Nordson
MEASUREMENT & CONTROL

PrediktIR II

User Guide

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Issue C

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Proprietary Notice

PrediktIR II User Guide

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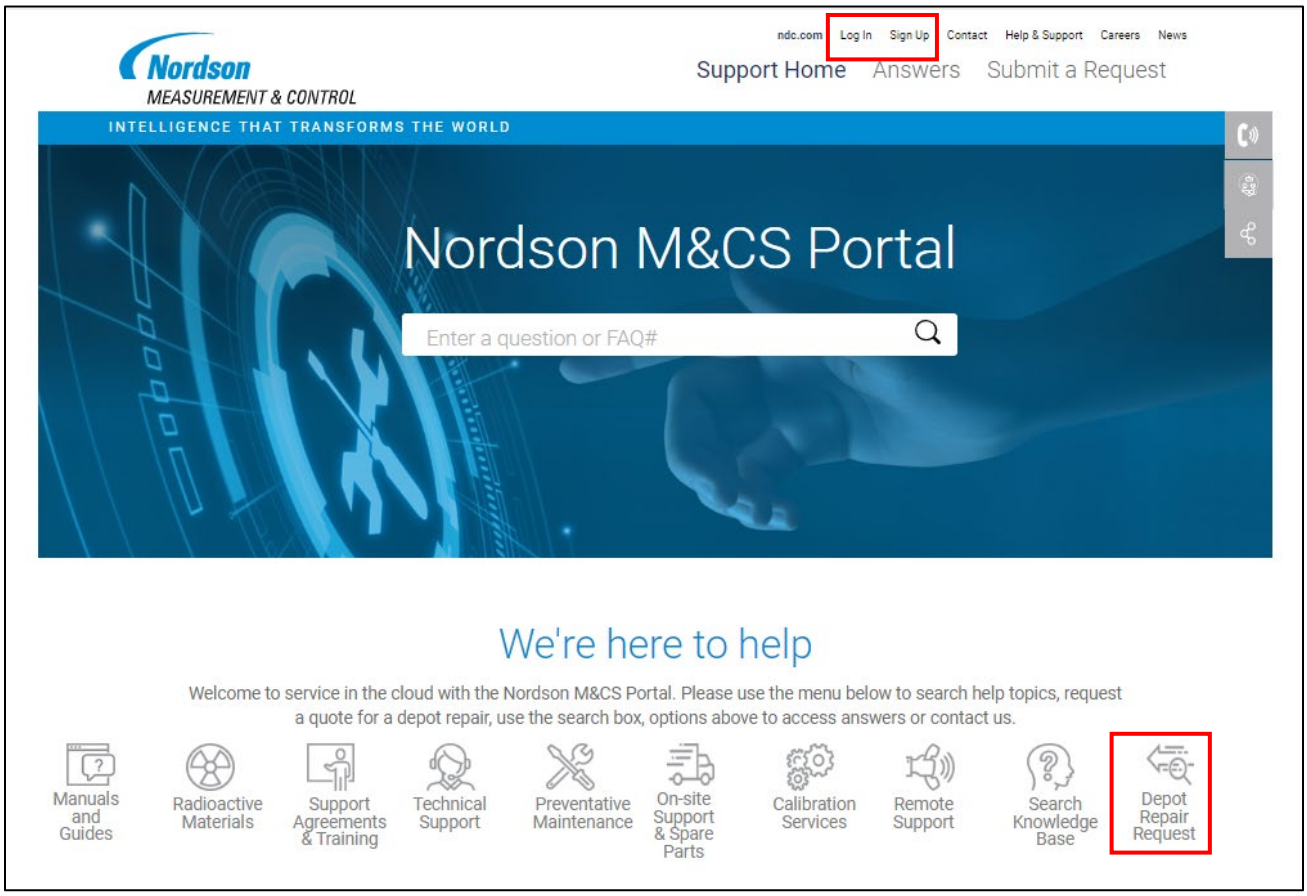

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Caution

Warnings

To avoid the risk of electric shock, isolate the mains supply to the equipment before carrying out any installation, maintenance or repair work. The gauge contains items that rotate at high speed and which could cause injury. Do not operate the gauge unless it is fully assembled.

Compressed air can be dangerous. Where this is used, observe all relevant local regulations and follow normal operational good practice for handling compressed air.

If the gauge is not installed and used in the manner prescribed in this manual, the safety protection afforded by the equipment may be impaired.

Cautions

The gauge and associated equipment contain static-sensitive devices. During installation, maintenance or repair, observe standard electrostatic precautions to avoid damaging the equipment.

Clean the gauge windows and external equipment surfaces with clean non-abrasive materials only, in accordance with the cleaning instructions (see Section 6.2 - Cleaning). If in doubt, contact Nordson.

The equipment described in this manual contains high potential voltages. Isolate the mains supply **from the equipment during interconnection and maintenance.**

For complete electrical safety in operation, the equipment has been supplied with double-pole neutral fusing incorporated. Do not modify in any way.

Overview

Thank you for purchasing your PrediktIR II on-line gauging system. We are confident that it will provide you with immediate process benefits, now and for years to come.

The aim of this manual is to help you, step-by-step, from taking delivery of the gauge, unpacking, installation and calibration to obtaining results in the shortest possible time. The manual describes the installation, operation, calibration and maintenance of the PrediktIR II gauges and peripheral equipment. It is intended for use by installation personnel, suitably qualified maintenance staff and trained operators. As an aid to using the manual for installing and setting up the system, we have provided this manual, which gives the essential steps and takes you quickly to the sections that describe them.

A numbered key system has been used to allow quick access to specific chapters of the manual.

Chapter 1 − Shows the schematic diagrams for some of the commonly used PrediktIR II configurations.

Chapter 2 − Details installation good practice, installation of the gauge.

Chapter 3 − Gives an overview of the operation of the PrediktIR II Gauge Control Interface.

Chapter 4 − Describes the purpose of calibration and the practical procedures to set up the gauge to obtain accurate measurement results. Explains how to calibrate the gauge for a new product.

Chapter 5 − Details the usual configuration activities and the set-up method.

Chapter 6 − Provides details for maintenance e.g., replacing the lamp and motor within the gauge.

Chapter 7 − Contains Outline drawings.

Chapter 8 – Specifications for the PrediktIR II system.

Table of Contents

Table of Figures

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CHAPTER 1

1 Introduction

The PrediktIR II gauge system is designed for basic moisture measurements in bulk and converting products in continuous processes.

1.1 System Components

The PrediktIR II gauge system has the following key components, which may be configured in either a single-head or dual-head configuration: Gauge and PrediktIR II Gauge Control Interface (GCI).

1.1.1 Gauge

PrediktIR II gauges are intelligent devices that perform all of the measurement and processing functions of the system internally, and provide direct outputs of the calibrated measurement values. They also generate the displays shown on the PrediktIR II GCI. The gauges work on the principle that different product constituents absorb Near Infra-red Light (NIR) at specific wavelengths. The gauges emit NIR light at these wavelengths and then accurately measure the amount reflected from the product. From this they generate outputs that are directly proportional to the amount of each measured constituent in the product. Depending on the application and environment, the gauges may be fitted with a vortex air cooling option. As standard, an air purge unit is fitted to keep the gauge window free from contamination. By default, the gauges communicate with other system devices via ethernet. They are powered from a 24V supply, and connect to the system by means of a single cable carrying both data and, where required, DC power from the PrediktIR II GCI.

1.1.2 PrediktIR II Gauge Control Interface

The PrediktIR II Gauge Control Interface provides supervisor-level access to up to 2 gauges within the system. The operating and display interface is a colour touch screen. Each connected gauge has its own home page, normally configured to display the real-time measurement outputs.

Other pages allow for direct interaction with the gauges for functions such as taking sample measurements and performing calibration. Product definitions can be created through the PrediktIR II GCI, each of which is a collection of settings for a specific gauge and measurement application. These are stored in the gauges and can be recalled remotely or manually from the PrediktIR II GCI. In addition to ethernet connection, it provides four scalable analogue outputs, eight opto-isolated digital inputs and eight digital outputs as options.

1.1.3 Power Hub

The PrediktIR II PH includes an embedded universal power supply (input: 85 Vac – 264 Vac) that outputs 24Vdc for connection to a single PrediktIR II gauge.

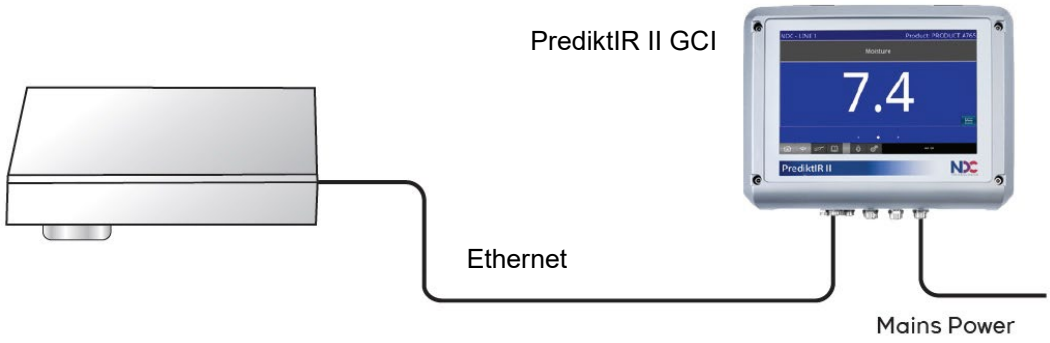
It is also an Ethernet hub that provides an Ethernet port to a single gauge, 2 extra Ethernet ports to support “daisy chain” gauge networking, and an RJ45 external Ethernet port for quick connection to a computer.

1.2 Configuration Examples

The following examples show typical configurations of PrediktIR II gauges to illustrate the application of the system components.

1.2.1 Single Gauge System

The PrediktIR II GCI is used to provide supervisory functions and remote measurement display. It also provides the facility to interface with factory systems for remote measurement or control purposes via ethernet and optional analogue and digital I/O.

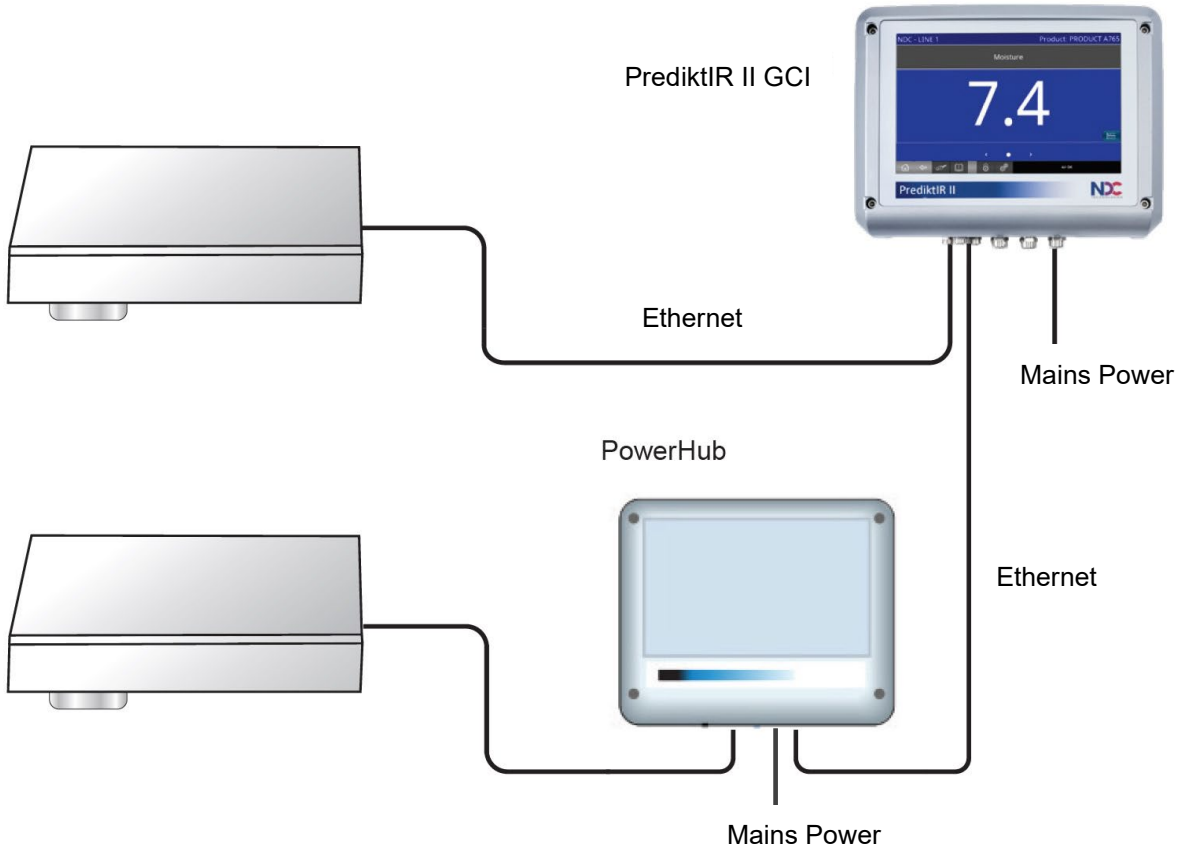


Alternative arrangements may use Nordson GaugeToolsXL software for supervisory functions and remote measurement.

For Analogue and Digital I/O, see Section 2.10.5 - Analogue and Digital Inputs and Outputs.

1.2.2 Dual-Gauge System

In this configuration, the PrediktIR II GCI provides the supervisory functions and remote measurement display for both gauges, with each gauge having a separate home page available through the display. Extensive I/O facilities in the PrediktIR II GCI enable the gauges to be interfaced with other equipment via discrete analogue and digital channels. Powerhubs can be connected to run additional gauges.



For Analogue and Digital I/O, see Section 2.10.5 - Analogue and Digital Inputs and Outputs.

CHAPTER 2

2 Installation

2.1 Installation Good Practice

- **Electricity Supply**
  The PrediktIR II gauge requires 24V input. This is provided by the PrediktIR II GCI or Power Hub that takes mains power supply (100W / 85-265Vac 50/60Hz) and converts to 24V.

- **Isolation Switch**
  Equipment permanently connected to the mains supply should incorporate an accessible and clearly identifiable isolating device, such as a double-pole isolator switch or circuit breaker, positioned near to the equipment.

- **Cables**
  Lay signal cables in a low power signal conduit, and mains cables in a low power mains supply conduit. Do not alter any of the supply cables or enclosures. The cable and isolating device used to connect the equipment to the mains supply should have a minimum current rating of 10 amps.

- **Avoid Vibration**
  The PrediktIR II system is an optical instrument. Excessive vibration may damage it.

