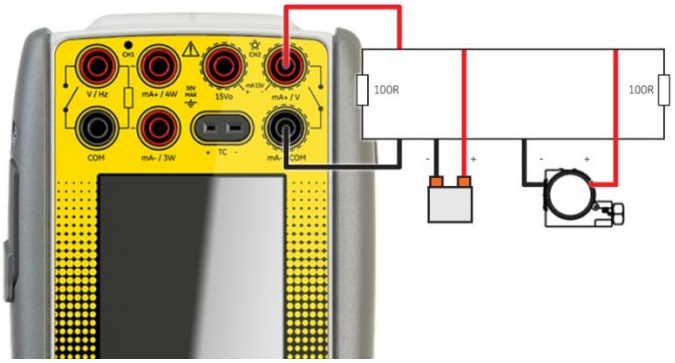


Figure 8-2 Example Connection Diagram FOUNDATION™ Fieldbus – External Network

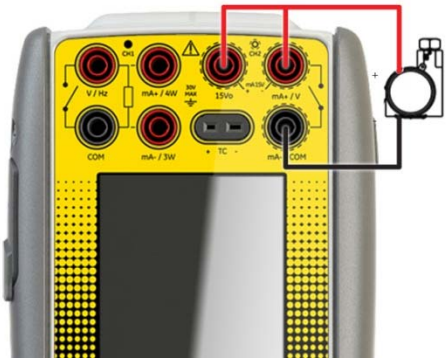


Figure 8-3 Example Connection Diagram FOUNDATION™ Fieldbus – Internal Network

2. Select the FOUNDATION™ Fieldbus channel so that it is in its expanded view (refer to Section 2.4).

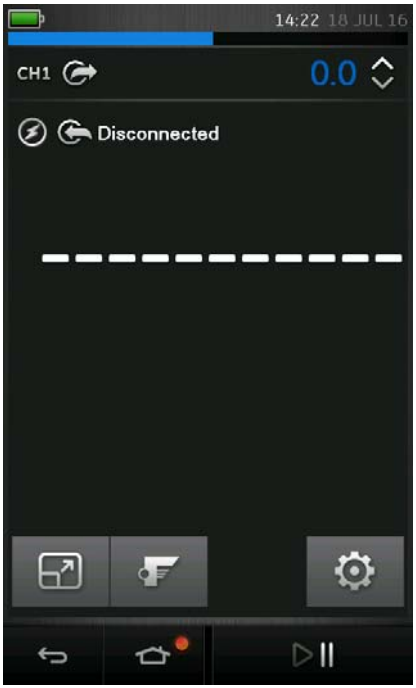


Figure 8-4 Calibrator FOUNDATION™ Fieldbus Channel

3. Select the Settings icon to configure the network.



Figure 8-5 FOUNDATION™ Fieldbus Channel Settings

4. Turn on the Terminators and Internal Power Supply as required by ticking the relevant boxes.

5. Visual confirmation of the Terminator status is provided by the resistor icon(s) at the top of the display.



Figure 8-6 FOUNDATION™ Fieldbus Channel Settings

Note: Bus Terminator 1 and Bus Terminator 2 are identical thus if only one is required either can be selected.

6. Select the back icon ⮌ to return to the FOUNDATION™ Fieldbus channel view.

8.4 FOUNDATION™ Fieldbus Application – Connecting to a Network

Select button. The main FOUNDATION™ Fieldbus application will now open.

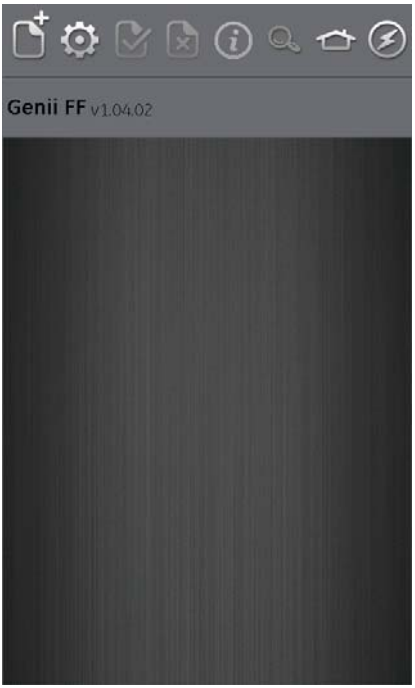


Figure 8-7 FOUNDATION™ Fieldbus Application

If the application does not open and an error message appears, check that the unit is a DPI620G-IS-FF or DPI620G-IS-FFPB.

Note: Updating CH1, P1, and P2 tasks is only possible when the FOUNDATION™ Fieldbus application is not running – to close select: HOME >> Exit (refer to Section 8.4.1)

8.4.1 FOUNDATION™ Fieldbus Toolbar

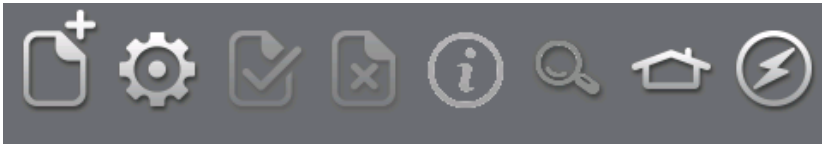


Figure 8-8 FOUNDATION™ Fieldbus Toolbar

On entering the FOUNDATION™ Fieldbus application, the toolbar is displayed. Icons that are not currently active are greyed out.

The ICON functions are described below:

OPEN CONNECTION – Only available when awaiting an open connection. (When navigating devices **OPEN CONNECTION** is replaced by the **CLOSE** icon).

CLOSE – Only available in Navigation Tree (refer to Section 8.5.28.5.2) and Folder Variables (refer to Section 8.5.4).

Closes down connection and returns to Device Focus View (refer to Section 8.5.1).

SETTINGS – Application configuration settings and DD library details (refer to Section 8.8).

COMMIT – Commit updated values back to the device (refer to Section 8.5.7).

ABORT – Abort Update of parameters, reverts to previous values (refer to Section 8.5.7).

STATUS – Provides Device profile of currently connected device (refer to Section 8.5).

FUNCTION FINDER – Search Folder Variables and device functions (refer to Section 8.9).

HOME - Allows user to either MINIMISE or EXIT to Main Application. (If FOUNDATION™ Fieldbus readings are to be referenced in Main Application then MINIMISE should be selected).

DEVICE COMMUNCATIONS OFF – Indicator showing no active communications

DEVICE COMMUNICATIONS ON – Indicator showing that there is active communications.

8.4.2 Scanning For Devices

The following steps describe how to scan for FOUNDATION™ Fieldbus devices over a FOUNDATION™ Fieldbus H1 connection:

1. Connect DPI620G-IS to network (refer to section 8.3).

2. Select the **OPEN CONNECTION** Icon on the Toolbar to enter device scan screen.

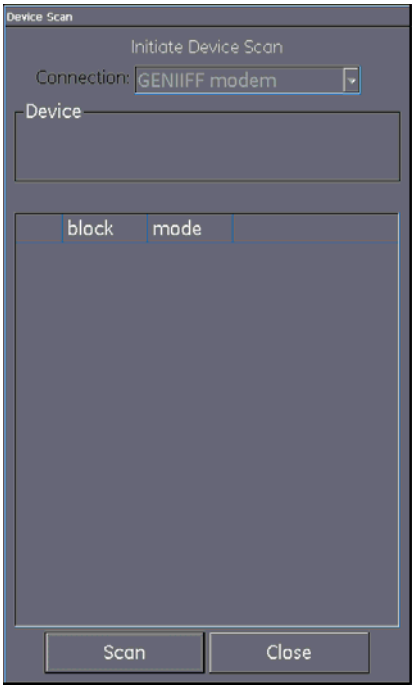


Figure 8-9 Device Scan Screen

3. Select the **SCAN** button.

   The 'scanning' progress dialog view will open. Any devices found will appear in the bus tree window list.

   All scanned devices are shown as a bold icon with an associated tag or if the device does not have a tag assigned, as the string "NO_TAG". Previous scan results are indicated in grey.

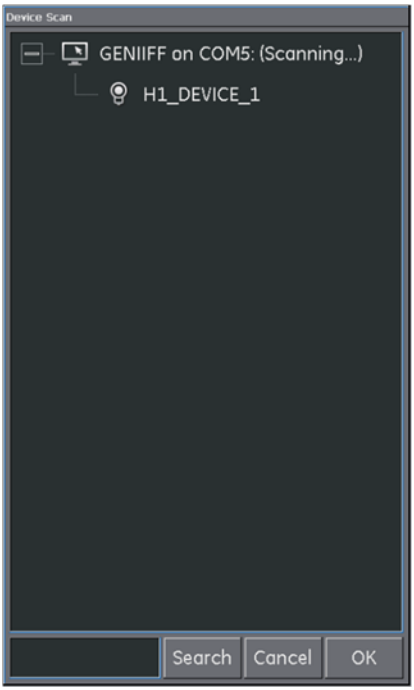


Figure 8-10 Device Scan View

Note: The scan may be stopped at any time by selecting the CANCEL button. If cancelled, the current scan results are retained.

A search term can be entered into the SEARCH dialog to look for a specific device in the discovered scan list.

4. Selecting a device with an assigned tag in the search results and selecting **OK** will initiate connection to the 'Device Focus view.' (Refer to Section 8.5.1)

5. Selecting a NO_TAG device and selecting **OK** will initiate the setting of the tag. (Refer to Section 8.4.4)

6. Re-scan use the context sensitive menu on the DPI620G-IS Modem (Refer to Section 8.4.3).

8.4.3 Context Sensitive Menu

Context sensitive menus are available for the modem and each device in the bus tree window list. Open by select and hold.

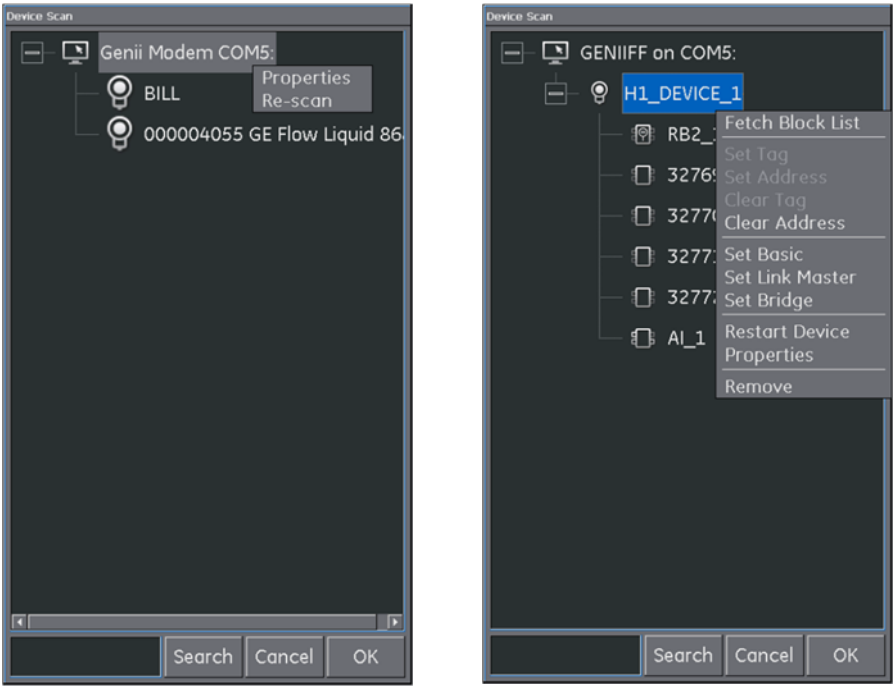


Figure 8-11 Scan Menu - Context Sensitive

Modem

This provides access to the following functions:

- **Properties** (Displays modem profile)
- Re-Scan

Devices

This provides access to the following functions:

- Fetch Block List

Tag/Address Change:

- Set Tag
- Set Address
- Clear Tag
- Clear Address

Boot Operational Function (BOF) class change:

- Set Basic
- Set Link Master
- Set Bridge
- Restart Device
- Properties (Displays device profile)

Note: Functions that are greyed out are not available in the current device state (refer to Section 8.4.4).

8.4.4 Device State

A FOUNDATION™ Fieldbus device can be in one of 3 states:

Uninitialized – No tag, No permanent address

Initialized – Tag, No permanent address

Operational – Tag and permanent address

A device must be given a tag and a permanent address before the Device Focus View can be reached.

