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# Introduction

The purpose of this User Reference Guide is to provide all of the information required for the ownership and successful operation of the PHD Pro2. Before using the PHD Pro2 for the first time, we advise you read the PHD Pro2 Quick Start Guide which contains important safety warnings, risk assessment advice, and a basic introduction to operating the instrument.

# The PHD Pro2

The PHD Pro2 range of high-voltage DC pinhole (or 'holiday') detectors are ideal for rapid and effective holiday testing of a range of non-conductive coatings and linings for porosity, faults and defects. The PHD Pro2 features a 240x160 pixel , three-colour backlit LCD which displays the user options for setting the test voltage, alarm volume, alarm threshold sensitivity, alarm suppression, several pre-installed test standards, and an optional audible warning tick that sounds when the high voltage is enabled. Fault detection is indicated by an audible alarm coinciding with the front panel LCD display flashing red. A low-tension coiled lead connects the unit to the test probe.

The user options are selected by a membrane keypad input. The selected values and options are retained when the unit is switched off. During operation, the test voltage will remain regulated as the batteries discharge. Since the output voltage is DC, the material under test is subjected to minimum electrical stress.

# Safety Warnings

**IMPORTANT:** We strongly advise that individuals with pacemakers, cochlear implants, or trans-dermal electronic implants - e.g., glucose monitors do not use our high-voltage test equipment under any circumstances.

**IMPORTANT:** This product must not be used in combustible atmospheres or ATEX Hazardous Areas, such as fuel stations or in proximity to any combustible gas (and/ or oxygen concentrations exceeding normal atmosphere).

All high-voltage testing equipment must be operated by suitably trained, responsible, authorised personnel only.

**IMPORTANT:** This product can cause radio interference and caution must be taken when operating in sensitive environments such as hospital roofs.

**IMPORTANT:** This instrument must be connected to an appropriate earth (ground) before a high voltage is applied.

Observe all safety precautions; operators will be exposed to high voltages when using this instrument. Avoid contact with live components.

This instrument creates sparks in use, which cause the formation of ozone (O3). Ozone is a known irritant and therefore - particularly when using the instrument in confined spaces - the user must ensure adequate ventilation so that established workplace exposure limits are not exceeded.

**Safety Warning:** DO NOT USE this equipment in the event of it being immersed in water. It must be immediately returned to Buckleys for service, calibration and/or repair.

**A high voltage will always take the easiest route to earth. The risk of electrical shock is inherent when operating high-voltage equipment and extreme caution must be taken at all times.**

The output voltage of this equipment is derived from a high-impedance source and is current limited. However, when the equipment is in use, should the operator accidentally contact the test electrode they will receive an electric shock. If this situation is unavoidable, we recommend that suitable rubber or plastic insulating gloves be worn. Furthermore, the operator should be in good health and - in particular - not suffer from any cardiac condition.

During testing, a static charge may accumulate on the surface under test. If the operator is walking on the surface, they may also become 'charged- up'. When discharged to earth, this charge could result in a static electric shock, such as may be experienced in the home under certain weather conditions.

Whilst such a shock does not normally present any danger to the user, it can be unpleasant. In most cases, the operator can avoid this by wearing the blue electrostatic discharge wristband supplied and ensuring it is connected by the blue cable to the grounding terminal (4mm socket) on the test probe handle, or the earthing terminal on the instrument's enclosure.

In all cases it is essential to ensure that the instrument is correctly earthed.

# Declarations of Conformity

## EC Declaration of Conformity

We, Buckleys (UVRAL) Ltd., as sole manufacturer of the apparatus listed below, declare that the product **PHD Pro2** is manufactured in conformity with the following directives: **2014/30/EU, 2014/35/EU, 2015/863/EU** and **2011/65/EU (RoHS)**.

Date: 01/07/2021

Authorised by:

**J P Hoveman**

CEO, Buckleys (UVRAL) Ltd.

CE

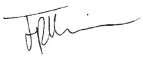
## UKCA Declaration of Conformity

We, Buckleys (UVRAL) Ltd., as sole manufacturer of the apparatus listed below, declare that the product **PHD Pro2** is manufactured in conformity with the following UK legislation: **Electronic Compatibility Regulations 2016**, **The Electrical Equipment (Safety) Regulations 2016** and **Restriction of the Use of Certain Hazardous Substances in Electrical and**

**Electronic Equipment Regulations 2012**.

Date: 01/07/2021

Authorised by:



**J P Hoveman**

CEO, Buckleys (UVRAL) Ltd.

UK CA

# Specifications

**Note:** Due to ongoing technical developments, all stated information is typical and is subject to change without notice or obligation.

- Max. output current: <1mA (continuous)
- Alarm sensitivity range: 10µA to 450µA (factory-set to 200µA)
- Recommended coating thickness range (usando NACE SP0274):
  - 6kV modelos: 4µm - 576µm
  - 30kV modelos: 13µm - 14.4mm
  - 40kV models: 13µm - 25.6mm
- Built-in test standard compliance: NACE SP0274/ NACE SP0490/NACE SP0188/ASTM D5162/ASTM G62/ISO 21809-2†
- Unit: 1.64kg, 172mm x 85mm x 235mm
- Handle: 720g, 290mm x 85mm
- When packed:DimensionsWeight
  - Basic kit:580 x 440 x 250mm9.4kg
  - Standard/Pipeline kit:580 x 440 x 250mm11.4kg
  - Coatings kit:660 x 515 x 230mm13.3kg
- Battery type: 4 x D-cell/LR20
- Meter accuracy: <10kV: +/- 10V. >=10kV +/- 100V
- Current meter FSD: 450µA
- Maximum relative humidity: 80% noncondensing
- Working altitude: <2000m
- Temperature range: 0°C - +40°C

## Output voltage range:

| Model | Low Range | Increment | High Range | Increment | Polarity | Battery Life* |
|---|---|---|---|---|---|---|
| PHD Pro2 (6kV) | 500V-6kV | 10V | N/A | N/A | Positive | 16 hours |
| PHD Pro2 (30kV) | 0.9kV-10kV | 10V | 10.1kV-30kV | 100V | Positive | 10 hours |
| PHD Pro2 (40kV) | 0.9kV-10kV | 10V | 10.1kV-40kV | 100V | Positive | 8 hours |

* Test conducted in accordance with BS EN50356. Test units fitted with 10,000mAh NiMH rechargeable cells. Instrument output voltage set to maximum.

† These standards are pre-programmed and are provided for convenience. However, it is the user's responsibility to ensure that the correct settings are chosen for the intended application of this unit.

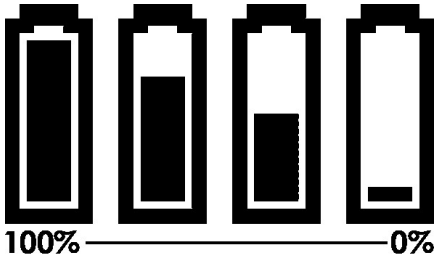
# Maintenance

The PHD Pro2 is designed for minimum maintenance by the user and contains no user-serviceable parts. Send the entire kit back to the manufacturer or distributor for recalibration annually. Remove the batteries for transportation, or if the unit is not used for prolonged periods.

