IQ4 Metal Detection System

Designed for Food & Packaging Industries

Metal Detection

Operating Instructions

Designed to Survive

Loma Systems, Summit Avenue, Southwood, Farnborough, Hampshire, GU14 0NY UK

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Contents

1: Introduction

Inspection systems are widely used and integrated into the production lines of a vast range of businesses. Where they identify metal contamination in products ensuring they are removed from the production line and are not supplied to customers.

Loma Systems has been designing and manufacturing metal detection equipment for over 45 years and has earned a reputation for consistent quality and advanced technology.

The following sections provide more information:

- About this guide

  This section provides you with a general introduction to the guide, its purpose and the intended audience.

- Organisation

  The guide is organized into a number of chapters providing information in a logical sequence. This section lists and briefly describes the contents of each chapter.

- Document Change Control

  This guide is a controlled document which is subject to change in line with changes to our products. As the principle aim of the guide is to provide you with the information that you need, we would welcome any comments or feedback that will enable us to make improvements to the guide. Please e-mail us at manuals@loma.com.

- Document Key

  Special text is used throughout the document, highlighted through the use of icons, to add notes and warnings where appropriate.

- Copyright and Acknowledgements

  This guide is copyright to Loma Systems. No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, or computer language in any form or by any means without the written permission of Loma Systems.

- The Loma Group of Companies

  Loma has offices around the world that can provide you with sales and support services. This section includes address and contact details for the main offices but details for all offices are available via the website at www.loma.com

About this guide

This guide explains in plain language and by examples how to operate the IQ4 metal detection system.

Audience

There are four levels of user access to the available features and functionality available, each provides specific benefits to that user.

- Level 1 (Operator)

  A user that uses the system to carry out routine product inspections and remove any contaminated products from the production line.

- Level 2 (Supervisor)

  A user that uses the system to manage the selection and inspection of a range of products.

- Level 3 (Quality)

  A user that monitors and analyses inspection data to ensure that acceptable quality standards are achieved and maintained for all the products inspected meeting customer and legislative requirements.

- Level 4 (Engineer)

  A user that carries out the installation, commissioning and integration of the system into the production line, and carries out routine servicing and maintenance tasks ensuring the high availability and performance of the machine.

Purpose

This guide has the following goal:

Showing users at all levels how to carry out operations and tasks that will ensure the effective, safe and continued operation of the machine to detect contaminants in products and remove them from the production line.

Organisation

- Introduction

  Guidelines provide an introduction to this guide and some general information, including global contact details for Loma Systems.

- Safety First

  Guidelines identify and explain the safety features built into the machine, potential hazards, warnings, labelling and other general and legislative information related to the safe use of the machine.

- Technical Specifications

  Guidelines provide technical information for the machine to generally assist in the site selection and safe installation processes

- User Interface

  Guidelines describe how to navigate around the user interface and also provides a description of the screens, through which you can setup and manage all parameters required for inspecting products and for the general operation of the machine.

- Operating instructions

  Instructions are provided describing how to set up and configure the machine, including adding new products for inspection.

Document Change Control

The information contained in this guide is believed to be accurate at the time of writing but may, of course be subject to changes and additions over time to improve on the information provided in line with any changes made to the system. For any feedback or necessary changes, please contact us at manuals@loma.com.

Document Key

The following special text may be used throughout the document. The icons and colour coding have the following meanings:

Notes and Warnings

Notes are used to provide supplementary information. Typically this is information that may only apply in specific situations.

Warnings are used to identify possible hazards which may cause damage to or malfunction of the equipment, loss of life, bodily damage or ill health in any form, either immediate or latent. Loma Systems cannot be held responsible for injury to anyone, however caused, where Warnings have been ignored or taken lightly.

Important is used where the information is critical to the completion of a task. You should not disregard an important indication.

Examples are supplied for the purpose of explanation they do not reflect your specific needs or requirements.

Conventions

Safety First	Indicates a hyperlink, so tapping on the text will display another page.
manuals@loma.com	Indicates an email hyperlink, so tapping on the text will open a new message window in your email system.
www.loma.com	indicates a web hyperlink, so tapping on the text will open the page in your default web browser.
Cancel	indicates a button or named section of screen to interact

	with, so tapping on the section will cause the action to occur.
Learn Screen	indicates the name of a screen or section. for example the Learn Screen or the Access Level dropdown.
`+Solution+`	Indicates code or report text.