- **Product View**
  Choose the position for the gauge carefully so that it views only material that is representative of the product at the relevant stage in the process (Section 2.5.1 - Positioning).

- **Gauge Mounting**
  Ensure that the gauge support is rigid, and free from vibration during normal operation (Section 2.5.2 - Mounting).

- **Atmospheric Contaminants**
  If the working environment has a high level of airborne contaminant (e.g. dust and dirt) the gauge head air purge window should be used (Section 2.7 - Air Purge Window).

- **Electromagnetic Compatibility**
  Follow the EMC precautions to avoid interference from other equipment (Section 2.2 - EMC Precautions).

- **Window Protection**
  Leave the protective plastic cap fitted to the gauge window until installation is complete. If it is removed for any reason, do not touch the gauge window.

- **Ambient Light**
  Shield the gauge window and measuring area from direct sunlight as this may affect the sensitivity of measurements.

- **Peripheral Units Location**
  The PrediktIR II GCI and any associated power supply units must be installed where the risk of mechanical damage is low.

- **Ambient Light**
  The gauge performance is not influenced by ambient light changes of any type. However, intense direct radiation into the viewing window may disturb the gauge. If this occurs, an error message is displayed on the display.

- **Viewing Windows**
  The product may be viewed through a window. This can be glass or sapphire but must not be Perspex, Polycarbonate or any other plastic due to their absorption properties and their ability to retain moisture. The product must be in contact with the window for reliable results.

- **Relative Humidity**
  The gauge automatically compensates for relative humidity variation and is therefore not significantly affected.

- **Condensing Steam**
  Steam as water droplets will influence a measurement, and an air purge window should be used to prevent problems.

2.2 EMC Precautions

Use the following guidelines to minimize the effects of electrical interference.

1. Ensure that the system is supplied with a clean mains supply (instrumentation supply).

2. Lay signal cables in a low-power signal conduit, and mains cables in low-power mains supply conduit.

3. Ensure that no part of the gauge/system or cabling is placed near sources of strong EMI (Electromagnetic Interference). Example sources of EMI:

    - Large electric motors
    - Welding equipment
    - Large static discharges
    - Infrared ovens
    - Microwave ovens
    - Large transformers
    - Transmitters
    - Power control circuits

Note: Do not alter any cables or enclosures without prior permission from the Engineering Department at Nordson.

For advice or help on installation concerning EMC, please contact the Customer Care Helpdesk at Nordson.

2.3 Unpacking

Note: Before unpacking your on-line gauge, make sure you check off all the items against the packing list.

Retain the packaging used to ship all parts of your system, so that in the event that the equipment needs to be returned, it can be suitably re-packed for its safe return.

Open the packaging carefully and remove each item. Take the items to a clean room for inspection. Check that all the items on the Packing Note / Scope of Supply, have been supplied. Check that they are free from external damage, the connectors are free from dirt, and the cables are not chaffed or kinked.

2.4 Storage

Pending installation, store between 0°C and 70°C (-32 to 158°F) at less than 60% relative humidity. Allow the equipment to regain ambient temperature prior to installation.

Include desiccant if there is any possibility of condensation.

2.5 Gauge Mechanical Installation

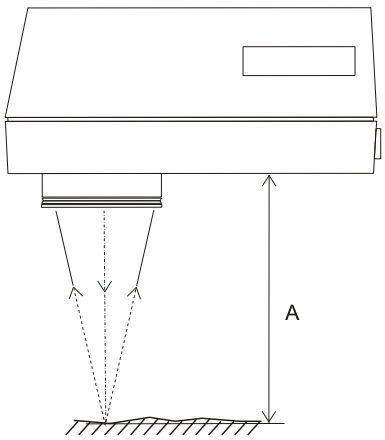
2.5.1 Positioning

The following points should be considered when positioning PrediktIR II gauges.

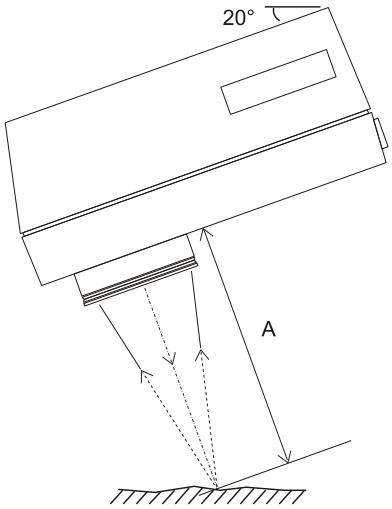
2.5.1.1 Direct Viewing

When viewing the product directly, the gauge should be installed above a moving and continuous stream of product without gaps. Ideally, the depth of the product should be at least a few centimetres - enough to obscure the conveyor surface completely.

In most diffuse applications, the gauge should be fixed to a horizontal mounting so that the infrared beam is perpendicular to the surface of the product.



If there is a possibility of gaps in the product, the gauge must be mounted at an angle. This prevents direct reflection of the infrared beam from the conveyor surface into the gauge window, which could affect measurement accuracy. Also, for reflective products (coatings etc) where light is reflected from the surface, mount gauge at 20 degrees.



Position the gauge at the correct pass height from the product surface, according to the beam patch size. Fluctuations in the product surface should be kept within the allowable limits shown for the pass height.

Beam patch size	60mm (2.36in)	25mm (0.89in)
Pass height (A) measured from window	250 +/-100mm (9.84 +/-3.94in)	200 +/- 50mm (7.87 +/-1.97in)

2.5.1.2 Window Viewing

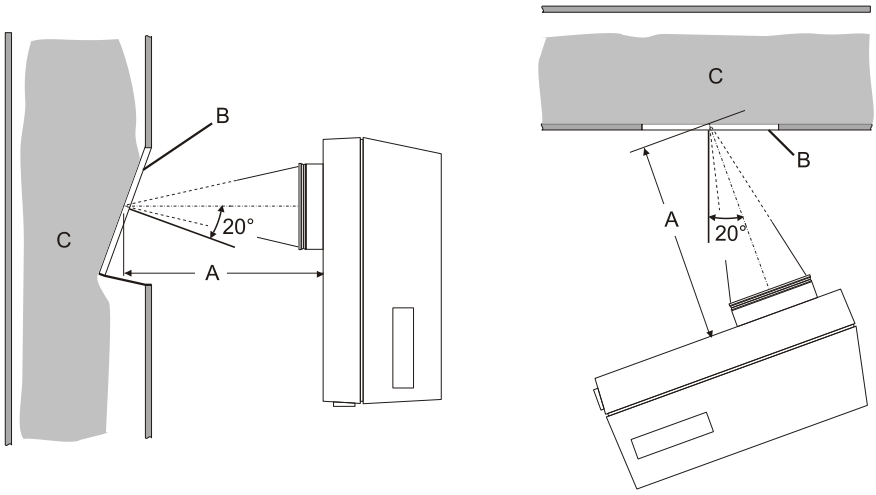
Where the process is enclosed, the gauge can view the product through a glass or sapphire window. In this case:

To prevent reflections, the gauge must be angled with respect to the window.

A solid bed of product must be flowing against the viewing window. Otherwise, spurious reflections and the varying path length of the gauge beam may affect measurement accuracy.

Arrangements must be made to keep the viewing window free from accumulated product.

It is vital not to measure a falling “rain” of powder where there would be an extremely variable product presentation.



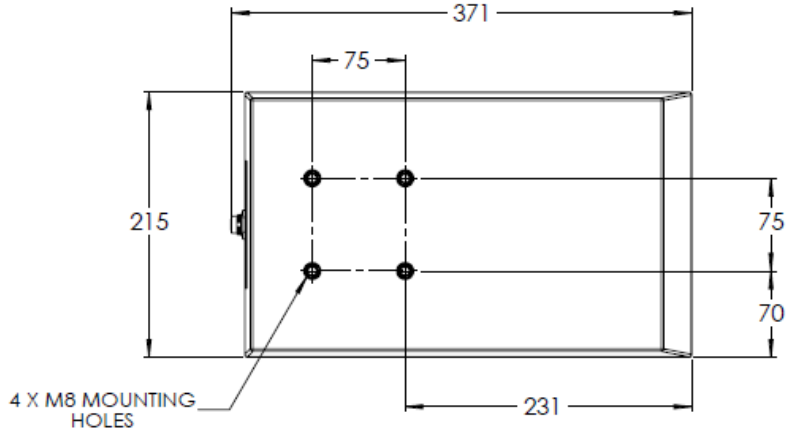
A - Path length; B - Viewing window; C – Product

Product Surface

Measurements after a dryer or conditioner are best taken as far down stream as possible to give the product a chance to equilibrate. If there is danger of the surface not representing the bulk product (from surface drying of a hot product, for example), then a plough or other mechanism should be installed just before the gauge location to turn over the product. This is essential to ensure that the measurements are representative of the bulk product.

2.5.2 Mounting

The gauge may be attached to any suitable mounting bracket or frame, using the four M8 x 10mm (0.39in) mounting holes provided in the top of the case. The mounting must be rigid and vibration-free. The mounting arrangement must provide sufficient clearance for fitting and removing connectors, and enable the gauge to be positioned correctly with respect to the product. The mounting hole positions for the gauges are shown below.



All dimensions in mm.

For details of case and fitting dimensions, refer to Chapter 7 - Outline Drawings.

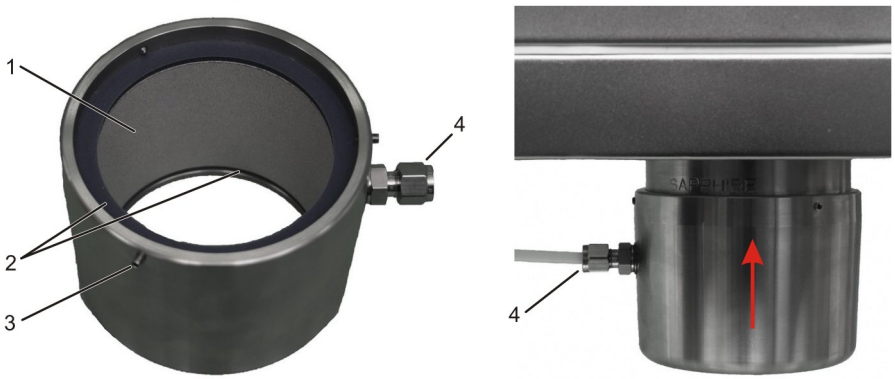
2.6 Air Purge Window

The Air Purge Window (APW) inhibits window contamination by maintaining a positive air pressure around the window area. It is secured to the gauge by three set screws that locate into a groove around the outside of the window bezel.

Fitting the Air Purge

Fit the AP as follows:

1. Check that the cylindrical filter insert (1) and both the upper and lower sealing gaskets (2) are located correctly in the air purge housing.



2. Fit the AP onto the gauge window bezel and press it firmly against the bezel while you tighten the three screws (3) evenly. This will ensure that the fixing screws locate correctly into the retaining groove in the window bezel.

3. Using 6mm (0.24in) diameter pipe, connect a clean, dry and oil-free air supply to the air connector (4).

4. Regulate the air supply.
   Typically, the stated air flow (see Section 8.2 - PrediktIR II Gauge Specification) can be achieved from a 30 psi (2 Bar) supply delivered through 3m x 6mm Ø pipe and 4mm inside Ø (in imperial units, 9.84 feet x 0.24in Ø pipe and 0.16in inside Ø).

   If an air-flow meter is not available, a reasonable assessment can be made by holding your hand a few centimetres below the air purge window and increasing the air pressure until you can feel a gentle air flow.

   The figure given for air flow is, in any case, only a guide for a starting value and should be adjusted according to experience after a period of operation. If window contamination is significant, increase the air flow until it is reduced to an acceptable level.

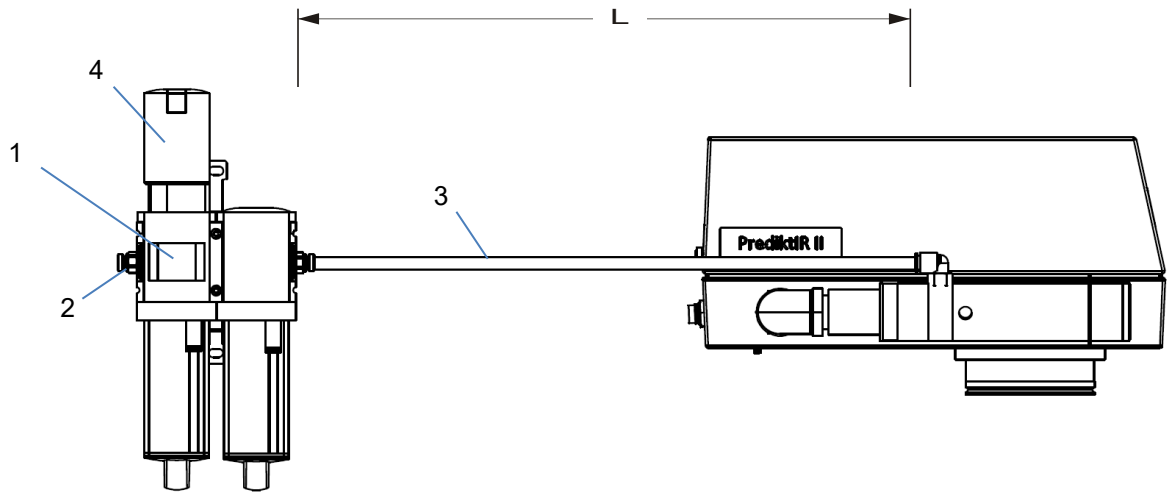
2.7 Vortex Air Cooling

This cooling option uses a vortex unit to create a cold air flow from a compressed-air supply, which is then circulated through the gauge interior. The vortex unit is close-coupled to the gauge, and factory-fitted as part of the assembly. The option comprises the vortex unit, factory-fitted to the gauge, and a filter module to provide clean and dry air.

2.7.1 Installation

There are no additional installation requirements, other than connection of an air supply to the sensor air purge assembly.

WARNING: COMPRESSED AIR CAN BE DANGEROUS.
Do not operate the cooler at pressures above 10.3 Bar (150psi).
Do not operate with input air above 43ºC (110ºF).



When planning the installation, keep the air hose (3) as short as possible to minimise pressure drop.

1. Fix the filter module (1) in a suitable location. The module **must** be mounted vertically.
2. Connect the factory air supply (2) and the Vortex cooler supply (3).
3. Adjust the air pressure control (4) for a reading on the pressure gauge:
   4 Bar, (60psi) for ambient temp. 45 to 60ºC (113 to 140°F)
   5.5 Bar, (80psi) for ambient temp. 60 to 70ºC (140 to 158°F)

2.7.2 Air Connections

Tube	Function	Diameter	Notes
2	Factory air in	10mm (0.39in)	Instrument quality air 7 Bar (100psi), <25°C (77°F)
3	Cooler air supply	10mm (0.39in)	If length (L) >2m, pressure should be measured at the cooler inlet. If necessary, to achieve the pressure specified above, either use larger diameter tube (with suitable adapters) or increase the regulator pressure indicated on the gauge (1).