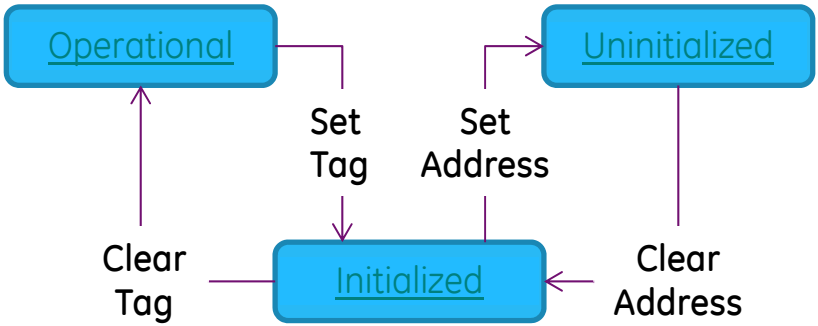


Figure 8-12 Device State Map

To set the tag and address:

1. Select the NO_TAG device and select **OK** and a prompt will appearing asking to set the tag. Alternatively, **Set Tag** can be selected from the Context Sensitive Menu.

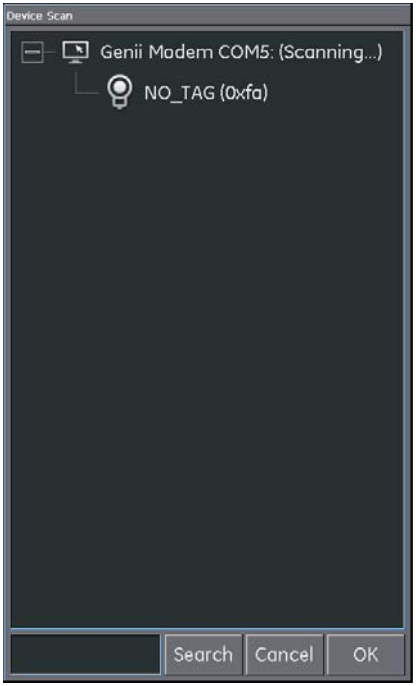


Figure 8-13 Scan Menu – NO_TAG

Note: In Figure 8-13 as the device does not yet have a permanent address it has been assigned a temporary address (in the range 248_{10} – 255_{10}, 0xF8 – 0xFF) on the network.

2. Use the on-screen keyboard to enter a tag. Confirm by selecting OK.



Figure 8-14 Set Tag

Note: Use the '123' and '*#!' buttons to switch to the numerical and symbolic keyboards respectively.

3. Select the device and select **OK** and a prompt will appearing asking to set a permanent address. Alternatively, **Set Tag** can be selected from the Context Sensitive Menu.



Figure 8-15 Set Permanent Address

4. Select an address in the permanent range (16_{10}-247_{10}, 0x10 – 0xF7) and select **OK**.

8.4.5 Troubleshooting Connection Problems

If no device is found when performing scan check**:**

- Field wiring. Verify electrical segment connections are in accordance with the specific manual supplied with the field device and segment coupler / power supply.

- The loop is not suffering from interference due to an unstable voltage supply from the segment power supply and / or electrical interference.

- The required termination is present in the network.

- The internal power supply is switched on (if required).

Some bridging devices / LAS implementations provide an optimization whereby some address ranges are not scanned. This may result in individual device not being found.

After setting address, it may take some time for the device and the Link Active Scheduler (LAS) to synchronise information including address, identity and protocol timing information.

8.5 FOUNDATION™ Fieldbus Application – Communication

8.5.1 Device Focus View

In this view the specific information of the device is shown.

- PD tag
- Device Id
- Block List with Target / Actual Mode

On entering 'Device Focus View' the software will load the Blocks of the target field device and make them available for parameterization.

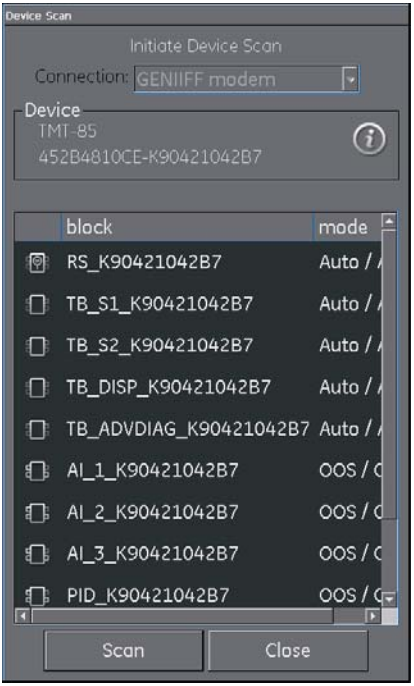


Figure 8-16 Device Focus View

There are 3 types of blocks:

Resource

- Devices only have one resource block.
- Specifies the general characteristics of the device. E.g. device type, manufacturer ID and serial number.
- Can normally be identified by a "RS_" block prefix.

Transducer

- Reads the physical sensor information.
- Acts as a coupler between the function blocks and the physicals sensors.
- Can normally be identified by a "TB_" block prefix.

Function

- Provide the control by talking to the transducer blocks to set the Inputs and Outputs.
- Devices can have a defined set of functions they can perform, e.g. Analog Input (AI) or Proportional/Integral/Derivative (PID).
- Can normally be identified by a block prefix stating the function of the block, e.g. "AI_" or "PID_".

Note: based on the option selected in the settings menu (refer to section 8.8.2), function blocks may or may not be visible in the Device Focus View.

Selecting the information icon ⓘ shows the device profile.



Figure 8-17 Device Focus View

Selecting the **Scan** button returns device scan view (refer to Figure 8-10 Device Scan View).

Selecting the desired block with a single key press will open the Navigation Tree for the block (Refer to section 8.5.2).

8.5.2 Block Navigation Tree

Once a block is selected the navigation tree will be shown.

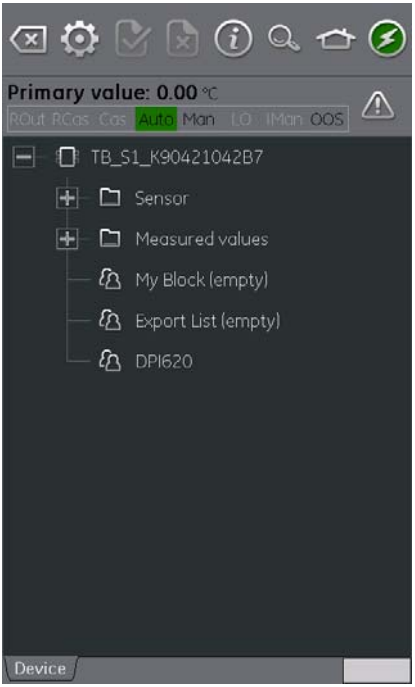


Figure 8-18 Navigation Tree

Any folder with a + symbol to the left can be expanded by selecting the folder name and any with a – symbol can contracted in the same fashion.

The navigation tree will show a number of folders containing device variables and also **My Block**, **Export List** and **DPI620**.

My Block is a “favourites” location that device variables can be added to (refer to Section 8.6).

Export List is a location for the device variables that wish to be displayed in the Communication channel window of the main DPI620G-IS application (refer to Section 8.6).

DPI620 shows a list of all the variables that are currently being read by the channels of the main DPI620G-IS application.

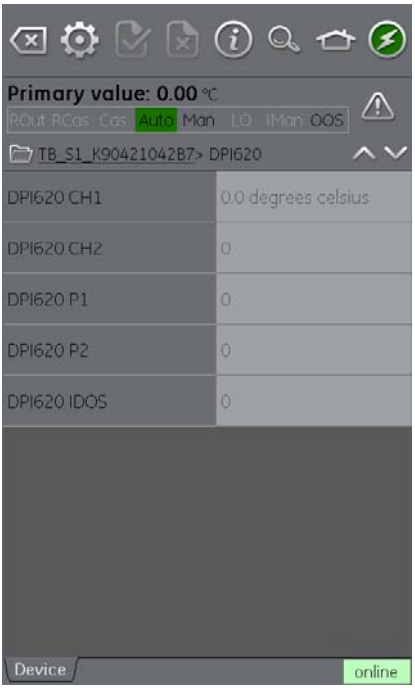


Figure 8-19 Navigation Tree - DPI620

8.5.3 Block Header Bar

The block header bar indicates the target and actual mode of the block.



Figure 8-20 Block Header Bar

The highlighted text indicates the actual mode of the device block. The highlight is shown in green if the target mode is equal to the actual mode of the device block. If the target mode does not equal the actual mode of the device block, the highlight is in red.

Available options are indicated by black text, unavailable options are shown in grey.

The target mode can be changed with a momentary touch on the block header or by running a block method.

When in a transducer block with a Primary Value, the Block Header bar will also contain a live display of this value.



Figure 8-21 Block Header Bar Primary Value

A warning symbol will appear in the Block Header Bar if there is an issue with the device communications.



Figure 8-22 Block Header Warning

Clicking on the warning symbols will give further information.



Figure 8-23 Block Header Warning Information

8.5.4 Folder Variables

By clicking on a folder that cannot be expanded the folder variables can be viewed (refer to Section 8.5.2).

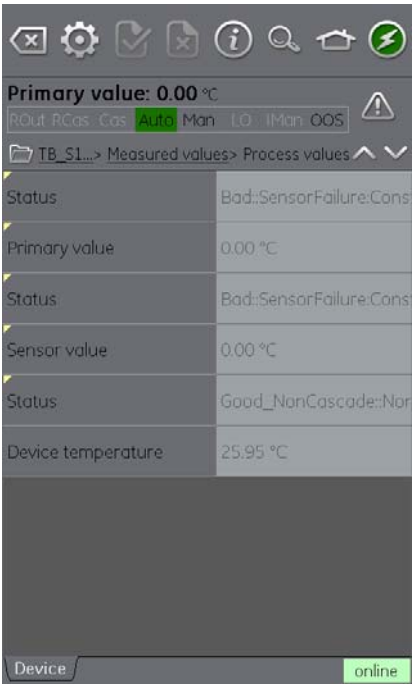


Figure 8-24 Folder Parameters

The left side hosts the 'Variable Description Area' and access to the context based adjustment functions.

The right side with light background hosts the 'Variable Editing Area' and access to value adjustment.

Some folders contain executable methods (refer to Section 8.5.8)

The Navigation Tree Bar shows where the current view exists in the device hierarchy.



Figure 8-25 Navigation Tree Bar

Navigation back out of the folder is possible by the linked references in the tree bar itself (eg TB_S1 in Figure 8-25 Navigation Tree Bar**Error! Reference source not found.**).

The up and down navigation arrows move the selected set of folder parameters to that of the one above or below the current selection in the menu tree.

Communication activity is signified by the communication progress bar in the bottom right of the screen.

8.5.5 Displaying Parameter Help

The yellow triangle in the corner of the Variable Description area indicates that help is available for that parameter.

Context menu opened up with touch and hold action.

Selecting **Display Help** will show the help attributes.

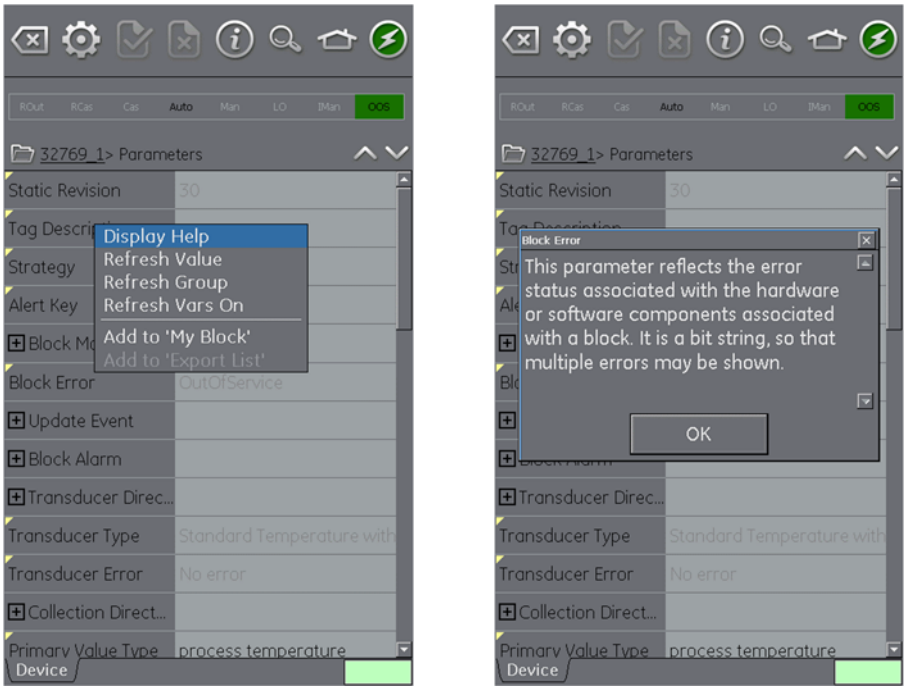


Figure 8-26 Parameter Help

8.5.6 Refreshing Data

When a refresh is in progress the variable description goes grey and in the right area of the Variable Editing area the pending icon appears.



