DPI 620 Genii

Advanced Modular Calibrator
Instruction Manual

Introduction

Druck multifunction calibrators provide an all-in-one solution for your pressure measurement and generation needs. The DPI 620 Genii multifunction process calibrator and HART® / FOUNDATION™ Fieldbus / Profibus® communicator features a modular design that enables expansion over time. With designs for both safe and hazardous area use, you can perform a wide variety of tasks from reading and sourcing voltage, current, frequency, and resistance signals, to documenting data and automating calibration procedures, equipping you to test and calibrate electrical equipment, pressure sensors, gauges, switches, thermocouples, RTDs, and more.

Safety

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

It is dangerous to attach an external source of pressure to a PV 62XG pressure generation stations. Use only the internal mechanisms to set and control pressure in the pressure calibrator.

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

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

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

Maintenance

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

Technical Advice

For technical advice contact the manufacturer.

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

Symbols

Symbol	Description
CE	This equipment meets the requirements of all relevant European safety directives. The equipment carries the CE mark.
UKCA	This equipment meets the requirements of all relevant UK Statutory Instruments. The equipment carries the UKCA mark.
📖i	This symbol, on the equipment, indicates that the user should read the user manual.
⚠	This symbol, on the equipment, indicates a warning and that the user should refer to the user manual. Ce symbole, sur l'appareil, est un avertissement qui indique que l'utilisateur doit consulter le manuel d'utilisation.
⟢⟋	USB ports: Type A; Mini Type B connector.
⏚	Ground (Earth)
− ⊙ +	DC adaptor polarity: the Centre of the plug is negative.
🗑	Druck is an active participant in Europe's Waste Electrical and Electronic Equipment (WEEE) take-back initiative (directive 2012/19/EU). The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems. If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. Please visit the link below for take-back instructions and more information about this initiative. **https://qrco.de/dsweee**

Abbreviations

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

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

Abbreviation	Description
TC	Thermocouple
USB	Universal Serial Bus
V	Volts
°C	Degrees Celsius
°F	Degrees Fahrenheit

Contents

1. Introduction

1.1 Overview

The Druck DPI 620 Genii is a battery powered instrument for electrical measure, source operations and HART® communications. The DPI 620 Genii also supplies the power and user interface options for all supported functions. The touchscreen displays up to six different parameters in individual channel windows.

This version of the manual is applicable to software revisions DK420 v3.19 and above.

1.2 What's in the Box

The following items are supplied with the DPI 620 Genii (standard option):

- Druck DPI 620 Genii multifunction calibrator.
- Li-polymer battery.
- DC power supply.
- Stylus
- AC probe.
- Set of six test leads.
- Quick start guide.

1.3 Optional Items

The items that follow are optional items which can be used with the Druck DPI 620 Genii:

Optional Item	Description
	Pressure Module Carrier, MC 620G – this attaches directly to the DPI 620 Genii to allow pressure to be applied to it. The MC 620G also houses pressure sensing modules to make a fully integrated pressure instrument when combined with the PM 620 / PM 620T pressure module.
	Pressure Module, PM 620 / PM 620T – this is a pressure sensing module that attaches to the pressure module carrier (MC 620G) or a Pressure Station (PV 62XG) to enhance the pressure measurement functionality. There are several pressure ranges available with the PM 620 / PM 620T pressure modules.
	Pressure Station, PV 62XG – if the DPI 620 Genii is installed in a Pressure Station with a pressure module, it becomes a fully integrated pressure calibrator.

Figure 1-1: DPI 620 Genii with MC 620G Module Carrier and PM 620 Pressure Modules

Figure 1-2: DPI 620 Genii with PV 62XG Pressure Station and PM 620 Pressure Module

1.4 Observance of the User Manual

This manual contains safety and battery installation information for the Druck DPI 620 Genii. 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 'Safety & Quick Start Guide' (K0542).

1.5 General Safety Precautions

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

- Use only the approved tools, consumable materials and spares to operate and maintain the equipment.
- Use equipment only for the purpose for which it is provided.
- Wear all applicable Personal Protective Equipment (PPE).
- Do not use sharp objects on the touch-screen.

- Observe absolute cleanliness when using the instrument.
- Severe damage can be caused if equipment connected to this instrument is contaminated.
- Connect only clean equipment to the instrument. To avoid any contamination, an external Dirt Moisture Trap is recommended.
- Some liquid and gas mixtures are dangerous. This includes mixtures that occur because of contamination. Make sure that the equipment is safe to use with the necessary media.
- Read and obey all applicable WARNING and CAUTIONS signs.
- Make sure that:
  - i.   All work areas are clean and clear of unwanted tools, equipment and materials.
  - ii. All unwanted consumable materials are disposed in accordance with local health and safety and environmental regulations.
  - iii. All equipment is serviceable.

1.6 Warnings

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

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

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

1.7 Electrical Safety

WARNING The DC input to the DPI 620G is rated at 5 Vdc ± 5% 4 Amps.

External circuits should have appropriate insulation to the mains.

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

This instrument uses a rechargeable Lithium Polymer (Li-ion) battery pack. To prevent an explosion or fire do not short circuit.

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

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

Note that the operating and storage temperature range of the optional PSU does not match that of the DPI 620G. Mains PSU operating temperature range 0°C to +40°C, storage temperature range -40°C to +70°C.

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

Keep the leads free from all contaminants.

1.8 Pressure Warnings

WARNING **It is dangerous to attach an external source of pressure to a PV 62XG pressure generation station. Use only the internal mechanisms to set and control pressure in the pressure calibrator.**

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

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

To prevent damage to the PV 62XG, MC 620G, PM 620 or PM 620T, only use it within the specified pressure limits.

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

Reduce pressure at a controlled rate when venting to atmosphere.

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

Always wear appropriate eye protection when working with pressure.

1.9 Overvoltage Category

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

Table 1-1: Overvoltage Categories

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

1.10 Receiving the Instrument

On receipt of the instrument, check the contents in the box listed in Section 1.2. It is recommended to retain the box and packaging for future use.

1.11 Installing the Battery

1. Remove the five Pozidriv screws A, see Figure 1-3.
2. Remove the battery cover.
3. Check the connections on the battery line up with the connections in the battery compartment.
4. Place the battery in the battery compartment.
5. Replace the battery cover.

6. Secure the cover with the five Pozidriv screws.
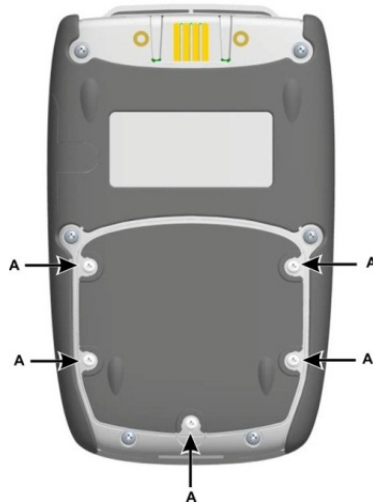
Figure 1-3: Installing the Battery

1.12 Charging the Battery

1. Connect the DC power supply into the + 5V DC connection on the side of the unit, see Figure 1-4.
2. The unit can be on or off when charging. Charging times may be longer if charging when the unit is switched on or in standby.
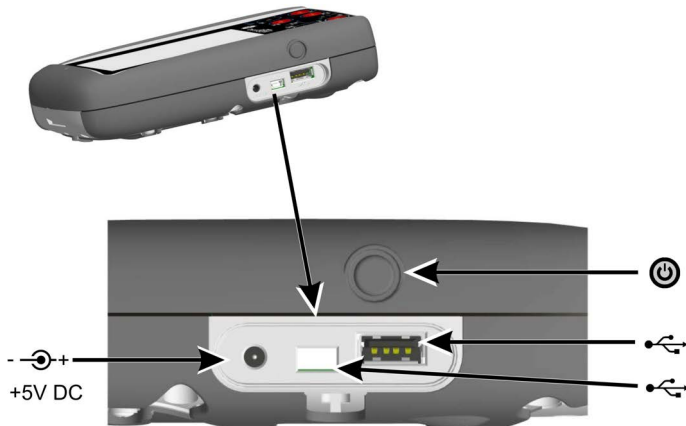
Figure 1-4: DPI 620 Genii Power Button and Ports

Table 1-2: Battery Charging Times

Charging Connection	Charge Time
DC Power Supply	6.5 hours
External Battery Charger	6.5 hours

1.13 Power On

If the unit is off, momentarily press the power button (Figure 1-4) until the display flashes and the splash screen appears.

1.14 Power Off

To power off the unit, press and release the power button. The POWERDOWN OPTIONS window will be displayed as shown in Figure 1-5.

POWERDOWN OPTIONS

SWITCH OFF

GO TO STANDBY

CANCEL
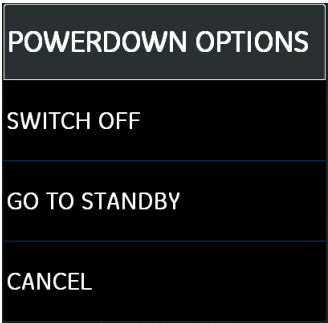
Figure 1-5: Power Down Options

Option	Description
SWITCH OFF	Initiates full power down of DPI 620 Genii and is recommended if unit is not going to be used for several hours. It requires full reboot on next power up. Full power down can also be achieved by pressing and holding the power button until the screen goes blank.
STANDBY	Places the DPI 620 Genii in standby mode and reduces power consumption from operating mode. It is recommended if unit is to be inactive for short periods. (DPI 620 Genii has fast turn on from standby mode). When powered up from standby mode the instrument always opens the last screen shown before going into standby mode.

1.15 Maintenance

The DPI 620 Genii instrument contains no user serviceable parts and should be returned to a Druck service center for repair.

1.15.1 Cleaning

⚠ **CAUTION** **Do not use solvents or abrasive materials.**

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

1.16 Instrument Return

1.16.1 Return Goods/Material Procedure

If the unit requires calibration or is unserviceable, return it to the nearest Druck Service Centre listed at: **https://qrco.de/bcPHml**.

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

- Product (e.g. DPI 620G)
- Serial number.
- Details of defect/work to be undertaken.
- Calibration traceability requirements.
- Operating conditions.

1.16.2 Safety Precautions

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

1.16.3 Important Notice

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

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

1.16.4 For More Information Contact

Druck customer service department: **Druck.com**

1.17 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. See Section 1.16.
3. Return the instrument to the manufacturer or an approved service agent for all repairs.

1.18 Environment

The following conditions apply for both shipping and storage:

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

2. Instrument Operation

This chapter gives examples of how to connect and use the instrument. Before starting, read the safety precautions contained in Section 1.5 and the 'Safety & Quick Start Guide' (K0542).

2.1 DPI 620 Genii Modes

The DPI 620 Genii can be used in the following modes:

1. Calibrator (with independent functions on each of six channels). This includes the following capabilities for each function:
   a. Data logging.
   b. Documenting
2. HART® Communicator.
3. FOUNDATION™ Fieldbus Communicator.
4. Profibus® Communicator.

2.2 Dashboard Navigation

The Dashboard is navigated by swiping a finger from top to bottom, or bottom to top, while touching the screen. The Dashboard has an array of applications which can be accessed by tapping the required application icon.
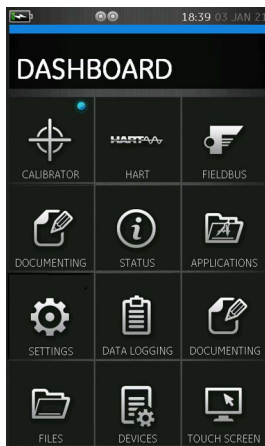
Figure 2-1: Dashboard / Home

Note: HART®, FOUNDATION™ Fieldbus and Profibus® PA are optional items.

Table 2-1: Dashboard Icons

Icon	Function
	Advanced
	Calibrator
	Data Logging
	Documenting
	Files
	Applications
	Help
	Settings
	Blue Status LED (Active)
	Red Status LED (Alarm)
	Green Status LED (Connected)
	Touchscreen
	Status
	Devices
	FOUNDATION™ Fieldbus

Table 2-1: Dashboard Icons

Icon	Function
PROFI BUS®	Profibus®
HART~∿∿	HART®
4 S 2	4Sight2™

2.2.1 Settings

From the Dashboard, the display settings can be accessed by selecting the SETTINGS ⚙ icon. The following setting items can be modified:
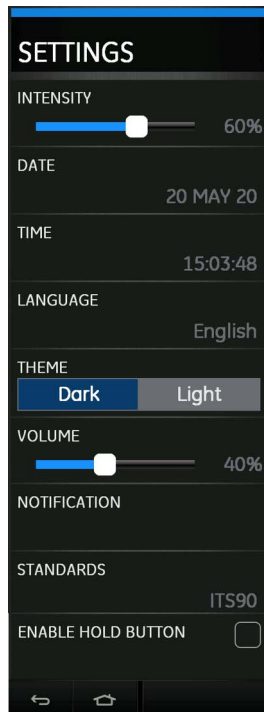
Figure 2-2: Settings

2.2.1.1 Brightness Intensity

To adjust the brightness intensity of the screen, press and drag the slider button left or right to decrease or increase respectively.

2.2.1.2 Date and Time

Change the date and time by selecting the option in the settings.

2.2.1.3 Language

Select the required language from the list of supported languages

2.2.1.4 Display Theme

To enhance device screen visibility, select the desired theme from two options available:

Theme	Description
Dark	Presents white/light text on black screen background.
Light	Presents dark/black text on light grey screen background.

2.2.1.5 Volume

To adjust the sound volume on the device, press and drag the slider left or right to decrease or increase respectively.

2.2.1.6 Notifications

Select the option to turn on or off notifications when User upgradeable or Factory upgradeable software components have an available update.
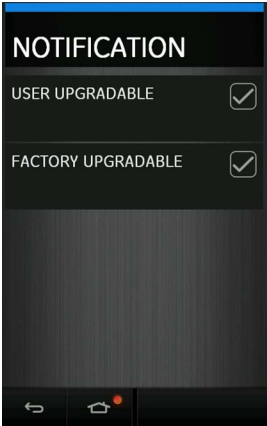
Figure 2-3: Notification

2.2.1.7 Standards

Select the required International Temperature Scale (ITS) standard to utilize on the device. The two options available are IPTS-68 and ITS-90.

Note: Default selection is ITS-90.

2.2.1.8 Enable Hold Button

Select the tick box to enable or disable the Hold function button ▷|| which appears in the calibrator screen.

In the calibrator screen, the Hold button freezes all measurement readings for all channels displayed at that instant. Pressing the Hold button again unfreezes the readings and returns to live measure readings.

If the Hold button is disabled in the settings, it is still possible to enable it from the calibrator screen when the button is pressed.

2.2.2 Help

The Help menu is accessible by pressing the (?) icon on the dashboard. All the information required to operate the DPI 620 Genii is included in this menu and provides the following options:
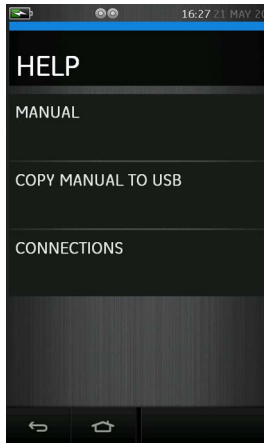
Figure 2-4: Help Menu

Help Option	Description
MANUAL	View user manual document on the DPI 620 Genii screen.
COPY MANUAL TO USB	Copies the user manual document to a USB memory device.
CONNECTIONS	View illustrations showing correct electrical connections for different individual functions. Swipe left or right to view the different diagrams available.
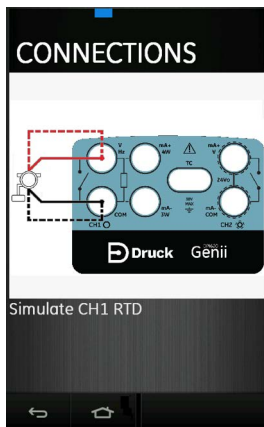
Figure 2-5: Example Connection Help Diagram

2.2.3 Status

The Status menu is accessible from the Dashboard by pressing the Status ⓘ icon. The Status menu options available are listed as shown in Figure 2-6.
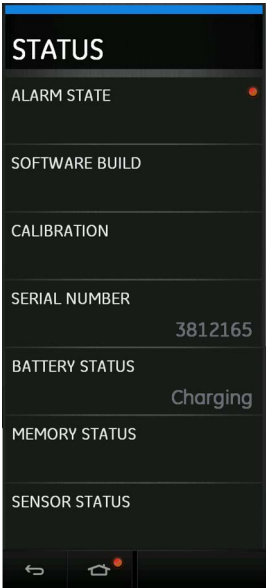
Figure 2-6: Status Menu

2.2.3.1 Alarm State

An Alarm Status is indicated with a red LED on the Alarm State section of the Status menu. This indication is also visible on the Status button and on the Home button in other screens.

Figure 2-7: Alarm Indication

The red LED shows alarms such as Date/Time not set, Calibration overdue etc.
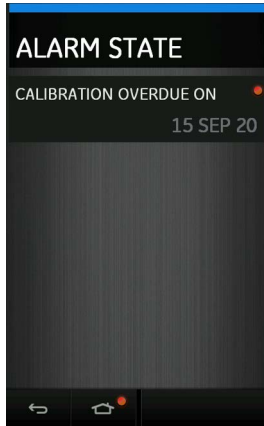
Figure 2-8: Alarm State

Selecting the displayed alarm will clear the indication until the next device restart.

2.2.4 Software Build

The software revisions running on the DPI 620 Genii can be viewed by selecting Software Build.

Note: If the software revision number has a red dot indication, then an upgrade is available for that module.

Figure 2-9: Software Build Status

The software available on the DPI 620 Genii are listed below:

- Application DK420
- Operating System DK419
- Boot Loader DK418
- HART® Driver (Processor Application) DK417
- HART® Boot Loader DK416
- SDC625 Application DK421
- HART® Device Library DK401
- CH1 FPGA DK413
- CH2 CPLD DK414

2.2.4.1 Calibration

The Calibration status displays the following information:

- Date next calibration is due.
- Date of the last calibration.

2.2.4.2 Serial Number

Displays the serial number of the DPI 620 Genii device.

2.2.4.3 Battery Status

Displays the available battery charge percentage of the DPI 620 Genii device and indication of power source i.e. charging or battery powered.

2.2.4.4 Memory Status

Displays the portion of the device memory used and that which is available. The memory information covers the following:

• Internal device memory
• USB flash drive (if present)
• SD Card (internal)

2.2.4.5 Sensor Status

Displays information on any connected external sensors such as the PM 620 / PM 620T modules.
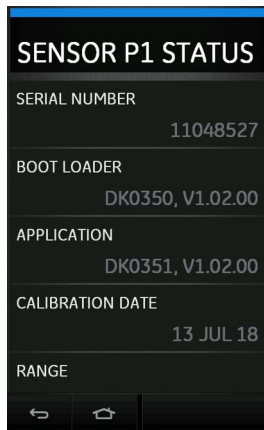
Figure 2-10: Sensor Status

2.2.5 Applications

The Application menu provides access to a number of Windows™ OS applications shown in Figure 2-11.
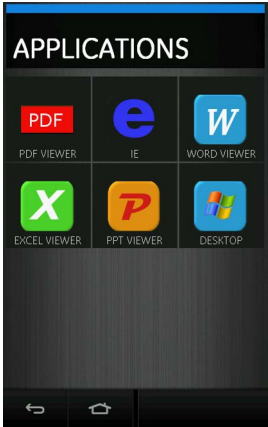
Figure 2-11: Applications Menu

Application	Description
PDF Viewer	Allows viewing of PDF documents on the DPI 620 Genii.
IE	Internet Explorer (IE) allows access to the web browser if Internet connection is available.
Word Viewer	Allows access to Microsoft Word format documents (e.g. *.doc, *.txt, *.rtf) which can be viewed and edited.
Excel Viewer	Allows access to Microsoft Excel format (e.g. *.xls, *.csv) documents which can be viewed and edited.
PPT Viewer	Allows viewing and editing of Microsoft Powerpoint format documents (e.g. *.ppt).
Desktop	Gives access to Windows CE Desktop location where all of the above applications can be accessed. Access to other Windows related applications are made available from the Desktop application. To exit the Desktop and return to the Genii application, double tap the Genii icon.
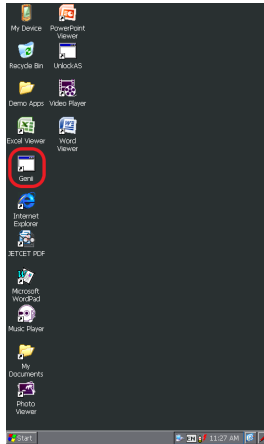
Figure 2-12: Desktop Application (Genii Application Icon Highlighted)

2.2.6 Advanced Menu

The Advanced menu is accessible from the Dashboard by pressing the Advanced menu ⚖ icon. The advanced menu should only be accessed by competent users to perform calibrations on the DPI 620 Genii (See Section 12) and update its software components (See Section 2.2.6.1).

2.2.6.1 Upgrading the Software

Download the software update files from the website onto a USB flash memory device. The files are compressed in a zipped folder and will require extracting within the USB memory device location before starting the upgrade.

Druck.com

1. On the DPI 620 Genii, press the Advanced menu icon via the Dashboard.

2.   Enter the calibration PIN: 5487 and press the tick button to access the software upgrade screen.
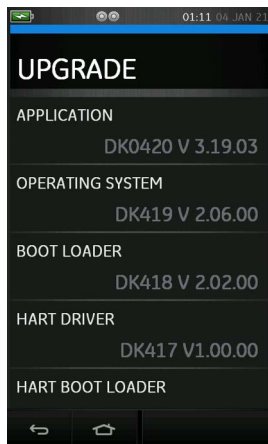
Figure 2-13: Software Upgrade Menu

Continue with one of the following upgrade operations:

1.   Upgrade the Operating System (DK419) and Bootloader software (DK418).

 a.   Copy the folder named 'OS' into the root of the USB flash memory device.

 b.   Insert the USB flash memory device in the USB type A port.

 c.   On the device screen, select OPERATING SYSTEM.

 d.   Follow the on-screen instructions.

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

2.   Upgrade the Application software (DK420) and SDC625 Application (DK421).

 Note: If an Operating System upgrade is required, it is recommended to upgrade the Operating System before the Application software.

 a.   Copy the 'AMC' application folder into the root of the USB flash memory device.

 b.   Insert the USB flash memory device in the USB type A port.

 c.   On the device screen, select APPLICATION.

 d.   Follow the on-screen instructions.

 Note: The SDC625 HART® Application can only be upgraded as part of an application upgrade.

3.   Upgrade the HART® Processor Application (DK417) and Boot Loader (DK416).

 a.   Copy the folder named 'HART' into the root of the USB flash memory device.

 b.   Insert the USB flash memory device in the USB type A port.

 c.   On the device screen, select HART® APPLICATION.

 d.   Follow the on-screen instructions.

 Note: The HART® bootloader can only be upgraded as part of the HART® application upgrade.

4.   Upgrade the CH1 FPGA.

 a.   Copy the folder named 'FPGA' into the root of the USB flash memory device.

 b.   Insert the USB flash memory device in the USB type A port.

    c.   On the device screen, select CH1 FPGA.

    d.   Follow the on-screen instructions.

    Note: The CH2 CPLD cannot be remotely upgraded.