2.8 Mounting the Gauge Peripherals (PrediktIR II GCI and PH)

It is recommended that the ABS boxed peripherals (PrediktIR II GCI and PH) are mounted on a flat surface otherwise a wall mounting kit should be purchased, part No. 120/16261-01SA and vertically so that the cables run down and away from the unit. Ensure that there is adequate clearance above and below to allow unrestricted airflow. Refer to Chapter 7 - Outline Drawings for further details.

2.9 Electrical Connections

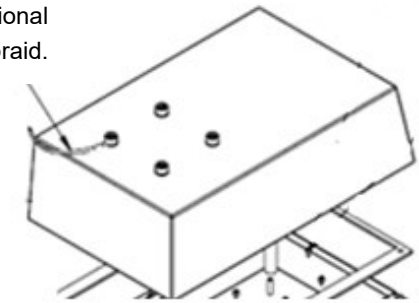
The following section provides details of the electrical connections for the PrediktIR II GCI.

Ethernet connection (PLUG) | Analogue and digital connections | Gauge connection | Ethernet connection (terminal) | Mains connection | M4 earth stud

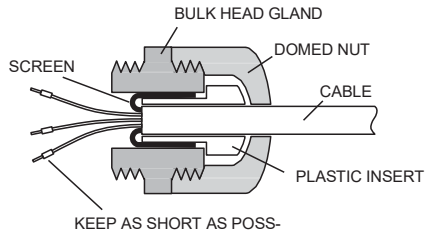
2.9.1 Earth Stud

The Gauge must be permanently connected to earth through one of its M8 mounting screw holes, as shown in the thumbnail sketch below using a 4mm^2 (minimum) cross-sectional area earth braid with M8 ring terminal and Stainless Steel M8 fixing and star washer to hold in place.

The sensor must be permanently connected to earth through one of its M8 mounting screw holes using a stainless steel 4mm^2 (minimum) cross sectional area earth braid.



Connections to all the peripherals (GCI/PH) are routed through cable glands and made to screw terminations that have a common arrangement, as per the following sections. The gland nut must be tightened with a torque wrench to 3.5Nm to form a good seal with the cable braids trapped in the gland, as per the sketch below.

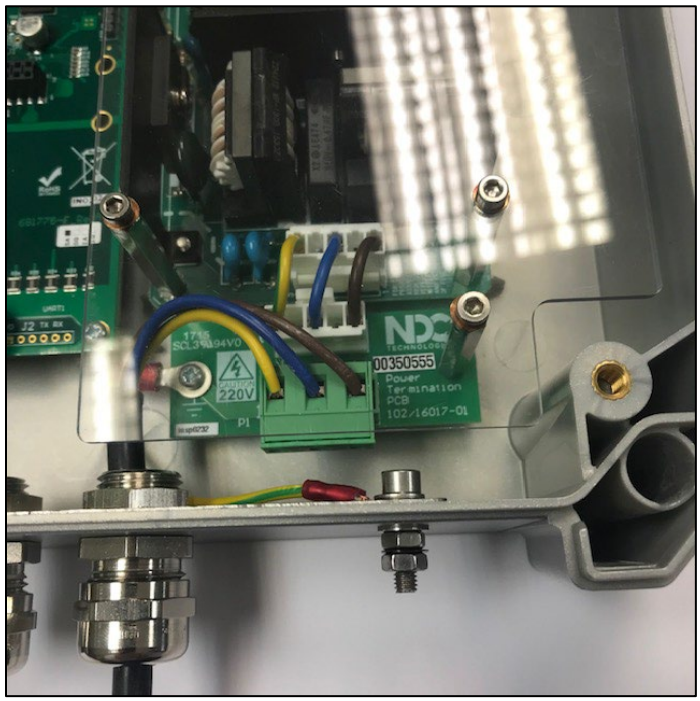


2.9.2 Mains Power Connection

The power supply requirement is 100W through a single-phase supply in the range: 85Vac - 264Vac, 47-63Hz.

The mains power cable provided by the user, must be 3-core mains cable, double insulated, 18 AWG (minimum) wire gauge with an outside diameter in the range Ø6mm to Ø10mm (0.24 to 0.39in) to ensure it will seal in the cable gland.

The cable should be routed through the gland closest to the power terminals as shown in the photo below, following the legend on the board, terminated from left to right; **1** = Earth, **2** = Neutral. **3** = Live.

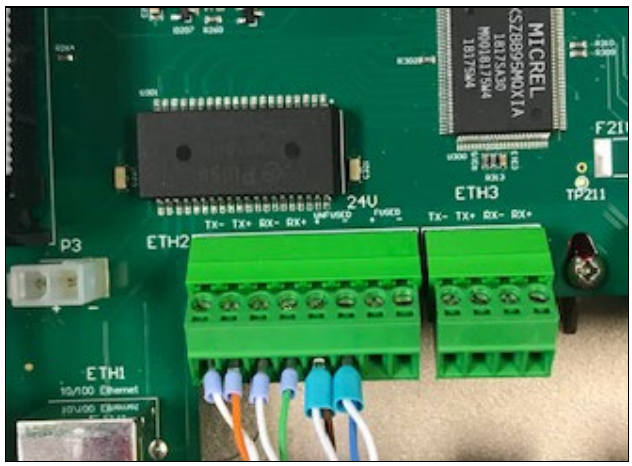


2.9.3 Gauge Services Cable Connections

The PrediktIR II Gauge is connected to the GCI/PH through the services cable supplied with the Gauge.

The cable must be routed through the gland closest to the “ETH2 24v” screw terminal connector terminations as given in the following table and photo.

Wire Colour	“ETH2 24v” terminal	Function
Pair 1 White	Tx-	Ethernet Tx-
Pair 1 Orange	Tx+	Ethernet Tx+
Pair 2 White	Rx-	Ethernet Rx-
Pair 2 Green	Rx+	Ethernet Rx+
Pair 3 White	UNFUSED +	Power output +24Vdc
Pair 3 Brown	UNFUSED +	Power output +24Vdc
Pair 4 White	UNFUSED -	Power output 0Vdc return
Pair 4 Blue	UNFUSED -	Power output 0Vdc return



To clamp the cable securely and form a good seal, the gland nut must be tightened with a 20mm (0.79in) A/F torque wrench to 3.5Nm.

2.9.4 Ethernet Cable Connections

The Ethernet connections can be made through the screw terminal connectors marked “ETH3” and “ETH4”. These connections must be made using an Industrial Cat5E network cable (normally supplied) with an outside diameter in the range Ø6mm to Ø10mm (0.24 to 0.39in) using the following table.

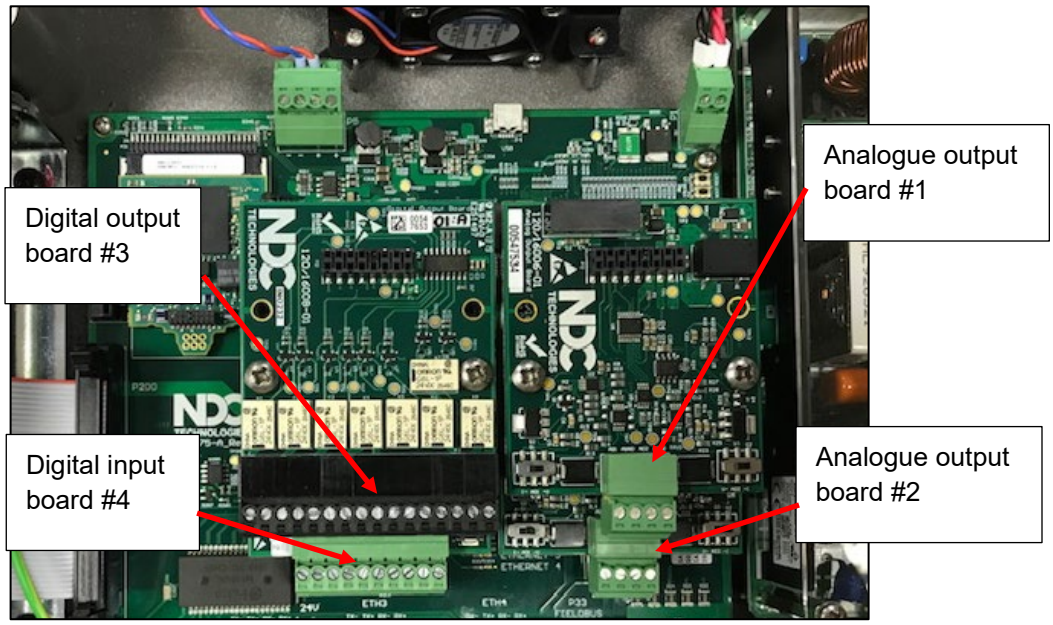
The termination designations are the same at both ends of the cable.

Wire Colour	“ETH3” “ETH4” terminal	Function
Pair 1 White	Tx-	Ethernet Tx-
Pair 1 Orange	Tx+	Ethernet Tx+
Pair 2 White	Rx-	Ethernet Rx-
Pair 2 Green	Rx+	Ethernet Rx+

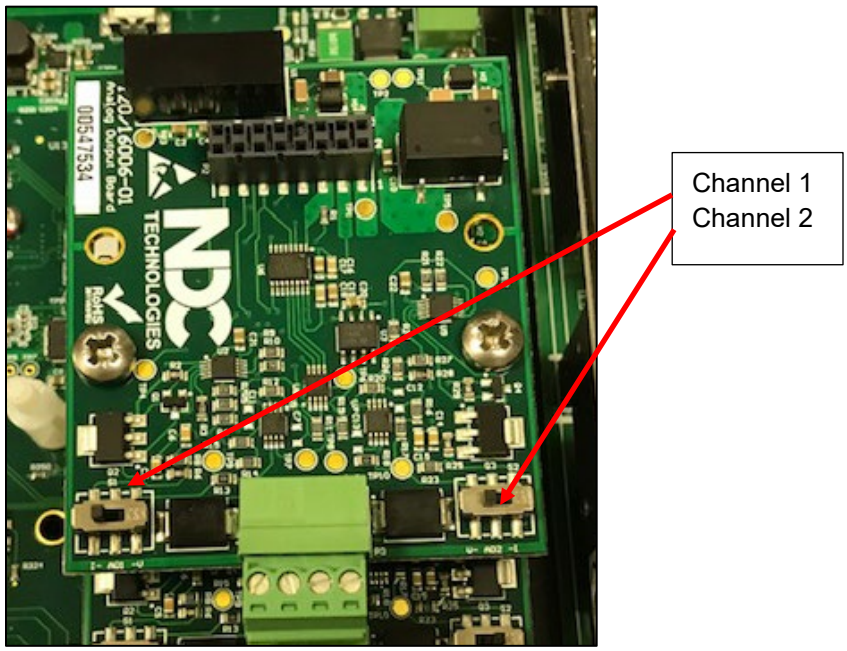
Note that the twists in the pairs must be continued up to the termination point.

2.9.5 Analogue and Digital Inputs and Outputs

The PrediktIR II GCI can be populated with up to four input/output boards that can plugged in and stacked in two rows, as shown in the photo below, for example.



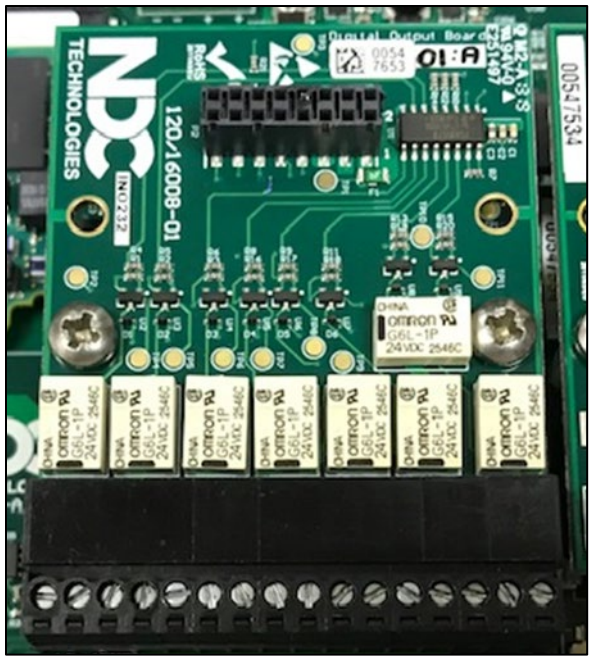
2.9.5.1 Analogue Output Board



Provides two isolated Analogue outputs that can be set for 0-10v (V) or 4-20mA (I) by the slide switches as shown on the board legend (as V and I) with the following connections.

Terminal Number Left to right	Function
1	Channel 1 +
2	Channel 1 -
3	Channel 2 +
4	Channel 2 -

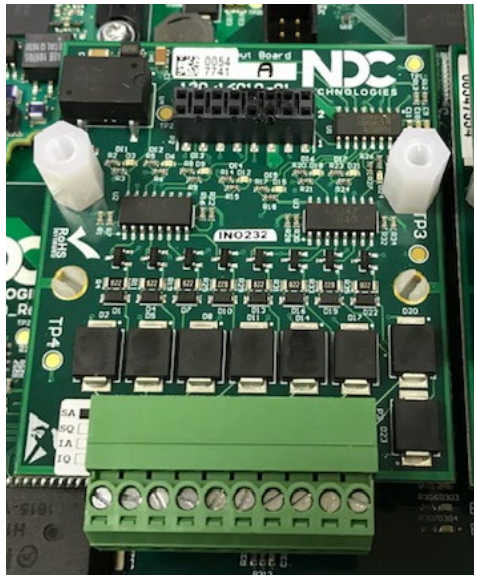
2.9.5.2 Digital Outputs



Provides eight N/O relay contacts (125vac/60vdc/1A maximum ratings) with connections in the table below.

Terminal Number Left to right	Function
1 and 2	Relay contact 1
3 and 4	Relay contact 2
5 and 6	Relay contact 3
7 and 8	Relay contact 4
9 and 10	Relay contact 5
11 and 12	Relay contact 6
13 and 14	Relay contact 7
15 and 16	Relay contact 8

2.9.5.3 Digital Inputs



Provides eight Opto-isolated inputs (Low 0vdc and High 3vdc-30vdc) with connections in the table below.

Terminal Number Left to right	Function
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9 & 10	Common 0v

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CHAPTER
3

3 Gauge Control Interface Overview

3.1 General

Operation of the PrediktIR II Gauge Control Interface (GCI) is carried out via the button icons displayed on its touch-sensitive display screen.