Figure 8-27 Variable refresh

When the read request is fulfilled the variable description goes from grey to black again and the pending icon disappears.



Figure 8-28 Refreshed variable

A data refresh can be selected from the context menu:

Refresh Value	Updates selected value only
Refresh Group	Updates all values in the function group
Refresh Vars On	Automatically Refreshes Values
Refresh Vars Off	Manual Refresh required to Update Values

8.5.7 Editing Variables

Some variables are open for editing. Select the variable to open.

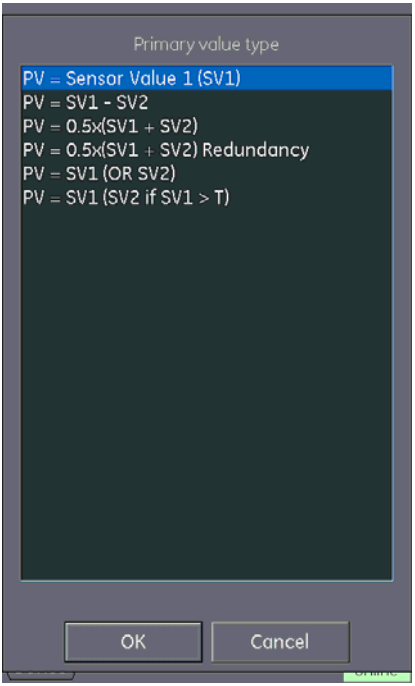


Figure 8-29 Edit Variable

Once Edit is complete, the variable description is highlighted in bold and the commit and cancel icons in the toolbar become active.

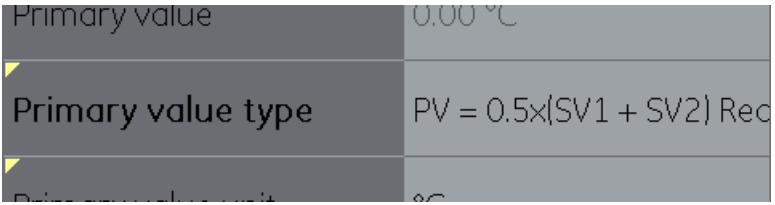


Figure 8-30 Edited Parameter

Commits all Update

Aborts all Updates

Individual updates can be reverted by selecting **Revert Value** from the context menu. (Accessed by a touch and hold action on the variable description).

Note: This can only occur if the update has not yet been committed.

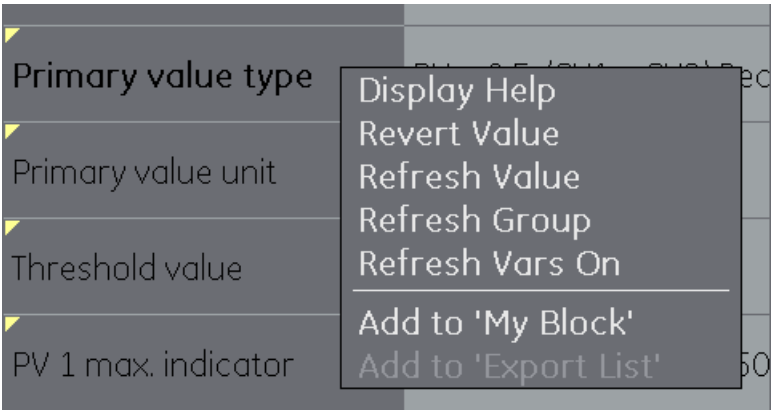


Figure 8-31 Revert Value

If an invalid value is entered the variable will be shown in red and the error icon appears.



Figure 8-32 Invalid Value

8.5.8 Methods

Methods are executable functions that are used for configuration or calibration.



Figure 8-33 Methods

Selecting execute and following the on-screen prompts will run the desired method.

8.6 FOUNDATION™ Fieldbus Application - My Block

My Block allows the user to create a list commonly used variables for easy recall.

Additional folders can be created under **My Block** using the context menu accessed with touch and hold gesture.

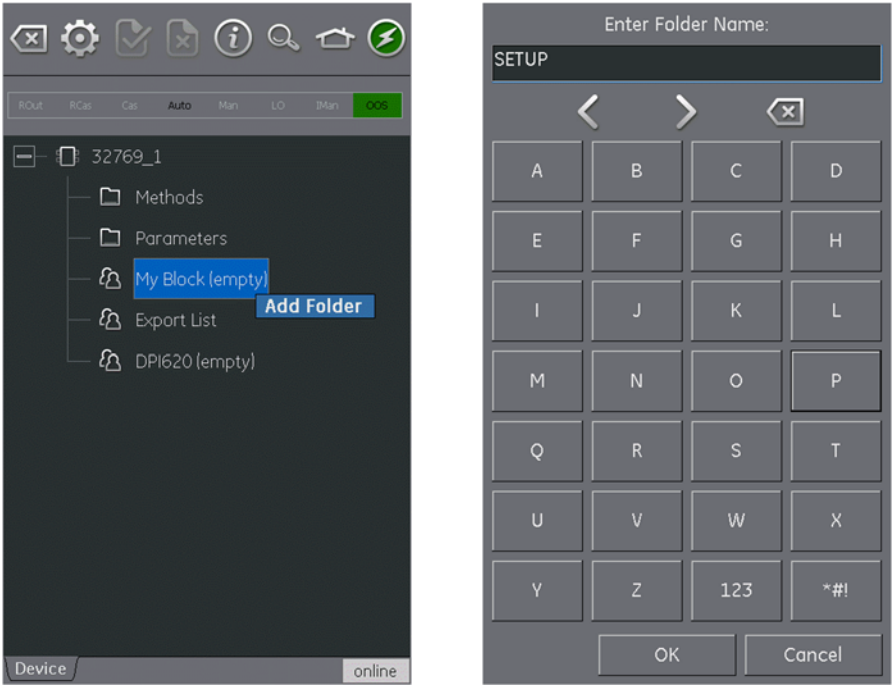


Figure 8-34 Add 'My Block' Menu

Variables are added to **My Block** (or the created folders) using the context menu in the Variable Description area (refer to Section 8.5.4).

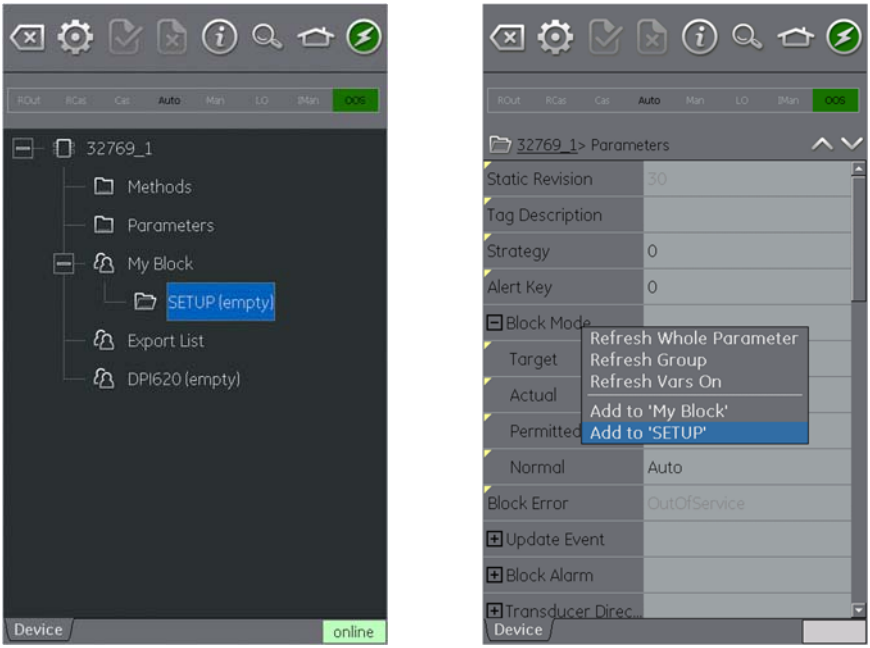


Figure 8-35 Adding Variables to 'My Block'

8.7 FOUNDATION Fieldbus Application - Exporting Variables

The FOUNDATION™ Fieldbus application allows selected variables to be displayed in the Communications channel window.

The selected variables are defined by the **Export List** Menu (refer to Section 8.5.2).

Parameters are added to the Export List using the context menu in the Variable Description area (refer to Section 8.5.4) and selecting **Add to 'Export List'**.

Note: A maximum of 6 variables and only variables that return a value can be added to the Export List.

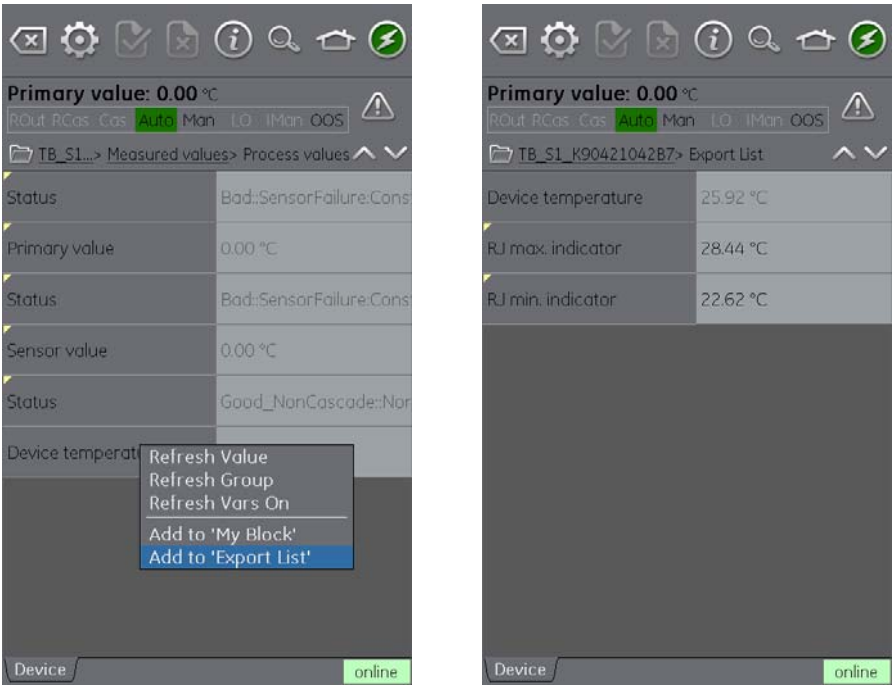


Figure 8-36 Adding Items to Export List

8.7.1 Viewing Exported Variables in Channel Window

Return to Main Application by Minimizing the FOUNDATION™ Fieldbus application.

HOME >> Minimize

Expand the FOUNDATION™ Fieldbus window and select:

Settings >> PRIMARY VALUE

The Export List of selected variables will be displayed. The selected parameter will be displayed in the FOUNDATION™ Fieldbus channel window.

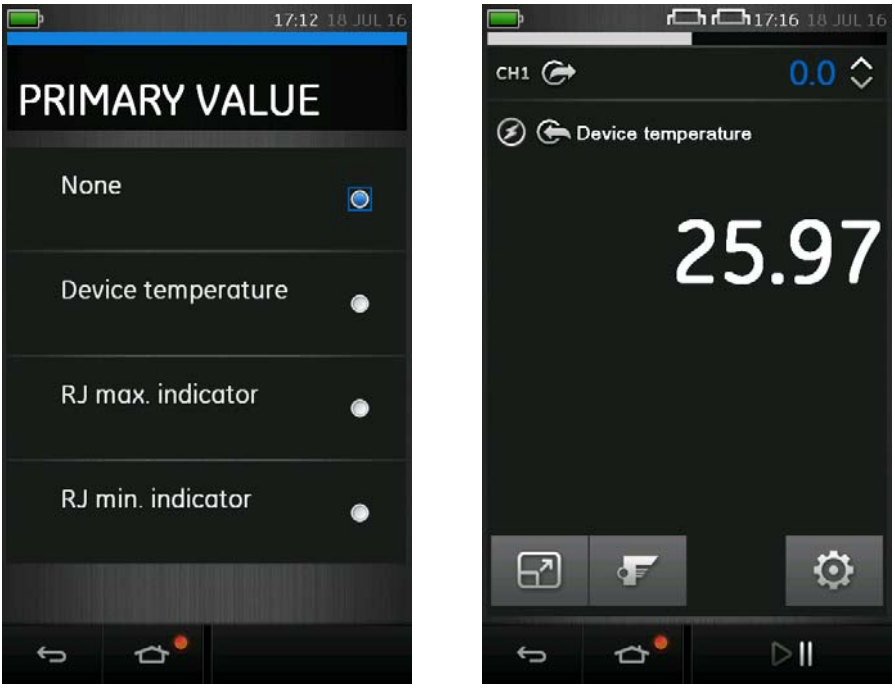


Figure 8-37 Displaying Primary Value

8.8 Application Settings

Application settings are access from the FOUNDATION™ Fieldbus toolbar by selecting:

⚙ SETTINGS

8.8.1 Device Library

The library tab shows the Device Descriptions (DDs) that are currently on the DPI620G-IS. This allows the user to browse for a specific device to determine that there is support for it.