5.   Upgrade the HART® Device Library.

    By default, the HART® device library is stored on the DPI 620 Genii internal micro SD card. There are two methods to upgrade the HART® Device Library.
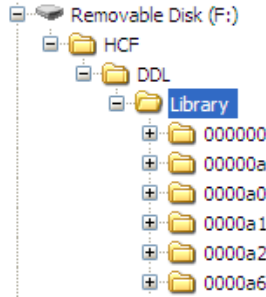
Figure 2-14: HART® Device Library Folder Structure

a.   Method 1 – Using a USB flash drive.

    1.   Download the HART® Library update files from the website and extract the zipped folder onto a USB flash drive.

    2.   Ensure the HCF folder is in the root directory of the USB flash drive. The required directory structure on the USB flash drive is shown in Figure 2-14.

    3.   Insert the USB flash drive containing the HCF folder into the DPI 620 Genii.

    4.   From the Software Upgrade menu, select the HART® Device Library (DK401).

    5.   Follow the on-screen instructions.

    6.   Upgrade will take approximately 30 minutes.

b.   Method 2 – Using a PC and USB cable.

    1.   Download the HART® Library update files from the website and extract the zipped folder onto a PC hard drive.

    2.   Connect the DPI 620 Genii Client USB port to the PC USB port. The DPI 620 Genii will connect to the PC as a USB flash memory device.

    3.   Copy the HCF folder into the root directory of the DPI 620 Genii USB flash memory device. The required directory structure on the DPI 620 Genii USB flash memory device is shown in Figure 2-14.

Note: If a mistake is made during upgrade and there are no files to upload, follow the on-screen instructions and complete the procedure.

Note: When an upgrade completes normally, the initial operation of the touch screen may be slower (a period of approximately 30 seconds).

Note: To make sure the upgrade completed correctly, go to the Status menu on the Dashboard to check the revision of the application that has been updated.

2.2.7 Devices

The Devices menu is accessible from the dashboard by pressing the Devices ![icon] icon.
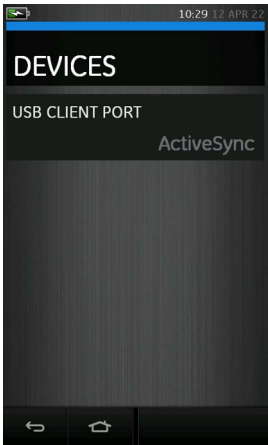
Figure 2-15: Devices Menu

2.2.7.1 USB Client Port

The DPI 620 Genii USB port can be configured into one of three modes:
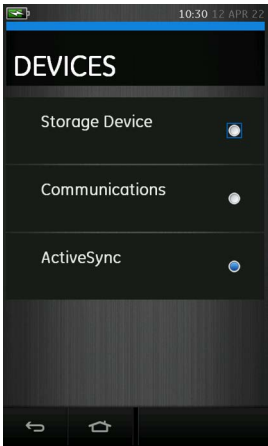
Figure 2-16: USB Client Port Configuration Menu

USB Client Port Option	Description
Storage Device	View and access the internal file system of the DPI 620 Genii storage when connected to a PC.
Communications	For use with 4Sight2™ software communication.
ActiveSync	For use with Microsoft® Windows® CE™ applications.

2.2.8 Files

The DPI 620 Genii user settings can be accessed and modified by selecting the Files 📁 icon.
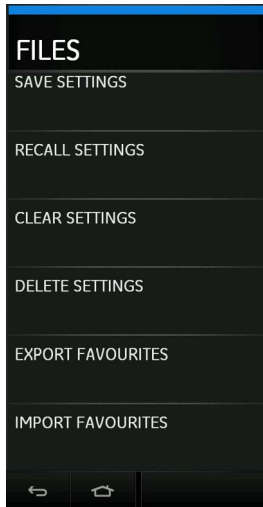
Figure 2-17: Files Menu

2.2.8.1 Save Settings

Saves all the current user settings on the device.

2.2.8.2 Recall Settings

Previously saved user setting files can be restored to the device.
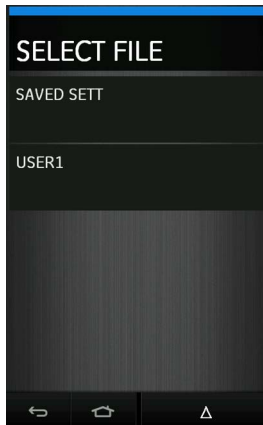
Figure 2-18: Selecting a Saved User Settings File to Recall

2.2.8.3 Clear Settings

Clears the current user settings and returns the device back to factory default settings.
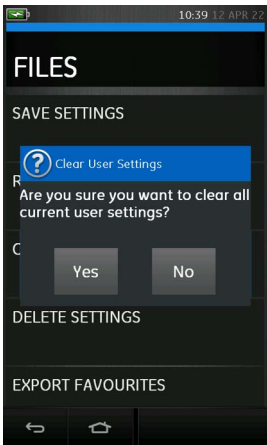
Figure 2-19: Clear Settings Confirmation

2.2.8.4 Delete Settings

Erases selected existing saved settings files.

2.2.8.5 Export Favourites

Exports Favorites that have been saved on the device. A USB flash drive must be inserted into the DPI 620 Genii, and detected successfully, to complete this action.
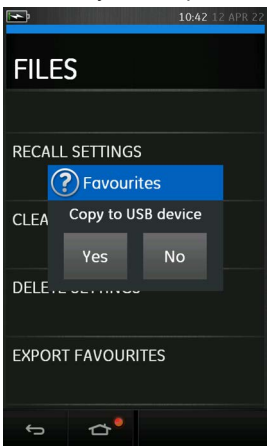
Figure 2-20: Exporting Favorites to USB Flash Drive

The following folders are created on the USB flash drive:

Figure 2-21: Folders Created for Exported Favorites

2.2.8.6 Import Favourites

Imports Favorites files that have been previously saved on a USB flash drive into the device. A USB flash drive containing the correct Favorites setup folder must be detected successfully to complete this action.

2.2.9 Touchscreen

This feature helps to test the operation and touch response of the touchscreen. Follow the instructions on the test screen to carry out the test.
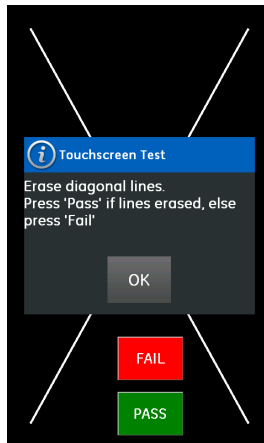
Figure 2-22: Touchscreen Test

3. Calibrator

3.1 Basic Calibrator Operation

Select CALIBRATOR from the Dashboard.

3.1.1 Layout

The calibrator screen displays measurement or source functions which are grouped in channels. It is possible to display more than one channel on the calibrator screen. There is a total of six separate channels listed as follows:

• Electrical - Channels "CH1" and "CH2".

• Pressure (via PM 620 / PM 620T and MC 620G) - Channels "P1" and "P2".

• External Sensor (USB) - supports sensors such as TERPS, IDOS or RTD-INTERFACE.

• Communications - supports HART®, FOUNDATION™ Fieldbus and Profibus®.

There are two display views in the CALIBRATOR screen when multiple channels are in use. Figure 3-1 shows a normal view with three selected channels.

To expand the view on a particular channel, tap anywhere in the channel window area.
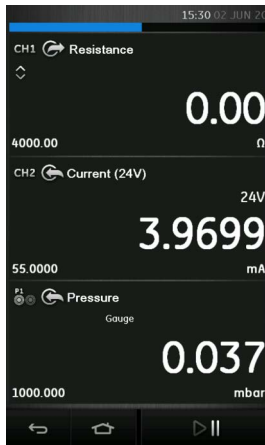
Figure 3-1: Calibrator Window – Normal View (Three Channels)

Figure 3-2 displays an expanded view of the selected channel (CH2) and minimizes the remaining channels (CH1 and P1).
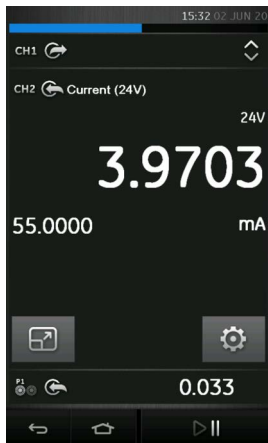
Figure 3-2: Calibrator Window – Expanded View on CH2

•   Selecting ⬀ displays all channels in the reduced view.

3.1.2 Calibrator Screen Information

1 Function Symbol	2 Channel Direction
3 Channel Function	4 Sensor Type
5 Utility Icon	6 Measurement Reading
7 Measurement Unit	8 Channel Settings
9 Hold/Pause Readings	10 Home or Dashboard
11 Back	12 Additional Measurement Data
13 Sensor Full-scale	14 Process Icon
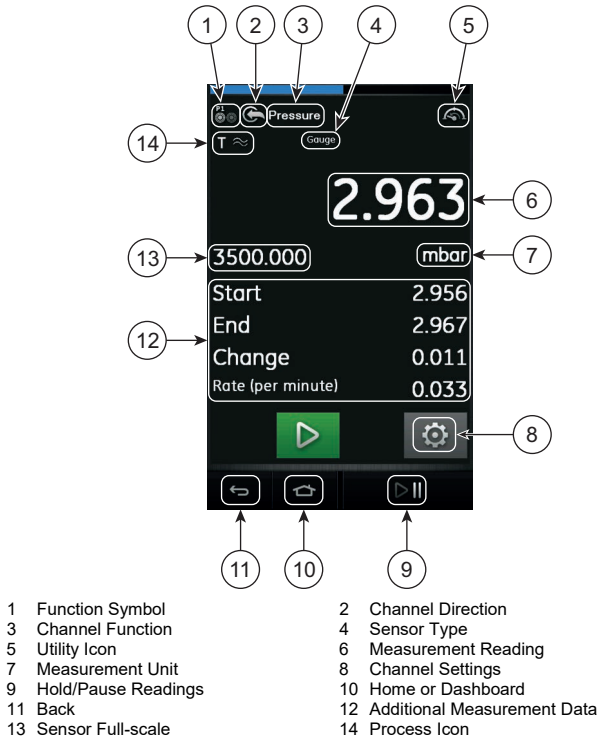
Figure 3-3: Calibrator Screen Information Example

3.2 Error Indications

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

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

3.3 Task Menu

Access the Task Menu by swiping the display from right to left from the calibrator screen.
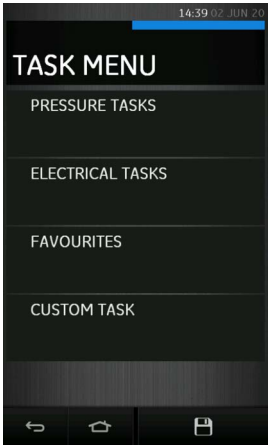
Figure 3-4: Task Menu

3.3.1 Pressure Tasks

Select Pressure Tasks from the Task Menu to display a list of pre-defined pressure related tasks.

The Pressure Task option will only be available if a pressure sensor is detected such as the PM 620, PM 620T, IDOS UPM or TERPS USB.
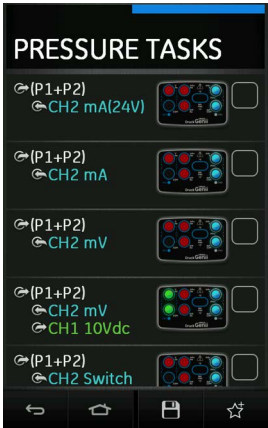
Figure 3-5: Pressure Tasks

Select the required function by selecting either the appropriate text or diagram. The DPI 620 Genii will set the functions and return to the Calibrator screen.

3.3.2 Electrical Tasks

Select electrical tasks from the Task Menu. This will allow the user to select from commonly used combinations of electrical functions.

Figure 3-6: Electrical Tasks

Select the required function by selecting either the appropriate text or diagram. The DPI 620 Genii will set the functions and return to the Calibrator screen.

3.3.3 Saving Tasks

At any point within the Task Menu the currently active tasks can be saved to Favourites (refer to Section 3.3.4) by selecting Save Task 💾 icon.

Note: The saved function is what is currently active in the Calibrator window. It is NOT a selected Task. Refer to Add to Favourites in Section 3.3.4.

3.3.4 Favourites

Function or task set up can be copied to Favourites by selecting the box as shown in Figure 3-8 and selecting Add to Favourites ☆ icon.

Figure 3-7: Selected Task

If the required task is not available as a default, a new task can be created using Custom Task. Refer to Section 3.3.5.

1. Selecting FAVOURITES from the Task Menu displays all saved and copied tasks and allows the required one to be selected.

2. Select the required function by tapping on either the appropriate text or image. The DPI 620 Genii will set the functions and return to the Calibrator screen.

Figure 3-8: Favourite Tasks

3. Favourite tasks can be deleted by selecting the tick box as shown in Figure 3-8 and selecting the 🗑 Delete icon.

4. Pressing the save icon will save the currently configured user task with a prompt to save as a named filename.

3.3.5 Custom Task

1. Select CUSTOM TASK from the Task Menu.

    This allows the user to individually set up CH1 and CH2 in addition to the Pressure Channels P1 and P2, USB (IDOS or TERPS) and Communications (HART®, FOUNDATION™ Fieldbus or Profibus®).

Figure 3-9: Task Settings Menu

Table 3-1: Calibrator Channel Description

Channel	Description
CH1	Set up CH1 by entering the channel settings menu.
CH2	Set up CH2 by entering the channel settings menu.
P1 ◎◎	P1 is used for pressure measurements with pressure module connected on position P1 on the pressure module carrier. Refer to Section 5.
P2 ◎◎	P2 is used for pressure measurements with pressure module connected on position P2 on the pressure module carrier. Refer to Section 5.
◎	Used for external sensors i.e. IDOS, TERPS or RTD-Interface. Refer to Section 5 and Section 6.
⊘	Used for HART®, FOUNDATION™ Fieldbus and Profibus® PA. Refer to Section 9, Section 10 and Section 11.

2. The Channel Settings menu allows the user to set up the selected channel for measurement.

Figure 3-10: Channel Settings Menu

•   DIRECTION selects 🠖 source or 🠔 measure for the selected function.

•   FUNCTION selects the channel function required (e.g. Current or Voltage). For more options scroll down the menu by swiping the display from bottom to top. Each channel will have a different list of functions available which is unique to the channel type e.g. Electrical channels CH1 and CH2 will not have any pressure related functions and Pressure channels P1 and P2 will not have any electrical functions.

•   UNITS selects the type of measurement unit required (e.g. Hz, kHz). The unit options available to select will depend on the function selected. Please note that there may only be one type of unit available in particular functions (e.g. mA for current).

•   UTILITY selects the required function utility. Refer to Section 3.5 for details.

•   CAPTION allows the user to change the caption or label of the channel, if required. Caption is the title text that appears next to the channel and direction icon at the top of each channel window.

Figure 3-11: Channel Caption/Label Example

- • RESET CAPTION allows the user to change the caption back to the factory default caption.

3. Once all settings have been selected, press ✓ button at the bottom of the screen to save and return to the Task Settings screen.

4. Repeat the above if another channel is required.

   Note: For the settings to be in effect, the user must press the ✓ button in the TASK SETTINGS menu.

3.4 Channel Function

Individual channels have Direction options for each function as either Measure or Source/Simulate.

Note: Pressure tasks are Measure only functions

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 ⚙ in the expanded view of the selected channel in Calibrator mode.

3.4.1 Automation

Source Functions have additional settings available which include the following options:

- • Nudge - allows the source value to be incremented by a defined step size value.
- • Span Check - allows two-point span check. The LOW (minimum) and HIGH (maximum) span values can be set as well as the DWELL time.
- • Percent Step - allows the source value to be incremented in steps that correspond to a set percentage of the span. There is also the option to auto-repeat the automation process.
- • Defined Step - allows the source value to be incremented at a defined step size within the span limits. There is also the option to auto-repeat the automation process.
- • Ramp - allows the source value to be automatically incremented from a defined START value to a defined END value in steps of defined value in both increasing and decreasing direction. The TRAVEL time can be set to define the period of time it takes the value to go from START to END and vice versa while the DWELL time defines the period for the source value to remain at the END value.
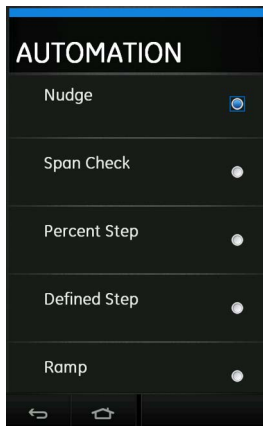
Figure 3-12: Source Automation Settings

3.5 Utility Options

For each function only one utility may be active at any time. Not all source and measure functions have associated utilities.

For all utility options the ⟳ button resets the additional readings provided by the selected utility.

The utilities available are:

- Max/Min/Avg
- Leak Test (see Section 5.7)
- Switch Test
- Relief Valve Test

3.5.1 Max/Min/Avg

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

When this utility is selected, the real-time minimum, maximum, and average values of the measured signal is displayed in addition to the live measured reading.

Figure 3-13: Max/Min/Avg Example

3.5.2 Switch Test

The ⟋∘⟍ Switch Test is available with measure or source functions.

The additional readings 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 the 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.
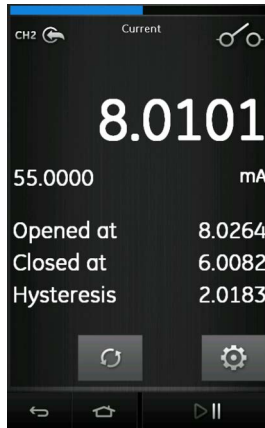
Figure 3-14: Switch Test Example

3.5.3 Relief Valve

The $\bigwedge$ Relief Valve utility is only available with measure functions.

This utility tests circuits or mechanisms that have a cut-out response when an input reaches a defined threshold value. The utility allows the user to select a mode of operation which can be rising or falling. The utility displays additional values that represent the maximum and minimum values achieved by the input signal.
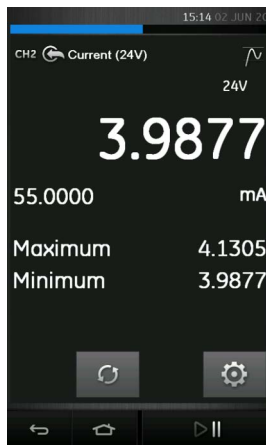
Figure 3-15: Relief Valve Example
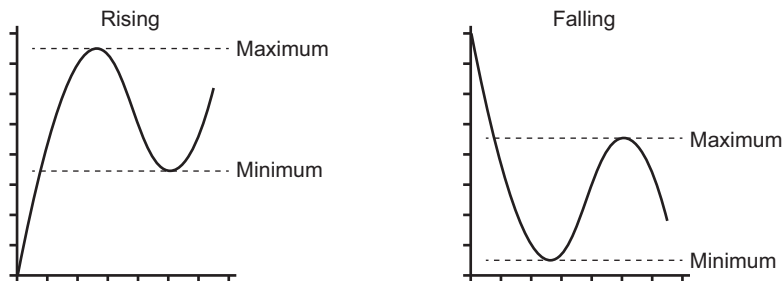
Figure 3-16: Relief Valve Utility

3.6 Process Options

Process options are related to the measured values for individual channel functions. Options available depend on the function and include:

Option	Description
Tare	Used to set a temporary value for zero. This makes an adjustment to all subsequent readings on the display.
Alarm	Used to indicate when a limit has been exceeded
Filter	Sets the Band and Time Constant for a low pass filter
Flow	When selected, the square root of the measured value is displayed.
Scaling	Absolute values are scaled.

4. Electrical Tasks

The DPI 620 Genii provides the following electrical 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.

4.1 Measure or Source Current

Figure 4-1 shows CH1 set up to measure a current with external loop power.
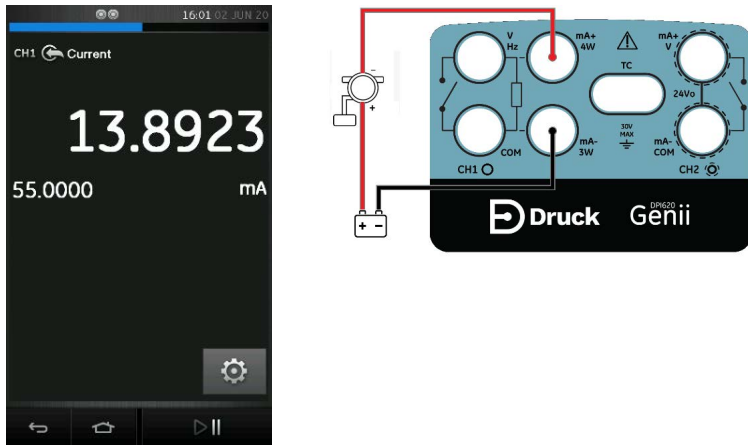
Figure 4-1: Measure Current on CH1 (Range ± 55 mA)

1. Set the applicable channel options: CH1 (or CH2), Measure (or Source), Current, mA.
2. Complete the electrical connections as shown and continue with the measure or source operation.

4.2 Measure DC Voltage

Figure 4-2 shows CH1 set up to measure a DC voltage (0 to 30 V) or DC mV (0 to 2000 mV).
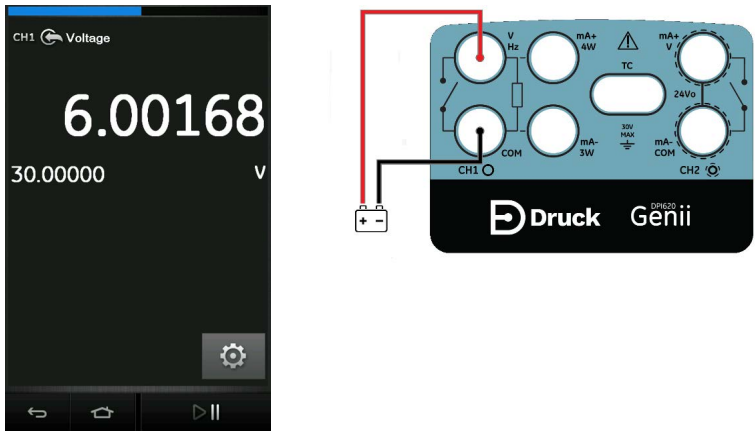
Figure 4-2: Measure DC Volts or DC mV on CH1 (Range ± 30 V)

Note: When using the CH2 connectors, set up CH2 to measure this range.

1. Set the applicable channel option: CH1, Measure, Voltage (or Millivolts), V (or mV).
2. Complete the electrical connections and continue with the measure operation.