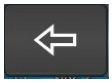
The PrediktIR II GCI allows the user to control one or more PrediktIR II gauges and display their measurements. The operation of the unit will be more easily understood by referencing the flow chart, included at the end of this section, that shows the page structure and icon names.

3.2 Home Page and Touch Buttons

Access to various functions is through touch buttons with specific Icons as described in the following sections.

3.2.1 Navigation Buttons

Home  Available on all pages and takes you back to the home page.

Back  Takes you back to the previous page.

3.2.2 Home Page

The Home page is displayed automatically on power up after the splash screen, as per the example below (Figure 3-1).

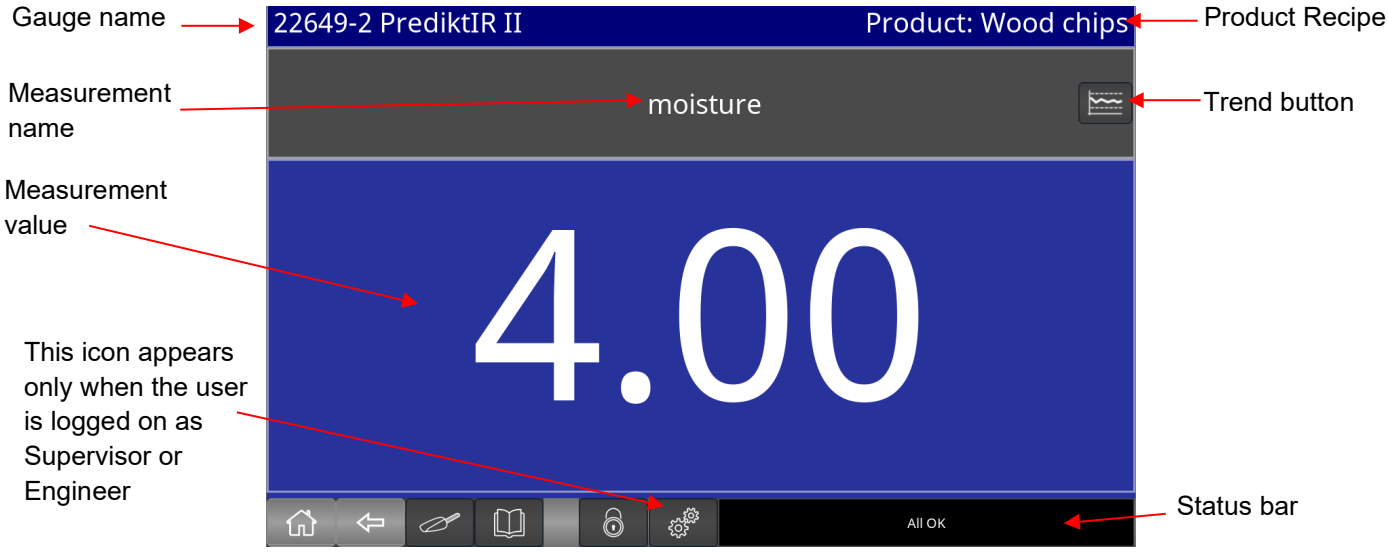


Figure 3-1 Home page

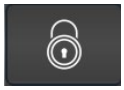
3.2.3 Toolbar Buttons

− Sample 

The Sample function enables the average gauge measurement to be computed over a preset time period.

− Product Selection 

Used to select a Product Recipe containing predefined calibration settings from a list.

− Security 

Used to select the permitted access level with Operator being the basic default level and Supervisor and Engineer, allowing more advanced access with default password as 1111 and 2222, respectively.

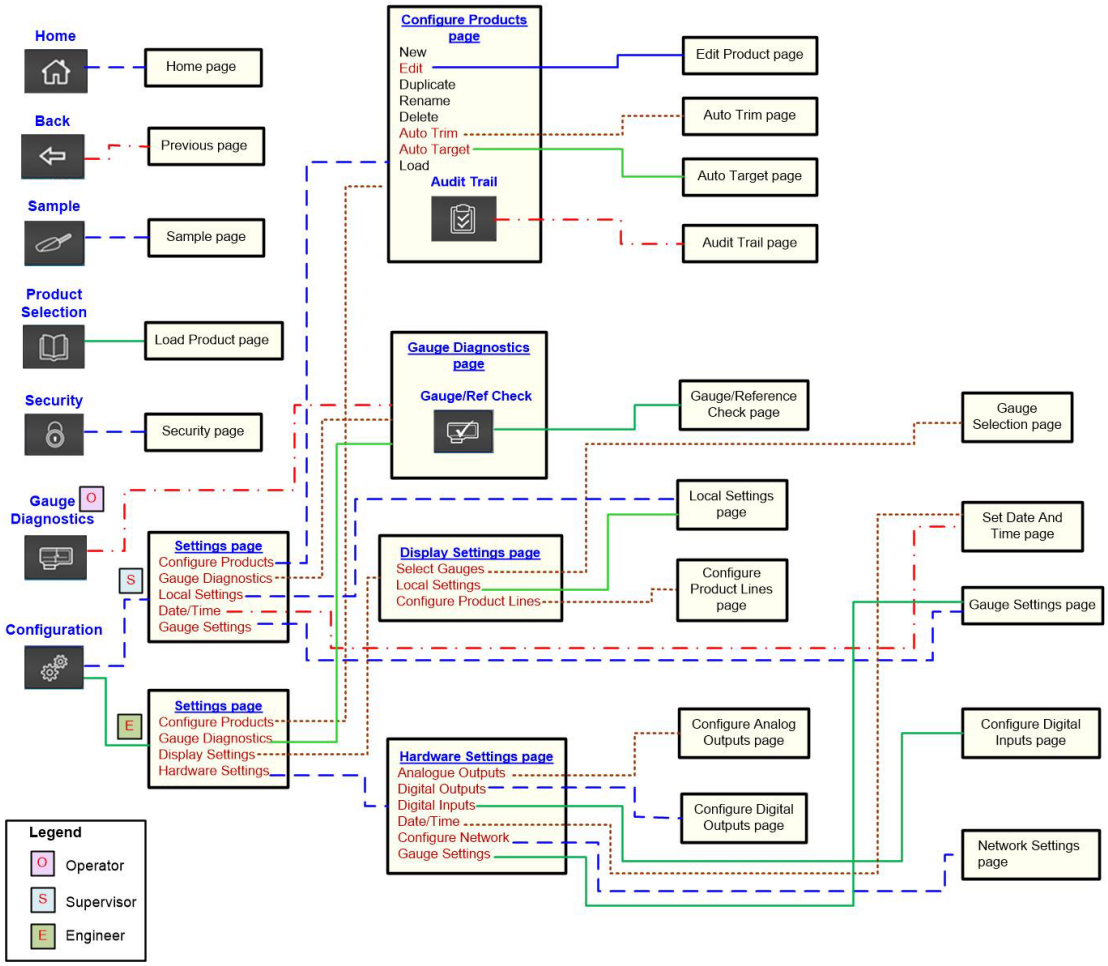
− Gauge Diagnostics 

This is only shown when the user is logged on at Operator level, and is used to view Gauge diagnostics and to perform a gauge check function.

− Configuration 

This is only shown when the user is logged on at Supervisor or Engineer level, and is used to manage configuration settings, including Product recipes.

PrediktIR II Flow Chart



CHAPTER
4

4 Calibration

4.1 Overview

Before attempting calibration, it is important to make sure you have configured the gauge response time, alarms (where fitted), gauge name, constituent names, and saving the existing gauge settings. Please refer to Chapter 5 - Guide to Commonly Used Features and Functions.

Calibration is necessary to ensure that the measurement made by the PrediktIR II gauge agrees with the user's laboratory reference method, over the measurement range of interest. The gauge requires only minimum setting-up before it can be used for process control. While the gauge as delivered shows a linear response to the parameters being measured, it is necessary to Trim the gauge to ensure that it matches the local reference method and takes into account the measurement location.

The following steps are involved - functional detail described later.

- Use the AUTOTRIM function to automatically adjust the TRIM, based upon knowledge of the expected product constituent levels. This process ensures that the PrediktIR II GCI screen displays a value close to that expected.
- Repeat the above for each constituent in the product.

  A new TRIM value is automatically calculated and downloaded to the gauge.
- Sample the product from the process line to allow an accurate Trim adjustment so that the gauge agrees with the reference method. This involves accurate physical sample collection.
- Take samples physically from a position just after and in line with the measurement point, and store in a sealed container whilst using the sample function in the PrediktIR II GCI, and record the sample average. Repeat the Sample procedure at least 10 times.
- Undertake the laboratory reference analysis of the collected samples.
- Using the sample averages recorded and the associated lab reference results, calculate the average difference between them. This difference is the TRIM change required to achieve perfect calibration, see Figure 4-1 below.
- Enter the new TRIM value as part of the Product recipe.
- Select the Product recipe.

The new TRIM value is downloaded to the gauge.

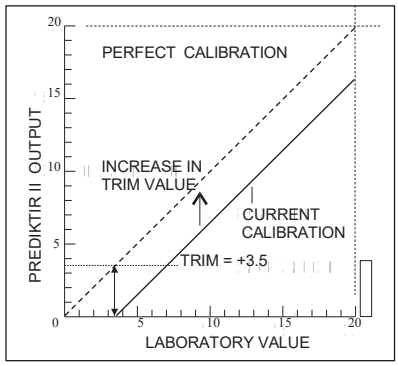


Figure 4-1 Updating TRIM to +3.5 to move calibration to the perfect calibration line

4.1.1 Response Time

Note: Before attempting to check the calibration, it is important to make sure that you have configured the gauge response time, alarms (where fitted), gauge name, constituent names, and saved the existing gauge settings.

The response time is a process specific averaging function. For the PrediktIR II gauge, it is normally set at a value in the range 2sec to 10 sec. A powdered product with a small particle size, will only require a relatively short response time, 2 sec, whereas a product with a large particle size - 5mm (0.2in) pelletized feed for example, will require a response time of 5 to 10 secs.

4.2 Collecting Samples

Samples should be collected following the best practice outlined below.

- The samples collected must be representative of what the gauge is seeing.
- Take samples immediately after the gauge and in line with the gauge, Figure 4-2.

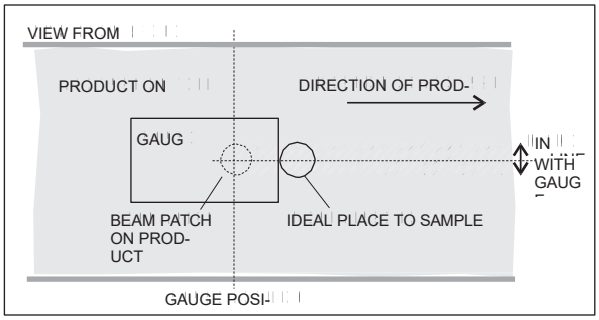


Figure 4-2 Where to take samples of product

- Take samples when there are no large process changes or trends occurring.
- Use the Sample function on the PrediktIR II GCI to get representative average readings.
- Collect sample continuously for the period corresponding to the SAMPLE PERIOD set in the PrediktIR II GCI Interface.
- Immediately place the samples collected in sealed containers. This is particularly important for moisture measurements.
- Analyse the samples in duplicate by laboratory reference method.
- If there are significantly large differences between the duplicate tests, ignore these results or re-test samples.
- Take a minimum of 10 samples, but more samples will give a more accurate result.

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CHAPTER
5

5 Guide to Commonly Used Features and Functions

5.1 Introduction

The graphical procedures in this chapter illustrate how to set-up the following commonly used functions:

- How to change the security levels
- How to change the language
- How to change the date/time
- How to change the gauge and measurement channel names
- How to view, edit and save Product Recipes (Span, Trim, Application, Response time)
- How to use Auto Trim
- How to use Auto Target
- How to view an Audit Trail
- How to set up the analogue output scaling
- How to configure product lines

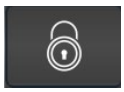
Note: **The functions above, except for changing the security levels, are accessible only to a Supervisor or Engineer.**

5.1.1 How to Change the Security Levels

Operator is the default user. The other two security levels are Supervisor and Engineer. Those levels require a password.

− Logging in as a Supervisor or Engineer

To log in as a Supervisor or Engineer:

1. Touch the  **Security** button. The Select user level page will appear (Figure 5-1). The topmost button shows the user that is currently logged on.

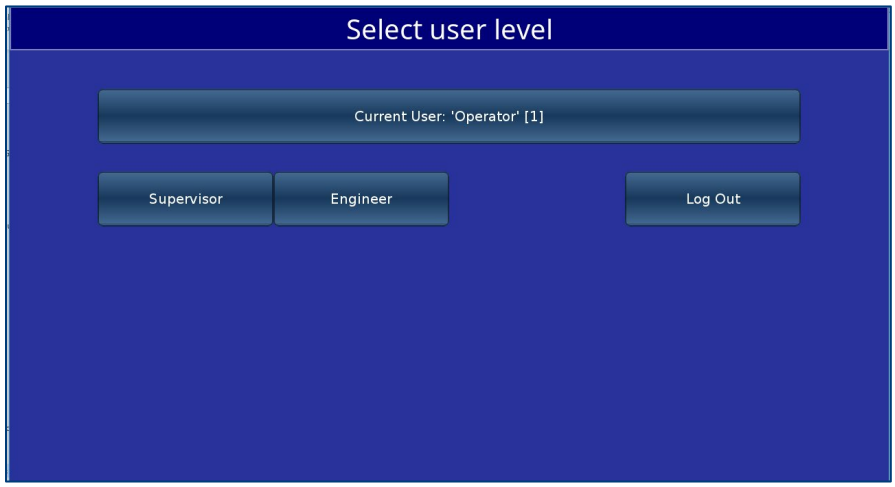


Figure 5-1 Select user level page

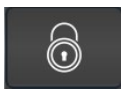
2. Touch the **Supervisor** or **Engineer** button.

3. Enter the password for Supervisor or Engineer using the displayed keyboard.

If the password that you entered is correct, you will be logged in as a Supervisor or Engineer.

− Logging Out

The Log Out function is only relevant if you are currently logged on as a Supervisor or Engineer. To log out:

1. Touch the  **Security** button. The Select user level page will appear (Figure 5-1).

2. Touch the **Log Out** button.

This will cause the current user to be set to Operator, and the Home page to be displayed.

5.1.2 How to Change the Language

To change the language:

1. Touch the  **Configuration** button to bring up the Settings page.

   Icons appearing on this page vary, depending on whether you are logged in as a Supervisor or Engineer. Figure 5-2 shows the Settings page as viewed by a Supervisor.