**IMPORTANT:** Calibration and repair of this product and its components **must only** be carried out by trained approved technicians working in full accordance with Buckleys' service guidelines. There are no user-serviceable components within the instrument or handle and **very dangerous voltages** may be present for some time after the unit is switched off. For your own safety, do not dismantle or modify the instrument or its accessories.

## Battery status indicator

**Note:** The battery level indicator is characterised to NiMH rechargeable cells.




The battery compartments are located on the unit's rear panel and are easily accessible. When refitting, the batteries ensure their positive identification pips face the rear of the unit *in **both** battery compartments*, otherwise the unit will not function. Use only good quality high capacity batteries of at least 10000mAh (rechargeable NiMH) or 15000mAh (non- rechargeable) ratings.

Rechargeable batteries reach optimum performance after several charge/discharge cycles.

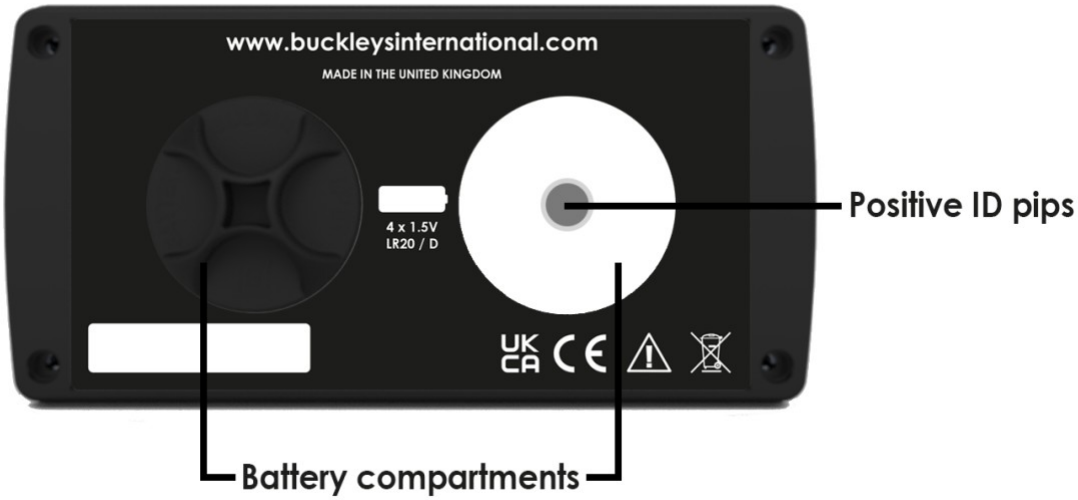



Fig 1 - PHD Pro2 rear panel

The exterior of the unit should be cleaned regularly. Dirt that is difficult to remove from the unit and handle may be removed with a moistened cloth (99% water +1% mild detergent). Mild solutions may be used to remove greasy dirt. Under no circumstances may the cleaning fluid be allowed to enter the unit. The use of other cleaning agents may lead to damage to the unit's surface areas.

Our service team will ensure your detector's performance is within our strict tolerances and carry out a thorough inspection of the entire kit; advising you of any repairs required.

It is advisable to remove the batteries and keep them fully charged when the unit is not in use.

If the unit is submerged in water, or water is allowed to enter the casing, then immediately do the following:

1. Remove the batteries
2. Drain any water that may have entered the unit
3. Replace the battery covers
4. Disconnect the lead between the handle and the unit
5. Dry everything as much as possible using towels or cloths
6. Pack the instrument in its case and turn to Buckleys or your distributor for service and/or repair, ensuring that you make it clear that the unit has been immersed in water

An instrument that has been immersed in water is potentially very dangerous.

Please note that water immersion is not covered under warranty.

**NOTE:** The PHD Pro2 requires annual calibration by an approved provider. For more details, visit: http://www.buckleysinternational.com/services/calibration

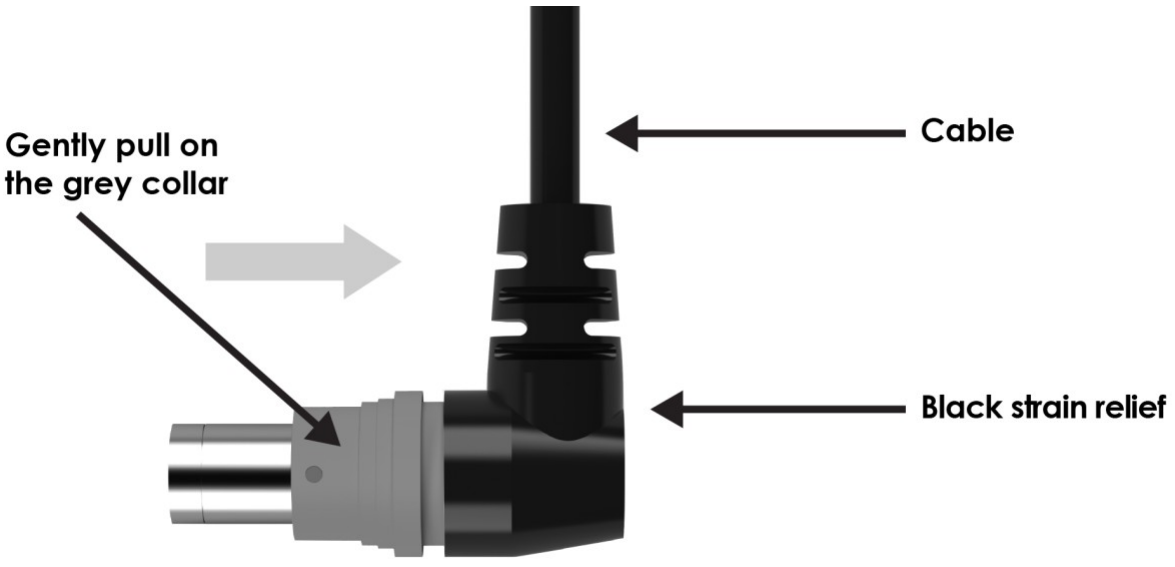
## Storage and Transit

When you have finished using your PHD Pro2, please ensure that the equipment is clean and dry and carefully packed away in the transit case supplied with your kit.

All cables MUST BE REMOVED before packing away as leaving the cables connected during storage and transit can cause damage which can disable your instrument and invalidate your warranty.

Extra care must be taken when removing the interconnect cable from the handle and instrument. The plugs are designed to latch into their sockets to prevent them disconnecting by accident. It is necessary to first release the latch in order to remove the plug from the socket.

To release the catch, gently pull on the grey collar, and the plug will easily disengage from the socket.




Do not pull on the black strain relief or the cable.

**DO NOT TWIST** any part of the cable or plug.

Incorrect technique may result in damage to the interconnect cable.