4.3 Measure AC Voltage (CH1) – 20 V RMS Maximum

⚠ **WARNING** **To prevent electrical shocks, use only the Druck specified AC probe (Part: IO620-AC) to measure AC voltages that are more than 20 V RMS (maximum: 300 V RMS). Refer to Section 4.4.**

Figure 4-3 shows CH1 set-up to measure an AC voltage (0 to 20 V RMS) or AC mV (0 to 2000 mV RMS).
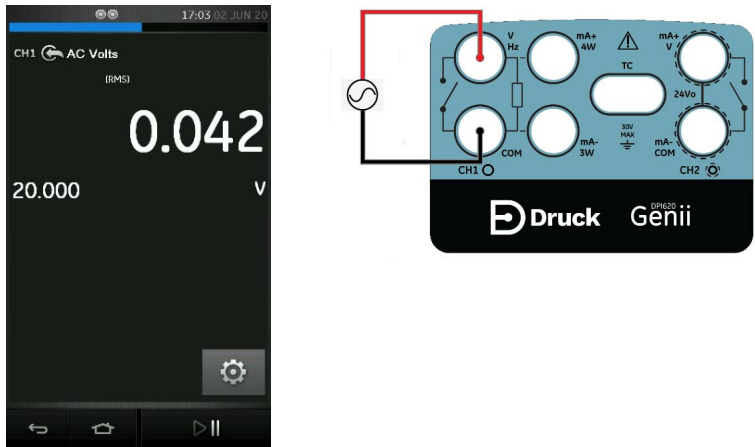
Figure 4-3: Measure AC Volts or AC mV on CH1 (Range ± 20 V RMS)

1. Set the applicable channel options: CH1, Measure, AC Volts, V.

2.   Complete the electrical connections and continue with the measure operation.

4.4 Measure AC Voltage (CH1) – 300 V RMS Maximum

⚠️ **WARNING** **To prevent electrical shocks, use only the Druck specified AC probe (Part: IO620-AC) to measure AC voltages that are more than 20 V RMS (maximum: 300 V RMS). Attach it to the specified connections only.**

Figure 4-4 shows CH1 set-up to measure an AC voltage with the AC probe Maximum: 300 V RMS.
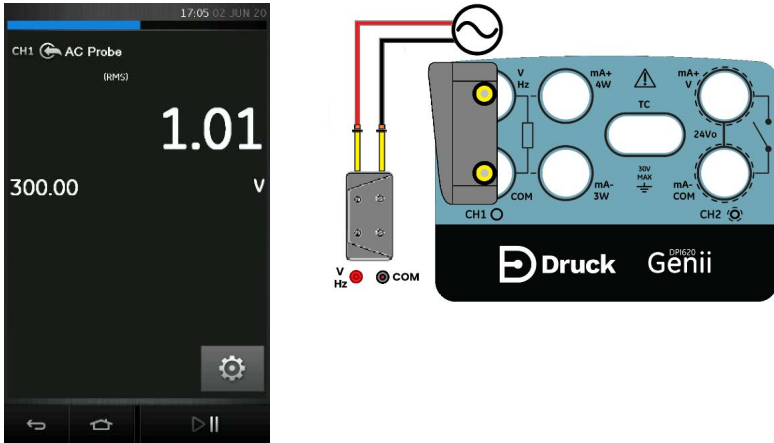
Figure 4-4: Measure AC Volts with AC Probe (Range 300 V RMS)

1.   Set the applicable channel option for the AC Probe.
2.   Complete the electrical connections Red - V/Hz connector, Black - COM connector. Then continue with the measure operation.

4.5 Source DC Voltage (CH1)

Figure 4-5 shows CH1 set up to source a DC voltage on CH1 (0 to 20V).
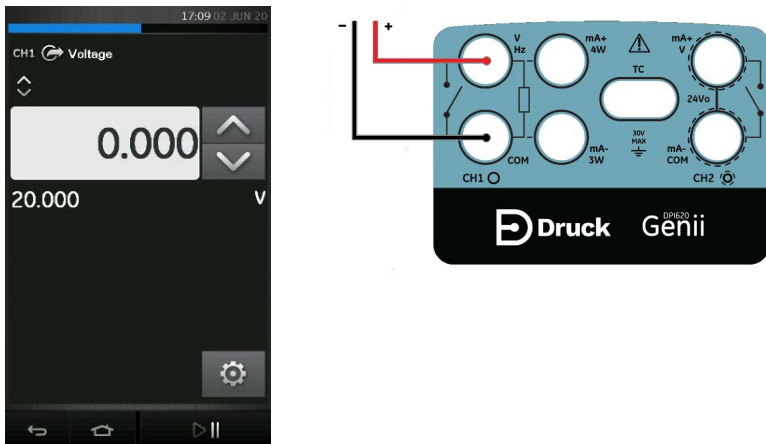
Figure 4-5: Source Voltage on CH1 (Range 0 to 20 V)

1. Set the applicable channel option to Voltage source.

2. Complete the electrical connections.

3. To continue, set the applicable output value.

4.6 Measure or Source Current with Loop Power

When using CH2, current measure or source function can be set with the option of internal loop power supply.

Loop power has three possible settings:

1. None (current only)

2. 24 V

3. 28 V
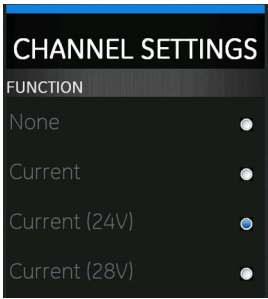
Figure 4-6: Current Loop Supply Options

Figure 4-7 and Figure 4-8 show CH2 set up to measure (± 55 mA) or source (0 to 24 mA) a current with internal loop power (Selectable to 24 V or 28 V).

1. Set the applicable channel options.

2. Complete the electrical connections and continue with the measure or source operation.

3. Source only (Automation): Set the applicable output value.

Note: The current limit of the Loop power is 30 mA.
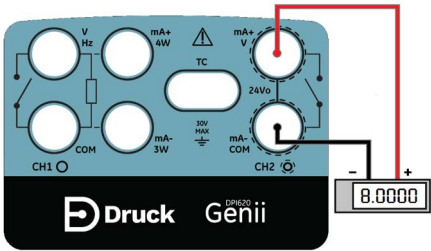
Figure 4-7: Source Current on CH2 with Internal Loop Power (Range: 0 to 24 mA)
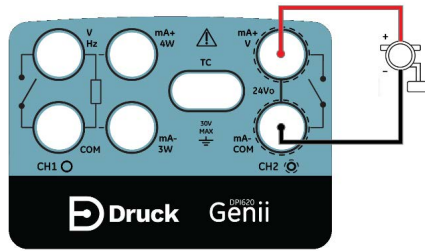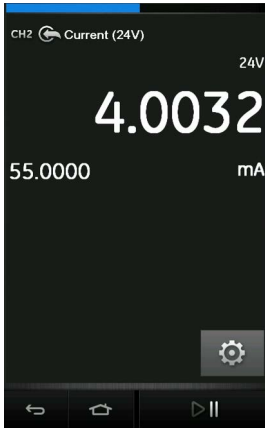
Figure 4-8: Measure Current on CH2 with Internal Loop Power (Range: 55 mA)

4.7 Measure Frequency on CH1
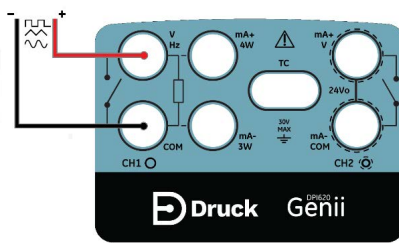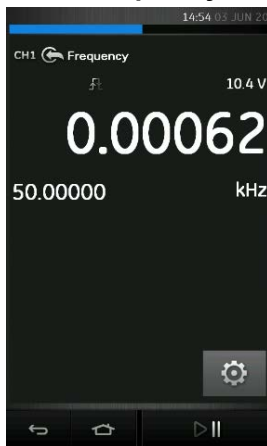
Figure 4-9: Example A – Measure Frequency on CH1 (Range 0 to 50 kHz)

1. Set applicable channel options: CH1, Source, Frequency, Hz (or other unit).
2. Complete the electrical connections.
3. Default channel settings:
    *   Range: 0 to 50 kHz
    *   Trigger level: 2.5 V

    If necessary, adjust the Trigger level value by pressing the SETTINGS ⚙ icon and selecting MANUAL LEVEL.
4. AUTO TRIGGER can be enabled or disabled.
    Note: Manual Level setting is for Manual Trigger only.

4.8 Source Frequency on CH1
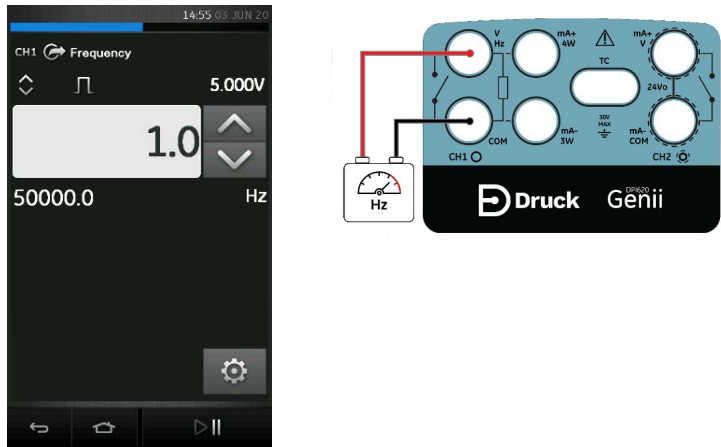
Figure 4-10: Example B – Source Frequency CH1 (Range 0 to 50 kHz)

1. Set the applicable channel options.
2. Complete the electrical connections.
3. Default channel settings:
   - Range: 0 to 50 kHz
   - Waveform: Square
   - Amplitude: 5.0 V

If necessary, change the Waveform Setup in the SETTINGS ⚙. See Figure 4-11.
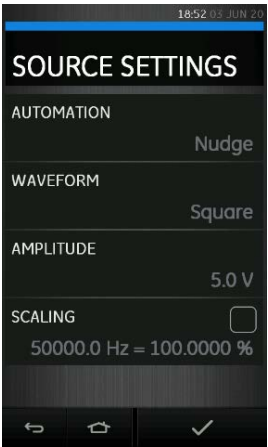
Figure 4-11: Source Frequency Settings

- WAVEFORM - Waveform options include:
   a. Square
   b. Triangle

   c. Sine

*   AMPLITUDE - Select the Peak-to-Peak value.
*   OFFSET - Set an offset value (only applies when Sine and Triangle waveforms are selected).

4.9 Measure or Simulate a Resistance Temperature Detector (RTD)

Figure 4-12, Figure 4-13 and Figure 4-14 show CH1 set up to measure an RTD. A 4-wire configuration gives the best accuracy; a 2-wire configuration has the lowest accuracy.
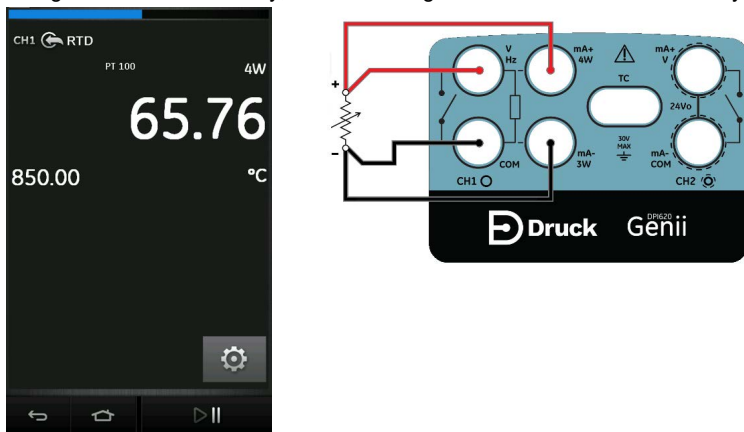
Figure 4-12: PT100 RTD Measure CH1 4-Wire (Range -200 to 850°C)
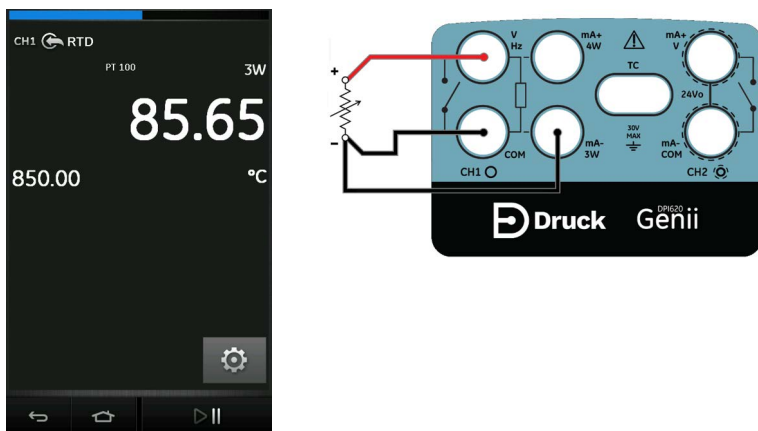
Figure 4-13: PT100 RTD Measure CH1 3-Wire (Range -200 to 850°C)
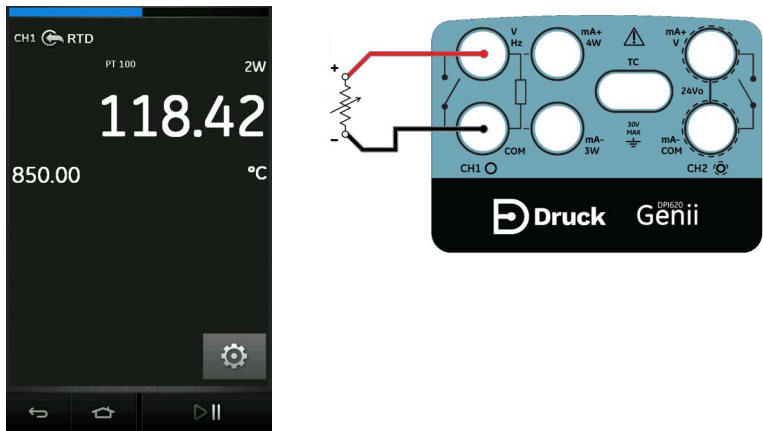
Figure 4-14: PT100 RTD Measure CH1 2-Wire (Range -200 to 850°C)

1. Set the applicable channel options.
2. Complete the electrical connections.
3. If necessary, change the RTD Type (default is PT100).
4. SETTINGS ⚙ > RTD TYPE

    The MEASURE OHMS MODE can also be selected as Standard or True Ohms.

Note: To measure or simulate resistance Ω, select the Resistance function (Range 0 to 4000 Ω).

A custom RTD setting may be used by selecting the CUSTOM RTD tick box and configured by importing the relevant custom RTD file.
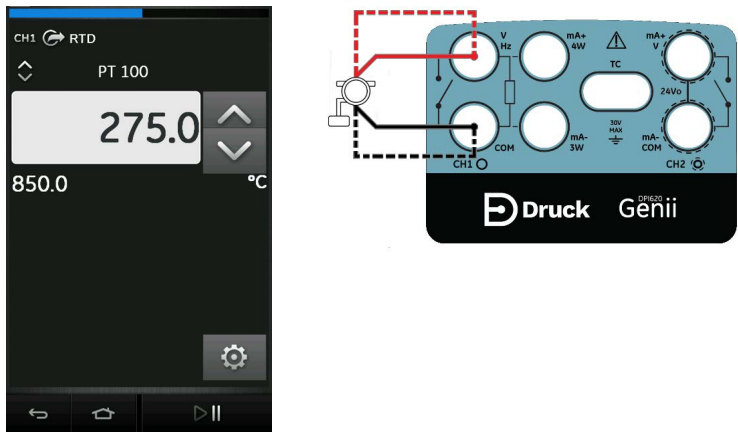
Figure 4-15: PT100 RTD Source CH1 4-Wire (Range -200 to 850°C)

4.10 Measure or Simulate a Thermocouple (TC)

Figure 4-15 and Figure 4-16 show CH1 set up to measure or simulate a TC temperature.
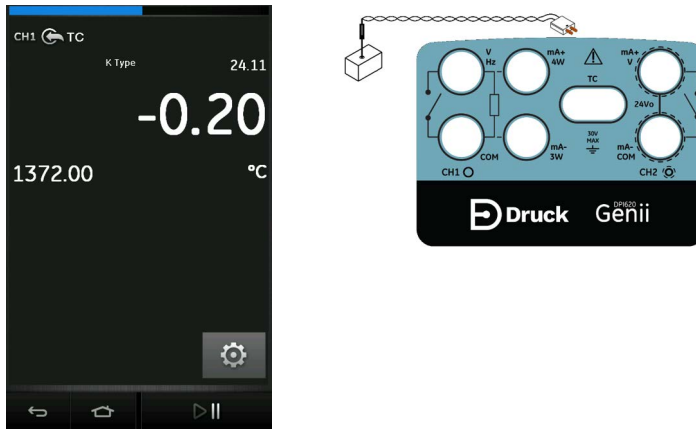
Figure 4-16: K-Type Thermocouple Measure CH1 (Range -270 to 1372°C)
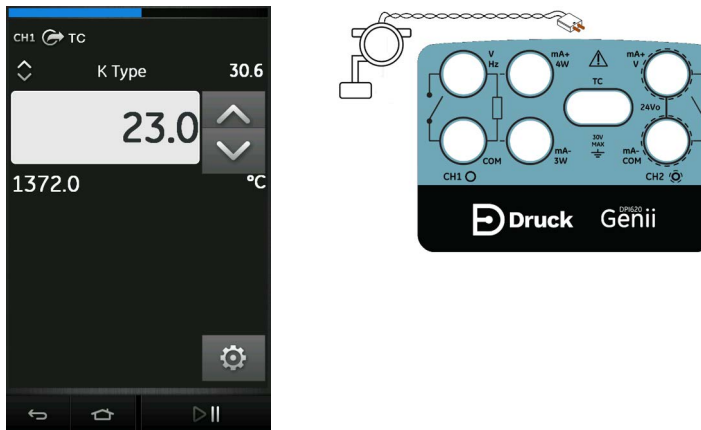
Figure 4-17: K-Type Thermocouple Source CH1 (Range -270 to 1372°C)

Note: To measure or simulate TC millivolts, set the TC mV function.

1. Set the applicable channel options.
2. Complete the electrical connections as shown.
3. If necessary, change the thermocouple type. Default is K-Type.

   SETTINGS ⚙ > TC TYPE

4. Set CJ (Cold Junction) compensation mode i.e. choose between Manual and Automatic mode.
5. Set the Manual CJ compensation value if Manual mode has been selected in the previous step.

SETTINGS ⚙ > MANUAL CJ COMPENSATION

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

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

6. Select Burnout Detection if required by tapping the associated check box.

4.11 Switch Test

When setting the Switch Test utility on any channel, the software automatically sets up a separate channel for the switch connections.

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

• CH2 functions use the CH1 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:
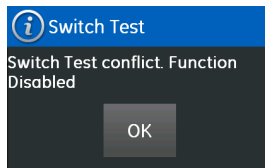
Figure 4-18: Switch Test Channel Conflict Message
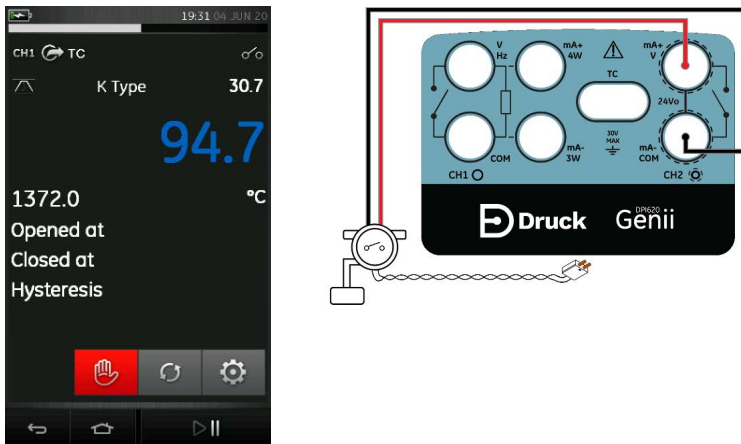
Figure 4-19: Thermocouple Switch Test

1. Set the applicable channel options:
    • The TC function 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. TC is a CH1 function, so 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:

Opened at	8.0264
Closed at	6.0082
Hysteresis	2.0183

    a. Value for switch Open point.
    b. Value for switch Close point.
    c. Hysteresis value.

To perform the test again, press the restart button ↻.

5. Pressure Tasks

5.1 Introduction

This chapter gives examples of how to connect and use the instrument to measure pressure. This can be with the use of the module carrier (MC 620G) and applicable pressure modules (PM 620 or PM 620T) or with the use of an external pressure sensor.

Figure 5-1: MC 620G with PM 620 Pressure Modules

To make a fully integrated pressure calibrator instrument with one of the three Pressure Stations, refer to the User Manual K0457 for the PV 62XG Series of Pressure Stations.

Figure 5-2: DPI 620 Genii with MC 620G Module Carrier and PM 620 Pressure Modules

Figure 5-3: DPI 620 Genii with PV 62XG Pressure Station and PM 620 Pressure Module

5.2 Module Carrier and PM 620 / PM 620T Pressure Modules

⚠️ **CAUTION** **To prevent damage to the PM 620 or PM 620T module, only use it within the specified pressure limit on the label.**

This section shows the parts of the module carrier (MC 620G) and pressure module (PM 620 / PM 620T). See Figure 5-4 below.
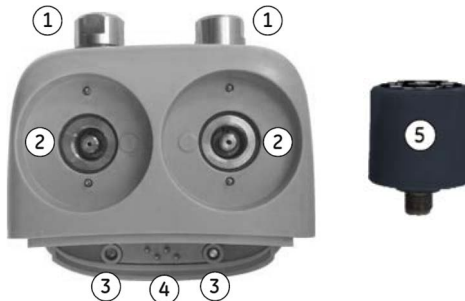
1 Pressure connection (G1/8 or 1/8 NPT) to attach external pressure equipment.
2 Pressure and electrical connections for a pressure module (PM 620 / PM 620T).
   These are self-sealing pressure connections.
3 Two screws to attach the calibrator (DPI 620 Genii).
4 Electrical connections for the calibrator (DPI 620 Genii).
5 Pressure module (PM 620 / PM 620T) with a pressure connection and reference
   port.
   The PM 620 / PM 620T Label identifies:
   - Sensor type (g: gauge, a: absolute)
   - Pressure Range
   - Serial Number
   - Manufacturer

Figure 5-4: Pressure Module Carrier MC 620G and PM 620 / PM 620T Pressure Module

When the items are attached to the DPI 620 Genii it is a fully integrated pressure indicator, measuring pneumatic or hydraulic pressure.

5.2.1 Assembly Instructions

Figure 5-5: MC 620G Assembly 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 / PM 620T modules (4) with the correct range and type.

4. Tighten each PM 620 / PM 620T module (4) hand-tight only.

5. The ◎ ◎ symbol flashes at the top of the display, when communication between the PM 620 / PM 620T module and the calibrator is established.

5.3 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. See Figure 5-6.

Figure 5-6: Quick Fit Pressure Adaptor

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 620G carrier and hand-tighten.

a. NTP

b. (G)/BSPP
    P ≥ 100 bar

c. (G)/BSPP
    P ≤ 100 bar
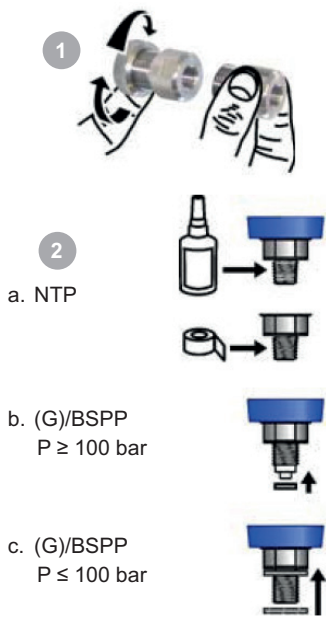
Figure 5-7: Pressure Connections

When the pressure indicator assembly is complete use the menus to set up the necessary operations. Refer to Section 3.3 and Section 3.3.1.