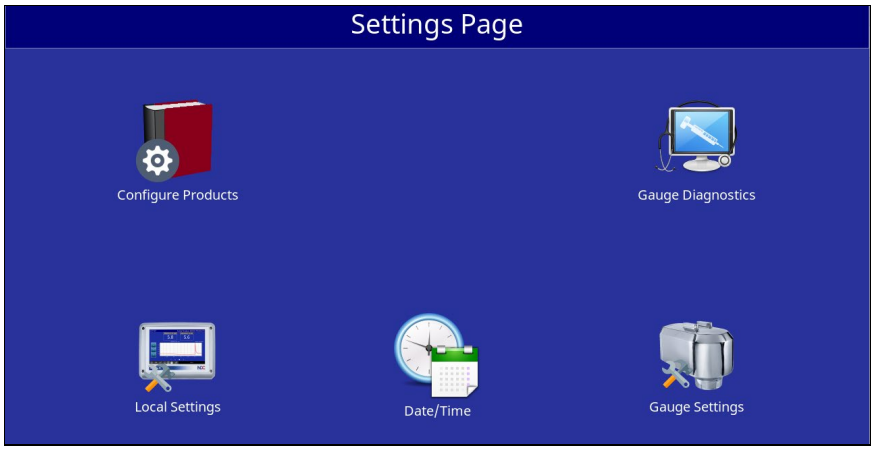


Figure 5-2 Settings page - Supervisor user

2. Supervisor: Touch the **Local Settings** icon.
   Engineer: Touch the **Display Settings** icon on the Settings page, then touch **Local Settings** on the Display Settings page.

   The Local Settings page will appear (Figure 5-3).

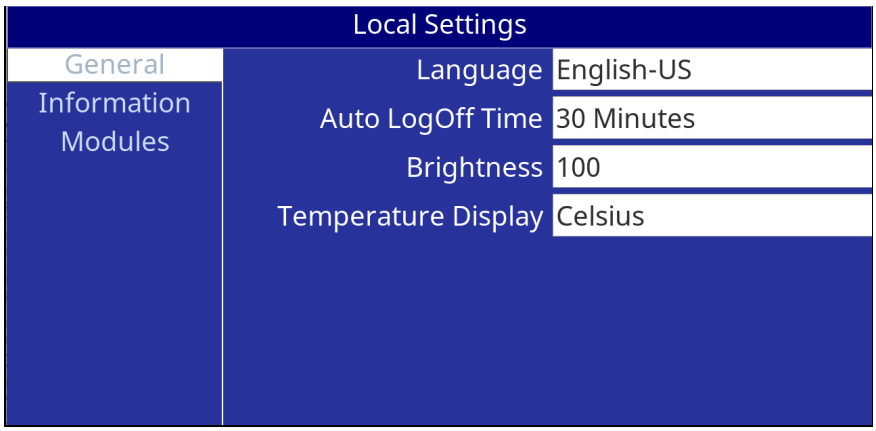


Figure 5-3 Local Settings page

3. Touch the **Language** box, select the desired language, and select **OK**.

5.1.3 How to Change the Date and Time

To change the date and time:

1. Touch the  **Configuration** button to bring up the Settings page.

2. Supervisor: Touch the **Date/Time** icon.
   Engineer: Touch the **Hardware Settings** icon on the Settings page, then touch **Date/Time** on the Hardware Settings page.

   The Set Date and Time page will appear (Figure 5-4).

Figure 5-4 Set Date and Time page

3. To change the date, touch the date on the calendar on the left, then touch the **Set Date To xxx** button.
   To change the time, touch the **HOURS**, **MINUTES** and **SECONDS** lists, then touch the **Set Time to xxx** button.

5.1.4 How to Change the Gauge and Measurement Channel Names

The gauge as supplied will have been named with the gauge serial number. To change to another name of your choice at any time, carry out the following procedure.

To change the gauge and measurement channel names:

1. Touch the  **Configuration** button to bring up the Settings page.

2. Supervisor: Touch the **Gauge Settings** icon.
   Engineer: Touch the **Hardware Settings** icon on the Settings page, then touch **Gauge Settings** on the Hardware Settings page.

   The Gauge Settings page will appear (Figure 5-5).

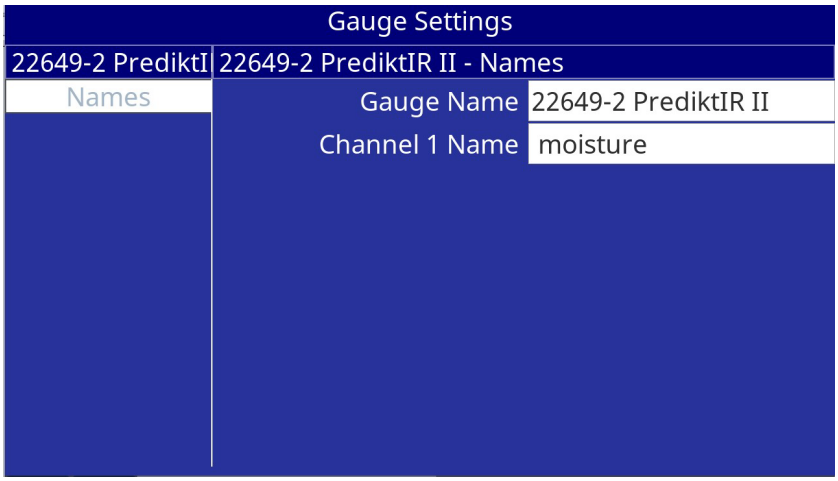


Figure 5-5 Gauge Settings page

3. To change the gauge name, touch the **Gauge Name** box and enter the new gauge name.
   To change the measurement channel name, touch the **Channel x Name** box and enter the new measurement channel name.

5.1.5 How to View, Edit and Save Recipes (Span, Trim, Application, Response Time)

The measurement Response Time may be set to suit the characteristics of the Product being measured. This is done by editing a product definition for that product.

To view or edit the contents of a Product Recipe:

1. Touch the  **Configuration** button to bring up the Settings page.

2. Touch the **Configure Products** icon.

   The Configure Products page will appear (Figure 5-6).

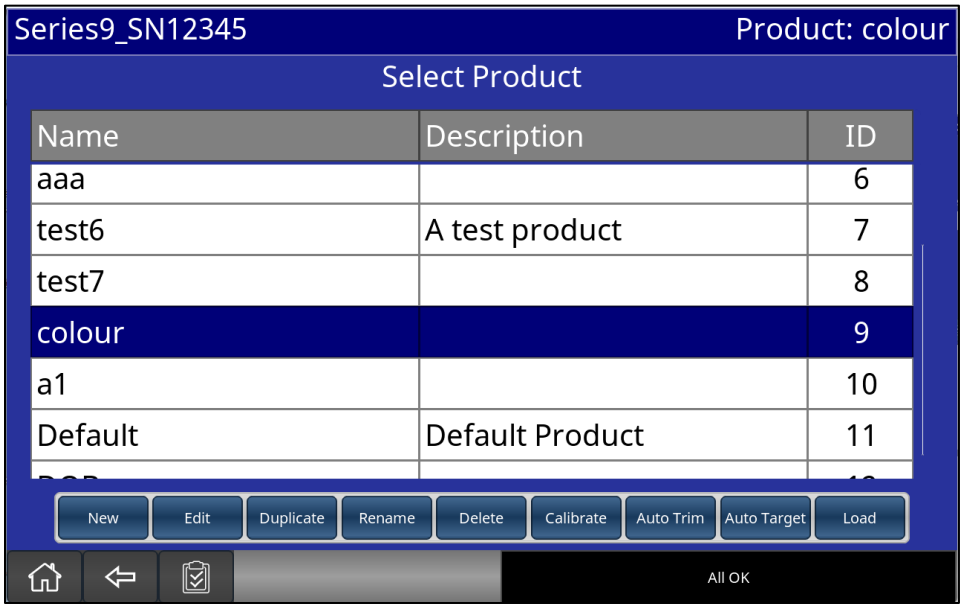


Figure 5-6 Configure Products page

3. Under “Select Product”, select a Product from the list.

4. Touch the **Edit** button.

   The contents of the selected Product will be displayed (Figure 5-7). Simply swipe up or down to scroll the settings.

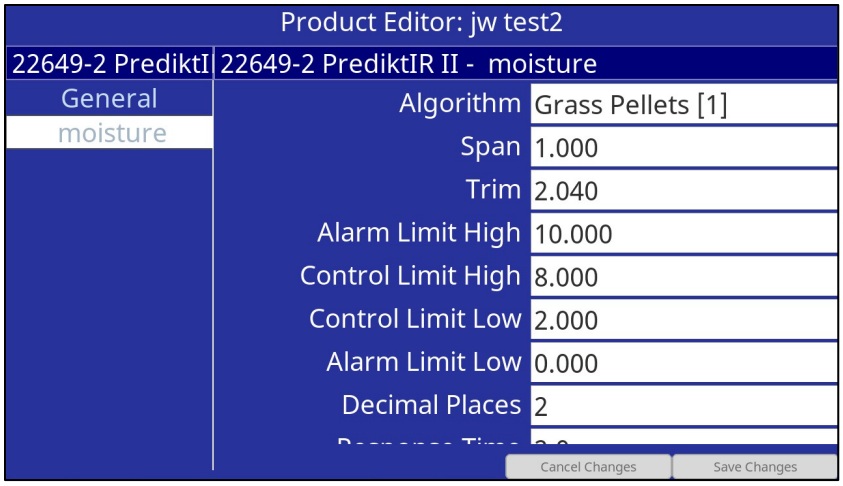


Figure 5-7 Contents of selected Product

5. To change a setting, touch the appropriate box and enter the new value or select from the list shown. Common settings are **Span**, **Trim, Algorithm** and **Response Time**.

   If a setting is changed, the affected box will be shown with a light yellow background (Figure 5-8).

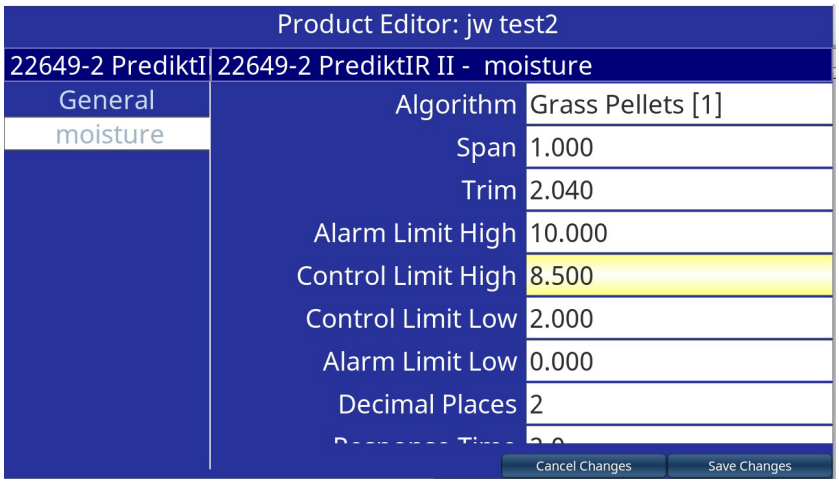


Figure 5-8 Product change indicator

6. To save the changes to the Product, touch the **Save Changes** button.
   Otherwise, if the **Cancel Changes** button is touched, the changes will not be saved to the Product.
   Note that the change will not take effect on the current measurement until loaded.

5.1.6 How to Use Auto Trim

Note: The Auto Trim function can only be carried out on the current Product.

To carry out the Auto Trim function:

1. Touch the  **Configuration** button to bring up the Settings page.
2. Touch the **Configure Products** icon.

   The Configure Products page will appear (Figure 5-6).
3. Touch the **Auto Trim** button.

   The Auto Trim page will be displayed (Figure 5-9).

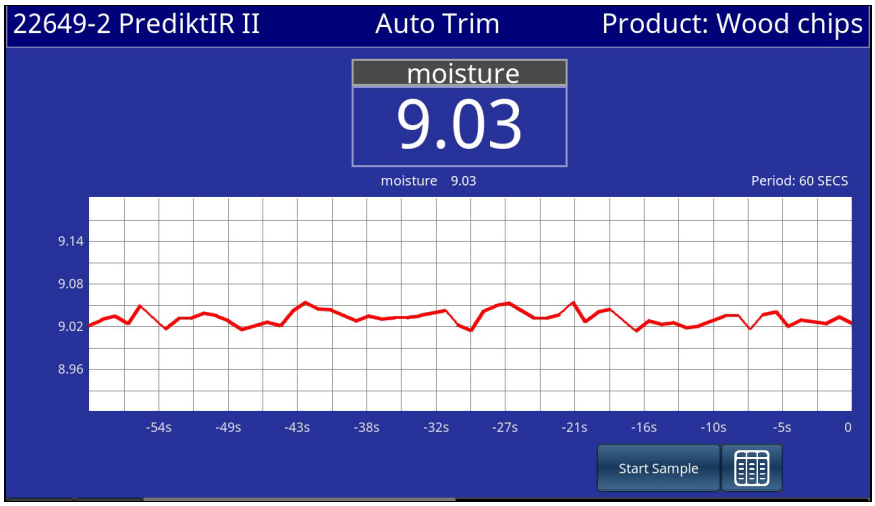


Figure 5-9 Auto Trim - first page

4. Touch the  button below the Trend chart.

   The display will switch to the Auto Trim page shown in Figure 5-10.

Figure 5-10 Auto Trim - second page

5. Touch the **Start Sample** button.
   While the gauge is sampling, a progress indicator bar is updated.

6. Touch the **Target** box and enter the measurement value the gauge should be reading.
   This is the value known (from lab results) at the point where the measurement is taken.

7. Touch the **Apply** button to update the newly calculated Trim value.

5.1.7 How to Use Auto Target

Note: The Auto Target function can only be carried out on the current Product.

To carry out the Auto Target function:

1. Touch the  **Configuration** button to bring up the Settings page.

2. Touch the **Configure Products** icon.

   The Configure Products page will appear (Figure 5-6).

3. Touch the **Auto Target** button.

   The Auto Target page will be displayed (Figure 5-11).

Figure 5-11 Auto Target page

4. Touch the **Start Sample** button.
   While the gauge is sampling, a progress indicator bar is updated.

5. When sampling is completed, touch the **Set Target** checkbox (and an "X" will appear in that box), then touch the **Apply** button. This sets the **Target** value of the selected measurement to the value of the **Average**. For example, in Figure 5-12, the **Target** value of measurement L* is set to 95.43.

6. The **Save Sample** button can also be touched to save the sample.

5.1.8 Audit Trail

To view an Audit Trail of events that have occurred:

1. Touch the  **Configuration** button to bring up the Settings page.

2. Touch the **Configure Products** icon.

   The Configure Products page will appear (Figure 5-6).