To request support for a non-registered DD please contact your local GE Service centre (refer to Section 1.11).

8.8.2 Options

- **Poll header every** - Sets the refresh rate for the device parameters displayed in the header.
- **Poll all dynamic every** - Sets the refresh rate for FF dynamic variables in the folder variables view (note this setting only becomes valid if the folder variables option **Refresh Vars On** is active) (refer to Section 8.7.2).
- **Enable Device Library Monitor** - If checked enables the automatic check of the Open Field Communications DD library on application start up for new Device Descriptions. Note this configuration option requires a network path to the Internet. After installation the default setting is 'checked'.
- **Confirm Device Commits** - If checked brings up a confirmation dialog before every write is committed to the field device. After installation the default setting is 'checked'.
- **Enable My Device Functions** – Enables the My Device and

Export to DPI620G-IS functions. After installation the default setting is 'checked'.

- **Enable Value Range Checking** - If checked ensures that all variable edits are within the limits specified by the device. After installation the default setting is 'checked'.
- **Enable Function Blocks –** If checked function blocks are enabled. After installation the default setting is 'un-checked'.
- **Enable Transducer Blocks –** If checked transducer blocks are enabled. After installation the default setting is 'checked'.

8.8.3 Advanced

These settings are for advanced users only and it is recommended to retain Default Values.

8.9 Function Finder

Function Finder is a way of searching for FF variables and device functions in the on-line device. In complex devices with multiple menus this allows the user to navigate a device without a manual, greatly simplifying the on-line experience, even with an unfamiliar device.

The system requires the input of the name of the variable concerned (or part thereof) and the results show all variables that match the search. Navigation to the variable is just a single click in the search results. To start a search proceed as follows in the on line or off-line device view.

Select the search icon from the FOUNDATION™ Fieldbus Toolbar.

1. In Name field enter the text you wish to search for in the on-line device.

2. Select return in the keyboard view followed by the **Search** button to initiate the search.

3. From the list of results select the parameter that you require. Note that the variable name and the folder it relates to is displayed.

4. Function Finder will then display the Folder Variables concerned in the device view with all searched variables highlighted in yellow.

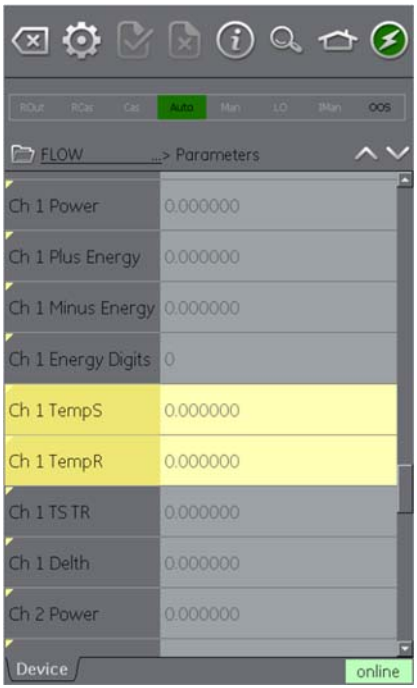


Figure 8-38 Function Finder

9 PROFIBUS PA Fieldbus

9.1 Introduction

The DPI620G-IS can communicate with devices that use the PROFIBUS PA Fieldbus implementation. This is achieved via an integrated modem.

Note: The modem hardware is only included in DPI620G-IS-PB or DPI620G-IS-FFPB.

This section provides detail of how to connect PROFIBUS PA device to the DPI620G-IS.

9.2 PROFIBUS Configurations

Before setting-up the electrical connections between the PROFIBUS device and the DPI620G-IS, the correct configuration should be established.

A PROFIBUS network at its simplest consists of a field device, 2 terminators and a power supply. The terminators and power supply are available within the DPI620G-IS.

This allows the connection of the DPI620G-IS to:

- Already existing networks where the power supply and termination are already present.
- Stand-alone PROFIBUS PA devices.
- Any network configuration in between.

Note: The DPI620G-IS internal power supply is current limited to approximately 30mA.

9.3 Start-up

PROFIBUS is started by selecting:

DASHBOARD >> PROFIBUS

Tasks can be selected for CH1, P1 and P2 (refer to Section 2.2).

CH2 is locked into Volts measure mode. Trying to select a function on CH2 will result in an information message and the selected function not being set.



Figure 9-1 CH2 Function Not Set

PROFIBUS can also be selected from the CALIBRATOR function.

Select:



COMMUNICATOR channel from TASK SETTINGS

FUNCTION >> PROFIBUS

Note: Volts measure or none are the only valid mode for channel 2 when PROFIBUS is operational.

9.3.1 PROFIBUS Connections

To start the PROFIBUS application and connect to a network:

7. Connect DPI620G-IS to a PROFIBUS PA network.

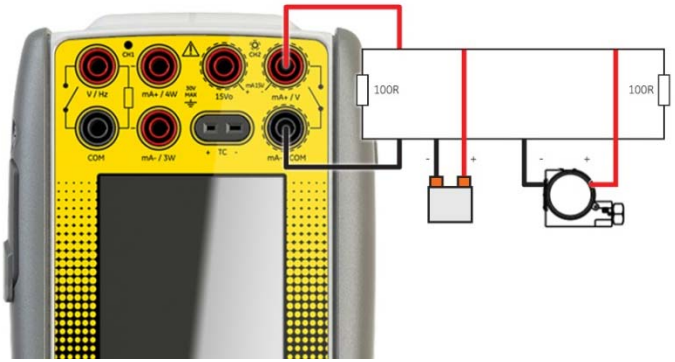


Figure 9-2 Example Connection Diagram PROFIBUS – External Network

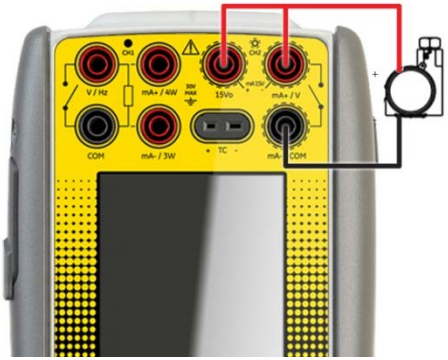


Figure 9-3 Example Connection Diagram PROFIBUS– Internal Network

8. Select the PROFIBUS channel so that it is in its expanded view (refer to Section 2.4).

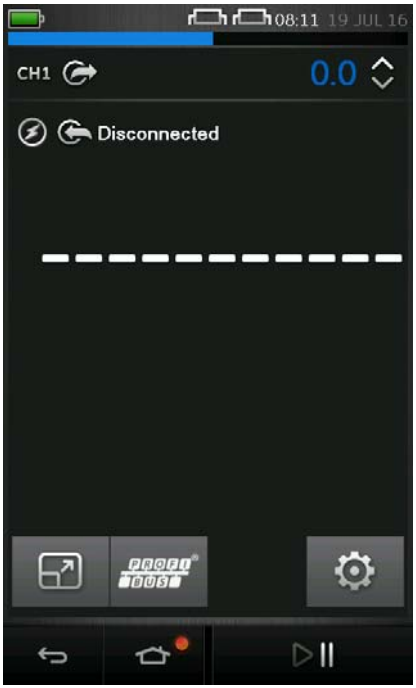


Figure 9-4 Calibrator PROFIBUS Channel

9. Select the Settings icon to configure the network.



Figure 9-5 PROFIBUS Channel Settings

10. Turn on the Terminators and Internal Power Supply as required by ticking the relevant boxes.

11. Visual confirmation of the Terminator status is provided by the resistor icon(s) at the top of the display.



Figure 9-6 PROFIBUS Channel Settings

Note: Bus Terminator 1 and Bus Terminator 2 are identical thus if only one is required either can be selected.

12. Select the back icon ⮌ to return to the PROFIBUS channel view.

9.4 PROFIBUS Application – Connecting to a Network

Select  button. The main PROFIBUS application will now open.

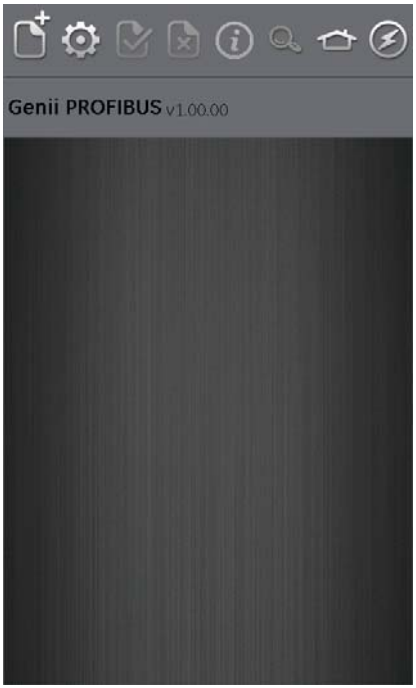


Figure 9-7 PROFIBUS Application

If the application does not open and an error message appears, check that the unit is a DPI620G-IS-PB or DPI620G-IS-FFPB.

Note: Updating CH1, P1, and P2 tasks is only possible when the PROFIBUS application is not running – to close select: HOME >> Exit (refer to Section 8.4.1)

9.4.1 PROFIBUS Toolbar

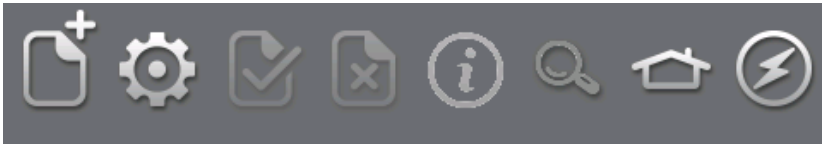


Figure 9-8 PROFIBUS Toolbar

On entering the PROFIBUS application, the toolbar is displayed. Icons that are not currently active are greyed out.

The ICON functions are described below:

OPEN CONNECTION – Only available when awaiting an open connection. (When navigating devices **OPEN CONNECTION** is replaced by the **CLOSE** icon).

CLOSE – Only available in Navigation Tree (refer to Section 8.5.28.5.2) and Folder Variables (refer to Section 8.5.4).

Closes down connection and returns to Device Focus View (refer to Section 8.5.1).

SETTINGS – Application configuration settings and DD library details (refer to Section 8.8).

COMMIT – Commit updated values back to the device (refer to Section 8.5.7).

ABORT – Abort Update of parameters, reverts to previous values (refer to Section 8.5.7).

STATUS – Provides Device profile of currently connected device (refer to Section 8.5).

FUNCTION FINDER – Search Folder Variables and device functions (refer to Section 8.9).

HOME - Allows user to either MINIMISE or EXIT to Main Application. (If PROFIBUS readings are to be referenced in Main Application then MINIMISE should be selected).

DEVICE COMMUNCATIONS OFF – Indicator showing no active communications

DEVICE COMMUNICATIONS ON – Indicator showing that there is active communications.

9.4.2 Scanning For Devices

The following steps describe how to scan for PROFIBUS PA devices over a PROFIBUS PA connection:

1. Connect DPI620G-IS to network (refer to section 8.3).

2. Select the **OPEN CONNECTION** Icon on the Toolbar to enter device scan screen.

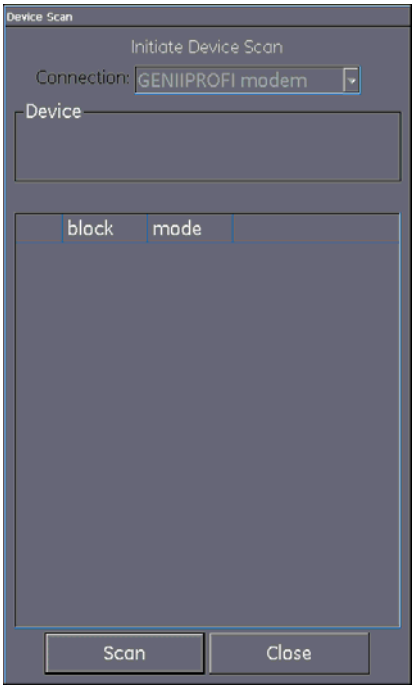


Figure 9-9 Device Scan Screen

3. Select the **SCAN** button.

   The 'scanning' progress dialog view will open. Any devices found will appear in the bus tree window list.

   All scanned devices are shown as a bold icon with an associated descriptor and device type (separated by a /). If the descriptor has not been set, only the device type will be shown.