5.4 Measure Pressure – PM 620 or PM 620T
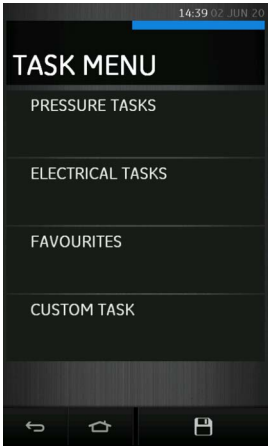
Figure 5-8: Task Menu

When PM 620 / PM 620T pressure modules are fitted or an external pressure sensor is connected, the Pressure Tasks option is displayed in the Task Menu. Refer to Section 3.3.1 for details.
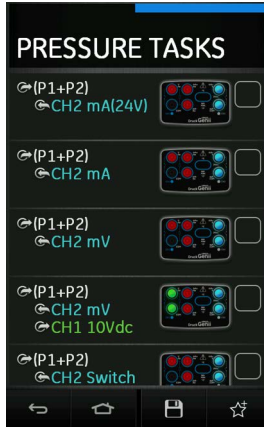
Figure 5-9: Pressure Tasks

Select the required function by selecting on either the appropriate text or diagram. The DPI 620 Genii will set the functions and return to the Calibrator screen.

Pressure Functions can also be selected through the Custom Task function. Refer to Section 3.3.5 for details.

Tasks can be saved or copied into the Favourites. Refer to Section 3.3.4 for details.

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

• Max/Min/Avg
• Switch Test
• Relief valve
• Leak Test
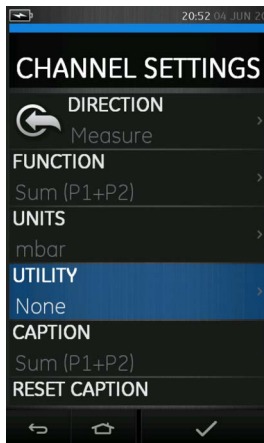
Figure 5-10: Channel Settings

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

5.5 Measure Pressure – IDOS

Optional item - An IDOS Universal Pressure Module (UPM) uses Intelligent Digital Output Sensor (IDOS) technology to measure the applied pressure and supply the data to an IDOS instrument.

Before using an IDOS module, please refer to the user manual (K0378, Druck IDOS UPM).

Note: To attach an IDOS module to the DPI 620 Genii calibrator, use an IO620-IDOS-USB adaptor.

Figure 5-11: IDOS Universal Pressure Module

5.5.1 IDOS Option Instructions

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

5.5.2 IDOS Function Procedures

Set the applicable channel options:

1. On the external sensor channel ◉, select IDOS function or any IDOS related option from the Task menu.
2. If necessary, change the Units for the function.
3. If necessary, set a Utility for the function i.e. Max/Min/Avg, Switch Test or Leak Test.
4. If required, change the Process settings for the IDOS function (Tare, Alarm, Filter, Flow, Scaling).
5. The zero procedure is the same for an IDOS module as for a PM 620 / PM 620T module. Zero a gauge sensor before use. See Section 5.8 for details on zero operation.

Note: These procedures and settings are the same for an IDOS module or for a MC 620G / PM 620 / PM 620T assembly. After channel set up is complete, continue with the pressure operation.
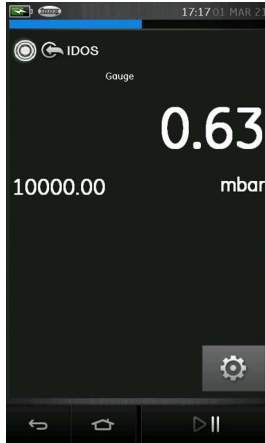
Figure 5-12: IDOS Pressure Measurement on External Sensor Channel

5.6 Measure Pressure – TERPS USB

TERPS (Trench Etched Resonant Pressure Sensor) UPM is a resonant silicon pressure sensor that provides high accuracy and high precision pressure measurement with a digital output. It can be used with the DPI 620 Genii using USB communication to enhance the calibrator functionality.

Before using a TERPS module, please refer to the user manual (K0473, Druck TERPS 8000/8100/8200/8300 Series).

Note: To attach a TERPS module to the DPI 620 Genii calibrator, use a Micro-USB cable to connect the module to the DPI 620 Genii.

Figure 5-13: TERPS USB (UPM)

5.6.1 TERPS Option Instructions

1. Attach one end of the micro-USB cable to the TERPS module.
2. Push the other type A end of USB cable into the USB socket on the instrument.
3. Power on the instrument.

5.6.2 TERPS Function Procedures

Set the applicable channel options:

1. On the external sensor channel ◉, select the TERPS function or any TERPS related option from the Task menu.
2. If necessary, change the Units for the function.

3. If necessary, set a Utility for the function i.e. Max/Mean/Min, Switch Test or Leak Test.

4. If required, change the Process settings for the TERPS function (Tare, Alarm, Filter, Flow, Scaling)

5. The zero procedure is the same for a TERPS module as for a PM 620 / PM 620T module. Zero a gauge sensor before use. See Section 5.8 for details on zero operation.

Note: These procedures and settings are the same for a TERPS module or for a MC 620G / PM 620 / PM 620T assembly. After channel set up is complete, continue with the pressure operation.
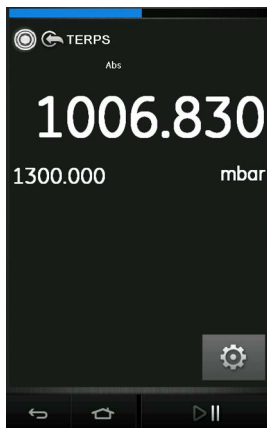
Figure 5-14: TERPS Pressure Measurement on External Sensor Channel

5.7 Leak Test

The Leak Test 🔍 utility is only available in pressure measurement modes.

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

To configure leak test:

1. Set the pressure channel Utility to Leak Test.

2. Select SETTINGS ⚙ and then 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 Leak Test.
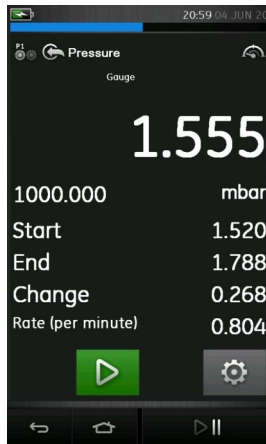
Figure 5-15: Example: Leak Test Results

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

5.8 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 zero adjustment is permitted only if the adjustment is less than 10% FS positive pressure value of the sensor.

Note: To make a temporary adjustment for zero, use the Tare function.
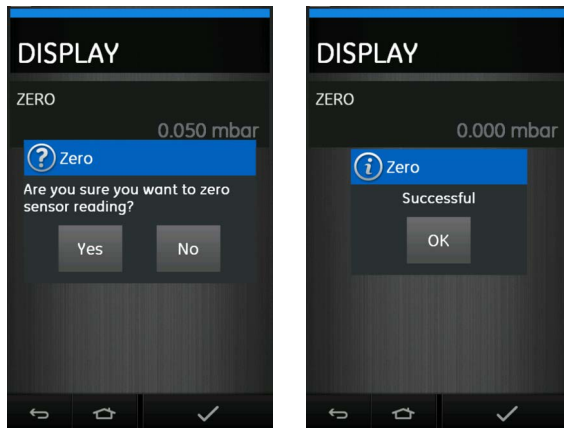
Figure 5-16: Pressure Module Zero Example

6. Temperature Tasks (RTD Interface)

The RTD-INTERFACE is a remote adaptor interface for use with the DPI 620 Genii to allow connection of a PT100 RTD probe to the instrument for the purpose of measuring temperature. The RTD-Interface can be supplied with a Druck 4-wire PT100 probe IO-RTD-PRB150.

Figure 6-1: RTD Probe and RTD-Interface

The RTD-INTERFACE is optionally supplied with a field-rewireable M12 connector for users to connect their own wire-ended RTDs. This is accessory part number IO-RTD-M12CON. The pin numbering is printed on the rear of the connector body.
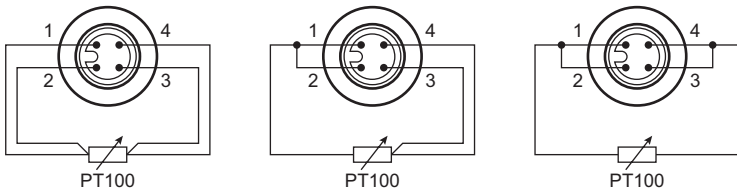
Figure 6-2: RTD M12 Connector Pinout

6.1 Setup

To use the RTD-INTERFACE option on the DPI 620 Genii, connect the remote RTD probe (IO-RTD-PRB150 or user-owned) to the RTD-INTERFACE adapter. Then connect the RS 485 end of the RS485-USB adapter cable (IO-RTD-USBCABLE) to the RTD-INTERFACE and the USB-A end to the USB-A port on the DPI 620 Genii.

Chapter 6. Temperature Tasks (RTD Interface)

Navigate to the Task menu in the Calibrator application. Select the RTD-INTERFACE option in the list of Functions on the External sensor channel settings menu.
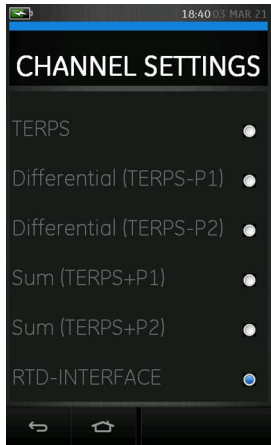
Figure 6-3: RTD-INTERFACE Channel Settings

6.2 Utilities

The only available UTILITY with the RTD-Interface option is Max/Min/Avg.
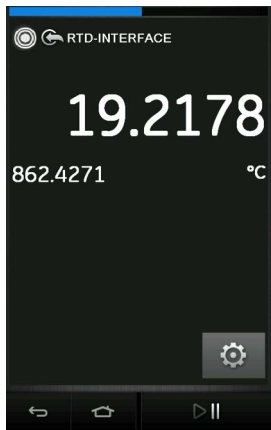
Figure 6-4: Example: RTD-INTERFACE on External Sensor Channel

6.3 Settings

The RTD-INTERFACE function can be configured by tapping the Settings button which gives the following:
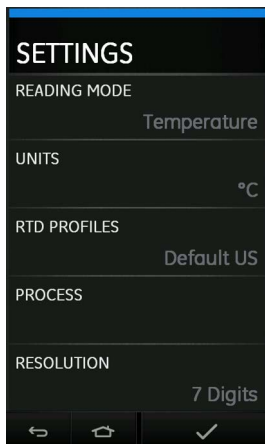
Figure 6-5: RTD-Interface Settings

• READING MODE

Allows the temperature measurement to be displayed as:

a.   Temperature (°C or °F)

b.   Resistance (Ohms)

• UNITS

Allows change of units depending on the Reading Mode selected.

• RTD PROFILES

Based on the Callendar-Van Dusen equation, the coefficients required for the RTD curve can be selected using a set profile.

There are two standard default profile options provided which cannot be edited. These are the "Default US" and the "Default EU".

6.4 User Profiles

There are up to ten customizable User Profiles which can be edited to suit the requirement.
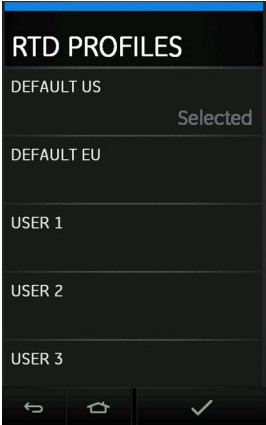
Figure 6-6: RTD Profile Selection
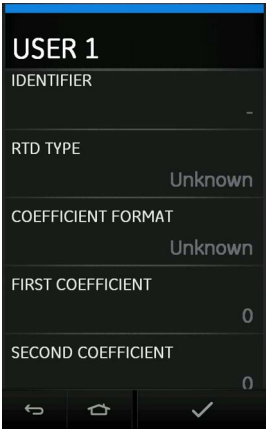
Figure 6-7: RTD Profile Set Up

7. Data Logging

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

This chapter describes how to use the Data Logging function to log data to a file.
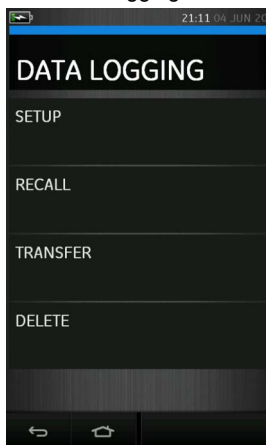
Figure 7-1: Data Logging

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

The data can be stored:

a.   Periodically

b.   Key press

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

7.1 Set-up

To begin a data logging session, ensure all relevant channels are set to the correct functions, refer to Section 3. Select Setup to access the Data logging setup menu.
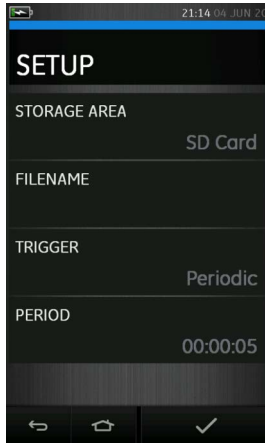
Figure 7-2: Data Logging Setup

* STORAGE AREA

    Used to set Internal, SD card or external USB Flash Drive if connected. Only the SD card can be read when connected to a PC.

* FILENAME

    Enter the required filename (10 characters maximum).

* TRIGGER

    Select one of the following:

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

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

* PERIOD

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

    To start Data Logging Mode:

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

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

    2. Select the ✔ button.

7.2 Operation

If in periodic mode, to begin data logging tap 'Start logging' ⟵⊙⌐ button.

In Key press mode, log a data point each time by tapping the log button ⟵.

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

To stop data logging at any time, tap the cancel ✕ button.

The data logging indicator ● flashes on the status bar to indicate whenever a reading is logged.

The data is stored in the internal memory, SD card, or external USB Flash Drive if connected, until the Data logging is stopped.

7.3 File Review

Data log files that have been saved can be viewed by selecting Recall from the Data logging menu.
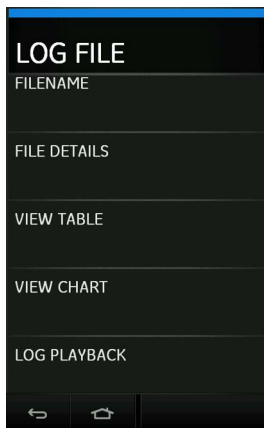
Figure 7-3: Data Log File Menu

To view a summary of the Data log file:

1. Tap on FILENAME to display the list of data files.
2. Select the file to be displayed.
3. Select FILE DETAILS to view the date/time stamp and total number of data points logged to that specific file.
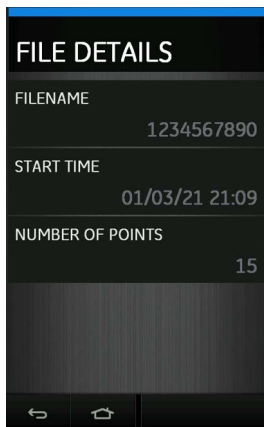
Figure 7-4: Data Log File Details

To view a data file as a table:

1. Tap on FILENAME to display the list of data files.
2. Select the file to be displayed.

3. Tap VIEW TABLE to see the data displayed in table format.
4. Tap the Next ▷ button to move to the next page of data points if applicable.
5. To go back a page, press the Previous ◁ button.

Figure 7-5: Data Log Table

To view a data file on as a chart:
1. Tap the Filename button to display the list of data files.
2. Select the file to be displayed.
3. Select VIEW CHART.
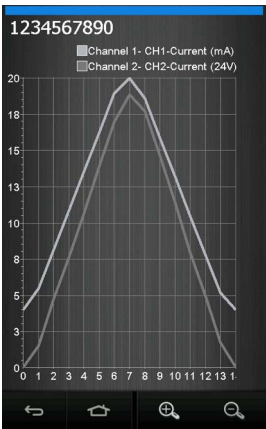
Figure 7-6: Data Log Chart

Press the Zoom In ⊕ button to magnify the graph or Zoom Out ⊖ button to decrease the view on the chart display.

Selecting Individual Points will highlight selected value.

To view a data file configured on the instrument during the initial data log session:
1. Tap the Filename button to display the list of data files.
2. Select the file to be displayed.

3. Select LOG PLAYBACK.
4. Use the Next ▷ button to step forward to the next data point and the Previous ◁ button to step back to the previous data point.
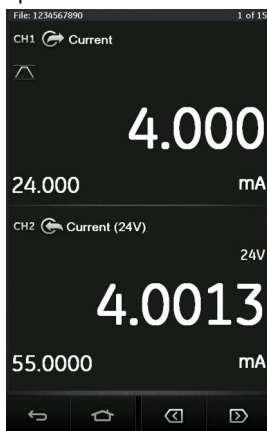
Figure 7-7: Data Log Play Back

7.4 Data Log File Management

The data log file management options are as follows:

*   TRANSFER

    Upload data log files to another device or computer to be processed externally.

*   DELETE

    Erase data log files.

7.4.1 Transfer

Data may be transferred using any of the following:

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

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

7.4.2 Delete

Data may be deleted by selecting the DELETE option from the Data logging menu.
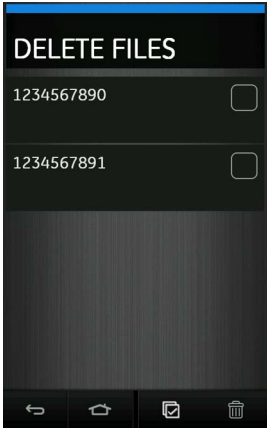
Figure 7-8: Delete Data Log Files

- DELETE ONE FILE

  Tap the tick box of the file to be deleted and press the Delete 🗑 button to delete the selected file.

- CLEAR INTERNAL

  To clear all files, tap the Select All ☑ button, then press the Delete 🗑 button to delete all the selected files.

7.4.3 Data Format

The data files are produced in a Comma Separated Variable (csv) format (See Figure 7-9). This allows the data to be imported into a spreadsheet (e.g. Microsoft® Excel). The first section of the data file contains the following:

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

The second section of the data file contains the following:

- Individual headings.

- Data point data.

```
FILENAME,1234567890
COLUMNS,3,14
START,10 Aug 2021, 10:00:00
VERSION,3
CHANNEL 0,Current,Out,mA,24
CHANNEL 1,Current (24V),In,mA,55
DATA,START
ID,Date,Time,Main Reading,Units,Caption,Main Reading,Units,Caption
0, 10 Aug 2021, 10:00:00, 4.000, mA, Current, 4.0013, mA, Current (24V)
1, 10 Aug 2021, 10:00:05, 5.499, mA, Current, 5.2774, mA, Current (24V)
2, 10 Aug 2021, 10:00:10, 8.117, mA, Current, 7.9861, mA, Current (24V)
3, 10 Aug 2021, 10:00:15, 10.841, mA, Current, 10.4681, mA, Current (24V)
4, 10 Aug 2021, 10:00:20, 13.519, mA, Current, 13.0331, mA, Current (24V)
5, 10 Aug 2021, 10:00:25, 16.213, mA, Current, 15.8164, mA, Current (24V)
6, 10 Aug 2021, 10:00:30, 18.919, mA, Current, 18.3990, mA, Current (24V)
7, 10 Aug 2021, 10:00:35, 20.000, mA, Current, 20.0065, mA, Current (24V)
8, 10 Aug 2021, 10:00:40, 18.599, mA, Current, 19.0423, mA, Current (24V)
9, 10 Aug 2021, 10:00:45, 15.888, mA, Current, 16.4401, mA, Current (24V)
10, 10 Aug 2021, 10:00:50, 13.191, mA, Current, 13.6680, mA, Current (24V)
11, 10 Aug 2021, 10:00:55, 10.472, mA, Current, 10.7516, mA, Current (24V)
12, 10 Aug 2021, 10:01:00, 7.777, mA, Current, 8.1810, mA, Current (24V)
13, 10 Aug 2021, 10:01:05, 5.164, mA, Current, 5.4783, mA, Current (24V)
14, 10 Aug 2021, 10:01:10, 4.000, mA, Current, 4.0016, mA, Current (24V)
```

Figure 7-9: Example 'csv' Data log File

8. Documenting

This chapter describes the Documenting functions available with the DPI 620 Genii calibrator and are as follows:

• ANALYSIS
• RUN PROCEDURE

8.1 Analysis

The Analysis function takes readings from two or more channels to calibrate the transfer characteristic of the device being tested. One channel is the Reference channel and the other channel is the Input channel.

The Reference channel:

• 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 could be P1 or P2 measuring the input pressure to the device or an external pressure channel e.g. IDOS.

The Input channel:

• Measures the output signal from the device.
• If calibrating a 4 to 20 mA 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 allows 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 test point value, the Analysis function calculates the difference of each Input channel to the ideal transfer characteristic and compares this to a tolerance limit.

This deviation is calculated and displayed as %Span or %Reading.

The tolerance test result is shown a Pass ›|✓|‹ or Fail ☒ icon.

8.1.1 Setup

1. Set the DPI 620 Genii channels in the Calibrator function. Refer to Section 3.
2. Connect the calibrator to the device under test.
3. Enter the Documenting function by tapping the icon 🖉 from the Dashboard.
4. Select ANALYSIS.

8.1.2 Define Reference Channel

1. Tap the channel button that is to be used as the Reference channel for the analysis.
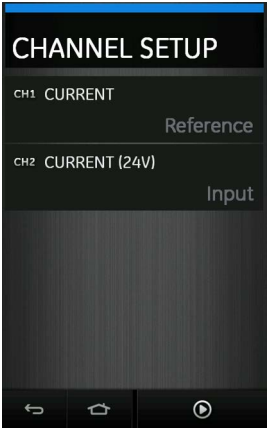
Figure 8-1: Select Reference Channel

2. Set the required channel type to Reference.
3. All other channel settings for this Reference channel will no longer be available. All other active channels are automatically set as Input channel(s).

8.1.3 Define Input Channel(s)

Tap each Input channel button to set the Input options.
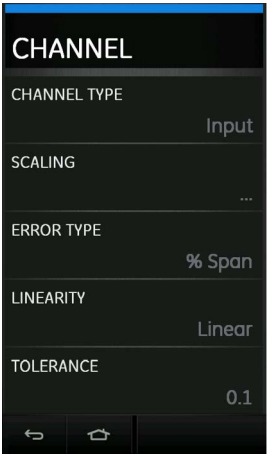
Figure 8-2: Select Input Options

- SCALING

  The scaling values are four set values:

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

  b. 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

  This the deviation from which the transfer characteristic is to be calculated. This can be displayed as one of the following options:

  a. % Span - a percentage of the Input signal span.

  b. % Rdg - a percentage of the Input signal reading.

- LINEARITY

  This is the transfer characteristic from Reference to Input signal. Select from the following options:

  a. Linear - a proportional response.

  b. Square Root - often found in flow sensors.

- TOLERANCE

  This provides test limits for the deviation from the transfer characteristic.

8.1.4 Analysis Function

Set Reference channel and Input channel parameters (refer to Section 8.1.2 and Section 8.1.3), 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:

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, maximize 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 (✕).

8.2 Run Procedure

The purpose of the 'Run Procedure' is to perform calibration procedures which have been downloaded from the 4Sight2™ software. The 4Sight2™ calibration procedure contains all the values required to calibrate a device under test (test points, ramp time etc).

The 'Run Procedure' function can be accessed from the Dashboard by selecting the 4Sight2™ 4 S 2 icon.

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

- A copy of the 4Sight2™ Calibration Software.
- USB lead: mini USB type B (DPI 620 Genii) to USB type A (PC).

The DPI 620 Genii calibrator device driver is supplied with the 4Sight2™ calibration software.

8.2.1 Sequence to Upload and Download File

1. Ensure the DPI 620 Genii USB setting is in Communications mode. See Section 2.2.7.

2. Connect a USB lead to the mini USB type B port on the DPI 620 Genii calibrator.

3. Connect the other end of the USB lead to a USB type A port on the computer that has the 4Sight2™ Calibration Software installed.