3. Touch the  **Audit** button to bring up the Audit Trail page (Figure 5-12).

   A table will display a list of events by date/time, and if applicable, the user name.

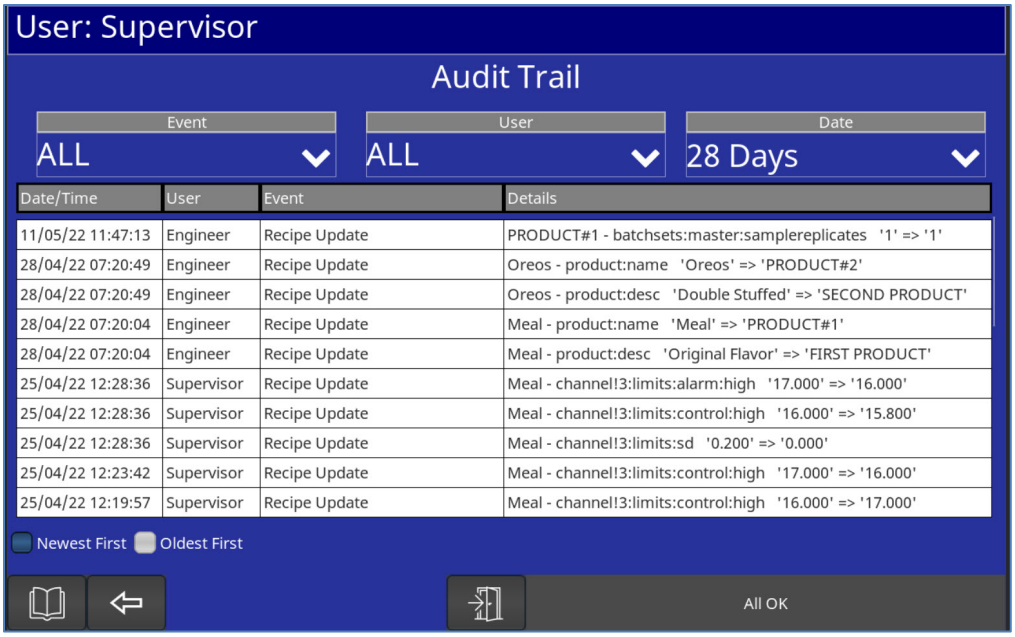


Figure 5-12 Audit Trail page

4. The events can be filtered by selecting any combination of Event, User name and Date range from the drop-down lists at the top of the screen.

5. There are 2 types of events: User and Recipe.

   Events such as a fault condition are not user-dependent, and therefore, do not have a User associated with them.

6. Either the newest or oldest events are listed first, depending on whether the **Newest First** or **Oldest First** box is selected at the bottom of the page.

5.1.9 How to Set Up the Analogue Output Scaling

Note: This function can only be carried out by an Engineer.

The analogue data output can optionally be a 4 to 20 mA current output, where the value of the current (mA) is directly and linearly proportional to the value of the gauge measurement. The following example shows how to set the measurement value (Low) to be represented by the 4 mA output and the measurement value (High) to be represented by the 20 mA output.

1. Touch the  **Configuration** button to bring up the Settings page.

2. Touch the **Hardware Settings** icon on the Settings page, then touch **Analogue Outputs** on the Hardware Settings page.

   The Configure Analogue Outputs page will appear (Figure 5-13).

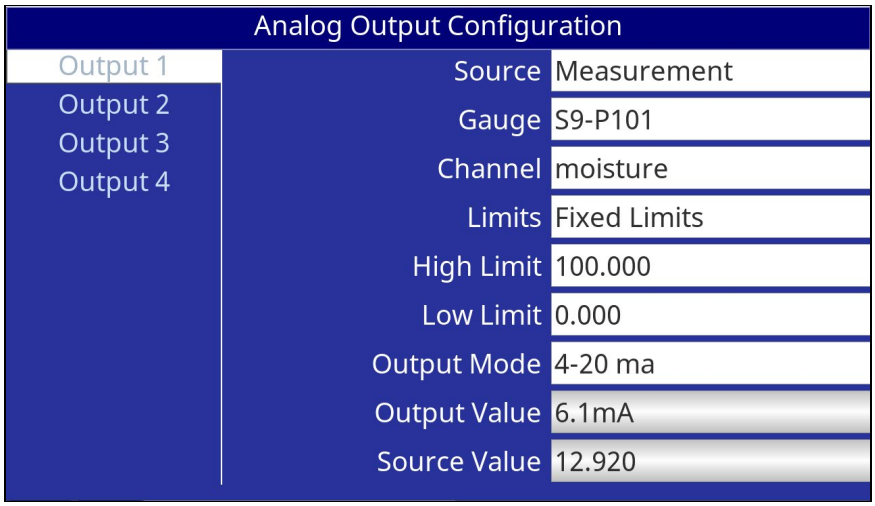


Figure 5-13 Configure Analogue Outputs page

3. 2 or 4 analogue outputs are available, depending on whether 1 or 2 boards are fitted. Select an output from the left column: **Output 1**, **Output 2**, **Output 3** or **Output 4**.

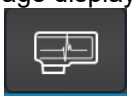
4. Touch the **Channel** box and select the measurement channel.

5. Touch the **Output Mode** box and select 4-20 ma.

6. Touch the **Low Limit** box and enter the measurement to correspond to the 4 mA output.

7. Touch the **High Limit** box and enter the measurement to correspond to the 20 mA output.

5.1.10 Gauge Diagnostics

The Gauge Diagnostics page displays various diagnostic information about the gauge. Operators can access this page by touching the  button. Supervisors and Engineers can access this page by touching the  button, and then selecting  **Gauge Diagnostics** on the Settings page.

There are 4 groups of information that can be viewed on the Diagnostics page, selectable by touching **General**, **Version**, **Motor** or **Lamp** on the left side of the screen. For example, the **General** group displays the internal temperature of the gauge and the window contamination level. Figure 5-14 shows the Diagnostics page when **General** is selected.

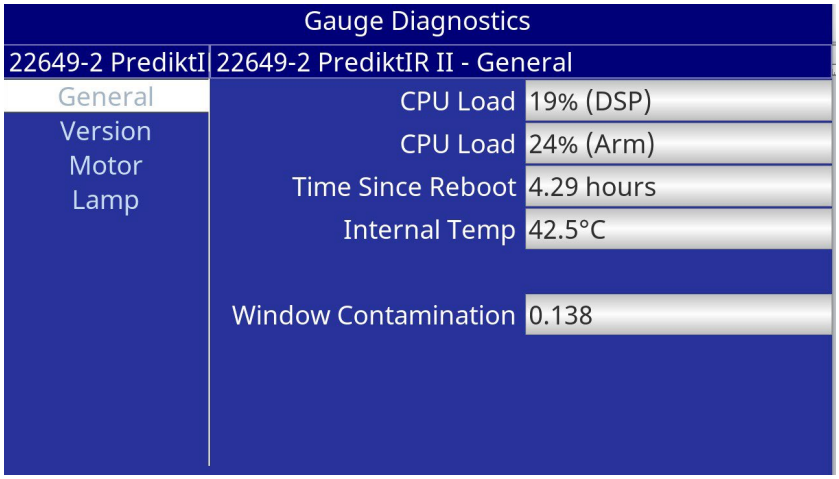


Figure 5-14 Gauge Diagnostics page - General group

5.1.10.1 Gauge Check

The  **Gauge/Ref Check** button on the Gauge Diagnostics page brings up the Gauge/Reference Check page, which has buttons to carry out the Gauge Check routine and Re-reference the gauge.
See Section 5.1.11 - Checking Gauge Stability.

5.1.11 Checking Gauge Stability

PrediktIR II gauges are self-compensating for factors such as aging of their internal source lamp, and are substantially unaffected by ambient light or environmental temperature changes within their operating temperature range. Consequently, the gauges should be stable and provide consistent measurements over long periods of operation. If you wish to check this for any reason, it can be done using either of the methods described below.

Note: By far the most common reason for drift in the gauge output is window contamination. It is vital, therefore, that the window is kept clean during normal operation, either by regular cleaning or by fitting an Air Purge window. The window should be cleaned before any reference check is performed.

5.1.11.1 Fitting the Auto Reference Standard (ARS)

Note: The ARS needs to be fitted before performing any Gauge check and re-reference operation.

The Auto Reference Standard (ARS) is an essential system accessory for checking and correcting aspects of gauge accuracy.

The ARS connects to the gauge window bezel by means of a bayonet fixing. It can be fitted only in one orientation.

If an air purge unit is fitted, it is **not** necessary to remove it in order to fit the ARS, although the index marker on the window bezel will be partially obscured.

Attach the ARS to the gauge as follows:

1. Shut off the air supply to the air purge assembly, where fitted.

2. Align the index markers on the ARS and window bezel (red dot to red dot), insert the ARS into the bezel as far as it will go, and then turn it to lock it in place.

5.1.11.2 Using the Gauge Check Function

Note: This function is accessible only to a Supervisor or Engineer.

This function can be used without loading a special product. It checks the gauge output against the ARS and provides a date- and time-stamped percentage reading, which represents the deviation from ideal.

It is important to understand that this is a very sensitive check, and that some deviation from 0% is normal. As an indication, a reading of 100% is equivalent to the threshold for failure of the Auto-reference procedure (see Section 5.1.11.3 - Performing an Auto-Reference). Anything below 30% is insignificant for all practical purposes.

1. Fit the Auto Reference Standard (see Section 5.1.11.1 - Fitting the Auto Reference Standard (ARS)) to the gauge.
2. Touch the  **Configuration** button, and then touch **Gauge Diagnostics**  on the Settings page.
3. Touch the  **Check** button to bring up the Gauge/Reference Check page.
4. Touch the **Gauge Check** button to start the check.

   The screen will show a 10-second countdown and then display a table showing the result of the gauge check (and references), together with previous results (Figure 5-15).

   The **Details** column provides an indication of how good the check or reference was with a traffic light system (green, yellow, red) to give a quick indication of good (<3%), marginal (3 to 5%), or bad results (>5%).

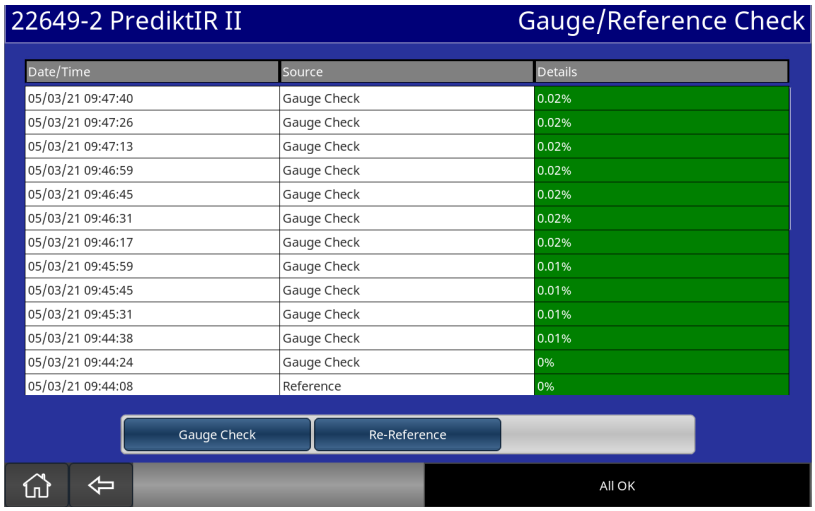


Figure 5-15 Gauge/Reference Check results

5. Exit from the results page and remove the ARS from the gauge.

5.1.11.3 Performing an Auto-Reference

Note: This function is accessible only to an Engineer.

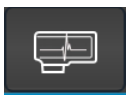
1. Obtain the Auto Reference Standard that was supplied for use with the relevant gauge.

   Do not use any other ARS, as the characteristics may be slightly different and this will affect the accuracy of the reference procedure.

2. Place the ARS in the same location as the gauge and allow at least 1 hour for it to warm or cool to the ambient temperature.

3. Fit the ARS to the gauge (see Section 5.1.11.1 - Fitting the Auto Reference Standard (ARS)).

4. Touch the  **Configuration** button, and then touch **Gauge Diagnostics**  on the Settings page.

5. Touch the  **Check** button to bring up the Gauge/Reference Check page.

6. Touch the **Re-Reference** button to start the process.

   A ten-second countdown is displayed while the sampling is in progress, followed by a success or fail message.

Auto-Reference Failed

If a fail message is displayed, it indicates that the correction required is beyond the capability of the normal Auto-Reference process.

Note: The number in the message has no operational significance, but may be required by Nordson to assist with diagnosis of the problem. Please make a note of the number.

Possible causes are:

- **Gauge window contaminated, or Auto Reference Standard window contaminated externally.**

  In this case, clean the window(s) and repeat the Auto-Reference procedure.

- **Auto Reference Standard not fitted correctly, or not allowed to equalise to the ambient temperature.**

  Check, and then repeat the auto-reference.

- **Auto Reference Standard contaminated internally.**

  This can happen as a result of poor storage conditions, resulting in the formation of water vapour within the unit. In this case, return the Auto Reference Standard to Nordson.

- **Gauge faulty.**

  If the error is not caused by contamination as described, it is possible that the gauge is faulty. In this case, contact Nordson.

5.1.12 How to Configure Product Lines

5.1.12.1 General

This applies to PrediktIR II systems with multiple gauges.

The Product Lines feature allows gauges to be split into separate groups, referred to as “lines”, making them simpler to identify and manage. If multiple lines are defined, the Home page will show each line as a grouped page, and the user will be able to scroll between lines.

Note: Only an Engineer has the capability to configure product lines.

1. Touch the  **Configuration** button to bring up the Settings page.
2. Touch the **Display Settings** icon on the Settings page, then touch **Configure Product Lines**.

   The Configure Product Lines page will appear (Figure 5-16).