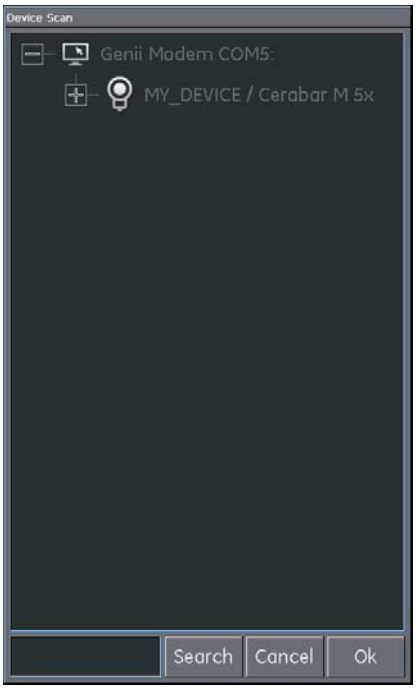


Figure 9-10 Device Scan View

Note: The scan may be stopped at any time by selecting the CANCEL button. If cancelled, the current scan results are retained.

A search term can be entered into the SEARCH dialog to look for a specific device in the discovered scan list.

4. Selecting a device in the search results and selecting **OK** will initiate connection to the 'Device Focus view.' (Refer to Section 8.5.1)

5. Re-scan use the context sensitive menu on the DPI620G-IS Modem (Refer to Section 8.4.3).

9.4.3 Context Sensitive Menu

Context sensitive menus are available for the modem and each device in the bus tree window list. Open by select and hold.

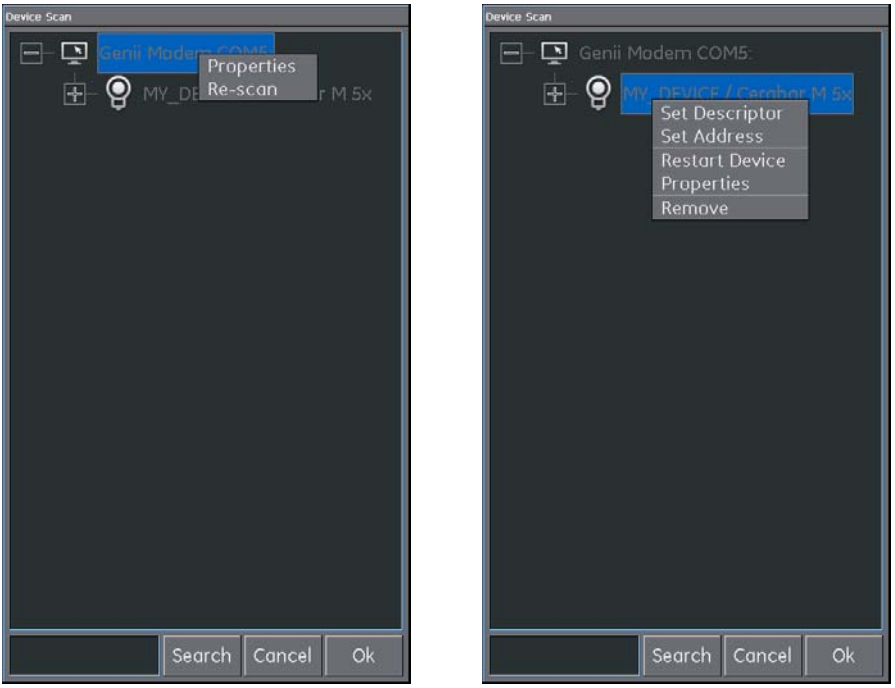


Figure 9-11 Scan Menu - Context Sensitive

Modem

This provides access to the following functions:

- **Properties** (Displays modem profile)
- Re-Scan

Devices

This provides access to the following functions:

Descriptor/Address Change:

- Set Descriptor
- Set Address

Boot Operational Function (BOF) class change:

- Restart Device
- Properties (Displays device profile)
- Remove

9.4.4 Troubleshooting Connection Problems

If no device is found when performing scan check**:**

- Field wiring. Verify electrical segment connections are in accordance with the specific manual supplied with the field device and segment coupler / power supply.

- The loop is not suffering from interference due to an unstable voltage supply from the segment power supply and / or electrical interference.

- The required termination is present in the network.

- The internal power supply is switched on (if required).

Some bridging devices / LAS implementations provide an optimization whereby some address ranges are not scanned. This may result in individual device not being found.

After setting address, it may take some time for the device and the Link Active Scheduler (LAS) to synchronise information including address, identity and protocol timing information.

9.5 PROFIBUS Application – Communication

9.5.1 Device Focus View

In this view the specific information of the device is shown.

- Device Descriptor
- Device Type
- Block List with Target / Actual Mode

On entering 'Device Focus View' the software will load the Blocks of the target field device and make them available for parameterization.

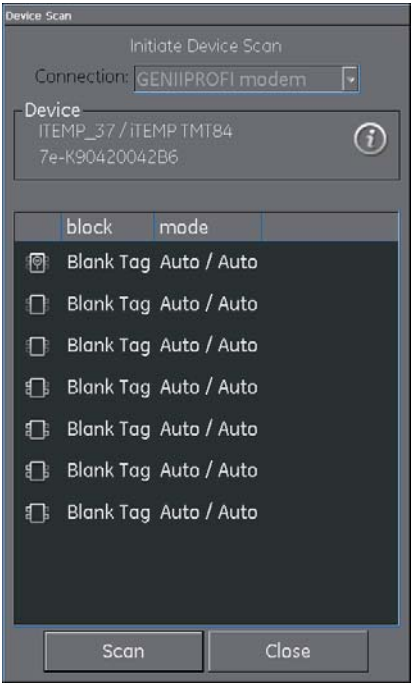


Figure 9-12 Device Focus View

There are 3 types of blocks:

Resource

- Devices only have one resource block.
- Specifies the general characteristics of the device. E.g. device type, manufacturer ID and serial number.
- Can normally be identified by the  block symbol.

Transducer

- Reads the physical sensor information.
- Acts as a coupler between the function blocks and the physicals sensors.
- Can normally be identified by the  block symbol.

Function

- Provide the control by talking to the transducer blocks to set the Inputs and Outputs.
- Devices can have a defined set of functions they can perform, e.g. Analog Input (AI).
- Can normally be identified by the  block symbol.

Note: based on the option selected in the settings menu (refer to section 8.8.2), function blocks may or may not be visible in the Device Focus View.

Selecting the information icon ⓘ shows the device profile.

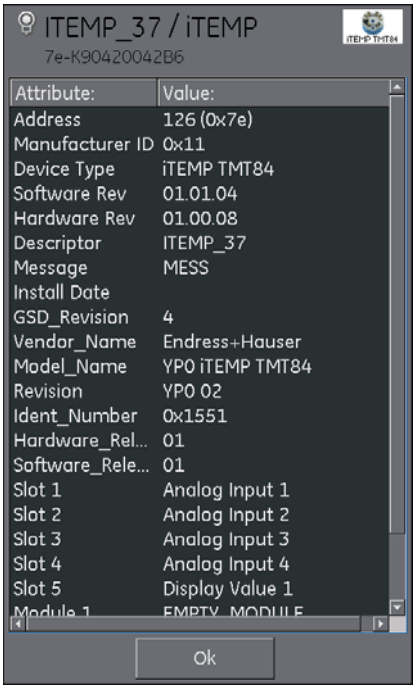


Figure 9-13 Device Focus View

Selecting the **Scan** button returns device scan view (refer to Figure 8-10 Device Scan View).

Selecting the desired block with a single key press will open the Navigation Tree for the block (Refer to section 8.5.2).

9.5.2 Block Navigation Tree

Once a block is selected the navigation tree will be shown.

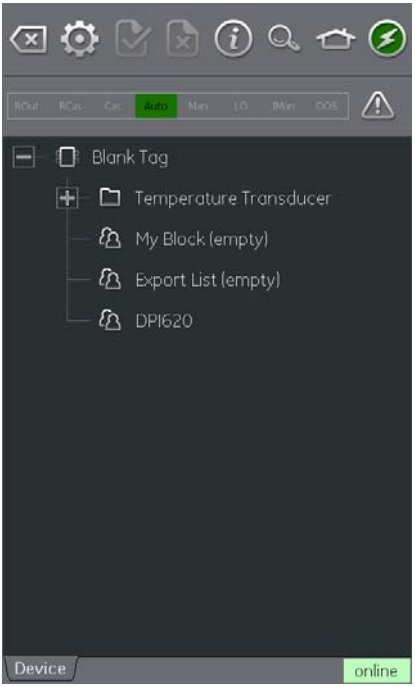


Figure 9-14 Navigation Tree

Any folder with a + symbol to the left can be expanded by selecting the folder name and any with a – symbol can contracted in the same fashion.

The navigation tree will show a number of folders containing device variables and also **My Block**, **Export List** and **DPI620**.

My Block is a "favourites" location that device variables can be added to (refer to Section 8.6).

Export List is a location for the device variables that wish to be displayed in the Communication channel window of the main DPI620G-IS application (refer to Section 8.6).

DPI620 shows a list of all the variables that are currently being read by the channels of the main DPI620G-IS application.



Figure 9-15 Navigation Tree - DPI620

9.5.3 Block Header Bar

The block header bar indicates the target and actual mode of the block.



Figure 9-16 Block Header Bar

The highlighted text indicates the actual mode of the device block. The highlight is shown in green if the target mode is equal to the actual mode of the device block. If the target mode does not equal the actual mode of the device block, the highlight is in red.

Available options are indicated by black text, unavailable options are shown in grey.

The target mode can be changed with a momentary touch on the block header or by running a block method.

A warning symbol will appear in the Block Header Bar if there is an issue with the device communications.



Figure 9-17 Block Header Warning

Clicking on the warning symbols will give further information.

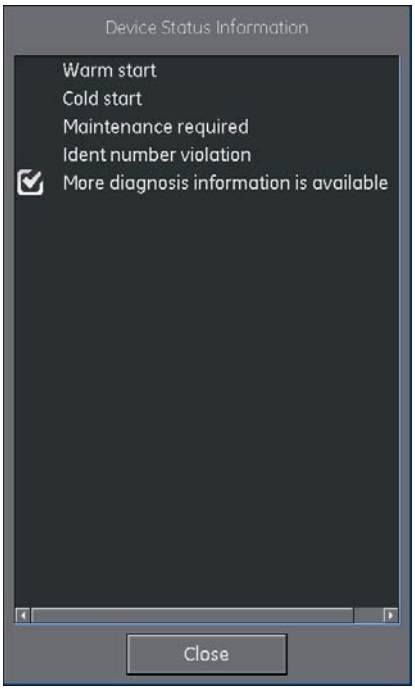


Figure 9-18 Block Header Warning Information

9.5.4 Folder Variables

By clicking on a folder that cannot be expanded the folder variables can be viewed (refer to Section 8.5.2).

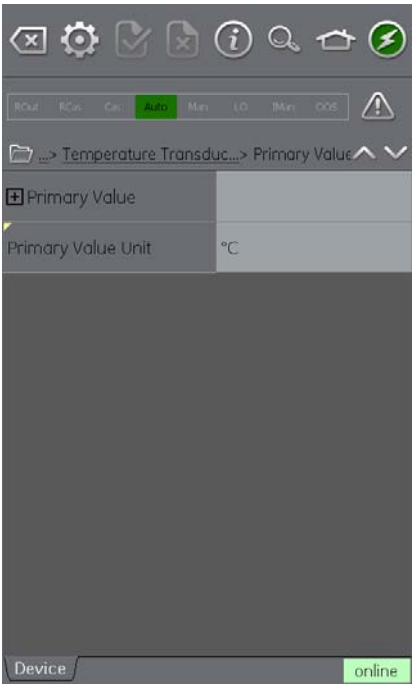


Figure 9-19 Folder Parameters

The left side hosts the 'Variable Description Area' and access to the context based adjustment functions.

The right side with light background hosts the 'Variable Editing Area' and access to value adjustment.

Some folders contain executable methods (refer to Section 8.5.8)

The Navigation Tree Bar shows where the current view exists in the device hierarchy.



Figure 9-20 Navigation Tree Bar

Navigation back out of the folder is possible by the linked references in the tree bar itself (eg Temperature Transducer > Primary value in).

The up and down navigation arrows move the selected set of folder parameters to that of the one above or below the current selection in the menu tree.

Communication activity is signified by the communication progress bar in the bottom right of the screen.

9.5.5 Displaying Parameter Help

The yellow triangle in the corner of the Variable Description area indicates that help is available for that parameter.

Context menu opened up with touch and hold action.

Selecting **Display Help** will show the help attributes.