4. Use 4Sight2™ to set up the procedure and create a work order for the device.

5. The procedure includes the parameters for the calibration, the number of test points, the relationship and pass/fail tolerance.

6. Use the Download button in 4Sight2™ to download the file to the DPI 620 Genii calibrator. A communications symbol will be displayed at the bottom of the screen.

7. Select RUN PROCEDURE from the Documenting Menu, or by selecting the 4Sight2™ 4 S 2 icon from the Dashboard.

8. In the Results window, select the filename specified in 4Sight2™.

9. Enter/check the User ID and the DUT Serial Number. The ambient environmental parameters can also be edited.

10. Press the Next button to continue.

11. The Warning notes and Pre-Calibration notes are displayed.

12. Tap on the Start (▶) button. The Procedure sets up the necessary Channel options e.g. Current (mA), Voltage (Volts).

13. Use the Take Reading ⬇ button at each set point specified by the procedure. A prompt shows for each point.

14. When all the readings are complete, tap on the Exit Button (✕). Look at the results on the display (As found/As Left).

15. To complete the process, use the calibrator manager to Upload the file back into the 4Sight2™ database.

9. HART® Operations

The DPI 620 Genii 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 chapter includes procedures to use the HART® functions available in the calibrator.

9.1 HART® Menu Operations

The HART® uses a digital signal on top of a standard 4 - 20 mA current loop to transmit 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.

• Retrieve 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 DPI 620 Genii can be used to communicate with other HART® field devices:

• As a Primary Master the DPI 620 Genii 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 DPI 620 Genii is connected into an existing HART® communications network. The Secondary Master communicates with the field device in between Primary Master messages.

9.2 Start-up

HART® communication is started by selecting the HART® **HART** icon from the Dashboard.

Tasks can be selected for CH1, CH2, P1, P2 and external sensor. Refer to Section 3.

HART® can also be selected from the Calibrator function by selecting the COMMUNICATOR channel from Custom Task Settings.

9.3 HART® Connections

Before setting-up the electrical connections between the HART® device and the DPI 620 Genii get the correct connection scheme (Refer to DASHBOARD > HELP).

9.3.1 Power Supply from the Calibrator

A 24 V or 28 V loop power can be supplied to the HART® device using the CH2 Current (24 V or 28 V) measure function.

In the example that follows, the Druck DPI 620 Genii supplies the loop power and a 250 Ω HART® resistor.
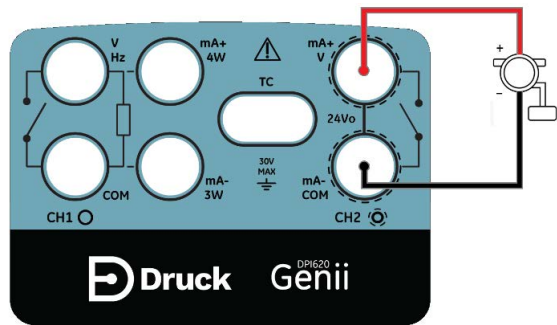
Figure 9-1: HART® Device Connection with Loop Power

9.3.2 External Loop Power

In the example that follows, there is an external power supply. Measure current on CH2 without 24 V loop power.

HART® function is enabled and 250 Ω resistor is enabled.
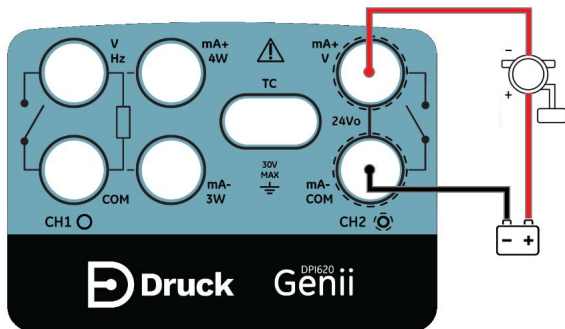
Figure 9-2: HART® Device Connection on CH2

9.3.3 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.
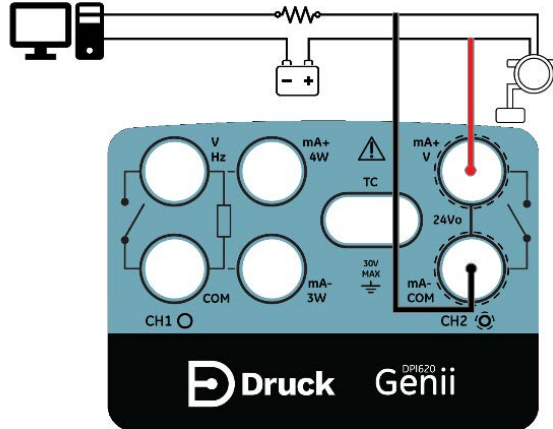
Figure 9-3: HART® Communicator Network Connection

CH2 function is set to None. The HART® function is enabled on the HART® channel with the 250 Ω resistor is set to Off.

9.3.4 Use of Test Connections

To use the test connection on a HART® transmitter, use CH1 to measure current and CH2 to communicate with the HART® device. The CH2 function must be set to None, and CH1 function must be placed into current measure mode. There must be an external HART® resistor in the loop.
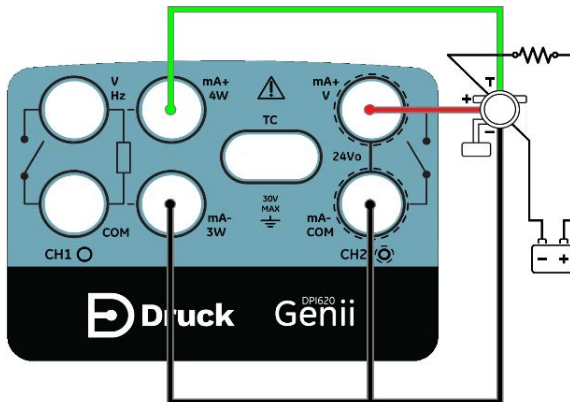
Figure 9-4: HART® Device Test Connections

9.4 Viewing HART® Primary Variables

When connected to a HART® device, the Primary Variable (PV) value and PV units will be displayed in the channel window.
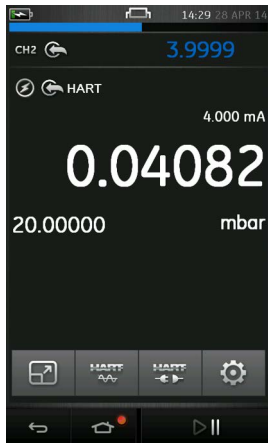
Figure 9-5: HART® Primary Variables

If there is no HART® connection and the PV is not displayed, the device connection set up will need to be configured.

The HART® device can be connected in two HART® modes:

1. OFFLINE
2. ONLINE (SDC Application)

9.5 HART® Offline

9.5.1 Introduction

The HART® Offline ![HART icon] feature sits alongside the existing HART® application to provide extended offline capabilities. All devices available in HART® library are supported. Typical operations include the following:

1. Connect to a HART® enabled device to view its configuration and save to file.
2. Full configuration is supported for all commands (universal/common & device specific).
3. Amend configuration files.
4. Work offline to create configuration files.
5. Upload configuration files to HART® devices.
6. Export configuration files (to USB flash drive).
7. Import configuration files on PC for viewing offline.

9.5.2 Device Polling

The connected HART® device may be configured with a unique Poll Address. To set up a new HART® Offline connection:

1. Tap on CONNECT TO DEVICE and select SCAN FOR DEVICES.
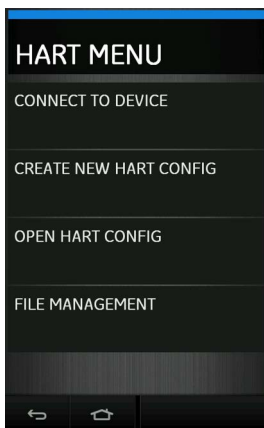
Figure 9-6: HART® Menu

2. Choose the scheme type required for polling from the following options:
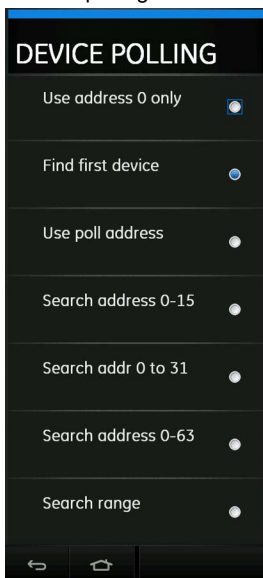
Figure 9-7: HART® Device Polling Options

- Select "Use address 0 only" to search for any device found on address 0 only.
- Select "Find First Device" to search from 0 to 63 and use the first device found.
- Select "Use poll address" to search a specific poll address number. Choose a number from 0 to 63 to find any device found on that specific address only.
- Select "Search address 0-15" to search poll address 0 to 15 and use the first device found.

- Select "Search address 0-31" to search poll address 0 to 31 and use the first device found.
- Select "Search address 0-63" to search poll address 0 to 63 and use the first device found.
- Select "Search range" to use a specified address range to select from a range of devices at poll addresses within that range.

3. When the poll scheme type has been selected, press the $\mathcal{Q}$ button to start the search.
4. Found devices are displayed in the SCAN FOR DEVICES list.
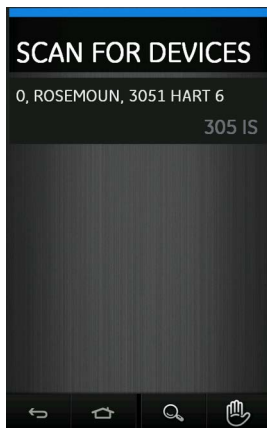
Figure 9-8: HART® Device List

5. Select the device to complete the connection process.
6. After successful connection, the HART® offline feature will be presented.

9.5.3 Connected Device Configuration

1. Press the HART® Offline button ![HART] .
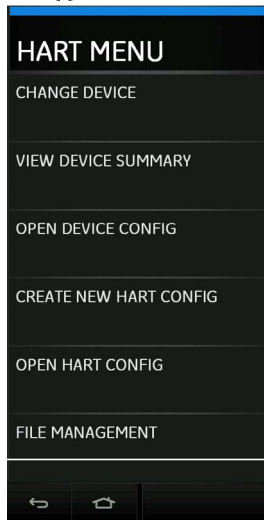
Figure 9-9: HART® Offline Menu

2. Select OPEN DEVICE CONFIG.
3. Details of the connected device will be displayed.
4. Edit the device details where required.

9.5.4 Change Device

To change the currently connected device to another device, select the CHANGE DEVICE option from the HART® menu.

Press SELECT DEVICE from list to choose from devices already detected by the DPI 620 Genii or press SCAN FOR DEVICES to start a new scan.

9.5.5 View Device Summary

Select VIEW DEVICE SUMMARY from the HART® menu to view details of the connected device.

The information displayed can only be viewed in this mode and data cannot be edited.

Figure 9-10: HART® Offline – Device Summary

9.5.6 Open Device Configuration

Select the OPEN DEVICE CONFIG from the HART® menu to view and modify the device configuration. The device PV (URV and LRV) parameters can be viewed and changed.

Note: The options and structure presented in the configuration menu varies from one HART® device to another.

Figure 9-11: HART® Offline – Device Configuration

In this example, there is a further Device Setup menu which can be selected to access more advanced configuration.
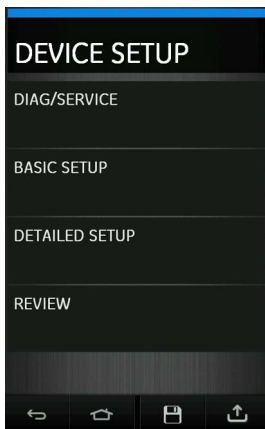
Figure 9-12: HART® Offline – Device Setup Example

The DEVICE SETUP menu options presented will vary from device to device but will generally contain the following:

- DIAG/SERVICE – typically contains calibration related parameters.
- BASIC SETUP – covering only a few basic device data such as device TAG, Units, Damping.
- DETAILED SETUP – covers more parameters associated with the sensor, signal and output condition, and device information.
- REVIEW – contains a full list of the configuration parameters available on that device. Text in this menu are displayed in dark orange or brown color.
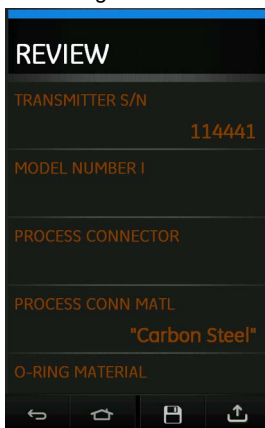
Figure 9-13: HART® Offline – Review

Each option will provide relevant parameters or settings associated with the device.

To navigate back to the previous menu screen, press the ⬆ button.

Note: Any unchanged configuration parameter will be displayed as green colored text (except in the REVIEW menu). Once changes have been made, the text color changes to yellow. The changed parameter text remain yellow until the changes have been sent/written to the device.

To save any changes, press the Save ⌷ button and select from the following options:

• SAVE/SAVE AS – saves the current configuration file including the new changes made as a new configuration file. When this option is selected, the user can give the new configuration a new filename or overwrite an existing filename. This file can be accessed from the Open HART configuration menu or via a PC in the HartOfflineData folder in the DPI 620 Genii file system.

• SEND TO DEVICE – writes the current configuration file including the new changes made to the HART device.

  When this option is selected, choose from the following additional upload mode options:

  • All Parameter - Save/write all configuration parameters.

  • Modified Parameters Only - Save/write only modified configuration parameters.
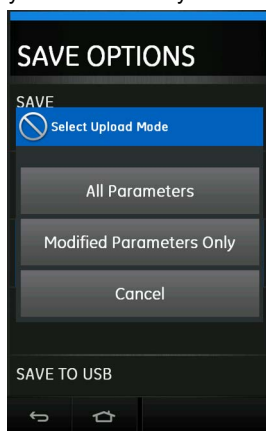
Figure 9-14: HART® Offline – Send to Device Save Options

• SAVE AND SEND TO DEVICE – saves the current configuration as a file in the internal storage of the DPI 620 Genii and also writes the current configuration including any new changes to the HART® device.

• SAVE TO USB – saves the current configuration as a file on a USB flash memory device. Ensure a compatible USB flash memory device is connected to the DPI 620 Genii before this option is selected.

• SAVE AND COPY TO USB – saves the current configuration as a file both in the internal storage of the DPI 620 Genii and also on a USB flash memory device. Ensure a compatible USB flash memory device is connected to the DPI 620 Genii before this option is selected.

9.5.7 Create a New HART® Configuration

To create a new device configuration, select CREATE NEW HART CONFIG from the HART® Offline menu. The HART DEVICE menu will open.
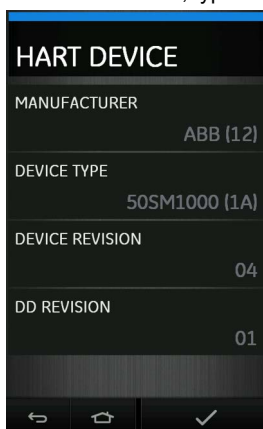
Figure 9-15: HART® Offline – Create New HART® Configuration

Select the following sections (in order):

1. MANUFACTURER – name of Manufacturer.
2. DEVICE TYPE – model or device name based on manufacturer selected.
3. DEVICE REVISION – based on device manufacturer and type selected.
4. DD REVISION – based on device manufacturer, type and revision.

Figure 9-16: HART® Offline – Example New HART® Configuration

When all sections are complete, select the ✓ button.

Enter CONFIG file name if different from the default device name and select the ✓ button to confirm / save and return to the Offline Configuration menu of the device.
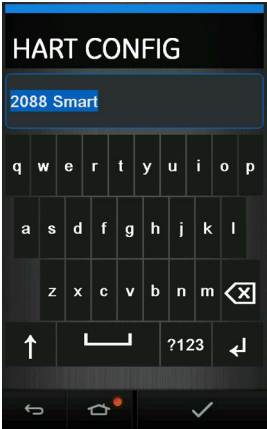
Figure 9-17: HART® Offline – Configuration File Name Entry

9.5.8 Open a HART® Offline Configuration

Having created an offline configuration (either connected or disconnected), the configuration file can be viewed using this option from the HART® Offline menu.

Figure 9-18: HART® Offline – Saved Configuration Files Selection

Select from the saved files, the desired configuration to load.

9.5.9 File Management

The FILE MANAGEMENT menu is used to copy or deleted HART® configuration files.
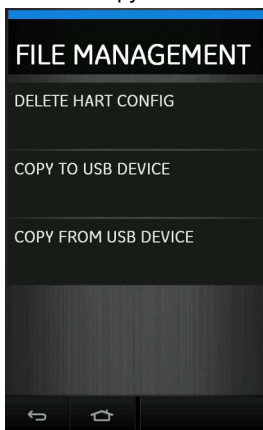
Figure 9-19: HART® Offline – Configuration File Management

Note: When copying to or from a USB flash memory device, ensure that the USB flash memory device is connected prior to selecting the menu option.

9.6 HART® Online

HART® devices can also be connected to the DPI 620 Genii in HART® ONLINE mode which allows detailed configuration. To set up a device connection ONLINE, select the HART® ONLINE **HART** button. This launches a Device Poll search based on the Poll Scheme selected in the HART® menu (OFFLINE mode). Once the device has been found, tap on the device details and press OK to complete the connection and launch the SDC Application.
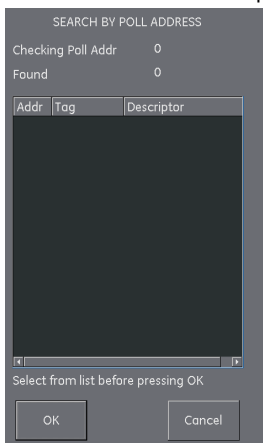
Figure 9-20: HART® Poll Address Search

9.6.1 HART® SDC Application

Once the device has been connected in HART® ONLINE mode, the HART® SDC application is automatically launched. See Section 9.6.

The DPI 620 Genii displays the HART® SDC application screen in light or dark mode.
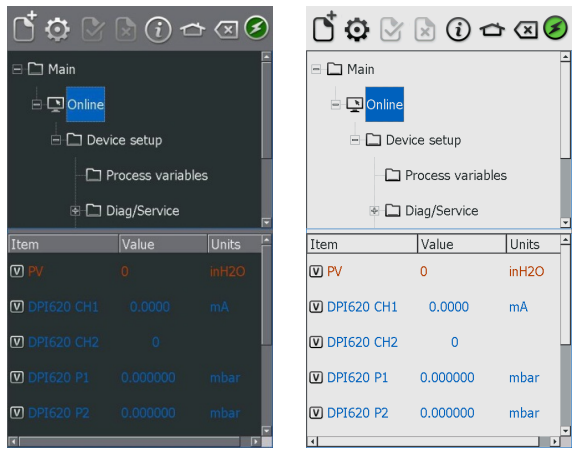
Figure 9-21: HART® SDC Application Main Screen

9.6.1.1 HART® Toolbar

Figure 9-22: HART® Toolbar

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

The icon functions are described below:

Icon	Name	Description
	OPEN NEW CONNECTION	Requires HART® SDC application to Exit and restart from Dashboard.
	PREFERENCES	Selection of Search Options (Poll Address / Short and Long Tags). See Figure 9-23.
	COMMIT	Commit updated values back to the device. Refer to Section 9.6.3.
	ABORT	Abort Update of parameters, reverts to previous values. Refer to Section 9.6.3.
	STATUS	Field Device Status and HART® operations summary. See Figure 9-24.
	HOME	Return to Dashboard. Minimizes HART® application.
	CLOSE	Closes down connection and exits to Calibrator screen.

Icon	Name	Description
	DEVICE COMMUNICATIONS ON	Indicator showing active communication.
	DEVICE COMMUNICATIONS STARTING	Indicator showing communication is starting.
	DEVICE COMMUNICATIONS FAILED	Indicator showing communication has failed.

Figure 9-23: HART® Poll Preferences

Figure 9-24: HART® Device Status

9.6.2 HART® SDC Data Display

The display data is color coded as follows:

Color	Description
Red	HART® transmitter data (cannot be edited).
Blue	DPI 620 Genii channel data (cannot be edited).
Black/White	Data that can be edited.

Common acronyms used are as follows:

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

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

9.6.3 Editing Device Data 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).
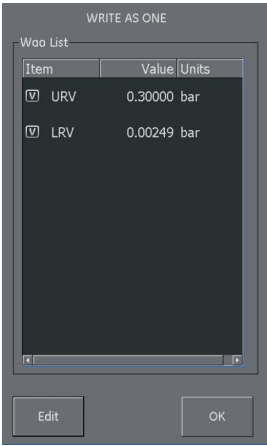
Figure 9-25: HART® Write Variable Selection

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 write and implement the new value. The yellow highlight will disappear after new data has been written to the device.

9.7 Executing HART® Methods

Not all HART® devices have the same methods available.

The function, purpose and execution of each method can be different depending on the device in use. Methods may include the following:

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

To execute any of the above listed methods:

1. Select the required folder in the SDC data structure.
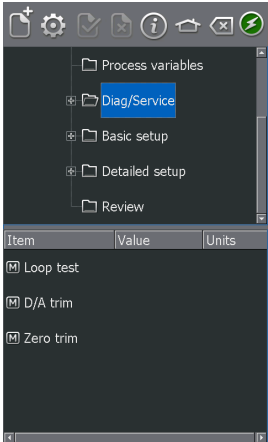
Figure 9-26: HART® Method – SDC Data Structure

2. Select the method name from the available list of method options. A screen opens with information about the selected method.

    Four buttons are displayed on the screen:

Button	Description
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 DPI 620 Genii screen (to change channel function settings without interrupting the method procedure). To return to the Method procedure, tap the HART® ONLINE **HART** button.

LOOP TEST

WARN-Loop should be removed from automatic control

Press OK button to continue method execution or Abort button to abort method execution.

| Abort | Help | OK |

Switch App
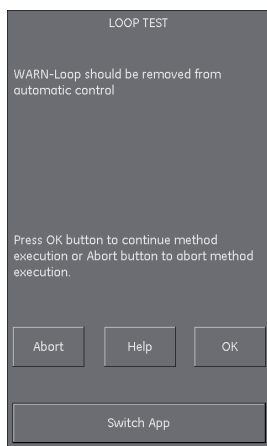
Figure 9-27: HART® Method Screen Example

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.

3. Some methods need values to be entered. Use the alphanumeric keypads where required.

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

5. Some methods require input from the DPI 620 Genii instrument channels. A drop-down menu displays the channels as follows:

    •   CH1
    •   CH2
    •   P1
    •   P2
    •   IDOS

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

9.7.1 HART® 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.

9.7.2 HART® Method Example – Analog Trim

The DPI 620 Genii can perform an analog trim on the 4 to 20 mA loop without connecting to any external reference meters.

1.   Navigate to the calibration folder.
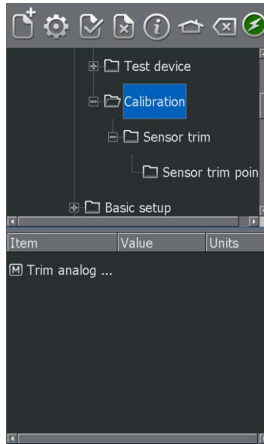
Figure 9-28: HART® Method – Analog Trim

2.   Select "Trim analog" method.
3.   Follow the on-screen instructions. If CH2 is set to Measure Current (24V), 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 9-29: Enter Calibration Point

5.   Select SET.
6.   Repeat steps 3, 4 and 5 with "20 mA" selected. This will calibrate the transmitter's output current.