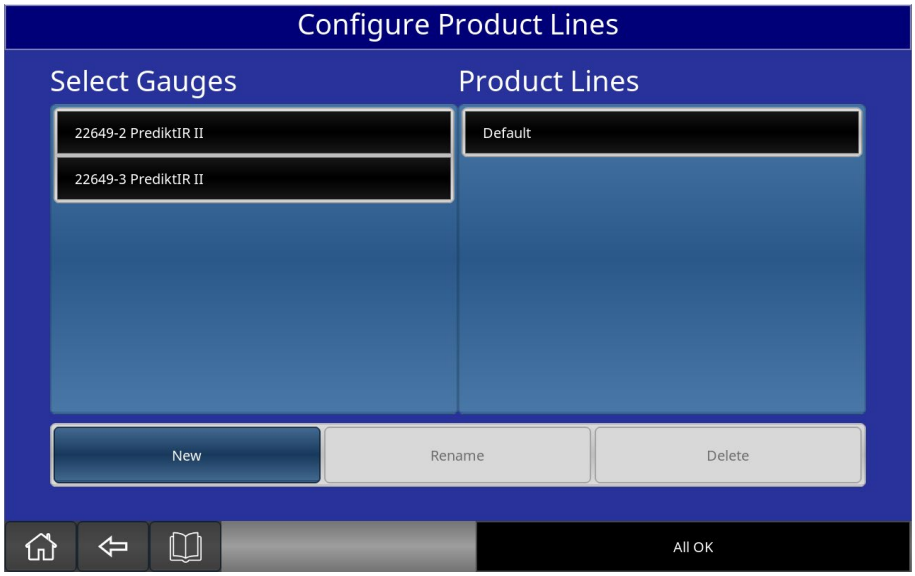


Figure 5-16 Configure Product Lines page

By default, all gauges are included in the line named “Default”. This line cannot be renamed or deleted. The “Default” line is not a real product line, but acts as a place holder for gauges that have not yet been assigned to a line.

- To add a new product line:

  a. Touch the **New** button and enter a name for the line.

  b. Assign one or more gauges to the line by touching the gauge buttons under “Select Gauges”. Those buttons will turn black when touched to indicate that they are selected.

- To rename a product line:

  a. Select the line by touching its button.

  b. Touch the **Rename** button and enter the new name for the line.

- To delete a product line:

  a. Select the line by touching its button.

  b. Touch the **Delete** button.
  Note that there is no confirmation before the line is deleted.

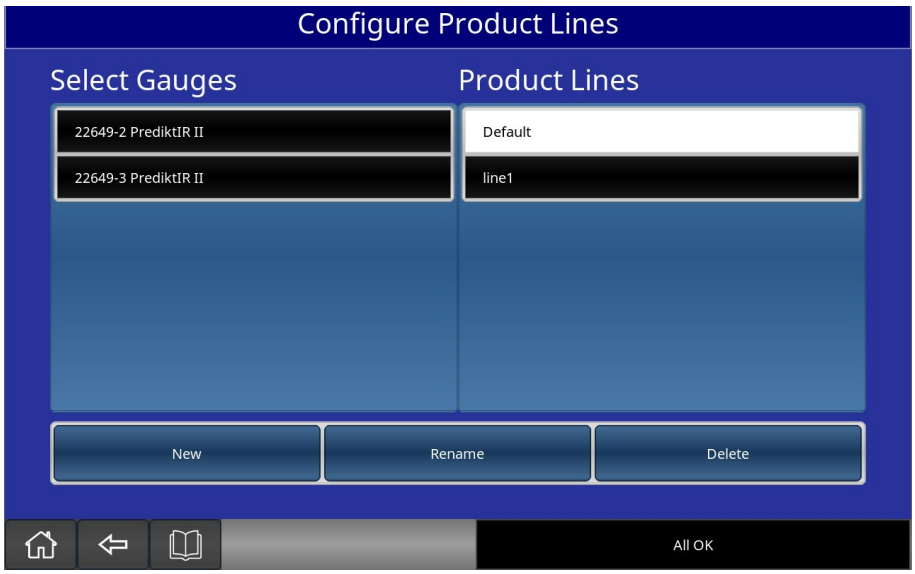


Figure 5-17 Configure Product Lines page (rename & delete)

5.1.12.2 Loading Products

When the  **Product Selection** button is touched to bring up the Load Product page, and multiple lines are configured, the user will be prompted to select a line. The selection dialog displays the names of the configured lines, except the “Default” line. Gauges belonging to the “Default” line are listed individually. The user may select a product line, or one of the unassigned gauges.

Selecting a gauge takes the user to the Product Load page for the gauge. When a line is selected, the Load Product page for the line is displayed. This lists the products that are common to all gauges assigned to the line. Once a product is selected and the **Load** button is pressed, that product will be sent to all gauges in that line.

Notes:

1. If the **Product Selection** button is touched and lines are configured, but not all gauges are selected in those lines, the user will be presented with a list to select a line or gauge.

2. If the **Product Selection** button is touched and no lines are configured except the Default line, the user will be prompted to select a single gauge.

3. Product loads from the Configure Product page (accessed by touching the **Configuration** button and then **Configure Products**) will still be performed on a single gauge.

CHAPTER
6

6 Maintenance

This chapter covers general cleaning of PrediktIR II components, and corrective maintenance to the level of the parts designated as customer replaceable items.

6.1 Warnings and Cautions

When carrying out any maintenance on the system, observe the following to avoid injury to personnel and damage to the equipment.

- If the gauge has been operating in very high temperature environment, allow adequate time for it to cool before handling.
- Compressed air can be dangerous. Isolate the Air Purge unit compressed air supply before working on a gauge.
- Do not power up the gauge when the case is open. The filter wheel rotates at a very high speed and could cause injury.
- Gauge maintenance must be carried out in a clean room away from the working area of the equipment.
- While the gauge case is open, take care not to touch any optical surfaces.
- When working on any system components, observe standard anti-static precautions.

When carrying out any maintenance on the system, observe the following to avoid injury to personnel and damage to the equipment.

BATTERY WARNING

There is a rechargeable PCB-mounted battery in the PrediktIR II sensor – **NO attempt should be made by the user to replace it.** If there are issues regarding this, please consult Nordson or their representative.

6.2 Cleaning

6.2.1 General Cleaning

External surfaces of gauges and other system components should be cleaned periodically with a damp non-abrasive cloth only.

Keep cables and connectors free from contaminants that could cause chemical damage.

Clean gauge windows as described below.

Caution: If solvents are needed to remove contamination, it is essential to consult the Customer Care Department of Nordson or their agent first, giving precise details of the solvent.

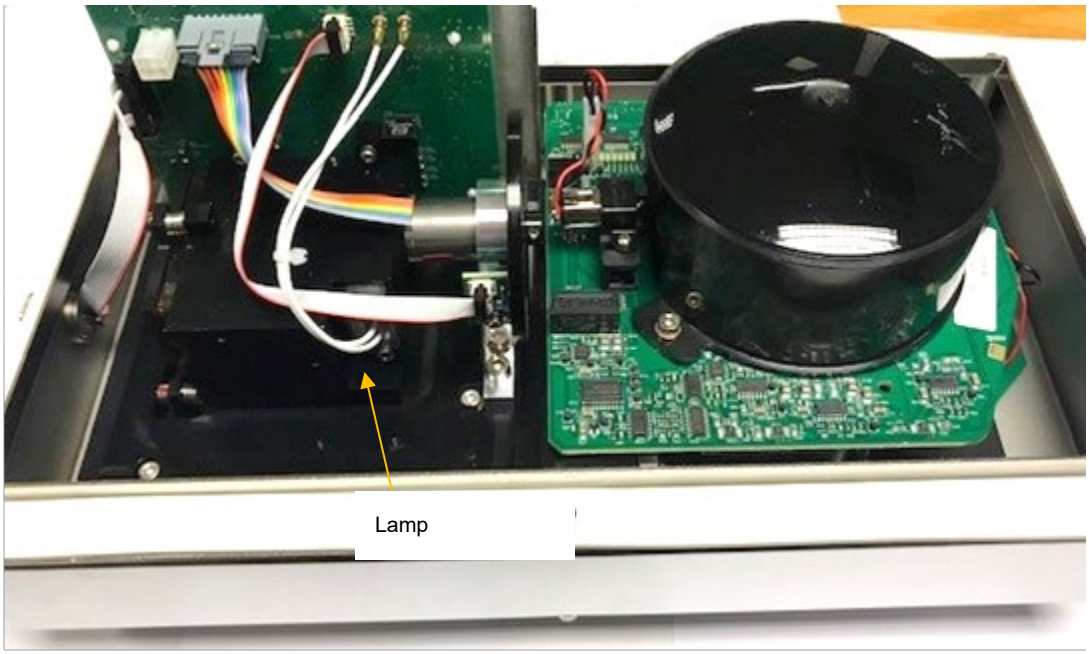
6.2.2 Cleaning Gauge Windows

Clean the gauge window using a soft lint-free cloth.

Where necessary, use warm water and a mild detergent. Do not use abrasive cleaners of any kind.
If a solvent is needed to remove contaminants, contact Nordson or their agents first.

6.3 Replacing the Gauge Source Lamp Assembly

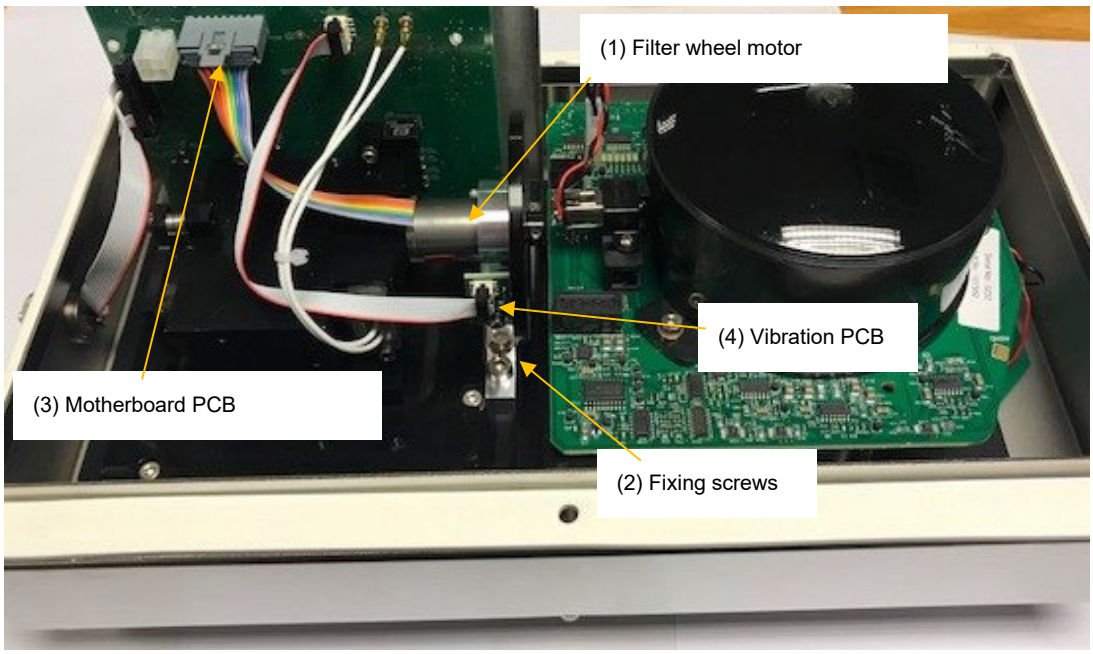
1. Remove power from the gauging system and ensure the explosive atmosphere is NOT present
2. Remove the connector clamp from the services cable, disconnect from the Gauge and fit the sealing caps to the connectors.
3. Using 4mm (0.16in) Allen key, undo the 6 fixings screws in the base to remove the lid.
4. Place the base looking downwards on a flat clean surface.
5. Locate the lamp, as indicated in the picture below.



6. Unplug the two lamp assembly leads.
7. Undo the two lamp fixing screws with 2.5mm (0.01in) Allen key and withdraw the lamp assembly from its mount.
8. Fit the new lamp and reassemble the Gauge using the reverse of this procedure. Take care not to touch the lamp glass as this may cause lamp failure. If accidental contact is made, clean the glass with isopropyl alcohol (IPA).
9. Switch the gauge on and allow 2 hours for it to reach full operating temperature, then auto-reference the gauge.

6.4 Replacing the Filter Wheel Motor

1. Remove power from the gauging system and ensure the explosive atmosphere is NOT present.
2. Remove the connector clamp from the services cable, disconnect from the Gauge and fit the sealing caps to the connectors.
3. Using 4mm (0.16in) Allen key, undo the 6 fixings screws in the base to remove the lid.
4. Place the base looking downwards on a flat clean surface.
5. Locate the filter wheel motor (1), as indicated in the picture below.

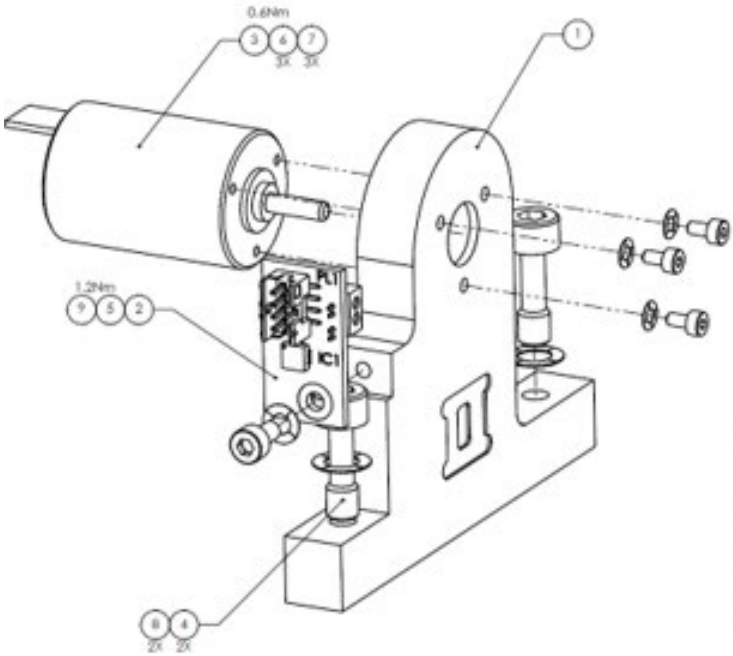


6. Unplug the filter wheel motor ribbon cable connector from the motherboard PCB (3).
7. Unplug the vibration PCB (4) ribbon cable connector.
8. Undo the filter wheel motor assembly fixings screws (2) with a 4mm (0.16in) Allen key
9. Lift the filter wheel assembly away from the Chassis. Do not touch the optical surfaces of the filter wheel. If accidental contact is made, clean the optical surfaces with isopropyl alcohol (IPA).
10. Note the orientation of the filter wheel, with the bush containing the grub screw towards the end of the motor shaft.

11. Loosen the grub screw and carefully withdraw the filter wheel from the motor shaft.

12. If the filter wheel does not come off easily, do not attempt to pull it off as this may damage the motor bearings. Instead, grip the wheel by its edges and use a small Allen key or similar tool to push the motor spindle out from the wheel.