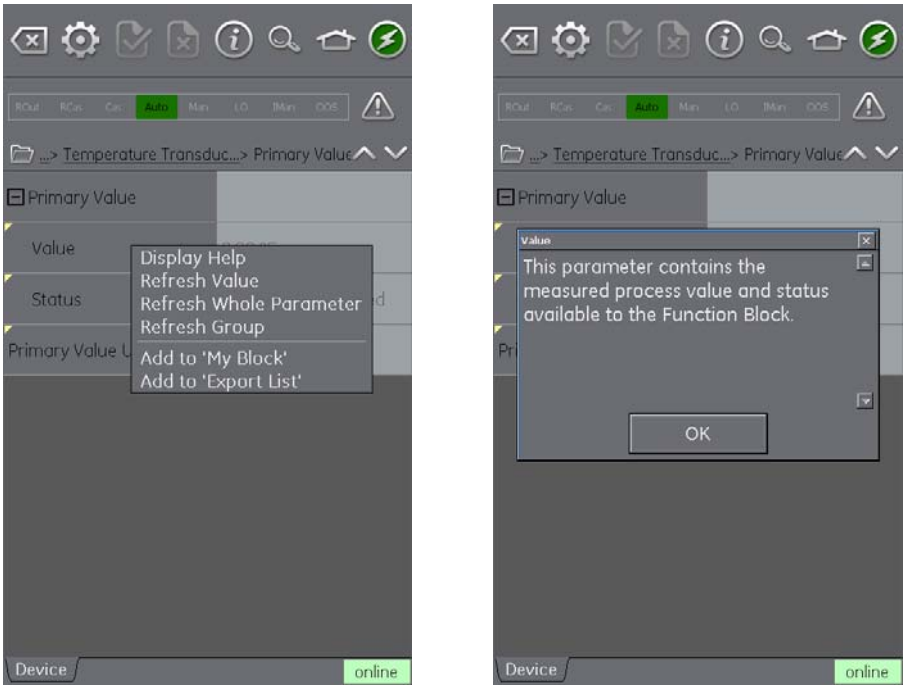


Figure 9-21 Parameter Help

9.5.6 Refreshing Data

When a refresh is in progress the variable description goes grey and in the right area of the Variable Editing area the pending icon appears.



Figure 9-22 Variable refresh

When the read request is fulfilled the variable description goes from grey to black again and the pending icon disappears.



Figure 9-23 Refreshed variable

A data refresh can be selected from the context menu:

Refresh Value	Updates selected value only
Refresh Group	Updates all values in the function group
Refresh Vars On	Automatically Refreshes Values
Refresh Vars Off	Manual Refresh required to Update Values

9.5.7 Editing Variables

Some variables are open for editing. Select the variable to open.

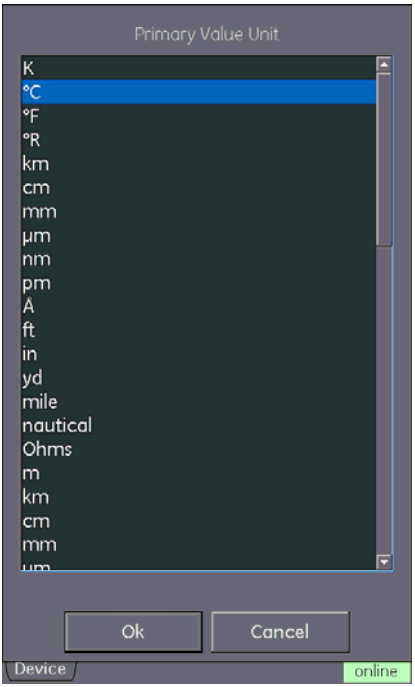


Figure 9-24 Edit Variable

Once Edit is complete, the variable description is highlighted in bold and the commit and cancel icons in the toolbar become active.



Figure 9-25 Edited Parameter

Commits all Update

Aborts all Updates

Individual updates can be reverted by selecting **Revert Value** from the context menu. (Accessed by a touch and hold action on the variable description).

Note: This can only occur if the update has not yet been committed.

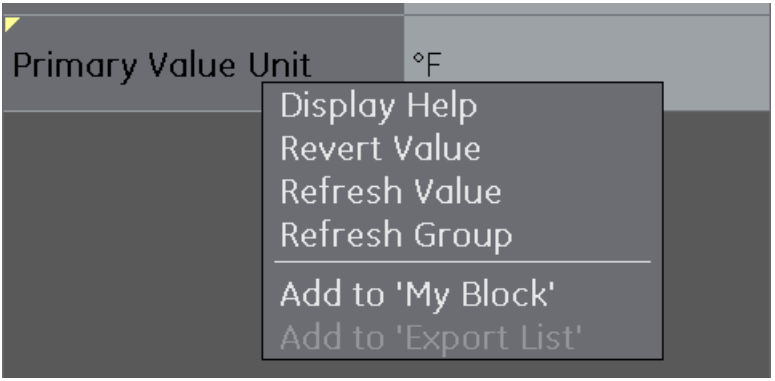


Figure 9-26 Revert Value

If an invalid value is entered the variable will be shown in red and the error icon appears.



Figure 9-27 Invalid Value

9.6 PROFIBUS Application - My Block

My Block allows the user to create a list commonly used variables for easy recall.

Additional folders can be created under **My Block** using the context menu accessed with touch and hold gesture.

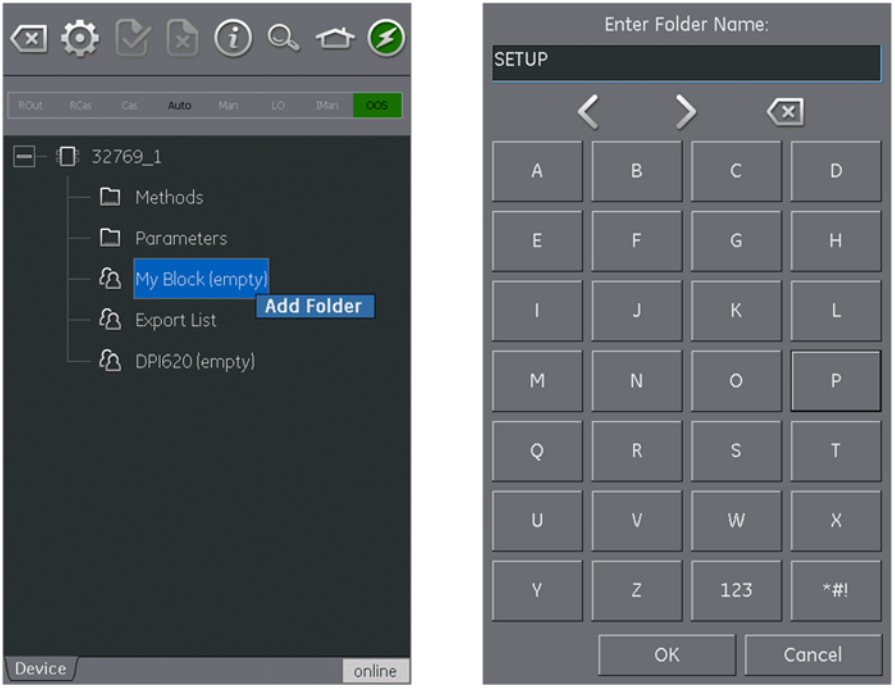


Figure 9-28 Add 'My Block' Menu

Variables are added to **My Block** (or the created folders) using the context menu in the Variable Description area (refer to Section 8.5.4).

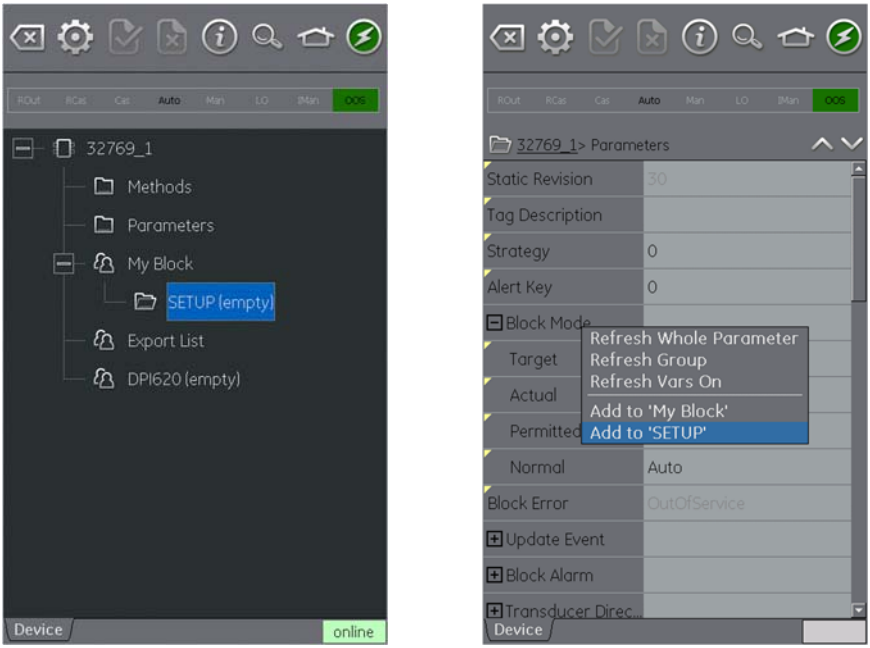


Figure 9-29 Adding Variables to 'My Block'

9.7 PROFIBUS Application - Exporting Variables

The PROFIBUS application allows selected variables to be displayed in the Communications channel window.

The selected variables are defined by the **Export List** Menu (refer to Section 8.5.2).

Parameters are added to the Export List using the context menu in the Variable Description area (refer to Section 8.5.4) and selecting **Add to 'Export List'**.

Note: A maximum of 6 variables and only variables that return a value can be added to the Export List.

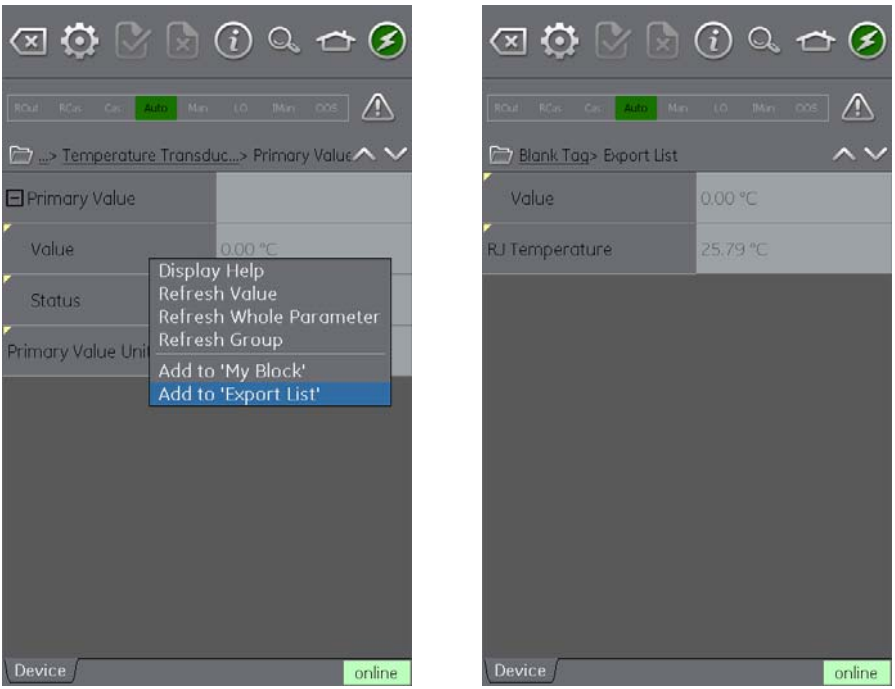


Figure 9-30 Adding Items to Export List

9.7.1 Viewing Exported Variables in Channel Window

Return to Main Application by Minimizing the PROFIBUS application.

HOME >> Minimize

Expand the FOUNDATION™ Fieldbus window and select:

Settings >> PRIMARY VALUE

The Export List of selected variables will be displayed. The selected parameter will be displayed in the PROFIBUS channel window.



Figure 9-31 Displaying Primary Value

9.8 Application Settings

Application settings are access from the PROFIBUS toolbar by selecting:

⚙ SETTINGS

9.8.1 Device Library

The library tab shows the Device Descriptions (DDs) that are currently on the DPI620G-IS. This allows the user to browse for a specific device to determine that there is support for it.

To request support for a non-registered DD please contact your local GE Service centre (refer to Section 1.11).

9.8.2 Options

- **Poll header every** - Sets the refresh rate for the device parameters displayed in the header.
- **Poll all dynamic every** - Sets the refresh rate for dynamic variables in the folder variables view (note this setting only becomes valid if the folder variables option **Refresh Vars On** is active) (refer to Section 8.7.2).
- **Enable Device Library Monitor** - If checked enables the automatic check of the Open Field Communications DD library on application start up for new Device Descriptions. Note this configuration option requires a network path to the Internet. After installation the default setting is 'checked'.
- **Confirm Device Commits** - If checked brings up a confirmation dialog before every write is committed to the field device. After installation the default setting is 'checked'.
- **Enable My Device Functions** – Enables the My Device and

Export to DPI620G-IS functions. After installation the default setting is 'checked'.