9.8 HART® SDC Application 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 DPI 620 Genii 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.

9.9 HART® Device Connection Failure

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 3.5 mA to 24 mA.
	DPI 620 Genii	Check the DPI 620 Genii 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 DPI 620 Genii resistor setting is OFF.
		Check that the CH2 function is set to "None" if the DPI 620 Genii 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.

9.10 HART® Configurations

9.10.1 HART® – Uploading the Configuration

From the Commands menu, the configuration may be uploaded to connected device by pressing the Upload ⬆ button.

9.10.2 HART® – Working with Saved Configurations

Selecting a Saved Configuration from the main offline menu enables the user to perform the following operations:

- Open HART® Config - This enables a previously saved HART® configuration file to be edited.
- Upload Config to Device -This enables a previously saved HART® configuration file to be uploaded to a connected device.

9.10.3 Copy HART® Configuration to USB

This enables a previously saved HART® configuration file to be saved to a USB flash drive. The USB flash drive should be inserted into the DPI 620 Genii prior to selecting this option.

Once copied to the USB flash drive, the HART® configuration file can be modified, copied or cloned on a PC.

9.10.4 Delete HART® Configuration

Deletes the HART® configuration file from the DPI 620 Genii.

9.10.5 Delete All HART® Configuration Files

From the main offline menu, all saved configuration files may be deleted by pressing the "Select All" ☑ button, followed by the Delete 🗑 button.

9.10.6 Import Configuration Files from USB Flash Drive

INFORMATION **Any files on the DPI 620 Genii with the same name as files on the USB flash drive will be overwritten.**

Insert a USB flash drive containing saved configuration files. From the main offline menu press the New Configuration Button.

10. FOUNDATION™ Fieldbus

10.1 Introduction

FOUNDATION™ Fieldbus (FF) is a device application for configuration of FF enabled field devices. Online connection is achieved via the integrated H1 modem. Devices directly connected to an H1 field segment can be configured and supported by FF.

10.2 Start up

FOUNDATION™ Fieldbus is started by selecting the FIELDBUS ⊜ button from the Dashboard. FOUNDATION™ Fieldbus can also be selected from within the CALIBRATOR function by

selecting the Fieldbus option on the COMMUNICATOR ⚡ channel within the CUSTOM TASK SETTINGS.

To establish the FOUNDATION™ Fieldbus online connection:

1. Connect DPI 620 Genii to a H1 FOUNDATION™ Fieldbus device.
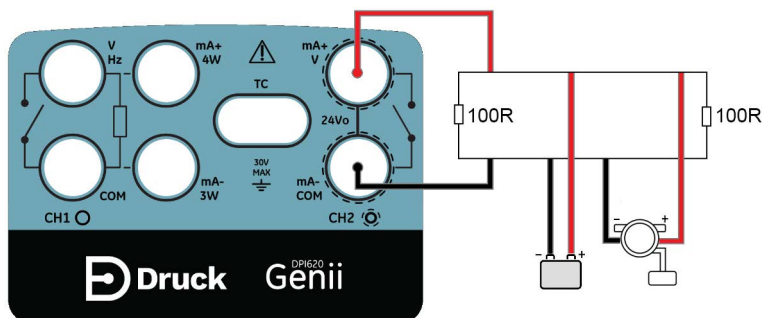
Figure 10-1: Example Connection Diagram FOUNDATION™ Fieldbus

2. Select the FOUNDATION™ Fieldbus channel so that it is in its expanded view. Refer to Section 3.1.1.
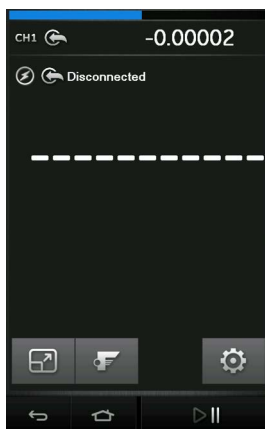
Figure 10-2: Calibrator Fieldbus Channel

3. Select ⊜ button.

4. The main FOUNDATION™ Fieldbus application will now open.

    Note: Updating CH1, CH2, P1 or P2 tasks is only possible when the FOUNDATION™ Fieldbus application is not running. Close the FOUNDATION™ Field bus application by pressing the Home ⌂ button and selecting Exit. Refer to Section 10.3.

    Note: Ensure the DPI 620 Genii USB setting is in Storage Device mode. See Section 2.2.7.

    Note: 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.

10.3 FOUNDATION™ Fieldbus Toolbar

On entering the FOUNDATION™ Fieldbus application, the toolbar is displayed. The icons are grayed out when they are not active.

Figure 10-3: FOUNDATION™ Fieldbus Toolbar

The icons functions are described below:

Icon	Name	Description
⎘⁺	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 10.8) and Functional Group view (refer to Section 10.9). This icon closes down the connection and returns to Device Focus view (refer to Section 10.7).
⚙	SETTINGS	Application configuration settings and DD library details (refer to Section 10.14).
☑	COMMIT	Commit updated values back to the device (refer to Section 10.9.3).
☒	ABORT	Abort Update of parameters, reverts to previous values (refer to Section 10.9.3).
ⓘ	STATUS	Provides device profile of currently connected device (refer to Section 10.5).
🔍	FUNCTION FINDER	Search FF variables and device functions.
⌂	HOME	Returns to Main Application. Allows user to either minimize or exit. If FOUNDATION™ Fieldbus readings are to be referenced in Main Application, then minimize should be selected.
⚡	DEVICE COMMUNICATIONS ON	Indicator showing active communication.
⚡	DEVICE COMMUNICATIONS OFF	Indicator showing no active communication.

10.4 Scanning for Devices

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

1. Connect DPI 620 Genii to H1 bus. Refer to Section 10.2.

2. Select the OPEN CONNECTION $\square^+$ Icon on the Toolbar to enter device scan screen.
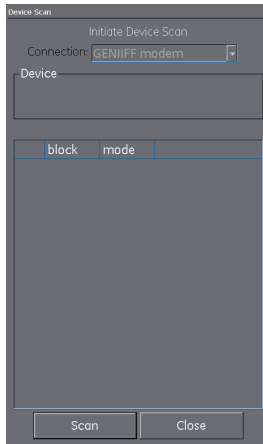
Figure 10-4: Device Scan Screen

3. Select the SCAN button.

   The scanning progress dialog view will open. Any devices found in the selected range will appear in the bus tree window list. All scanned devices are shown as a bold icon with an associated tag. Previous scan results are indicated in gray.
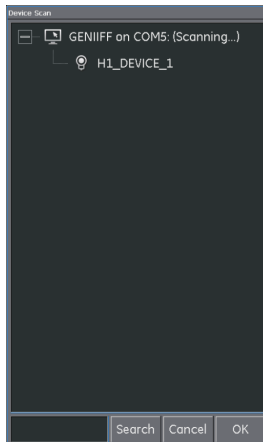
Figure 10-5: Device Scan View

   Note: The scan may be stopped at any time by selecting the CANCEL button. If canceled 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 any device in the search results and selecting OK will initiate connection to the 'Device Focus view'.

5. To Re-scan, tap and hold on "Genii Modem COM5" and select "Re-scan" from the drop-down list.
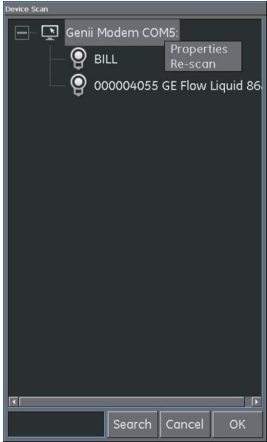
Figure 10-6: Re-scan

10.5 Context Sensitive Menu

Context sensitive menus are available for each device in the Device Scan menu by tapping and holding on the PD tag (device name).
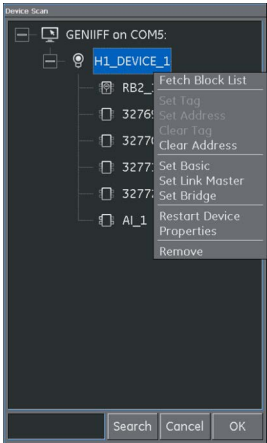
Figure 10-7: Context Sensitive Device menu

This provides access to the following functions:

1. Tag / Address Change - which includes:
    a. Set Tag.
    b. Set Address.
    c. Clear Tag.
    d. Clear Address.
2. Boot Operational Function (BOF) class change - which includes:

     a.   Set Basic.

     b.   Set Link Master.

     c.   Set Bridge.

3.   Restart device.

4.   Properties - displays device attributes.

Figure 10-8: Device Profile

5.   The device Block List can also be fetched from here (default functionality is to use "Device Focus View" - refer to Section 10.7).

6.   Remove - removes the device.

10.6 Troubleshooting

If no device is found when performing scan check:

1.   The field wiring - verify electrical segment connections are in accordance with the specific user manual supplied with the field device and segment coupler / power supply.

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

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 synchronize information including address, identity, and protocol timing information.

10.7 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.
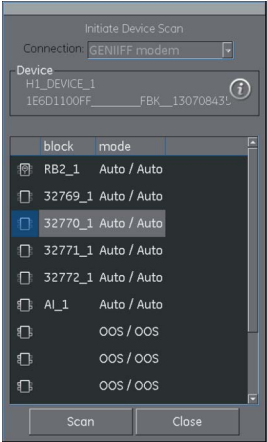
Figure 10-9: Device Focus View

Selecting the Scan button returns device scan view. Refer to Section 10-4.

Selecting the desired block with a single key press will open the Navigation Tree for the block. Refer to Section 10.8.

10.8 The Navigation Menu Tree

This is the overview of the entire loaded block of the device (this is not the entire field device, only one aspect of it) showing all the menus available according to the configured access level. Many field devices have additional menus that become visible when certain access rights are enabled, or other parameters set. The navigation tree shows nested menus with a '+' to the left of the description. A momentary touch of this symbol opens up the view to the lower level. This view can be closed by touch on the view '-' setting. In this way even complex devices menu structures can be navigated quickly and clearly.
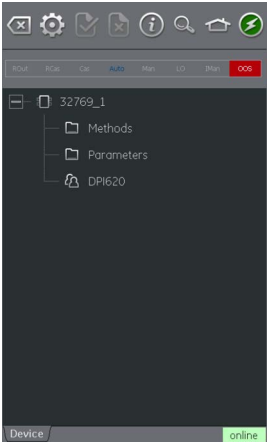
Figure 10-10: Navigation Tree

10.8.1 Block Header bar

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

Figure 10-11: 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.

The target mode of the device block is indicated by blue text.

Available options are indicated by black text while unavailable options are shown in gray.

The target mode can be changed with a momentary touch on the block header.

Figure 10-11 shows an example where target mode is Auto but actual mode is Out of Service (OOS).

10.9 Functional Group View

The functional groups show all the variables or settings in that menu group along with the current value.
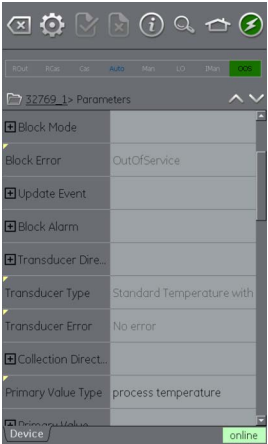
Figure 10-12: Function Group View

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.

A gray value is associated with a read-only value such as a variable that the device produces.

Variables with black text are open for editing under the appropriate access conditions, such as an access code or PIN that may be required in a different Functional Group.

The Navigation Tree bar shows the hierarchy of menus and groups above the current Function Group View.

Figure 10-13: Navigation Tree Bar

Navigation back out of the function group is possible by tapping the linked references in the tree bar itself (e.g. 32769_1 in Section 10-13).

The up and down ∨∧ navigation arrows move the selected function group to that of the one above or below the current selection in the menu tree.

Communication activity (online/offline) is signified by the communication progress bar in the bottom right of the screen.

10.9.1 Displaying Parameter Help

- The yellow triangle in the corner of the Variable Description area indicates that help is available for that parameter.
- The context drop-down menu can be opened by tapping and holding down the required variable descriptor.
- Selecting the "Display Help" option will show the help attributes.
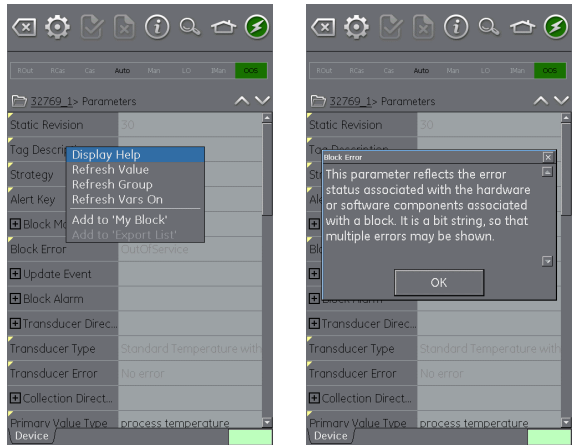
Figure 10-14: Parameter Help

10.9.2 Refreshing Data

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

When the read request is fulfilled the variable description goes from gray to black again and the pending (clock) icon disappears.

A data refresh can be selected from the drop-down context menu with the following options:

Refresh Option	Description
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.

10.9.3 Editing Values

Values which may be editable are shown in black in the "variable editing area" of the function group view. Refer to Figure 10-12. Select the required parameter to open for editing.

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

Figure 10-15: Edit Value

Icon	Description
	Commits all Update
	Aborts all Updates

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

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

Figure 10-16: Revert Value

If an invalid value is entered the variable will be shown in red and the error (cross) icon appears.
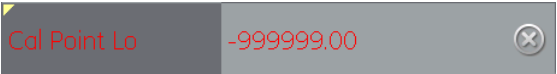
Figure 10-17: Invalid Value

10.9.4 Methods

These are viewed as a button or selection menu. Pressing the "execute" button activates the execution of the associated functionality. The user then follows any defined prompts to walk through the method.
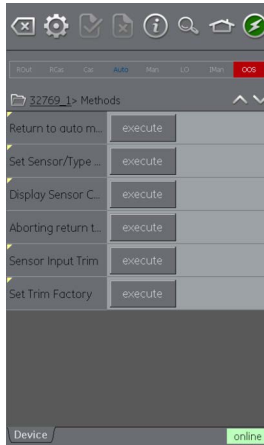
Figure 10-18: Methods

10.10 Fieldbus Function Finder

Function Finder is a way of searching for FF variables and device functions in the online device. In complex devices with multiple menus, this allows the user to navigate a device without a manual, greatly simplifying the online 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 online or offline device view:

1. Select the search icon from the FOUNDATION™ Fieldbus Toolbar.

2. In "Name" field, enter the text to search and press OK.

3. Press the Search button to initiate the search.

4. From the list of results select the parameter that you require. Note that the variable name and the function group it relates to is displayed.
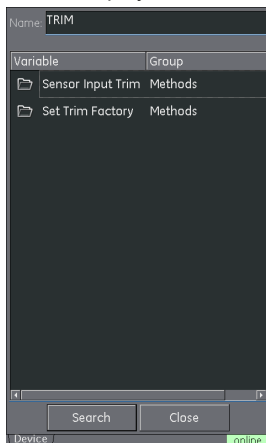
Figure 10-19: Found 'TRIM' Methods

5. Function Finder will then display the Function Group concerned in the device view with all searched variables highlighted in yellow. Refer to Figure 10-20.
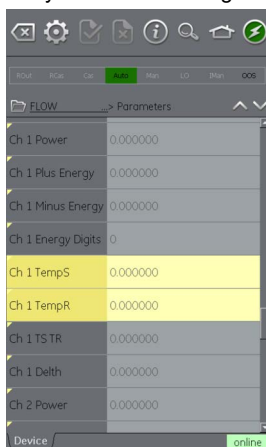
Figure 10-20: Function Finder

10.11 Exporting Data to Main DPI 620 Genii Application

The FOUNDATION™ Fieldbus application allows selected parameters to be displayed in the Communications channel window on the Calibrator screen.

The selected parameters are defined by the Export List section which is found on the tree directory of the connected device.
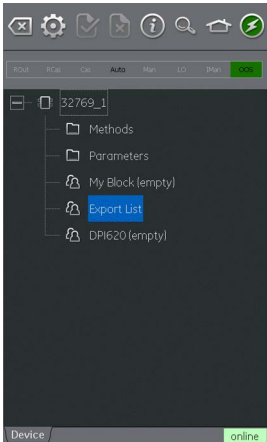
Figure 10-21: Export List

Parameters are added to the Export List using the context menu in the Variable Description area. Refer to Figure 10-22.

Note: Only Parameters that return a value can be added to the Export List.

Note: A Maximum of six parameters can be added to the Export List.

Items on List can be viewed by selecting the Export List menu.
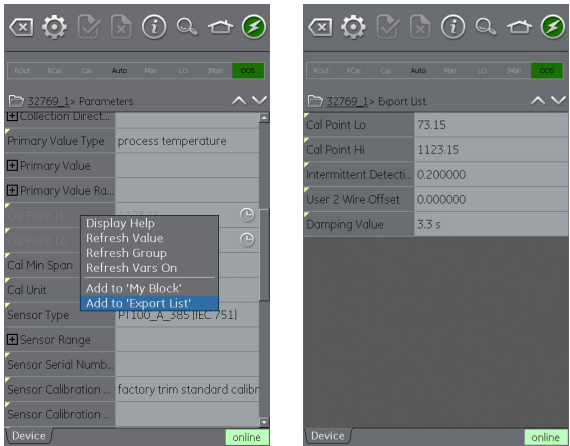
Figure 10-22: Adding Items to Export List

10.12 Viewing Exported Variables in Channel Window

Return to main application by minimizing the FOUNDATION™ Fieldbus application (pressing the Home ⌂ icon).

Expand the FOUNDATION™ Fieldbus window, select the Settings ⚙ icon and then press PRIMARY VALUE.

The Export List of selected parameters will be displayed.

Any selected parameter will be displayed in the FOUNDATION™ Fieldbus channel window.
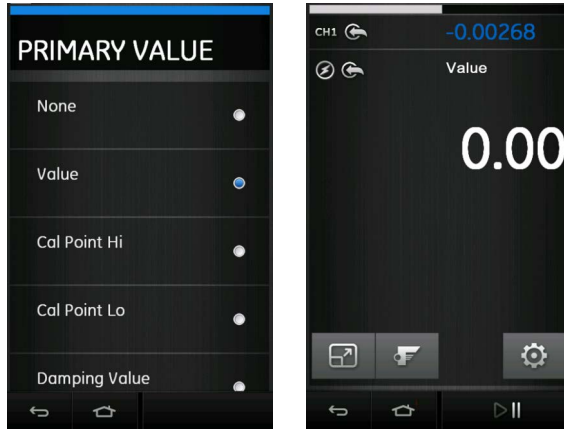
Figure 10-23: Displaying Primary Value

10.13 Fieldbus Application – My Block

My Block allows the user to create menus of commonly used parameters for easy recall.

Additional menus can be created under 'My Block' using the context menu accessed with press and hold gesture.
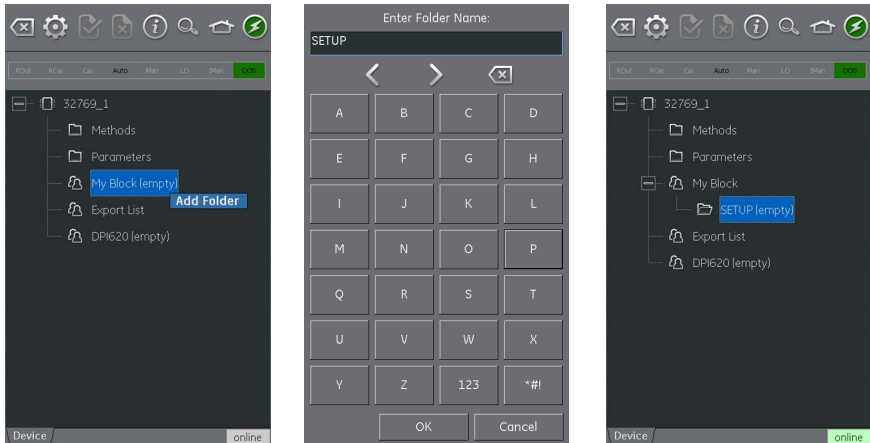
Figure 10-24: Setting up My Block

Parameters are added to 'My Block' (or the created menu) using the context menu in the Variable Description area. Refer to Figure 10-25.
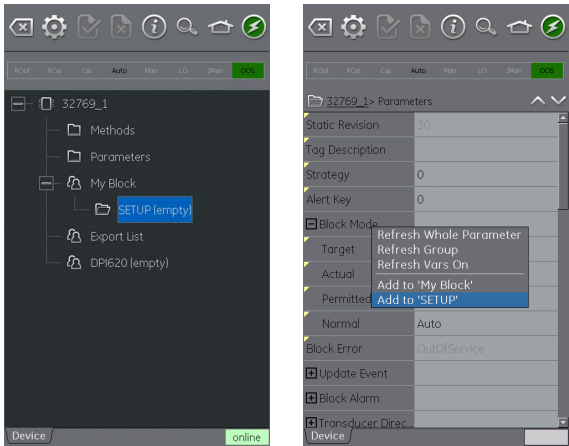
Figure 10-25: Adding Parameters to My Block

10.14 Application Settings

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

Settings 🔧.

10.14.1 Device Library

The library tab shows the Device Descriptions (DDs) that are currently on the DPI 620 Genii. 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 Baker Hughes Service center. Refer to Section 1.16.4.

10.14.2 Options

Option	Description
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 function group view (note this setting only becomes valid if the function group option Refresh Vars On is active). Refer to Section 10.9.
Enable Device Library Monitor	If checked, enables the automatic check of the Open Field Communications (OFC) 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 DPI 620 Genii 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 'unchecked'.
Enable Transducer Blocks	If checked, transducer blocks are enabled. After installation the default setting is 'checked'.

10.14.3 Advanced

These settings are for advanced users only and it is recommended to retain default values.

11. Profibus® PA

11.1 Introduction

The DPI 620 Genii can communicate with devices that use Profibus® PA Fieldbus implementation. This is achieved via an integrated modem.

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

This chapter provides detail of how to connect Profibus® PA device to the DPI 620 Genii.

11.2 Profibus® Configurations

Before setting up the electrical connections between the Profibus® device and the DPI 620 Genii, the correct configuration should be established.

A Profibus® network at its simplest consists of a field device, two terminators and a power supply. This allows the connection of the DPI 620 Genii to:

• Already existing networks where the power supply and termination are already present.

• Standalone Profibus® PA devices.

• Any network configuration in between.

11.3 Start-up

Profibus® is started by selecting the Profibus® application icon from the Dashboard screen.

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.
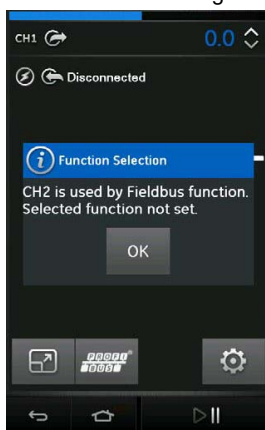
Figure 11-1: CH2 Function Not Set when Profibus® is Enabled

Profibus® can also be selected from the Calibrator Task Menu by selecting the Profibus® option in the Field Communications channel.

Note: Volts measure or none are the only valid mode for CH2 when PROFIBUS® is operational.