# Register Your Product

Please register this product via Buckleys' website and download the Warranty Registration Certificate.

Once your product is registered, you will receive the following benefits:

- Annual service & calibration reminders by email
- Latest industry news relating to your product
- Be the first to hear about our new products

We strive to improve the quality of our products and service. By registering your product, you can help us monitor overall quality of our products, service and dealer network.

Additionally, if we ever need to contact you regarding your product, we are able to do so immediately.

To register your product, simply visit www.buckleysinternational.com/registration, login, complete the online form and click on 'SUBMIT'.

# Useful Advice

## Instrument Sensitivity

Several variables including the test material itself, temperature, solar load and electrode type and size will impact the sensitivity setting required. The detector will show a low-level current draw in micro-amps (µA) as the electrode is passed over a coating. A sensitivity setting around 100µA above the displayed current draw is often suitable; although attention should be given to verify the effectiveness of the sensitivity setting; too low may cause false-alarms and too high could cause faults to go undetected.

It may not always be possible to determine a suitable sensitivity setting. In such cases, increasing the sensitivity until the detector switches to 'Spark Only' mode prevents the alarm from triggering unless a direct connection to ground is made. A higher test voltage may be required to compensate for current drawn as the electrode passes over the coating. This method is less precise and will not detect weak or thin areas as readily.

## Alarm Suppression

This new generation instrument is capable of detecting flaws much more rapidly than previous models. As a result of this, it is possible to get multiple alerts for a single flaw, which may be inconvenient or distracting for the operator. In this case, the Alarm Suppression may be adjusted – a setting of zero indicates no suppression, and higher settings will progressively reduce the likelihood of multiple alerts.

We recommend using the lowest comfortable setting as this reduces the chances of missing a second flaw close to one detected first.

# Unpacking

**Remove the unit and accessories from the packaging and check for any damage. Should any item be damaged or missing, notify your supplier and carrier immediately, keep all packing material for inspection and do not use the equipment.**

Keep all packaging in case the unit needs to be returned for repair or calibration.

Please ensure all components listed below are present and undamaged:

| Item | Description | Basic Kit | Pipeline Kit | Coatings Kit |
|---|---|---|---|---|
| A | Main detector unit |  |  |  |
| B | Test probe handle and nosecone |  |  |  |
| C | Interconnecting lead |  |  |  |

| Item | Description | Basic Kit | Pipeline Kit | Coatings Kit |
|---|---|---|---|---|
| D | Electrostatic discharge wristband |  |  |  |
| E | Calibration certificate |  |  |  |
| F | 150mm stainless steel drum brush electrode |  |  |  |
| G | 5m earth cable on reel |  |  |  |
| H | Trailing Earth Lead | |  | |
| I | D-cell batteries x4 |  | | |
| J | D-cell rechargeable batteries x4 | |  |  |
| K | Battery charger with mains power adaptors and in-car charger* | |  |  |
| L | Mid-section extension rod | |  |  |
| M | End-section extension rod | |  |  |
| N | Angled phosphor-bronze brush electrode | |  250mm |  450mm |
| O | Pair of knurled locknuts | |  |  |

| Item | Description | Basic Kit | Pipeline Kit | Coatings Kit |
|---|---|---|---|---|
| P | Rolling spring electrode claw | |  | |
| Q | Pointed probe electrode | | |  |
| R | Padded carry bag with shoulder strap |  |  |  |
| S | 50m earth extension cable on reel | | |  |
| T | Robust black transit case |  |  | |
| U | High-visibility transit case with machine-cut insert | | |  |
| V | 150mm straight angled rubber electrode | | |  |

* For details of the battery charger, please refer to the manual included with the charger.

# Risk Assessment

It is the user's responsibility to complete a risk assessment before using Buckleys equipment. The following points offer some guidance but must not be assumed to be complete or sufficient.

## Personal Safety

- Have all users been trained in the correct and safe use of the instruments?
- Are they aware that the instrument produces high voltages, and can give electric shocks if used incorrectly?
- Is the instrument in good condition, undamaged? Is the instrument dry? Are the accessories similarly in good condition, dry and undamaged?
- Is it possible to ensure that persons with pacemakers, cochlear implants or transdermal implants of any kind are sufficiently far from the instrument & test site to be safe?
- Ozone is an irritant gas which will be produced when the instrument produces sparks – is the test outdoors, or is there sufficient, suitable ventilation in place to ensure that this is not hazardous?
- Is the access route to the area of the test safe? Is fall protection necessary? If so, is it in place?
- Has the instrument been properly grounded to a metallic grounding point?
- Should you use the anti-static wristband to prevent static charge build-up?

## Explosion & Fire Risk

- Buckleys high-voltage instruments will produce sparks - Are you certain that there is no risk of an explosive atmosphere?
- Have all easily-ignited and/or flammable materials been removed from the area to be tested?

## EMC & RFI

- Buckleys high-voltage instruments will produce sparks which may create interference in nearby electronic apparatus, particularly communication and computer equipment.
- Are you certain that there is no risk of such interference causing a danger to others – particularly medical or life support equipment?
- Are you sure that there is no risk of such interference causing costs or inconvenience to others – e.g. industrial processes, measuring equipment, scientific apparatus, domestic radio and TV?

## Other Risks

- Have you checked that there are no ongoing processes in the area that may be dangerous – X-ray machines, other radiation?
- Are you certain that the instrument has not been immersed, dropped or otherwise damaged in a way that is not obvious?
- Have you verified that the ground connection is actually grounded?
- Is the person responsible for site safety aware of / fully understanding the testing you are going to do, and has it been reviewed in line with the site procedures?

**Note:** Wherever you are intending to use equipment of this type, on your site or on a customer's, always obtain clearance from the company safety officer.

## Factory Settings

In order to use the PHD Pro2, you will need to adjust the instrument settings to suit your specific application. The following is a summary of the settings as set in the factory:

Output voltage: 10kV
Alarm suppression: 0
Testing standard: Manual
Sensitivity: 200µA
Alarm volume: 5
Screen contrast: 5

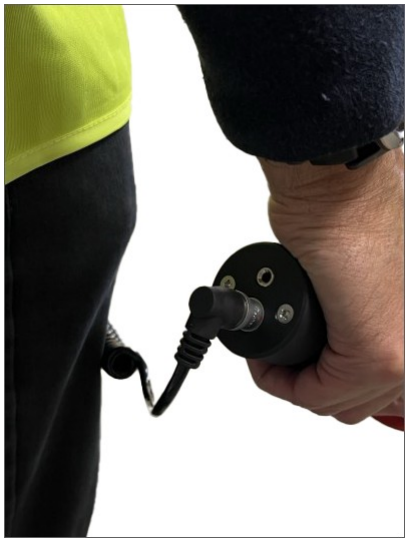
## Wearing the Equipment

The PHD Pro2 equipment has been designed to be safe and robust when used as recommended. Incorrect use of the equipment can cause damage that may disable your instrument and invalidate your warranty.