- **Enable Function Blocks –** If checked function blocks are enabled. After installation the default setting is 'un-checked'.
- **Enable Transducer Blocks –** If checked transducer blocks are enabled. After installation the default setting is 'checked'.

9.8.3 Advanced

These settings are for advanced users only and it is recommended to retain Default Values.

9.9 Function Finder

Function Finder is a way of searching for variables and device functions in the on-line device. In complex devices with multiple menus this allows the user to navigate a device without a manual, greatly simplifying the on-line experience, even with an unfamiliar device.

The system requires the input of the name of the variable concerned (or part thereof) and the results show all variables that match the search. Navigation to the variable is just a single click in the search results. To start a search proceed as follows in the on line or off-line device view.

Select the search icon from the PROFIBUS Toolbar.

5. In Name field enter the text you wish to search for in the on-line device.

6. Select return in the keyboard view followed by the **Search** button to initiate the search.

7. From the list of results select the parameter that you require. Note that the variable name and the folder it relates to is displayed.

8. Function Finder will then display the Folder Variables concerned in the device view with all searched variables highlighted in yellow.

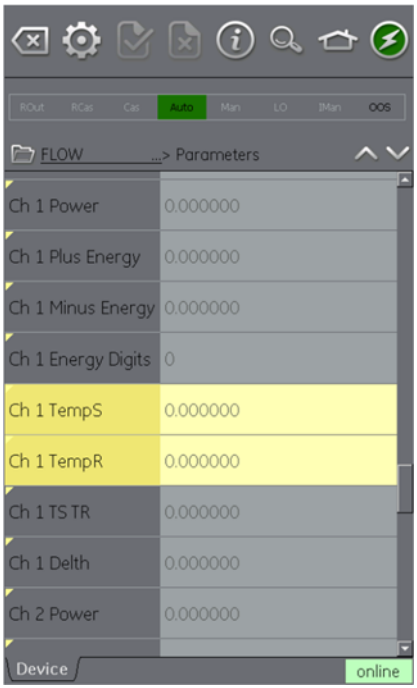


Figure 9-32 Function Finder

10 Calibration Procedures

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

GE recommends 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.

Use only original parts supplied by the manufacturer.

10.1 Before Starting

To perform an accurate calibration:

- Use the calibration equipment specified in Table 10-1.
- Calibrate in a stable temperature environment: 21 ± 1°C (70 ± 2°F).

Note: Before starting a calibration procedure, leave the equipment in the calibration environment for a minimum period of two hours.

Table 10-1 Calibration Equipment

Function	Calibration Equipment (ppm = parts per million)	
Current (CH1 or CH2)	Current (mA) calibrator. Accuracy - Current measure/source: see Table 10-2 or Table 10-3.	
Voltage (CH1 or CH2)	Volts calibrator. Accuracy - Voltage measure/source: see Table 10-5 or Table 10-7	
Millivolts (CH1 or CH2) or TC mV (CH1)	mV calibrator. Accuracy - Millivolts measure/source: see Table 10-4 or Table 10-6 Accuracy - TC mV: see	
Frequency (CH1)	**measure**	**source**
	Signal generator. Total error: 0.3 ppm or better	Frequency meter. Total error: 0.3 ppm or better Resolution: 8 digits (minimum)
Resistance (CH1)	**measure**	**source**
	Standard resistor (Ω) (ref Table 10-11): 100, 200, 300, 400, 1k, 2k, 4k Total uncertainty: 20 ppm	An ohmmeter or an RTD measurement system with the specified excitation currents – see Table 10-13

Function	Calibration Equipment (ppm = parts per million)
Cold Junction (CH1)	Calibrated K type thermocouple Accuracy: 50 mK for -5 to 28°C (23 to 82.4°F)
	Thermocouple temperature reference unit (0°C). Accuracy: 30 mK
Pressure (P1 or P2)	DPI620G-IS Module Carrier MC 620G-IS or DPI620G-IS Pressure Base PV 62XG-IS: **Range 25 mbar/0.36 psi**: total uncertainty of 0.015% reading or better **Ranges > 25 mbar/0.36 psi**: total uncertainty of 0.01% reading or better
IDOS	UPM only. Refer to the user manual for the IDOS UPM.

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

10.2 Selection Sequence

To perform a calibration on a measure or source function, use the advanced menu option:

1. Select:

   DASHBOARD >>  ADVANCED

2. Enter the calibration PIN: 4321
3. Select the  button.
4. Select:

   PERFORM CALIBRATION

Note: At this point, if the instrument has previously been calibrated, a window will appear allowing the existing calibration data to be saved (it can later be retrieved via the 'ADVANCED' menu). Choose the preferred option and continue:

5. Select channel
6. Select function
7. Select range (if applicable)
8. Follow the on-screen instructions

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

10.3 Calibration Procedures (CH1/CH2): Current (measure)

Note: When recalibrating 'measure' functions for this range, any adjustment will affect the corresponding source function calibration. The source function must, therefore, be re-calibrated after adjusting the measure function.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example:
   - CH1 (55 mA range) see Section 2.6
   - CH2 (55 mA range) see Section 2.6 and Section 2.7).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a three-point calibration (-FS, Zero and +FS) for each range: 20 mA and 55 mA.
4. Check the calibration is correct:
   - Select the applicable Current (measure) function, (Ref: Section 2.6, 2.7).
   - Apply the following values:
     mA: -55, -25, -20, -10, -5, 0 (open circuit)
     mA: 0, 5, 10, 20, 25, 55.
   - Check the error is within the specified limits (Ref: Table 10-2).

Table 10-2 Current (measure) error limits

Applied mA	Calibrator uncertainty (mA)	Permitted DPI620G-IS error (mA)
±55	0.003	±0.0055
±25	0.0025	±0.0040
±20	0.00063	±0.0022
±10	0.00036	±0.0016
±5	0.00025	±0.0013
0 (open circuit)	0.0002	±0.0010

Table 10-3 Current (source) error limits

Source mA	Calibrator uncertainty (mA)	Permitted DPI620G-IS error (mA)
0.2	0.00008	±0.00011
6	0.00023	±0.00132
12	0.00044	±0.00156
18	0.0065	±0.00180
24	0.0012	±0.00204

10.4 Calibration Procedures (CH1/CH2): Current (source)

Note: When performing a calibration of both the measure **and** source functions, the measure calibration should be performed first.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example:
   - CH1 (24 mA range) see Section 2.6
   - CH2 (24 mA range) see Section 2.6 and Section 2.7).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a two-point calibration (0.2 mA and FS) at 24mA range.
4. Check the calibration is correct:
   - Select the applicable Current (source) function (Ref: Section 2.6, 2.7).
   - Apply the following values:

     CH1/CH2, mA: 0.2, 6, 12, 18, 24

   - Check the error is within the specified limits (Ref: Table 10-3).

10.5 Calibration Procedures (CH1/CH2): DC mV/Volts (measure)

Note: When recalibrating 'measure' functions for this range, any adjustment will affect the corresponding source function calibration. The source function must, therefore, be re-calibrated after adjusting the measure function.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.8.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) 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:
   - Select the applicable Millivolts or Voltage (measure) function (Ref: Section 2.8).
   - Apply the input values that are applicable to the calibration:

     mV: -1995, -1000, -195, -100, 0 (short circuit)

     mV: 0, 100, 195, 1000, 1995

     Volts (V): -30, -21, -20, -10, -5, 0 (short circuit)

     Volts (V): 0, 5, 10, 20, 21, 30.

   - Check that the error is within the specified limits (Ref:

Table 10-4 or Table 10-5).

Table 10-4 Millivolts (measure) error limits

Applied (mV)	Calibrator uncertainty (mV)	Permitted DPI620G-IS error (mV)
±1995	0.051	±0.0899
±1000	0.040	±0.0750
±195	0.0051	±0.0109
±100	0.0040	±0.0095
0 (short circuit)	0.0036	±0.0080

Table 10-5 Voltage (measure) error limits

Applied (V)	Calibrator uncertainty (V)	Permitted DPI620G-IS error (V)
±30	0.00052	±0.00195
±21	0.00040	±0.00172
±20	0.00031	±0.00090
±10	0.00016	±0.00065
±5	0.00008	±0.00052
0 (short circuit)	0.000024	±0.00040

10.6 Calibration Procedures (CH1): DC mV/Volts (source)

Note: When performing a calibration of both the measure **and** source functions, the measure calibration should be performed first.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.9.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a two-point calibration (Zero and +FS) for the applicable range:

mV (source) ranges	Volts (source) ranges
2000 mV	12 V

4. Check the calibration is correct:
   - Select the applicable Millivolts or Voltage (source) function (ref Section 2.9).
   - Apply the input values that are applicable to the calibration (Ref: Table 10-6 or Table 10-7):

     mV: 0, 100, 195, 1000, 1995

     Volts (V): 0, 3, 6, 9, 12.

   - Check the error is within the specified limits (Ref: Table 10-6 or Table 10-7).

Table 10-6 millivolts (source) error limits

Source (mV)	Calibrator uncertainty (mV)	Permitted DPI620G-IS error (mV)
0	0.0001	±0.0060
100	0.00046	±0.0090
195	0.0009	±0.0119
1000	0.003	±0.0750
1995	0.006	±0.0899

Table 10-7 Voltage (source) error limits

Source (V)	Calibrator uncertainty (V)	Permitted DPI620G-IS error (V)
0	0.000004	±0.00048
3	0.000019	±0.00060
6	0.000034	±0.00072
9	0.000049	±0.00084
12	0.000064	±0.00096

10.7 Calibration Procedures (CH1): Frequency (measure/source)

Note: Perform just one frequency calibration - use either the measure function or the source function.

A) Frequency calibration (measure function)

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.10.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Set-up the equipment as follows:

Signal generator:	Output = 10 V, Unipolar, Square wave
	Frequency = 990 Hz
DPI620G-IS:	Input units = Hz
	Input trigger level = 5 V

4. Use the calibration menu (Ref: Section 10.2) to do a one-point calibration.
5. Check the calibration is correct: see C) below.

B) Frequency calibration (source function)

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.10.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Set-up the equipment as follows:

Frequency meter:	Gate time = one second
DPI620G-IS:	Waveform = Square; Amplitude = 10 V; Frequency = 990 Hz

4. Use the calibration menu (Ref: Section 10.2) to do a one-point calibration.
5. Check the calibration is correct: see C) below.

C) Frequency calibration check

Frequency (measure) calibration check (Section 2.10).

- Set-up the equipment as follows:

  Signal generator: Output = 10 V, Unipolar, Square wave

  DPI620G-IS: Units: Hz or kHz
  Input trigger level = 5 V

- Apply the input values that are applicable to the calibration (Ref: Table 10-8 or Table 10-9):

  Hz: 100, 990

  kHz: 1.1, 4.9

- Check the error is within the specified limits (Ref: Table 10-8 or Table 10-9).

Frequency (source) calibration check (Section 2.10).

- Set-up the equipment as follows:

  Frequency meter: Gate time = one second

  DPI620G-IS: Units: Hz or kHz.

- Source the values that are applicable to the calibration:

  Hz: 100, 990

  kHz: 4.5

- Check the error is within limits (Ref: Table 10-8 or Table 10-9).

Table 10-8 Hz error limits (measure/source)

Measure/ Source (Hz)	Calibrator uncertainty (Hz)	Permitted DPI620G-IS error (Hz)	
		(measure)	(source)
100	0.0002	±0.00230	±0.00260
990	0.0005	±0.00497	±0.00527

Table 10-9 kHz error limits (measure/source)

Measure/ source (kHz)	Calibrator uncertainty (kHz)	Permitted DPI620G-IS error (kHz)	
		(measure)	(source)
1.1000	0.00002	±0.000023	-
4.5000	0.00002	-	±0.000052
4.9000	0.00002	±0.000035	

10.8 Calibration Procedure (CH1): Frequency, Pulse Amplitude (source)

Perform the calibration as follows:

1. Connect a volts calibrator (specified in Table 10-1) across CH1 terminals 'V/Hz' and 'COM'.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) (CH1 Source >> Frequency >> Pulse Amplitude) to do a two-point calibration (0V and 12.0V).

   Note: The signal sourced by the DPI620G-IS will have a frequency of zero Hz – hence a volts calibrator can be used to measure the amplitude.
4. Check the calibration is correct:
   - Select the applicable function: CH1, source, frequency Section 2.10.2.