13. Remove the 3 x motor fixing screws using 1.5mm (0.06in) Allen key as shown in the picture below.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	UOM
1	120_16282-01	MOTOR MOUNTING BRACKET 16 FILTER	1	EA
2	6817x9	VIBRATION/SYNC BOARD ASSEMBLY	1	EA
3	CS MO/0387-06	MOTOR, BRUSHLESS (DIA 22mm) (24V)	1	EA
4	105/15895-01	SCREW, CAPTIVE, M5x16 SHCS, SS	2	EA
5	FX/0176-01	SCREW, M3x0.5 x 6mm LG., SHCS SS	1	EA
6	FX/12119-01	SCREW M2 X 4 SKT HD SS	3	EA
7	FX/0187-02	WASHER, M2 CRINKLE BER/Cu	3	EA
8	FX/0187-07	WASHER, M5 CRINKLE BER/Cu	2	EA
9	FX/0187-04	M3 CRINKLE WASHER, CRINKLE BER/Cu	1	EA

If the instrument is within the warranty period, return the faulty motor to Nordson for replacement. If not discard the motor.

14. Fit the filter wheel to the new motor.

15. If the wheel is a tight fit, do not attempt to push it on while holding the motor. Place the back end of the motor shaft against a hard surface and then push the filter wheel on as far as it will go.

16. Tighten the filter wheel grub screw.

17. Fit the motor assembly and reassemble the Gauge as a reversal of the previous steps.

18. Switch the gauge on and allow 2 hours for it to reach full operating temperature, then auto-reference the gauge.

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CHAPTER 7

7 Outline Drawings

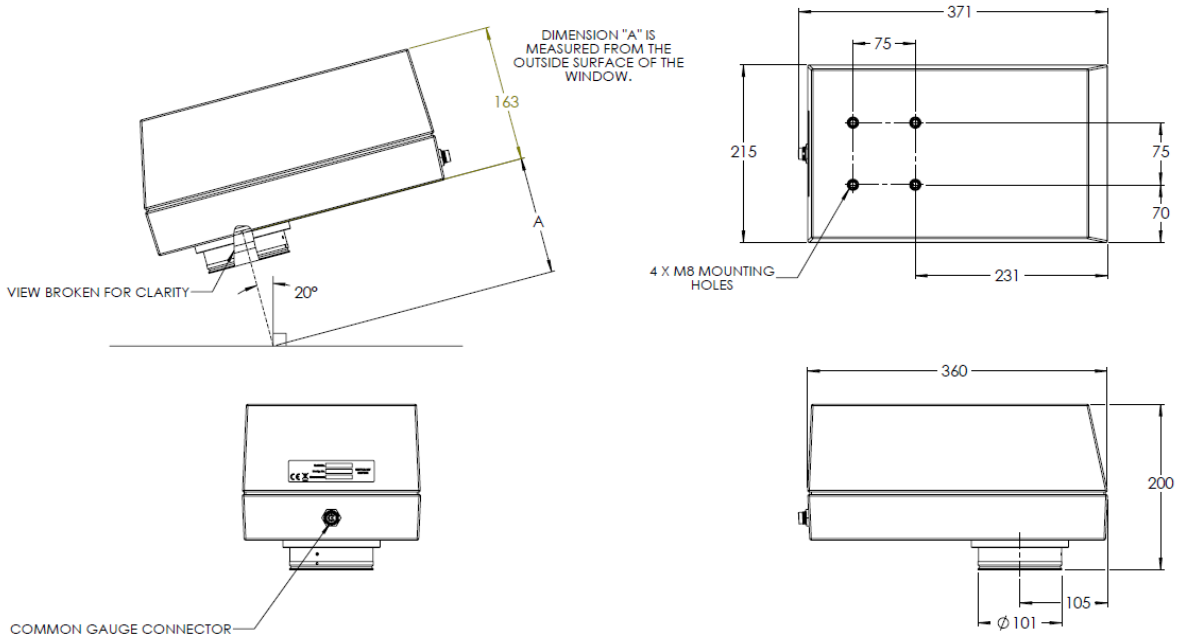

Figure 7-1 Gauge viewing distance from product and dimensions

Pass height depends on beam patch size. See Section 2.5 - Gauge Mechanical Installation for details.

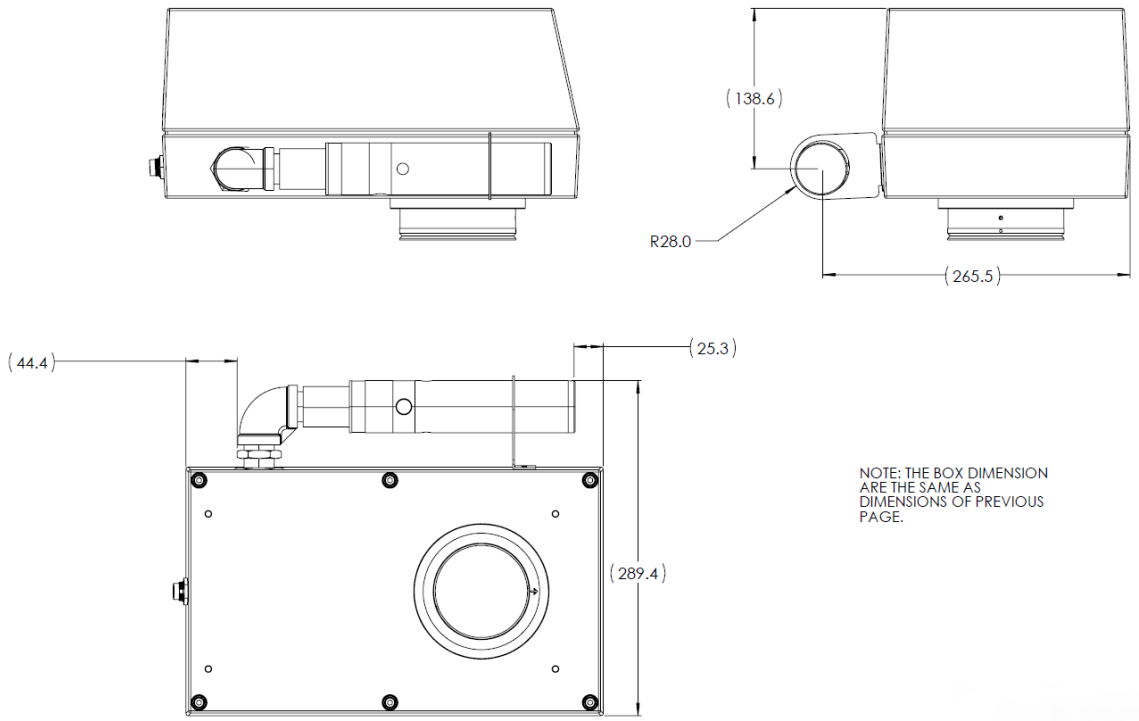

Figure 7-2 Gauge outline Drawing showing vortex pipe

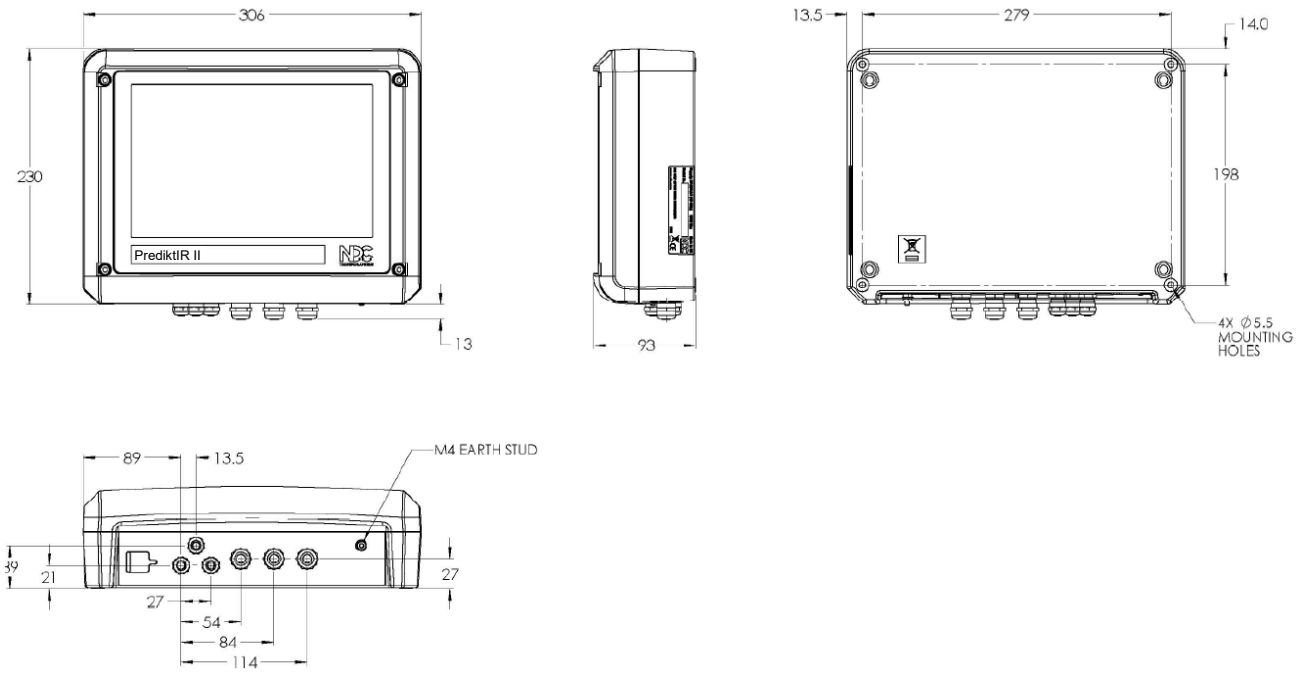

Figure 7-3 Stainless Steel PrediktIR II GCI Outline Drawing

CHAPTER 8

8 Specification

8.1 PrediktIR II Specification – All Components

Operating temperature	0 - 50°C (-32 to 122°F)
Storage temperature	0 - 70°C (-32 to 158°F)
Relative humidity	60% over full temperature range

8.2 PrediktIR II Gauge Specification

DC input	24Vdc +10% -20%, 35W	
Digital communications	Ethernet TCP/IP	
Mounting	Top face through 4 x M8 threaded holes	
Environmental sealing	IP65	
Weight	8.5Kg (18.74lbs)	
Pollution degree	Degree 1	
Working distance	Beam patch 60mm (2.36in) diam:	250mm +/- 100 mm (9.84in +/- 3.94in)
	Beam patch 25mm (0.89in) diam:	200 mm +/- 50 mm (7.87in +/- 1.97in)
Air Purge	Instrument quality compressed air, Ø10mm (0.39in) o/d tube, 20L/minute.	

8.3 PrediktIR II Gauge Control Interface Specification

Dimensions	Width 306mm (12.05in) Height 230mm (9.05in) +26mm (1.02in) large gland clearance Depth 91mm (3.58in) Note: Above values do not include cable clearance and connector removal clearance or mounting strap dimensions.
Weight	6 Kg (13.23lbs) excluding connected cables
Environmental sealing	IP65 NEMA 4
Pollution Degree	Degree 1

8.4 PrediktIR II Power Hub Specification

Power supply input	85-264vac 50/60Hz, 100W via screw terminals
Power output	24Vdc

Warranty

1. All sales of Nordson products are subject to the contractual terms and conditions of the Order pursuant to which they were sold to Buyer, including Warranty terms. The following terms are a general summary of the contractual Warranty terms, NOT a revision or alternative to the contractual terms, and are presented as merely a point of reference for your information. The contractual Warranty is the complete and exclusive statement of all Nordson warranties to Buyer. In the event the following terms are in conflict with any of the contractual Warranty terms, the contractual Warranty terms shall be deemed to control.

   The warranty terms contained herein are expressly in lieu of any and all other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose. In no event shall Nordson be liable for any incidental, consequential or special damages, including but not limited to, any loss of business, income or profits, expenses incurred for time when the system is not in operation, and any labor costs relating to or arising out of the performance, functioning or use of the system.

   Purchaser assumes the risk for use of this product and agrees to indemnify and hold Nordson harmless for any and all damage to person or to property resulting therefrom.

   Nordson grants no license under any patent rights except the right, under only such patents as may be owned or acquired by Nordson, to use the product sold hereby for the purpose for which it is sold. Nordson does not warrant that the product or its use does not infringe any patent owned by persons other than Nordson.

2. Nordson guarantees all products to be free from defects in material and workmanship for the following periods[1]:

   - Product and peripherals – 2 years from shipment
   - Source lamp – 5 years from shipment
   - Filter wheel motor – 5 years from shipment
   - Spare parts – 1 year from shipment
   - Replacement lamps and motors supplied under warranty – 1 year or up to the original 5 year warranty from shipment of the sensor, whichever is longer

   [1] Refer to the contractual terms and conditions of the Order for usage of the warranty.

   During this period, Nordson will repair or at its option replace, free of all charges for parts and labor, any Nordson parts determined by it to have been broken or damaged due to causes other than improper application, abuse or negligence. Nordson's obligation to repair or replace shall not extend to expendable parts which are subject to normal operating wear.

   Nothing in this paragraph 2 will require Nordson to make repairs or replacements where:

A. The product has been repaired, other than by an authorized Nordson dealer or a Nordson employee, or altered in any way without the prior written consent of Nordson; or

B. The product has not been properly maintained in accordance with any operating and maintenance manual supplied therewith; or

C. The product has been damaged as a result of fire, flood, war, insurrection, civil commotion, acts of God or any other cause beyond the control of Nordson or Buyer.

3. Nordson's liability shall be limited to the obligations set forth in Paragraph 2. These shall be the Buyer's sole and exclusive remedies, whether in contract, tort or otherwise, provided, however, that in lieu thereof, Nordson at its option may replace the entire product on an exchange basis or refund the purchase price against the return of the defective product.

4. Nordson will not be responsible for failure to provide service or parts due to shortage of materials, labor or transportation strikes or delays, or any causes beyond Nordson's control.

5. Unless otherwise specified by Nordson, all warranty repairs will be made at Nordson's facility. The customer shall be responsible for all expenses of packing, freight and insurance in connection with the shipment of products to Nordson for repair. Nordson will pay the cost of returning the equipment to customer.

   If it is mutually determined by the buyer and Nordson that the examination, replacement or repair takes place at the buyer's facility, then the buyer will be responsible for Nordson's travel and living expenses incurred in traveling to and from the buyer's facility, and during the time of the visit, as well as the cost of field labor and replacement parts unless the parts being repaired or replaced are determined to have been defective, in which event the cost of said repaired or replacement parts shall be borne by Nordson. These travel and living expenses will be billed to the buyer at actual cost to Nordson.

6. No person, including any Nordson distributor, agent or representative, is authorized to assume any liability on behalf or in the name of Nordson, and Nordson shall not be bound to any understandings, representations, or agreements with respect to warranties except as set forth in this policy.

7. Nordson requests immediate notification of any claims arising from damage in transit in order to determine if carrier responsibility exists. If damaged equipment arrives, save the shipping container for inspection by the carrier and telephone Nordson as soon as possible.