### Right-handed use:

The interconnect cable is worn in front of the body


The interconnect cable is kept outside of the shoulder-strap



The interconnect cable attached to the handle

### Left-handed use:

The interconnect cable is worn behind the body

The interconnect cable is worn behind the body

The interconnect cable attached to the handle

The interconnect cable attached to the

## The PHD Pro2 Instrument

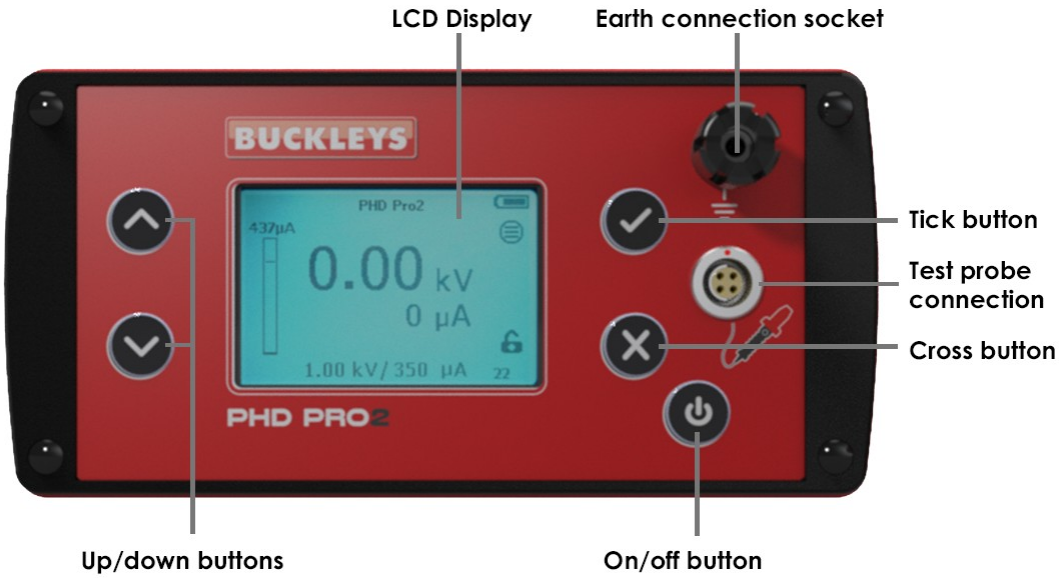



Fig 2 - PHD Pro2 front panel

The unit is powered on by pressing the ⏻ button. Initally the LCD will glow red, display the Buckleys logo, and then display the Home Screen. To switch the unit off again, press and hold the ⏻ button. The LCD screen will display "Good Bye" and the unit will power down.

Before using the unit you must first ensure that the supplied Earth Lead is attached to the Earth Connection Socket at one end, and a suitably grounded anchor point e.g. concrete, steel, foil-faced insulation , or the substrate of the material to be tested.

In the case that there is an insulating layer between the ground and the substrate of the material to be tested, an extra grounding lead can be connected from the grounding point of the building to this substrate, or foil backing. An improperly grounded instrument may cause electric shocks to users and possibly others. Although such shocks may not be inherently dangerous, they may cause severe discomfort, or cause someone to injure themselves in reacting to the shock.

The supplied handle must be attached, using the supplied interconnecting lead, to the Test Probe Connection. Depending on what you wish to test, you must also attach a suitable electrode to the handle, with or without the supplied Extension Rods.

Depending on the kit options, the PHD Pro2 may be supplied with the following electrodes:

6005-0237
150mm stainless steel drum brush electrode
for irregular shaped objects

All kits


Straight phosphor-bronze brush electrode
for large, flat and durable areas

Pipeline kit
250mm

Coatings kit
450mm

6005-0236
Pointed probe electrode
for recesses and small areas

Coatings kit only

6005-0134
Straight silicone rubber
150mm electrode
ideal for coatings too delicate for phosphor-bronze brush electrodes

Coatings kit only

## The PHD Pro2 Handle

**HAPTIC FEEDBACK:** Please note that the PHD Pro2 Handle will vibrate when a fault is detected. In addition to the screen glowing red and the unit sounding an alarm, the handle will also buzz to make sure you never miss a fault, even in the noisiest of environments.

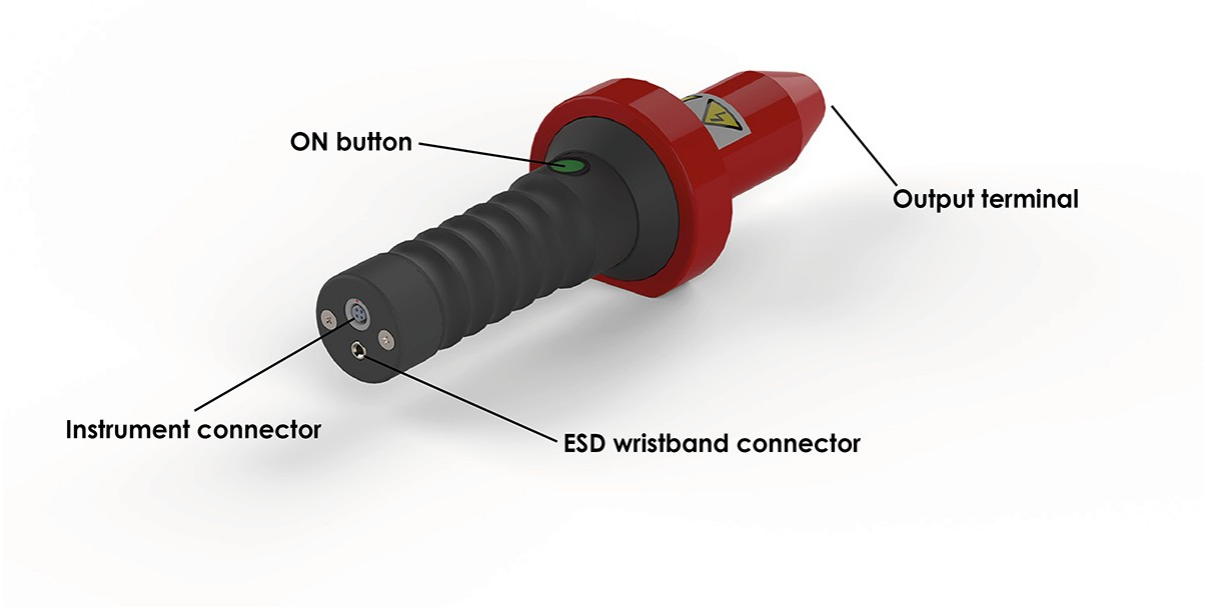



Fig 3 - PHD Pro2 Handle

## Instrument Connector

Used to connect the handle to the test instrument using the interconnecting lead

**Note:** The interconnecting lead must be **PUSHED** into the socket to connect, and **PULLED** to disconnect. **DO NOT TWIST the plugs under any circumstances as this will potentially cause damage.**

## ESD Wristband Connector

This socket allows the user to connect an ESD (antistatic discharge) wristband. Using an ESD wristband correctly will prevent a buildup of electrostatic charge accumulating within the user.