11.4 Profibus® Connections

To start the PROFIBUS® application and connect to a network:

Chapter 11. Profibus® PA

1. Connect the DPI 620 Genii to a PROFIBUS® PA network.
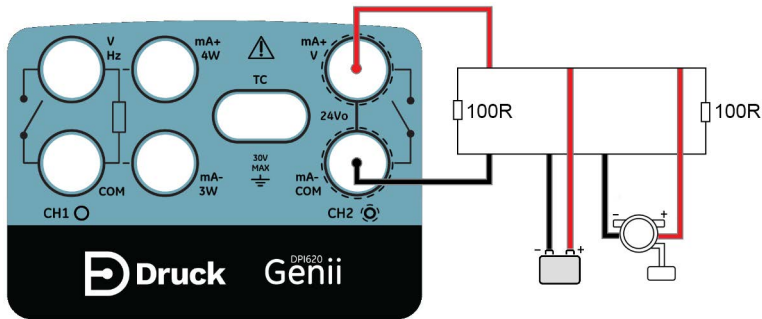
Figure 11-2: Example Connection Diagram Profibus®

2. Select the PROFIBUS® channel so that it is in its expanded view.

Figure 11-3: Calibrator Profibus® Channel

3. Select the Settings ⚙ icon to configure the network.
4. Select the back button to return to the PROFIBUS® channel view.

11.5 Profibus® Application – Connecting to a Network

Select the Profibus® ![PROFIBUS] button on the expanded Profibus® channel to start the application.

Figure 11-4: Profibus® Application

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

Note: Updating CH1, P1, and P2 tasks is only possible when the PROFIBUS® application is not running.

Note: Ensure the DPI 620 Genii USB setting is in Storage mode. See Section 2.2.7.

11.6 Profibus® Toolbar

On entering the Profibus® application, the toolbar is displayed. Icons that are not currently active are grayed out.

Figure 11-5: Profibus® Toolbar

The icons functions are described below:

Icon	Name	Description
	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 11.10.2). This icon closes down the connection and returns to Device Focus view (refer to Section 11.10.1).
	SETTINGS	Application configuration settings and DD library details (refer to Section 11.13).
	COMMIT	Commit updated values back to the device (refer to Section 11.10.7).

Icon	Name	Description
(x)	ABORT	Abort Update of parameters, reverts to previous values (refer to Section 11.10.7).
(i)	STATUS	Provides device profile of currently connected device (refer to Section 11.10.1).
(search)	FUNCTION FINDER	Search FF variables and device functions.
(home)	HOME	Returns to Main Application. Allows user to either minimize or exit. If Profibus® readings are to be referenced in Main Application, then minimize should be selected.
(green lightning)	DEVICE COMMUNICATIONS ON	Indicator showing active communication.
(lightning)	DEVICE COMMUNICATIONS OFF	Indicator showing no active communication.

11.7 Scanning for Devices

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

1. Connect DPI 620 Genii to network. Refer to Section 11.4.

2. Select the OPEN CONNECTION icon on the toolbar to enter device scan screen.
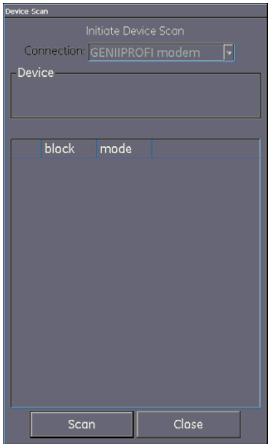
Figure 11-6: Profibus® Device Scan Screen

3. Select the 'Scan' button.

    The scanning progress dialog view will open. Any devices found will appear in the 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.
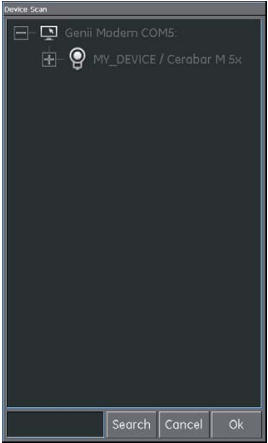
Figure 11-7: Profibus® Device Scan View

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

A search term can be entered into the Search bar 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 11.10.1.

5. Re-scan using the context sensitive menu, modem option. Refer to Section 11.8.

11.8 Context Sensitive Menu

Context sensitive menus are available for the modem and each device in the bus tree window list. Access the context sensitive menu by tapping and holding on the relevant field text.
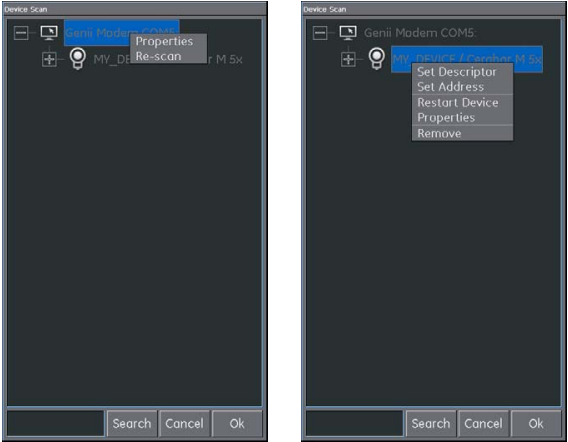
Figure 11-8: Profibus® Context Sensitive Menu

This provides access to the following functions:

1. Modem - this provides access to the following functions:
    a. Properties (Displays modem profile).
    b. Re-Scan
2. Descriptor/Address Change - which includes:
    a. Set Descriptor.
    b. Set Address.
3. Boot Operational Function (BOF) class change - which includes:
    a. Restart Device.
    b. Properties (Displays device profile).
    c. Remove

11.9 Troubleshooting Connection Problems

If no device is found when performing scan check:

1. Field wiring - verify electrical segment connections are in accordance with the specific manual supplied with the field device and segment coupler / power supply.
2. The loop is not suffering from interference due to an unstable voltage supply from the segment power supply and / or electrical interference.
3. The required termination is present in the network.
4. 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 synchronize information including address, identity and protocol timing information.

11.10 Profibus® Application – Communication

11.10.1 Device Focus View

In this view, the specific information of the device is shown i.e.

•   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.
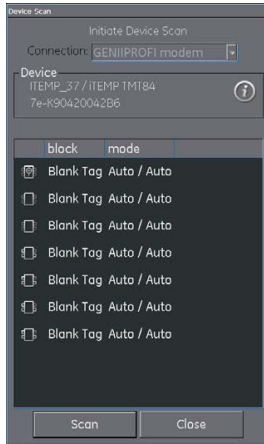
Figure 11-9: Profibus® Device Focus View

There are three types of blocks:

Icon	Block Name	Description
	Resource	Devices only have one resource block.
		Specifies the general characteristics of the device. For example, device type, manufacturer ID and serial number.
	Transducer	Reads the physical sensor information.
		Acts as a coupler between the function blocks and the physical sensors.
	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).

Note: Based on the option selected in the settings menu (refer to Section 11.13.2), function blocks may or may not be visible in the Device Focus view.

Selecting the information icon shows the device profile.

Figure 11-10: Profibus® Device Profile

Selecting the Scan button returns Device Scan view. Refer to Figure 11-6.

Selecting the desired block with a single key press will open the Navigation Tree for that block. Refer to Section 11.10.2.

11.10.2 Block Navigation Tree

Once a block is selected the navigation tree will be shown.
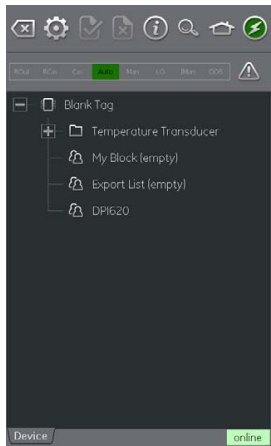
Figure 11-11: Profibus® Navigation Tree

Any folder with a '+' symbol to the left can be expanded by selecting the folder name and similarly any with a '-' symbol, can be contracted.

The navigation tree will show a number of folders containing:

• Device variables.

• My Block

• Export List

• DPI620

My Block - is a "favourites" location that device variables can be added to. Refer to Section 11.11.

Export List - is a location for the device variables that wish to be displayed in the Communication channel window of the main DPI 620 Genii application. Refer to Section 11.12.

DPI620 - shows a list of all the variables that are currently being read by the channels of the main DPI 620 Genii application.
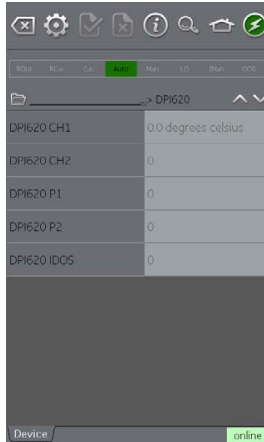
Figure 11-12: Profibus® Navigation Tree – DPI620

11.10.3 Block Header Bar

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

Figure 11-13: Profibus® 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 gray.

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.
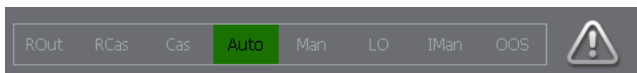
Figure 11-14: Profibus® Block Header Warning

Clicking on the warning symbols will give further information.
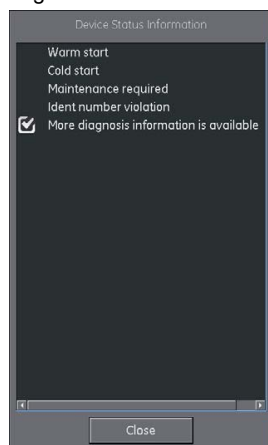
Figure 11-15: Profibus® Block Header Warning Information

11.10.4 Folder Variables

By clicking on a folder that cannot be expanded the folder variables can be viewed.
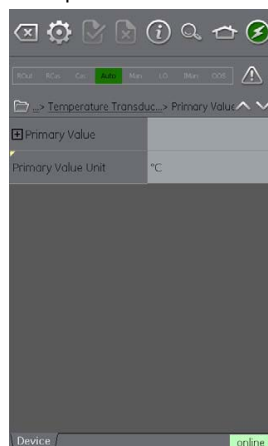
Figure 11-16: Profibus® Folder Parameters

The left-hand side hosts the 'Variable Description Area' and access to the context-based adjustment functions. The right-hand side with light background hosts the 'Variable Editing Area' and access to value adjustment.

Some folders contain executable methods.

The navigation tree bar shows where the current view exists in the device hierarchy.

Figure 11-17: Navigation Tree Bar

Navigation back out of the folder is possible by the linked references in the tree bar itself (e.g., 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.

11.10.5 Displaying Parameter Help

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

Context menu is opened with touch and hold gesture. Selecting "Display Help" will show the help attributes.
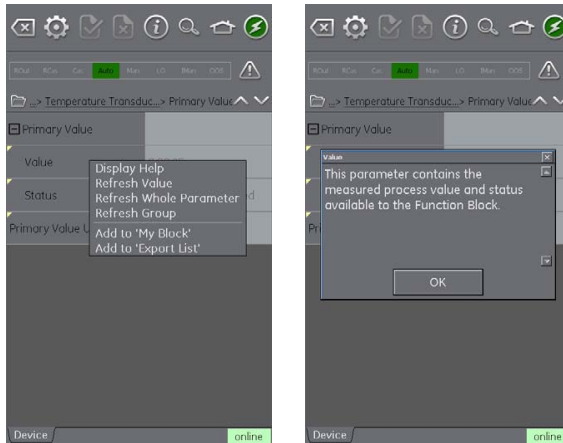
Figure 11-18: Profibus® Parameter Help

11.10.6 Refreshing Data

When a refresh is in progress, the variable description goes gray and in the right-hand side of the Variable Editing area the pending icon appears.

Figure 11-19: Profibus® Variable refresh

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

Figure 11-20: Profibus® Refreshed Variable

A data refresh can be selected from the drop-down context menu with the following options:

Refresh Option	Description
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.

11.10.7 Editing Variables

Some variables are open for editing. Select the variable to open.
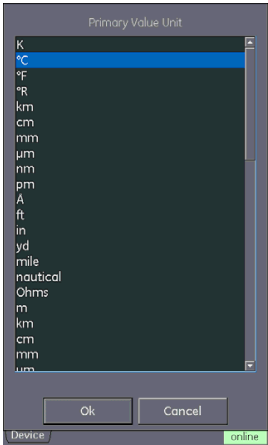
Figure 11-21: Profibus® Primary Variable Unit

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

Figure 11-22: Profibus® Edited Parameter

Icon	Description
	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 gesture on the variable description).

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

Figure 11-23: Profibus® Invalid Variable Value

11.11 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.
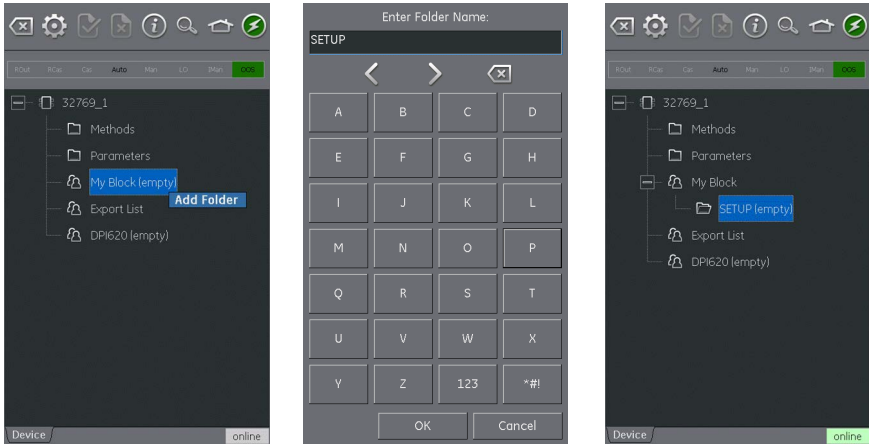
Figure 11-24: Profibus® 'My Block'

11.12 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 11.10.2.

Parameters are added to the Export List using the context menu in the Variable Description area and selecting Add to 'Export List'.

Note: A maximum of six variables and only variables that return a value can be added to the Export List.
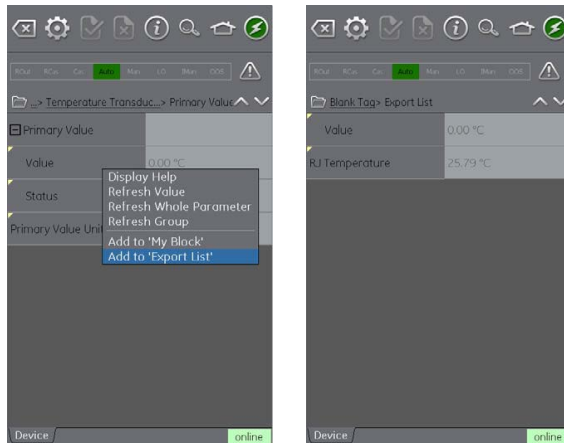
Figure 11-25: Adding Items to Export List

11.12.1 Viewing Exported Variables in Channel Window

Return to main application by minimizing the Profibus® application (pressing the Home ⌂ icon).

Expand the Profibus® window, select the Settings ⚙ icon and then press PRIMARY VALUE.

The Export List of selected parameters will be displayed.

Any selected parameter will be displayed in the Profibus® channel window.

Figure 11-26: Displaying Primary Value

11.13 Profibus® Application Settings

Application settings are access from the Profibus® toolbar by selecting the Settings button for the following options.

11.13.1 Device Library

The library tab shows the Device Descriptions (DDs) that are currently on the DPI 620 Genii. 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 Druck Service center. Refer to Section 1.16.4.

11.13.2 Application Options

Option	Description
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.
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 DPI 620 Genii functions. After installation the default setting is "checked".
Enable Function Blocks	If checked function blocks are enabled. After installation the default setting is "unchecked".
Enable Transducer Blocks	If checked transducer blocks are enabled. After installation the default setting is "checked".

11.13.3 Advanced

These settings are for advanced users only and it is recommended to retain default values.

11.14 Profibus® Function Finder

Function Finder is a way of searching for variables and device functions in the online device. In complex devices with multiple menus, this allows the user to navigate without a manual, greatly simplifying the online 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 online or offline device view:

1. Select the search icon from the Profibus® toolbar.
2. In "Name" field enter the text you wish to search for in the online device. 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 is required. 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.
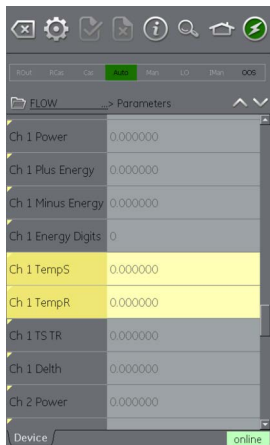
Figure 11-27: Profibus® Function Finder

12. Calibration Procedures

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

Druck 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 in this chapter.

12.1 Before Starting

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

- Calibration equipment specified in Table 12-1.
- Stable temperature environment: 21 ± 1°C (70 ± 2°F).

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

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

Table 12-1: Calibration Equipment Specification

Function	Calibration Equipment[a]	
	Measure	Source
Current (CH1 or CH2)	Current (mA) calibrator. For accuracy, see Table 12-2,	Current (mA) calibrator. For accuracy, see Table 12-3.
Voltage (CH1)	Voltage calibrator. For accuracy, see Table 12-5.	Voltage calibrator. For accuracy, see Table 12-7.
Voltage (CH2)	Voltage calibrator. For accuracy, see Table 12-5.	–
Millivolts (CH1)	Voltage mV calibrator. For accuracy, see Table 12-4.	Voltage mV calibrator. For accuracy, see Table 12-6.
Millivolts (CH2)	Voltage mV calibrator. For accuracy, see Table 12-4.	–
Millivolts TC mV (CH1)	Voltage mV calibrator. For accuracy, see Table 12-14.	Voltage mV calibrator. For accuracy, see Table 12-14.
Frequency (CH1)	Signal generator. Total error: 0.3 ppm or better	Frequency meter. Total error: 0.3 ppm or better. Resolution: 8 digits (minimum). Voltage calibrator. For accuracy, see Table 12-7.
Resistance (CH1)	Standard resistor (100R, 200R, 300R, 400R, 1k, 2k, 4k). Total uncertainty: 20 ppm or better.	An ohmmeter or an RTD measurement system with the specified excitation currents, refer to Table 12-13.
Cold Junction (CH1)	Calibrated K type thermocouple. Accuracy: 50 mK for -5 to 28°C (23 to 82.4°F)	Accuracy: 50 mK for -5 to 28°C (23 to 82.4°F)
Cold Junction (CH1)	Thermocouple temperature reference unit (0°C). Accuracy: 30 mK	–

Chapter 12. Calibration Procedures

Table 12-1: Calibration Equipment Specification

Function	Calibration Equipment[a]	
	Measure	Source
AC mV (CH1)	AC mV calibrator. For accuracy, see Table 12-15.	–
AC Volts (CH1)	AC Volts calibrator. For accuracy, see Table 12-16.	–
Pressure (PM 620) Range: 25 mbar (0.36 psi)	Module Carrier MC 620G or Pressure Base PV 62XG. Pressure Calibrator. Total uncertainty of 0.015% reading or better.	–
Pressure (PM 620) Range: > 25 mbar (0.36 psi)	Module Carrier MC 620G or Pressure Base PV 62XG. Pressure Calibrator. Total uncertainty of 0.01% reading or better.	–
Pressure (PM 620T)	Module Carrier MC 620G or Pressure Base PV 62XG. Pressure Calibrator. Total uncertainty of 0.009% reading or better.	–
Pressure (IDOS)	UPM only. Refer to the user manual K0378, Druck IDOS UPM.	–
Pressure (TERPS)	Refer to the user manual K0473, TERPS.	–
Temperature (RTD Interface)	Standard resistor (100R, 200R, 300R, 400R). Total uncertainty: 20 ppm or better.	–

a. ppm = parts per million.

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

1. Select the ADVANCED 📐 option from the Dashboard.
2. Enter the calibration PIN: 4321
3. Select the ✔ button.
4. Select PERFORM CALIBRATION.
5. Choose the required channel/function from the list.
6. Select range (if applicable).
7. Follow on-screen instructions.

8.   When the calibration is complete, set the next calibration date.
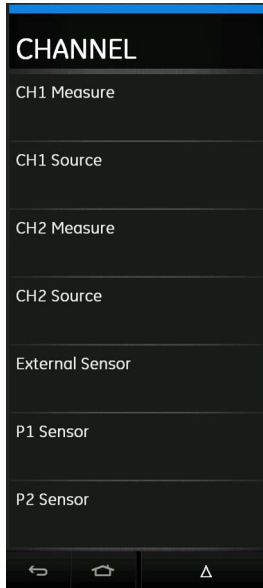
Figure 12-1: Calibration Function and Channel Selection

12.2 Procedures (CH1/CH2): Current (Measure)

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.

1.   Connect the applicable calibration equipment. Refer to Table 12-1.

2.   Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

3.   Use the calibration menu (see Section 12.1) to do a three-point current measure calibration (-FS, Zero and +FS) for each range:

   •   20 mA
   •   55 mA
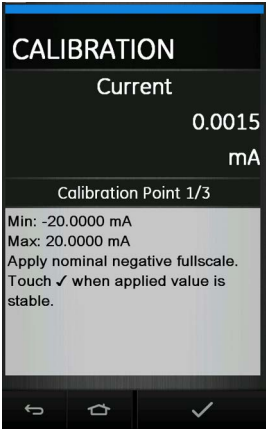
Figure 12-2: Calibration – Current Measure (Range: 20 mA)

4.   Check the calibration is correct.

5.   Check the error is in the specified limits. Refer to Table 12-2.

a.   Select the applicable channel Current (measure) function via the Calibrator Task Menu.

b.   Apply the values that follow:

mA: -55, -25, -20, -10, -5, 0 (open circuit)

mA: 0, 5, 10, 20, 25, 55

Table 12-2: Current (Measure) Error Limits

Applied (mA)	Calibrator Uncertainty (mA)	Permitted DPI 620 Genii Error (mA)
± 55	0.00300	0.0055
± 25	0.00250	0.0040
± 20	0.00063	0.0022
± 10	0.00036	0.0016
± 5	0.00025	0.0013
0 (open circuit)	0.00020	0.0010

12.3 Procedures (CH1/CH2): Current (Source)

Do the procedure as follows:

1.   Connect the applicable calibration equipment. Refer to Table 12-1.

2.   Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

3.   CH1 has only one range (24 mA) while CH2 has two ranges (24 mA and -24 mA).

4.   Use the calibration menu (see Section 12.1) to do a two-point current source calibration (0.2 mA and FS) for the relevant channel:

•   CH1 (one range): 24 mA

•   CH2 (two ranges): 24 mA (reverse) and 24 mA (forward)

Note: Input positive values for the forward and reverse calibration.
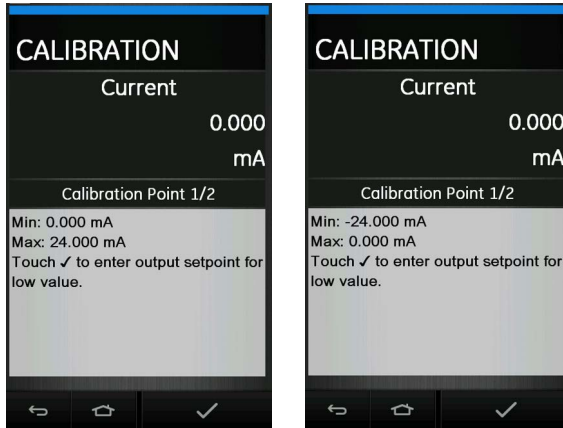
Figure 12-3: Calibration – Current Source (Range: +24 mA and -24 mA)

5. Check the calibration is correct:
   a. Select the applicable Current (source) function via the Calibrator Task Menu.
   b. Apply the values that follow:
      mA: 0.2, 6, 12, 18, 24
   c. Check the error is within limits. Refer to Table 12-3.