At zero Hz frequency, apply the pulse amplitude Input values applicable to the calibration (ref. Table 10-10). Check the error is within the specified limits (ref: Table 10-10).

Table 10-10 Pulse Amplitude (source) error limits

Source (V)	Calibrator uncertainty (V)	Permitted DPI620G-IS error (V)
0.2	0.000004	±0.1
3	0.000019	±0.1
6	0.000034	±0.1
9	0.000049	±0.1
12	0.000064	±0.1

10.9 Calibration Procedure (CH1): Resistance (measure) (standard)

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.11.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a two-point calibration for each of the following ranges:

   Range: 0-400Ω

   - Nominal zero ohms:
     Make a 4-wire connection to the 0Ω resistor.
   - Nominal positive full-scale ohms:
     Make a 4-wire connection to the 400 Ω resistor

   Range: 400Ω-4kΩ

   - Nominal 400Ω: Make a 4-wire connection to the 400Ω resistor
   - Nominal positive full-scale ohms: Make a 4-wire connection to the 4k resistor
4. Check the calibration is correct
   - Select the Resistance (measure) function (Ref Section 2.11).
   - Make a 4-wire connection to the applicable standard resistor (Ref: Table 10-11) and measure the value.
   - Check the error is within the specified limits (Ref: Table 10-11).

Table 10-11 Resistance (measure) (standard) error limits

Standard Resistor (Ω)	Resistor uncertainty (Ω)	Permitted DPI620G-IS error (Ω)
0 (short circuit)	-	±0.0200
100	0.002	±0.0320
200	0.004	±0.0440
300	0.006	±0.0560
400	0.008	±0.0680
1000	0.02	±0.2950
2000	0.04	±0.4100
4000	0.08	±0.6400

10.10 Calibration Procedure (CH1): Resistance (measure) (True Ohms)

Note: 'True ohms' measurement is more accurate than 'Standard'.

The calibration procedure is the same as that for Resistance (measure) (standard) (ref. Section 10.9) except:

- In the calibration menu (Ref: Section 10.2) select 'True Ohms' instead of 'Standard'.
- To check the calibration is correct, refer to Table 10-12.

Table 10-12 Resistance (measure) (true ohms) error limits

Standard Resistor (Ω)	Resistor uncertainty (Ω)	Permitted DPI620G-IS error (Ω)
0 (short circuit)	-	±0.0040
100	0.002	±0.0095
200	0.004	±0.0150
300	0.006	±0.0205
400	0.008	±0.0260
1000	0.02	±0.0950
2000	0.04	±0.1500
4000	0.08	±0.2600

10.11 Calibration Procedures (CH1): Resistance (source)

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.11.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a two-point calibration for each of the following ranges:
   - Range: 0-400 Ω
   - Range: 400Ω-2000Ω
   - Range: 2000Ω-4000Ω
5. Check the calibration is correct:
   - Select the Resistance (source) function (Ref Section 2.11).
   - Apply the input values applicable to the calibration (Ref: Table 10-13).
   - Check the error is within the specified limits (Ref: Table 10-13).

Table 10-13 Resistance (source) error limits

Ohms (Ω)	Excitation (mA)	Calibrator uncertainty (Ω)	Permitted DPI620G-IS error (Ω)
0	0.1	0.0014	±0.0140
100	0.1	0.0016	±0.0380
200	0.1	0.0021	±0.0620
400	0.1	0.0035	±0.1100
1000	0.1	0.008	±0.3100
2000	0.1	0.016	±0.5500
3000	0.1	0.024	±0.8600
4000	0.1	0.032	±1.1000

10.12 Calibration Procedures (CH1): TC mV (measure)

Note: When recalibrating 'measure' functions for this range, any adjustment will affect the corresponding source function calibration. The source function must, therefore, be re-calibrated after adjusting the measure function.

Note: To ensure correct calibration, use copper leads and copper connectors when connecting the applicable calibration equipment to DPI620G–IS. This minimises thermo-electric effects.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.12).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a three-point calibration (-10 mV, Zero and 100 mV) for the measure function
4. Check the calibration is correct:
   - Select the applicable TC mV (measure) function (ref. Section 2.12).
   - Apply the values applicable to the calibration (ref. Table 10-14):

     TC mV (measure): -10, 0 (short circuit)
     10, 25, 50, 100
   - Check the error is within the specified limits (ref: Table 10-14).

Table 10-14 TC mV (measure or source) error limits

Input or output	Calibrator uncertainty TC (mV)		Permitted DPI620G-IS error (mV)	
TC (mV)	(measure)	(source)	(measure)	(source)
-10	±0.0036	±0.00011	±0.0080	±0.0085
0	±0.0036	±0.00010	±0.0080	±0.0080
10	±0.0036	±0.00011	±0.0080	±0.0085
25	±0.0036	±0.00015	±0.0080	±0.0091
50	±0.0037	±0.00025	±0.0080	±0.0103
100	±0.0040	±0.00046	±0.0080	±0.0125

10.13 Calibration Procedures (CH1): TC mV (source)

Note: When performing a calibration of both the measure **and** source functions, the measure calibration should be performed first.

Note: To ensure correct calibration, use copper leads and copper connectors when connecting the applicable calibration equipment to DPI620G–IS. This minimises thermo-electric effects.

Perform the calibration as follows:

1. Connect the applicable calibration equipment specified in Table 10-1; for example see Section 2.12).
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (Ref: Section 10.2) to do a three-point calibration (-10 mV, Zero and 100 mV) for the source function
4. Check the calibration is correct:
   - Select the applicable TC mV (source) function (ref. Section 2.12).
   - Apply the Input values applicable to the calibration (ref. Table 10-14).

     TC mV (source): -10, 0, 10, 25, 50, 100
   - Check the error is within the specified limits (ref: Table 10-14).

10.14 Calibration Procedures (CH1): CJ and CJ (TC method) (measure)

Note: Perform the TC mV (measure) calibration before the cold junction calibration.

There are two methods of performing a cold junction test:

- CJ (TC Method)
- CJ

CJ (TC Method) is the preferred method. Both calibration procedures are described below:

CJ (TC Method)

1. Connect the applicable calibration equipment (Ref: Table 10-1); for example see Section 2.12). **Note:** Use miniature TC connectors.
2. Set up the DPI620G-IS calibrator as follows:
   - CH2 Function = "None"
   - CH1 Function = TC (measure)
   - In CH1 function settings select:
     TC Type = K Type
     Burnout Detection = off
3. Set the reference unit temperature: 0°C.
4. Let the equipment get to a stable temperature (minimum: 1 hour since the last power on).
5. Calculate the **CJ (adjust)** value using the known errors in the reference unit and thermocouple:

CJ (adjust) = reference unit error (°C) + TC error (°C).

6. Use the calibration menu (Ref: Section 10.2) to do a one-point calibration for the CJ (TC method) function.
   - When the display shows “Sampling complete”, set the ‘actual applied value’ = reference unit temperature + CJ (adjust)
7. Check the calibration is correct:
   - Select the TC measure function (Ref: Section 2.12).
   - Check the equipment gives a TC temperature that is the same as the temperature on the reference unit ±0.1°C (0.2°F), after correction for the known thermocouple and reference unit error.

CJ

1. Connect the applicable calibration equipment (Ref: Table 10-1); for example see Section 2.12). **Note:** Use miniature TC connectors.
2. Set up the DPI620G-IS calibrator as follows:
   - CH2 Function = “None”
   - CH1 Function = TC (measure)
   - In CH1 function settings select:
     TC Type = K Type
     Burnout Detection = off
     CJ Compensation, Mode = Automatic
3. Set the reference unit temperature: 0°C
4. Let the equipment get to a stable temperature (minimum: 1 hour since the last power on).

5. Record the following values:
   - TC temperature given on the reference unit: **T (actual)**
   - TC temperature given on DPI620G-IS: **T (measured)**
   - CJ temperature given on DPI620G-IS: **CJ (measured)** (located in top right corner of CH1 display):
6. Calculate the **CJ (Cal Value)** as follows:

   CJ (Cal Value) = CJ (measured) - T (actual) + T (measured).
7. Use the calibration menu (Ref: Section 10.2) to do a one-point calibration for the CJ (measure) function.
   - When the display shows “Sampling complete”, set the ‘actual applied value’ = CJ (Cal Value) above.
8. Check the calibration is correct:
   - Select the TC (measure) function (Ref: Section 2.12).
   - Check the equipment gives a TC temperature that is the same as the temperature on the reference unit ±0.1°C (0.2°F)

10.15 Calibration Procedures: Pressure Indicator Modules (PM 620-IS)

Perform the calibration as follows:

1. Assemble the DPI620G-IS calibrator with the necessary PM 620-IS modules; for example see Section 3.1.
2. Connect the assembled instrument to the pressure standard; for example see Section 3.2).
3. Let the equipment get to a stable temperature (minimum: 60 minutes since the last power on).
4. Use the calibration menu (Ref: Section 10.2) to do a three-point calibration or a two point calibration, as specified in Table 10-15):
   - Gauge Sensor: -FS †, Zero and +FS
     † see Table 10-15
   - Absolute sensor: Zero and +FS
     (Zero, +1/2 FS and +FS if the software version requires a three-point calibration)
5. Check the calibration is correct:
   - Select the applicable pressure function.
   - Apply the following pressure values:
     Ranges Gauge:
     0, 20, 40, 60, 80, 100, 80, 60, 40, 20, 0 (%FS)
     0,-20, -40, -60, -80, -100, -80, -60, -40, -20, 0 (%FS)
     Ranges Absolute:
     0, 20, 40, 60, 80, 100, 80, 60, 40, 20, 0 (%FS)

- Check the error is within the limits specified in the data sheet, Gauge & Absolute Range tables (use the values in the column 'Total uncertainty ... ').

  The specified values include an allowance for temperature changes, reading stability for one year, and the uncertainty of the standard used for calibration.

Table 10-15 Calibration pressures

Ranges: gauge	Nominal applied pressure mbar (psi)		
	-FS †	Zero	+FS
≤ 700 mbar (10.0 psi)	-FS	0	+FS
> 700 mbar (10.0 psi)	-900 (-13.1)	0	+FS
†For a three-point calibration, do not apply more than -90% of the specified FS for the unit.			
Ranges: absolute	Nominal applied pressure mbar (psi)		
	Zero		+FS
350 mbar (5.00 psi)	< 1.0 (0.02)		+FS
2 bar (30.0 psi)	< 5.0 (0.07)		+FS
7 bar (100.0 psi)	< 20.0 (0.29)		+FS
20 bar (300.0 psi)	< 50.0 (0.73)		+FS
≥ 350 bar (5000 psi)	Use atmospheric pressure as zero.		+FS

11 General Specification

11.1 Introduction

For a full specification of the DPI620G-IS calibrator and its related accessories (MC 620-IS carrier, PM 620-IS module and PV 62x-IS pressure stations) refer to the relevant product datasheet.

Display	LCD: Colour display with touch-screen
Operating temperature	-10 to 50°C (14 to 122°F)
Storage temperature	-20 to 70°C (-4 to 158°F)
Max Operating Altitude	2000m
Ingress Protection	IP54 (DPI620G-IS calibrator only)
Humidity	0 to 90% relative humidity (RH) non-condensing
Shock/Vibration	MIL-PRF-28800F for class 2 equipment
Pollution Degree	2
EMC	Electromagnetic compatibility: BS EN 61326-1:2006
Electrical safety	Electrical - BS EN EN 60950-1:2010 + A2:2013. (Charger PSU Only).
Pressure safety	Pressure Equipment Directive - Class: Sound Engineering Practice (SEP)
Approved	CE Marked
Battery power	Lithium-Polymer battery (GE Part number: IO620G-IS-BATTERY) Capacity: 5040 mAh (minimum), 5280 mAh (typical), Nominal voltage: 3.7 V. Charge temperature: 0 to 40°C (32 to 104°F) outside this range, charging stops.

Note 1: The DPI620G-IS has been assessed to the European IEC60529 standard as having an ingress protection rating of IP54, but this is for reliability purposes and not for safety reasons.

Note 2: The case of the DPI620G-IS is not suitable for prolonged exposure to UV.

Note 3: The DPI620G-IS is intended for indoor use and is not suitable for permanent installation in an outdoor environment.

12 Manufacturer

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13 Display Icons

Table 13-1 Dashboard Icons

	Advanced		Hart®
	Calibrator		PROFIBUS
	Data Logging		LED (shows status) Blue – Active Red – Alarm Green - Connected
	Touchscreen		Multimeter
	Documenting		Scope
	Foundation Fieldbus		Settings
	Files		Status
	Applications		Devices
			Help

Aufgrund laufender Weiterentwicklungen sind Änderungen der Spezifikationen vorbehalten. Alle Angaben vorbehaltlich Satz- und Druckfehler.