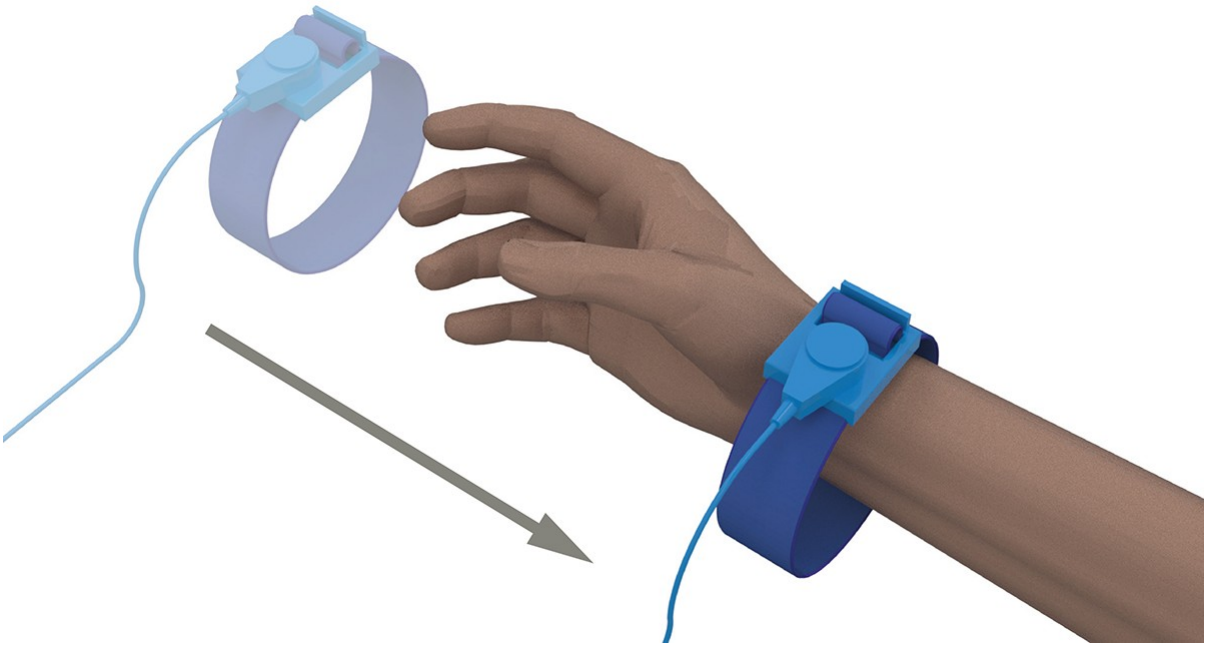


Fig 4 - ESD Wristband

Before operating the instrument, please ensure that the wristband plug is securely inserted into the connector socket on the handle, and that the wristband is placed around the wrist and snapped closed. **All parts of the strap should be in direct contact with your skin at all times.**

## ON button

The green ON button is pressed to apply the voltage to the material to be tested. The button can be locked in operating mode by pressing the ⊗ button on the main unit whilst holding the ON button. To release the lock, either press the ON button again, or press the ⊗ button on the main unit.

## Output terminal

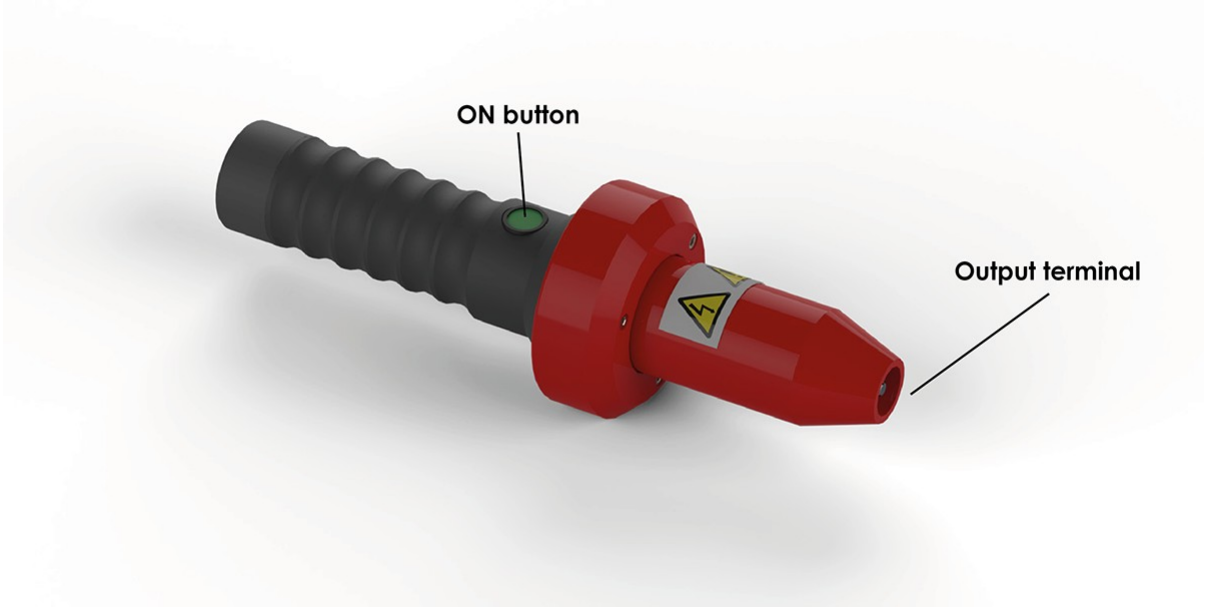



Fig 5 - PHD Pro2 Handle - output terminal

The output terminal is used to connect electrodes and other accessories to the handle.