Table 12-3: Current (Source) Error Limits

Source (mA)[a]	Calibrator Uncertainty (mA)	Permitted DPI 620 Genii Error (mA)
± 0.2	0.00008	0.0010
± 6	0.00023	0.0016
± 12	0.00044	0.0022
± 18	0.00065	0.0028
± 24	0.00120	0.0034

a. Negative source values only apply to CH2.

12.4 Procedures (CH1/CH2): DC mV/Volts (Measure)

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.

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (see Section 12.1) to do a three-point volts or mV measure calibration (-FS, Zero and +FS) for the applicable set of ranges:
   a. mV (measure) ranges:
      • 200 mV

- 2000 mV

b. Volts (measure) ranges:

- 20 V
- 30 V
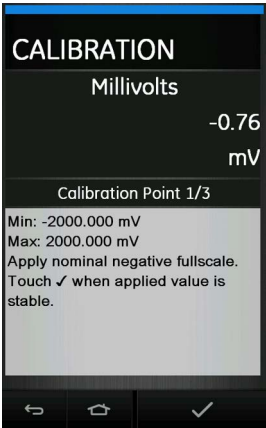
Figure 12-4: Calibration – Millivolts Measure (Range: ± 2000 mV)

4. Check the calibration is correct:

a. Select the applicable Millivolts or Voltage (measure) function via the Calibrator Task Menu.

b. Apply the input values that are applicable to the calibration:

mV: -2000, -1000, -200, -100, 0 (short circuit)

mV: 0, 100, 200, 1000, 2000

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

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

c. Check that the error is within limits. Refer to Table 12-4 or Table 12-5.

Table 12-4: Millivolts (Measure) Error Limits

Applied (mV)	Calibrator Uncertainty (mV)	Permitted DPI 620 Genii Error (mV)
± 2000	0.0510	0.1400
± 1000	0.0400	0.1000
± 200	0.0051	0.0170
± 100	0.0040	0.0125
0 (short circuit)	0.0036	0.0080

Table 12-5: Voltage (Measure) Error Limits

Applied (V)	Calibrator Uncertainty (V)	Permitted DPI 620 Genii Error (V)
± 30	0.000520	0.00210
± 21	0.000400	0.00180
± 20	0.000310	0.00090
± 10	0.000160	0.00065
± 5	0.000080	0.00053
0 (short circuit)	0.000024	0.00040

12.5 Procedures (CH1): DC mV/Volts (Source)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (see Section 12.1) to do a two-point volts or mV source calibration (Zero and +FS) for the applicable range:
    a. mV (source) ranges:
        • 2000 mV
    b. Volts (source) ranges:
        • 20 V
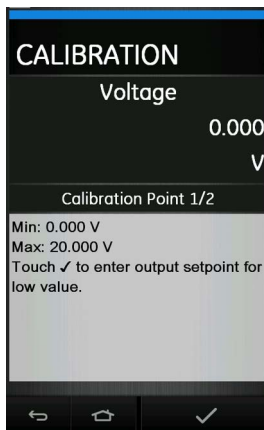
Figure 12-5: Calibration – Voltage Source CH1 (Range: 20 V)

4. Check the calibration is correct:
    a. Select the applicable Millivolts or Voltage (measure) function via the Calibrator Task Menu.
    b. Apply the input values that are applicable to the calibration:

    mV: 0, 100, 200, 1000, 2000

    Volts (V): 0, 5, 10, 15, 20

c.   Check the error is within limits. Refer Table 12-6 or Table 12-7.

Table 12-6: Millivolts (Source) Error Limits

Source (mV)	Calibrator Uncertainty (mV)	Permitted DPI 620 Genii Error (mV)
0	0.00010	0.0080
100	0.00046	0.0125
200	0.00090	0.0170
1000	0.00300	0.1000
2000	0.00600	0.1400

Table 12-7: Voltage (Source) Error Limits

Source (V)	Calibrator Uncertainty (V)	Permitted DPI 620 Genii Error (V)
0	0.000004	0.00042
5	0.000019	0.00070
10	0.000034	0.00010
15	0.000049	0.00013
20	0.000064	0.00160

12.6 Procedures (CH1): Frequency (Measure or Source)

Only do one frequency calibration, use either the measure function or the source function.

12.6.1 Frequency Calibration (Measure Function)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Set up the equipment as follows:
    a.   Signal generator:
    - Output = 10 V
    - Unipolar
    - Square wave
    - Frequency = 990 Hz
    b.   DPI 620 Genii:
    - Input units = Hz
    - Input trigger level = 5 V
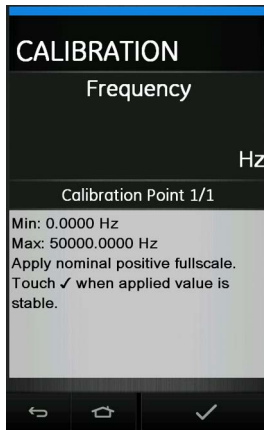
Figure 12-6: Calibration – Frequency Measure CH1 (Range: 50 kHz)

4. Use the calibration menu (see Section 12.1) to do a one-point frequency calibration.

5. Check the calibration is correct.

12.6.2 Frequency Calibration (Source Function)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.

2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

3. Set up the equipment as follows:

    a. Frequency meter:

        •   Gate time = one second

    b. DPI 620 Genii:

        •   Waveform = Square

        •   Amplitude = 10 V

        •   Frequency = 990 Hz

4. Use the calibration menu (see Section 12.1) to do a one-point frequency calibration.
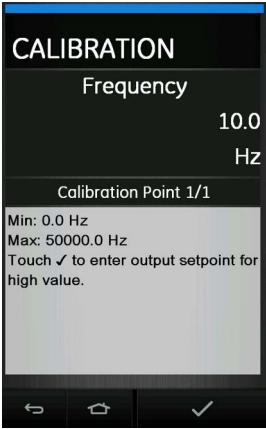
Figure 12-7: Calibration – Frequency Source CH1 (Range: 50 kHz)

5. Check the calibration is correct.

12.6.3 Frequency Calibration Check

1. Frequency (measure) calibration check.
   a. Signal generator:
      - Output = 10 V
      - Unipolar
      - Square wave
   b. DPI 620 Genii:
      - Input trigger level = 5 V
      - Units: Hz or kHz as specified in Table 12-8 or Table 12-9.
2. Frequency (source) calibration check.
   a. Frequency meter:
      - Gate time = 1 second
   b. DPI 620 Genii:
      - Units: Hz or kHz as specified In Table 12-8 or Table 12-9.
3. Select the applicable Frequency measure or source via the Calibrator Task Menu.
4. Apply the input values:
   a. Hz: 0, 990
   b. kHz: 10, 50
5. Check the error is within limits. Refer to Table 12-8 or Table 12-9.

Table 12-8: Hz Error Limits (Measure or Source)

Measure/Source (Hz)	Calibrator Uncertainty (Hz)	Permitted DPI 620 Genii Error (Hz)	
		(Measure)	(Source)
100	0.0002	0.0023	0.0026
990	0.0005	0.0050	0.0053

Table 12-9: kHz Error Limits (Measure or Source)

Measure/Source (Hz)	Calibrator Uncertainty (Hz)	Permitted DPI 620 Genii Error (Hz)	
		(Measure)	(Source)
10.0000	0.00002	0.00023	0.000067
50.0000	0.00002	0.00035	0.000185

12.7 Procedures (CH1): Frequency Amplitude (Source)

Do the procedure as follows:

Note: The procedure that follows calibrates the "mark" value of the square wave frequency output. The "space" value is fixed and is approximately -120 mV.

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Set up the equipment as follows:
    *   Source frequency = 0 (for DC output)
    *   Waveform = Square
4. Use the calibration menu (see Section 12.1) to do a two-point frequency source calibration.
    *   Point 1 = 0.2 V
    *   Point 2 = 20 V
5. Check the calibration is correct:
    a. Set up the equipment as follows:
        *   Source frequency = 0 (for DC output)
        *   Waveform = Square
    b. Apply the amplitude values that are applicable to the calibration. Refer to Table 12-10.
    c. Check the error is within limits. Refer to Table 12-10.

Table 12-10: Amplitude (Source) Error Limits

Amplitude Volts (V)	Calibrator Uncertainty (V)	Permitted DPI 620 Genii Error (V)
0.2	0.01	0.1
5.0	0.01	0.1
10.0	0.01	0.1
20.0	0.01	0.1

12.8 Procedures (CH1): Resistance (Measure)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (see Section 12.1) to do a two-point resistance measure calibration.
    a. Range: 0 - 400 Ω
        *   Nominal zero ohms - make a 4-wire connection to the 0 Ω.

- Nominal positive full-scale ohms - make a 4-wire connection to the 400 Ω resistor.
  b. Range: 400 Ω - 4k Ω
    - Nominal 400 Ω - make a 4-wire connection to the 400 Ω resistor.
    - Nominal positive full-scale ohms - make a 4-wire connection to the 4k Ω resistor.

Figure 12-8: Calibration – Resistance Measure CH1 (Range: 400 Ω)

4. Check the calibration is correct
   a. Select the applicable Resistance (measure) function via the Calibrator Task Menu.
   b. Make a 4-wire connection to the applicable standard resistor and measure the value.
   c. Check the error is within limits. Refer to Table 12-11.

Table 12-11: Resistance (Measure) Error Limits

Standard Resistor (Ω)	Resistor Uncertainty (Ω)	Permitted DPI 620 Genii Error (Ω)
0 (short circuit)	–	0.020
100	0.002	0.032
200	0.004	0.044
300	0.006	0.056
400	0.008	0.068
1000	0.020	0.300
2000	0.040	0.410
4000	0.080	0.640

12.9 Procedures (CH1): True Ohms (Measure)

Do the procedure as follows:

1. Repeat procedure in Section 12.8; in step 3 and 4 select 'True Ohms'.

2. Check the error is within limits. Refer to Table 12-12.

Table 12-12: True Ohms (Measure) Error Limits

Standard Resistor (Ω)	Resistor Uncertainty (Ω)	Permitted DPI 620 Genii 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	0.020	0.0590
2000	0.040	0.1140
4000	0.080	0.2240

12.10 Procedures (CH1): Resistance (Source)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3. Use the calibration menu (see Section 12.1) to do a two-point resistance source calibration for each of the following ranges:
   - Range: 0 - 400 Ω
   - Range: 400 Ω - 2000 Ω
   - Range: 2k Ω - 4k Ω
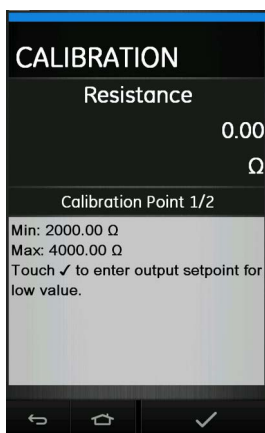
Figure 12-9: Calibration – Resistance Source CH1 (Range: 2000 to 4000 Ω)

4. Check the calibration is correct:
   a. Select the Resistance (source) function via the Calibrator Task Menu.
   b. Apply the resistance values that are applicable to the calibration. Refer to Table 12-13.

c.   Check the error is within limits. Refer to Table 12-13.

Table 12-13: Resistance (Source) Error Limits

Ohms (Ω)	Excitation (mA)	Calibrator Uncertainty (Ω)	Permitted DPI 620 Genii Error (Ω)
0	0.1	0.0014	0.014
100	0.1	0.0016	0.038
200	0.1	0.0021	0.062
300	0.1	0.0028	0.086
400	0.1	0.0035	0.110
1000	0.1	0.0080	0.310
2000	0.1	0.0160	0.550
3000	0.1	0.0240	0.860
4000	0.1	0.0320	1.100

12.11 Procedures (CH1): TC mV (Measure or Source)

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 when calibrating TC mV measure, the applied voltage values should be measured at the TC terminals using the recommended calibration equipment. Refer to Table 12-1.

Do the procedure as follows:

1.   Connect the applicable calibration equipment. Refer to Table 12-1.
2.   Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).
3.   Use the calibration menu (see Section 12.1) to do a three-point TC mV measure/source calibration with the following points:
     •   mV: -10, 0, 100

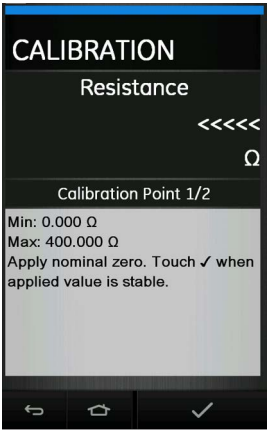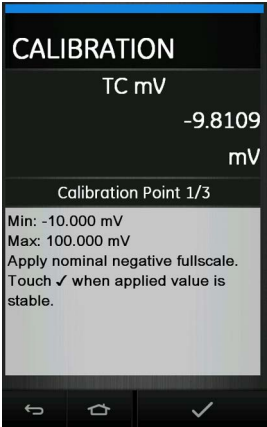**Figure 12-10: Calibration – TC mV Measure CH1 (Range: ± 100 mV)**

4. Check the calibration is correct:
   a. Select the applicable TC mV (measure) or (source) via the Calibrator Task Menu.
   b. Apply the necessary values:
      TC mV (measure): -10, 0 (short circuit)
      TC (mV): 10, 25, 50, 100
      TC mV (source): -10, 0, 10, 25, 50, 100
5. Check the error is within limits. Refer to Table 12-14.

Table 12-14: TC mV (Measure or Source) Error Limits

Input or Output TC (mV)	Calibrator Uncertainty TC (mV)		Permitted DPI 620 Genii Error TC (mV)	
	(Measure)	(Source)	(Measure)	(Source)
-10	0.0036	0.00011	0.0085	0.0090
0	0.0036	0.00010	0.0080	0.0080
10	0.0036	0.00011	0.0085	0.0090
25	0.0036	0.00015	0.0091	0.0100
50	0.0037	0.00025	0.0100	0.0125
100	0.0040	0.00046	0.0125	0.0170

12.12 Procedures (CH1): Cold Junction (TC Method) and CJ (Measure)

Note: Do the TC mV (measure) calibration before the CJ (Cold Junction) calibration. The conditions for CJ calibration are as follows:

• Battery mode (with DC charger disconnected).
• CH1 active (TC or TC mV).
• CH2 set to "None".
• Burnout Detection off (in CH1 TC settings).
• Use miniature TC connectors.

There are two methods of doing a cold junction test; the CJ (TC Method) is the preferred method. Both procedures are described as follows:

12.12.1 Cold Junction (TC Method)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.
2. Set the reference unit temperature: 0°C.
3. Let the equipment get to a stable temperature (minimum: 1 hour since the last power on).
4. Use the calibration menu (see Section 12.1) to do a one-point calibration for the CJ (TC method) function.
5. Calculate the expected reading, using the known error in the thermocouple and reference unit.
6. Check the calibration is correct:
   a. Select the TC measure function via the Calibrator Task Menu.
   b. 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.

12.12.2 Cold Junction (Alternative Method)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.

2. Set up the equipment:
    - Function = TC (measure)
    - TC Type = K Type
    - 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 values that follow:
    - TC temperature given on the reference unit T (actual).
    - TC temperature given on the calibrator T (measured).
    - CJ temperature given on the calibrator CJ (measured).

6. Calculate the CJ (Cal Value) as follows:
    - CJ (Cal Value) = CJ (measured) - T (actual) + T (measured).

7. Use the calibration menu to do a one-point calibration for the CJ (measure) function.

8. When the display shows "Sampling complete", set the correct Cal Value = CJ (Cal Value) in step 6.

9. Check the calibration is correct:
    a. Select the TC (measure) function via the Calibrator Task Menu.
    b. Check the equipment gives a TC temperature that is the same as the temperature on the reference unit ± 0.1°C (0.2°F).

12.13 Procedures (CH1): AC mV/Volts (Measure)

Do the procedure as follows:

1. Connect the applicable calibration equipment. Refer to Table 12-1.

2. Let the equipment get to a stable temperature (minimum: 5 minutes since the last power on).

3. Use the calibration menu (see Section 12.1) to do a two-point AC calibration for the applicable AC function.
    - Use the local power supply frequency.
    - For the AC mV (measure) function:
      point 1 = 200.0 mV AC
      point 2 = 2000.0 mV AC
    - For the AC Volts (measure) function:
      point 1 = 2.000 V AC
      point 2 = 20.000 V AC

4. Check the calibration is correct:
    a. Select the applicable AC mV or AC Volts (measure) function via the Calibrator Task Menu.
    b. Apply the input values that are applicable to the Calibration.
      AC mV: 10, 500, 1000, 2000
      AC Volts: 5, 10, 20

c. Check the error is within limits. Refer to Table 12-15 or Table 12-16.

Table 12-15: AC mV (Measure) Error Limits

Applied AC (mV)	Calibrator Uncertainty (mV)	Permitted DPI 620 Genii Error (mV)
10	0.12	2.50
500	0.20	3.10
1000	0.28	3.75
2000	0.44	5.00

Table 12-16: AC Volts (Measure) Error Limits

Applied AC Volts (V)	Calibrator Uncertainty (V)	Permitted DPI 620 Genii Error (V)
5	0.0018	0.030
10	0.0026	0.037
20	0.0042	0.050

12.14 Procedures: Pressure Module

Note: This procedure is suitable for PM 620, PM 620T or IDOS UPM pressure modules.

Do the procedure as follows:

1. Assemble the pressure indicator with the necessary pressure module.
2. Connect the instrument to the pressure standard.
3. Let the equipment get to a stable temperature (minimum: 1 hour since the last power on).
4. Use the calibration menu (see Section 12.1) to do a two-point pressure calibration (absolute sensors) or three-point pressure calibration (gauge sensor).
    - -FS, Zero and +FS for gauge sensors.
    - Zero and +FS for absolute sensors.

Note: If software version requires a three-point calibration for an absolute sensor, use points at 0, 50% and +FS or three-point calibration. Refer to Table 12-17 or Table 12-18.

Table 12-17: Calibration Pressures (Gauge Sensors)

Pressure Range	Nominal Applied Pressure mbar (psi)		
mbar (psi)	-FS[a]	Zero	+FS
< 700 mbar (10.0)	-FS	0	+FS
> 700 mbar (10.0)	-900 (-13.1)	0	+FS

a. For a three-point calibration, do not apply more than -90% of the specified FS for the unit.

Table 12-18: Calibration Pressures (Absolute Sensors)

Pressure Range bar (psi)	Nominal Applied Pressure mbar (psi)	
	Zero	+FS
350 mbar (5.0)	< 1.0 (0.02)	+FS
2 bar (30.0)	< 5.0 (0.07)	+FS
7 bar (100.0)	< 20.0 (0.29)	+FS
20 bar (300.0)	< 50.0 (0.73)	+FS
350 bar (5000)	Use atmospheric pressure as zero.	+FS

5. Check the calibration is correct:
    a. Select the applicable pressure function via the Calibrator Task Menu.
    b. Apply the following pressure values for absolute sensors:
        %FS: 0, 20, 40, 60, 80, 100
        %FS: 100, 80, 60, 40, 20, 0
    c. Apply the following pressure values for gauge sensors:
        %FS: 0, 20, 40, 60, 80, 100
        %FS: 100, 80, 60, 40, 20, 0
    d. Check the error is within limits.
    e. Refer to the sensor datasheet and use the values in the total uncertainty column.
    f. The specified values include an allowance for temperature changes, reading stability for one year, and the uncertainty of the standard used for calibration.

12.15 Procedures: TERPS USB

Refer to the user manual K0473, Druck TERPS. Refer to Section 12.14 for procedure.

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

12.16 Procedures: RTD-INTERFACE

Do the procedure as follows:
1. Connect the RTD-Interface to the DPI 620 Genii.
2. Connect the RTD probe to the temperature standard.
3. Let the equipment get to a stable temperature (minimum: 1 hour since the last power on).
4. Use the calibration menu (see Section 12.1) to do a two-point temperature (resistance) measure calibration (0 to 400 Ω range):
    •   Zero and +FS
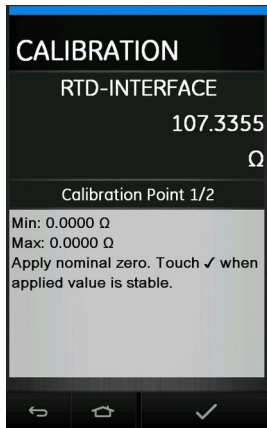
Figure 12-11: Calibration – RTD-INTERFACE

5. Check the calibration is correct:
    a. Select the applicable RTD-Interface measure function via the Calibrator Task Menu.
    b. Apply the following values:
        %FS: 0, 25, 50, 75, 100
    c. Check the error is within limits. Refer to Table 12-19.

Table 12-19: RTD Resistance (Measure) Error Limits

Applied Resistance (Ω)	Calibrator Uncertainty (Ω)	Permitted DPI 620 Genii Error (Ω)
0	0.0020	0.020
100	0.0020	0.032
200	0.0029	0.044
300	0.0041	0.056
400	0.0052	0.068

13. General Specification

For a full specification of the Druck DPI 620 Genii calibrator and its related accessories (MC 620G module carrier, PM 620 or PM 620T pressure module and PV 62XG pressure station), refer to the relevant product datasheet.

The DPI 620 Genii is suitable for indoor use with the following environmental requirements. It is also permitted to use outdoors as a portable instrument if these environmental requirements are met.

Item	Description
Display	LCD: Color display with touchscreen.
Operating Temperature	-10 to 50°C (14 to 122°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Ingress Protection	IP55 (Druck DPI 620 Genii 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: EN 61326-1:2013
Electrical Safety	Electrical: EN 61010:2010
Pressure Safety	Pressure Equipment Directive - Class: Sound Engineering Practice (SEP)
Approved	CE Marked
Battery Power	Lithium-Polymer battery (Druck Part Number: IO620-BATTERY). Capacity: 4600 mAh (minimum), 4800 mAh (typical) Nominal voltage: 3.7 V. Charge temperature: 0 to 45°C (32 to 113°F) outside this range, charging stops. Discharge temperature: -10 to 60°C (14 to 140°F). Charge/discharge cycles: > 500 > 70% capacity.

Note: The DPI 620 Genii has been assessed to the European IEC 60529 standard as having an ingress protection rating of IP55, but this is for reliability purposes and not for safety reasons.

Note: To meet the immunity requirements of annex A of EN 61326-1:2006, when used in an industrial environment, the unit must be battery powered to guarantee measurement specification.
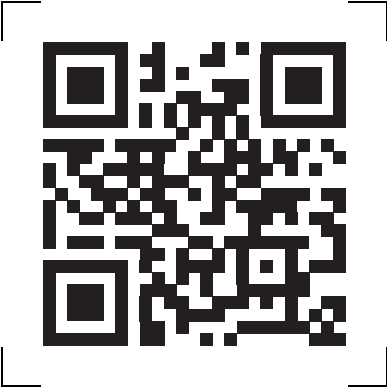
Note: The case of the DPI 620 Genii is not suitable for prolonged exposure to UV.

Note: The DPI 620 Genii is not suitable for permanent installation in an outdoor environment.

Office Locations

Services and Support Locations

K0541 Revision C | English

Baker Hughes

bakerhughes.com