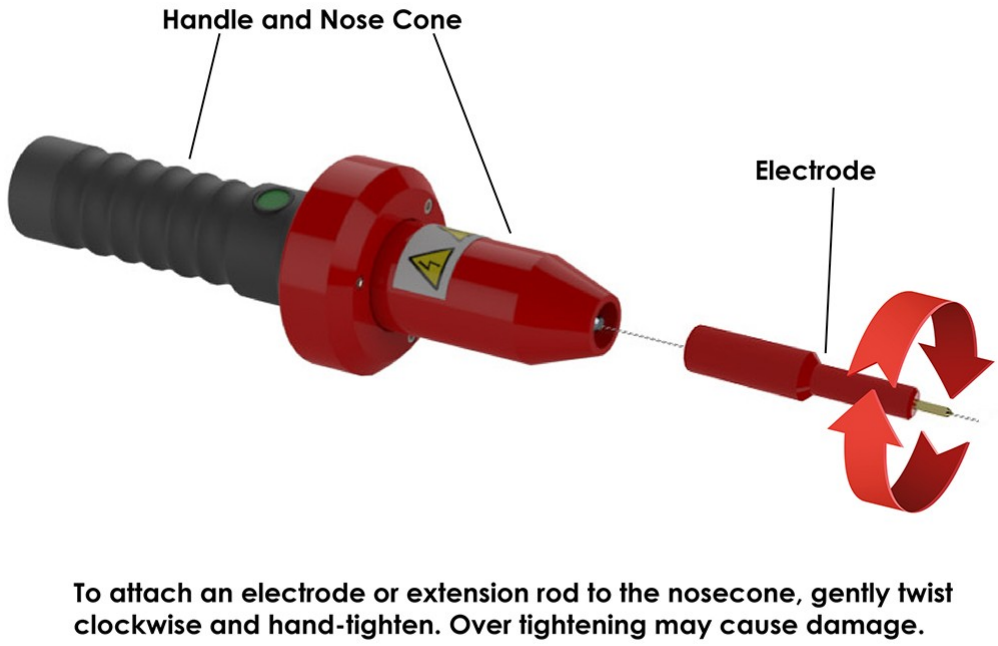



Fig 6 - PHD Pro2 Handle - attaching electrode or extension rod to the nosecone

Please ensure that the handle is returned to an authorised dealer for recalibaration on an annual basis. Your test results may become innaccurate without regular annual recalibration.

## Optional Electrodes

The electrodes supplied with your PHD Pro2 are shown on the previous page.

Depending on your application for the PHD Pro2, you may wish to choose from our extensive range of optional electrodes:

6005-0239
150mm flexible probe
for testing around corners and overlaps

6005-0445
Carbon coated drum brush electrode
for checking irregular shaped objects

Rolling spring electrodes
for external pipe inspection

Silicone rubber internal electrodes
for internal pipe inspection

## Home Screen

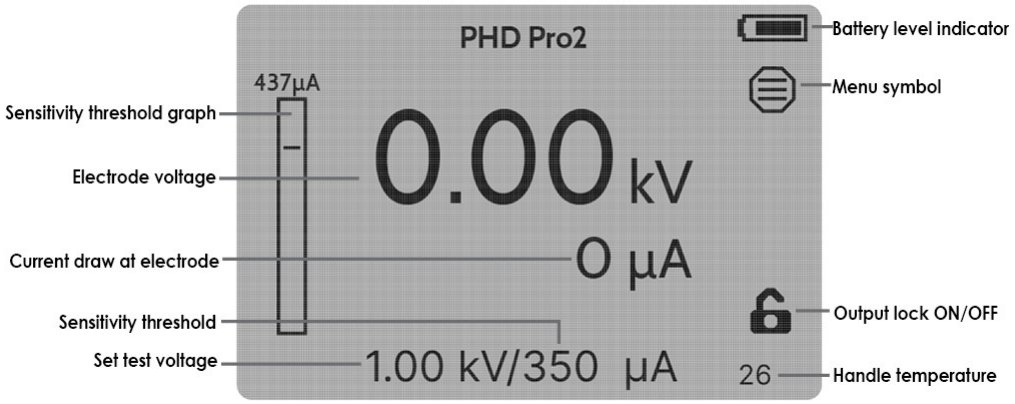



Fig 7 - PHD Pro2 Home Screen

The Home Screen is displayed by default when a handle is connected to the instrument.

For convenience it is possible to adjust the voltage from the home screen using the ⌄ and ⌃ buttons. It is necessary to return to the home screen (press ✓ or just wait) before enabling HV.

## Sensitivity threshold graph

This is an indicator to display how much current is being detected relative to the sensitivity threshold. The vertical bar is filled up as current is detected. The horizontal line represents the sensitivity threshold set by the user. When the current exceeds the threshold, the alarm sounds to indicate that a fault has been detected. The number above the vertical bar is the sensitivity threshold multiplied by 1.25.

## Electrode voltage

Displays the voltage (in kilovolts) that is being applied to the test material.

## Current draw at electrode

Displays the current (in µA) that is being drawn at the electrode.

## Sensitivity threshold

The threshold current (in µA) which, if exceeded, will trigger the alarm. The higher the threshold the greater the amount of current is required to trigger the alarm.

## Set test voltage

The voltage (in kilovolts) set by the user, that will be applied to the test material.

## Battery level indicator

A visual indication of the amount of power remaining in the batteries.

## Menu symbol

This symbol indicates that the ✓ can be pressed to display the Main Menu (see below).

## Output lock ON/OFF

To apply a voltage to perform the test, the user will press and hold the green button on the handle. By default, the voltage will cease to be applied if the user stops pressing the green button. To lock the green button, the user can press the ✕ whilst depressing the green button. The voltage will continue to be applied to the handle until the green button or the ✕ button is pressed again. This symbol will indicate whether the lock is on or off.

## Handle temperature

Displays the temperature of the handle. If the handle temperature exceeds 70° C, the unit will shut down as a safety precaution.

# Main Menu

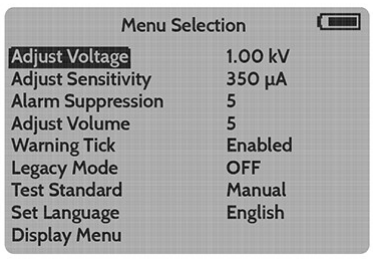



Fig 8 - PHD Pro2 Main Menu Screen

Use the ⌄ and ⌃ buttons to scroll through the menu options, and press ✓ to select the highlighted option.

# Adjust Voltage

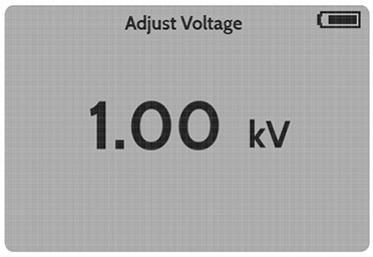



Fig 9 - PHD Pro2 Adjust Voltage Screen

This screen is used to adjust the voltage (in kV) that your instrument generates.

Use the ⌄ and ⌃ buttons to highlight Adjust Voltage on the Main Menu, and press the ✓ button to display the Adjust Voltage screen.

Press the ⌃ button to increase the voltage, or press the ⌄ button to decrease the voltage.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the voltage.

## Adjust Sensitivity

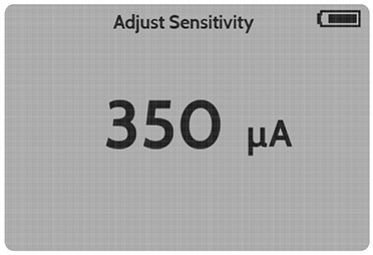



Fig 10 - PHD Pro2 Adjust Sensitivity Screen

This screen is used to adjust the sensitivity threshold (in µA) that will trigger the alarm once exceeded.

Use the ⌄ and ⌃ buttons to highlight Adjust Sensitivity on the Main Menu, and press the ✓ button to display the Adjust Sensitivity screen.

Press the ⌃ button to increase the sensitivity, or press the ⌄ button to decrease the sensitivity.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the sensitivity.

## Alarm Suppression

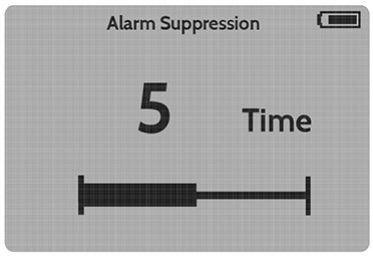



Fig 11 - PHD Pro2 Alarm Suppression Screen

The new generation of PHD Pro2 is capable of detecting flaws much more rapidly than previous models, so there is a possibility that the unit will trigger multiple alarms for a single flaw, which can be inconvenient or distracting for the operator. Since each alarm takes a few seconds to complete before the next one is signalled, it is possible that the unit will continue to alarm several times after the electrode has moved away from the flaw. The Alarm Suppression function allows the operator to adjust the time during which the alarm does not signal repeatedly. A setting of zero means that no suppression is applied, and multiple alarm triggers may occur. Higher suppression values reduce the likelihood of multiple alarms for a single flaw. However, higher suppression values increase the risk of a fault being missed if it was detected very soon after a previous one, so the ideal setting is the lowest possible without being distracted by multiple alarms.

Use the ⌄ and ⌃ buttons to highlight Alarm Suppression on the Main Menu, and press the ✓ button to display the Alarm Suppression screen.

Press the ⌃ button to increase the suppression, or press the ⌄ button to decrease the suppression.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the suppression level.

# Adjust Volume

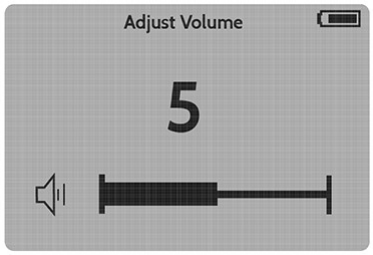



Fig 12 - PHD Pro2 Adjust Volume Screen

This screen is used to adjust the volume of the alarm.

Use the ⌄ and ⌃ buttons to highlight Adjust Volume on the Main Menu, and press the ✓ button to display the Adjust Volume screen.

Press the ⌃ button to increase the alarm volume, or press the ⌄ button to decrease the alarm volume.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the alarm volume.

# Warning Tick

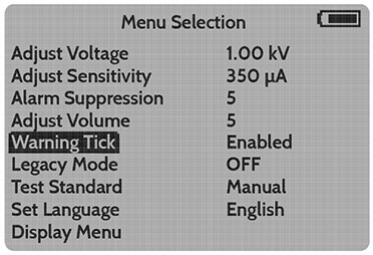



Fig 13 - PHD Pro2 Main Menu - Warning Tick

By default the PHD Pro2 screen will be blue and the instrument will sound a warning tick whilst the green button on the handle is depressed (or if the Output Lock is engaged). The Warning Tick option allows the operator to switch off this sound, but the screen will remain blue whenever High Voltage is present on the output terminal.

Use the ⌄ and ⌃ buttons to highlight Warning Tick on the Main Menu, and press the ✓ button to toggle between Enabled and Disabled. The Main Menu display will be updated to show the current status.

# Legacy Mode

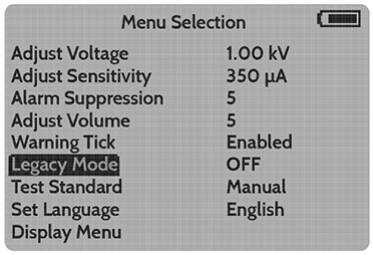



Fig 14 - PHD Pro2 Main Menu - Legacy Mode

The Legacy Mode option changes the functionality of the PHD Pro2 to simulate that of older PHD Pro' instruments.

Use the ⌄ and ⌃ buttons to highlight Legacy Mode on the Main Menu, and press the ✓ button to toggle between OFF and ON. The Main Menu display will be updated to show the current status.

# Test Standard

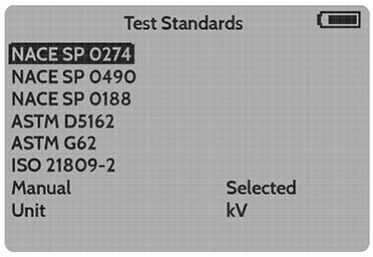



Fig 15 - PHD Pro2 Test Standards Screen

The PHD Pro2 is supplied with several pre-programmed settings that correspond to internationally recognised testing standards.

These standards prescribe particular voltage settings for different thicknesses of the materials to be tested.

The user is able to choose from a selection of test standards (which may be specificed by an architect or client), and then choose the preferred thickness measurement units. The **Adjust Voltage** screen now allows the user to adjust according to material th ickness, and the instrument will then automatically calculate the voltage appropriate for that thickness in accordance with the chosen standard.

Alternatively the Manual option allows the user to select the voltage directly in KV.

Use the and buttons to highlight Test Standard on the Main Menu, and press the button to display the Test Standards screen.

Press the or buttons to scroll through the available Test Standard options:

- NACE SP 0274 - High-Voltage Electrical Inspection of Pipeline Coatings
- NACE SP 0490 - Holiday Detection of Fusion Bonded Epoxy External Pipeline Coatings (10 to 30mil)
- NACE SP 0188 - Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
- ASTM D5162 - Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
- ASTM G62 - Standard Test Method for Abrasion Resistance of Pipeline Coatings
- ISO 21809-2 - Petroleum and natural gas industries — External coatings for buried or submerged pipelines used in pipeline transportation systems
- Manual – allows the user to select the voltage directly in KV
- Unit – If you select any of the pre-programmed standards (other than Manual), you can select your preferred units for the thickness of the material you are testing:
  - th – thousandth of an inch
  - mil - thousandth of an inch (same as th)
  - µm - micrometres (millionths of a metre)
  - mm - millimetres

Press the button to confirm your selection. The Test Standard sceen will update to indicate which option has been set, as well as the units the Test Standard employs. Press the button to return to the Main Menu after confirming your selection.

Alternatively, if you wish to return to the Main Menu without changing the Test Standard press the button without confirming a selection.

## Set Language

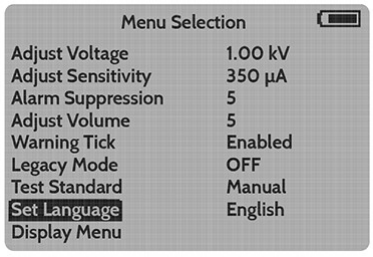



Fig 16 - PHD Pro2 Set Language from the Main Menu Screen

Use the and buttons to highlight Set Language on the Main Menu, and press the button to scroll through and select the language options. As you scroll through the options, the interface language will change accordingly.

The language options available are:

- English
- French
- German
- Spanish
- Italian
- Portuguese
- Russian
- Dutch
- Turkish
- Polish

When you have made the selection, press the button to return to the Main Menu, which will be displayed in the language chosen.

## Display Menu

The final option on the Main Menu is the Display Menu

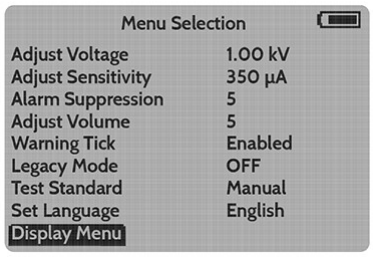



Fig 17 - PHD Pro2 Main Menu Screen

Use the ⌄ and ⌃ buttons to highlight Display Menu on the Main Menu, and press the ✓ button to display the Display Menu screen.

Press the ✕ button to return to the Main Menu Screen.

## Display Menu Screen

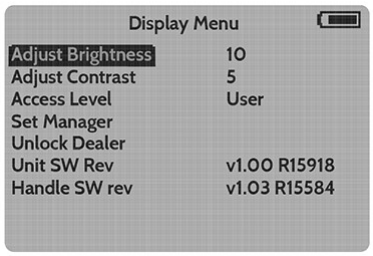



Fig 18 - PHD Pro2 Display Menu Screen

Use the ⌄ and ⌃ buttons to scroll through the options on the Display Menu, and press the ✓ button to make a selection.

Press the ✕ button to return to the Main Menu without making any selection.

## Adjust Brightness

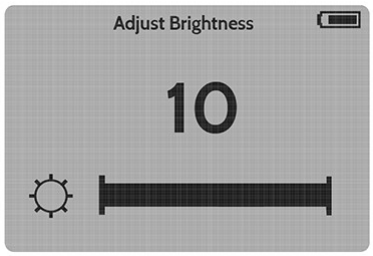



Fig 19 - PHD Pro2 Adjust Brightness Screen

This screen is used to adjust the brightness of the LCD display.

Use the ⌄ and ⌃ buttons to highlight Adjust Brightness on the Display Menu, and press the ✓ button to display the Adjust Brightness screen.

Press the ⌃ button to increase the brightness, or press the ⌄ button to decrease the brightness.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the brightness.

## Adjust Contrast

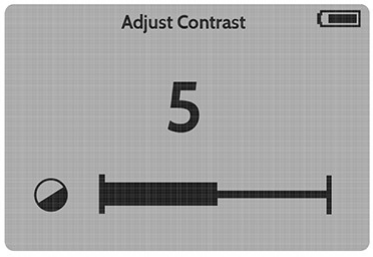


Fig 20 - PHD Pro2 Adjust Contrast Screen

This screen is used to adjust the contrast of the LCD display.

Use the ⌄ and ⌃ buttons to highlight Adjust Contrast on the Display Menu, and press the ✓ button to display the Adjust Contrast screen.

Press the ⌃ button to increase the contrast, or press the ⌄ button to decrease the contrast.

Press the ✓ button to confirm your selection and return to the Main Menu.

Press the ✕ button to return to the Main Menu without changing the contrast.

## Access Level

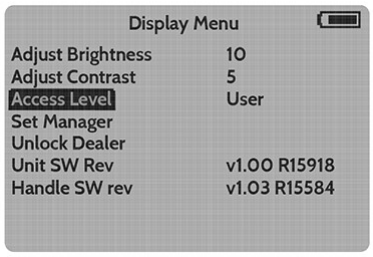



Fig 21 - PHD Pro2 Display Menu Screen

The Access Level item in the Display Menu is for display only. It will indicate to the operator whether the Manager Lock is set.

The Manager Lock feature allows the unit to be passcode-locked so that the test settings cannot be changed by an unauthorised person (e.g. an operator), however, the display settings can still be adjusted. See **Set Manager** to apply the Manager Lock.

By default the Access Level is set to User, which allows the operator to access all user functionality.

## Set Manager

Use the ⌄ and ⌃ buttons to highlight Set Manager on the Display Menu, and press the ✓ button to display the Set Manager screen.

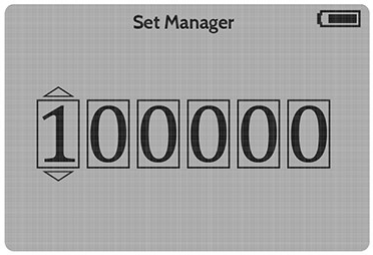



Fig 22 - PHD Pro2 Set Manager Screen

This screen allows the operator to set a Manager Code that will prohibit access to test settings functionailty of the instrument. The purpose of this function is to allow management to select settings for the instrument that cannot be changed by non-management operators. Note that the screen brightness and contrast settings can still be adjusted even when the Manager Lock is set.

In order to set the code, use the ⌄ and ⌃ buttons to scroll through the number 0 to 9. Press the ✓ button to confirm your selection and move on to the next digit. Once all of the digits have been entered and confirmed, the instrument will display the Manager Lock Display Menu.

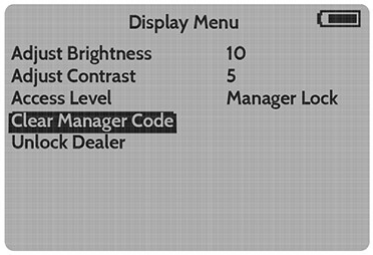



Fig 23 - PHD Pro2 Manager Lock Display Menu Screen

If you press the ✕ button to return to the Display Menu you will see that the Display Menu option will now show Manager Lock, and the operator will no longer be able to adjust voltage, sensitivity, alarm suppression, volume, warning tick or language.

**IMPORTANT:** Please ensure that you make a careful note of the manager code you have entered, as it will be necessary to return the instrument to an authorised dealer to clear the code if it is forgotten.

## Clear Manager Code

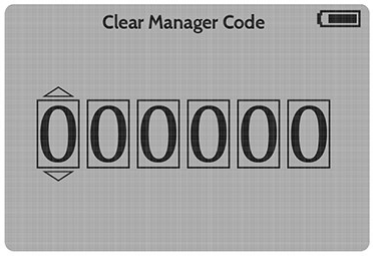



Fig 24 – PHD Pro2 Clear Manager Code Screen

Use the and buttons to highlight Clear Manager Code on the Display Menu, and press the button to display the Clear Manager Code screen.

In order to clear the manager code, you must enter the same code that you entered previously to set the Manager Lock. Use the and buttons to scroll through the number 0 to 9. Press the button to confirm your selection and move on to the next digit. Once all of the digits have been entered correctly and confirmed, the instrument will return to the Display Menu with the Manager Lock removed. If you enter an incorrect code, you will return to the Display Menu with the Manager Lock still set.

Once the Manager Code has been cleared, it is cleared from the instrument's memory. A code will need to be entered once again in order to set the Manager Lock the next time

## Unlock Dealer

This option is only for use by dealers of Buckleys instruments who are authorised for service, repair and calibration.

## Unit SW Rev

This is for display only and indicates which version of the software is currently running on the unit. This is not displayed whilst the Manager Lock is set.

## Handle SW Rev

This is for display only and indicates which version of the software is currently running on the handle. This is not displayed whilst the Manager Lock is set.