Copyright and Acknowledgements

Loma Systems
Summit Avenue
Southwood
Farnborough
Hampshire
GU14 0NY
England
Email: Enquiries@loma.com
Web: www.loma.com

The information in this guide is believed to be correct at the date of publication. However, our policy is one of continuous improvement, the information in this guide is subject to change without notice and does not represent a commitment on the part of Loma Systems.

No liability is accepted for errors and omissions in this document. If users are uncertain about any aspect of the installation of the equipment they should contact an authorised service centre. Details of these are provided in the Loma Group of Companies section or can be obtained from www.loma.com.

The Loma Group of Companies

UK

Sales Customer and Service Support
Loma Systems
Southwood
Farnborough
Hampshire
GU14 0NY
Tel: 01252 893300
Fax: 01252 513322
E-mail: Enquiries@loma.com
Web:www.loma.com

Canada

Sales and Customer Service
Loma Systems
Unit 11, 333 Wyecroft Road
Ontario
L6K 2H2
Tel: 1-800-387-7987 / 905-842-4581
Fax: 905-842-3460
E-mail: Enquiries@loma.com
Web:www.loma.com

USA and South America

Sales and Customer Service
Loma Systems
550 Kehoe Boulevard, Carol Stream
Illinois 60188,
Tel: 1-630-588-0900 / 1-800-USA-Loma
Fax: 1-630-588-1395
E-mail: Enquiries@loma.com
Web:www.loma.com

Czech Republic

Sales and Customer Service
Loma Systems s.r.o.
U Lomy 1069, 334 41
Dobrany
Tel: +49 (0) 2064 43724-0
Fax: +49 (0) 2064 43724-49
E-mail: Enquiries@loma.com
Web:www.loma.com

China

Sales and Customer Service
Loma Systems Shanghai (Asia HQ)
Shanghai
Loma Systems
Door 3, No. 15, Lane 1985
Chunsen Road, Shanghai, 200237 PRC
Tel: +86 (0) 21 64102396
Fax: +86 (0) 21 64102395
E-mail: Enquiries@loma.com
Web:www.loma.com

Benelux

Sales and Customer Service
Loma Systems
Steenovenweg 44
5708 HN
Helmond
Netherlands
Tel: +31 (0) 765 030212
Fax: +31 (0) 765 089800
E-mail: Enquiries@loma.com
Web:www.loma.com

France

Sales and Customer Service
Lock Inspection France
8, rue de la garde
Bâtiment
« Le Chêne »
F-44300, Nantes
Tel: +33 (0) 155 695778
Fax: +33 (0) 169 591621
E-mail: Enquiries@loma.com
Web:www.loma.com

Germany

Sales and Customer Service
Loma Systems
Magnusstr. 18
D-46535 Dinslaken
Deutschland
Tel: +49 (0) 2064 43724-0
Fax: +49 (0) 2064 43724-49
E-mail: Enquiries@loma.com
Web:www.loma.com

Poland

Sales and Customer Service
Loma Systems
Wiśniowy Business Park
ul. Łużecka 26, Budynek E
02-135 Warszawa
Poland
Tel: +48 22 575 70 25
Fax: +48 22 575 70 01
E-mail: Enquiries@loma.com
Web:www.loma.com

Brazil

Sales and Customer Service
Loma Systems / Brapenta Electronica
Baráo do Rio Branco
753 – Santo Amaro
São Paulo
SP – Brasil
CEP 04753-001
Tel: +55 (0) 11 3123 2853
Fax: +55 (0) 11 98455 1356
E-mail: Enquiries@loma.com
Web:www.loma.com

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Safety First

The safety of all people carrying out any activities associated with the installation and use of the metal detectors is of primary importance. This chapter is therefore included to provide you with general safety guidance. The following sections provide more information:

- Safety Awareness

  All personnel engaged in activities associated with the installation of the metal detectors should read and comply with the instructions and information contained herein, the statutory requirements and regulations, including the provisions of the **Health and Safety at Work Act (UK)**, and in line with other international standards.

- EC Declaration of Conformity

  Provided it is installed, operated, serviced and maintained in accordance with the guidelines contained in this User Guide, the metal detectors complies with the appropriate EU Directives which are listed in this section. A signed **EC Declaration of Conformity** is supplied with each metal detectors.

- Safety Warnings

  A number of general safety warnings appropriate for the use of Loma Systems metal detectors are provided in this section. It is essential that personnel who are, or will be, responsible for installing, maintaining or operating the metal detector described in this manual should read and understand these warnings.

- Safety Labels

  Safety labels are attached or etched in appropriate places to highlight areas of the metal detectors where caution should be taken to avoid potential hazards. The labels used are listed and described in this section.

- Safety Guards

  For Loma metal detectors the use of guarding, including covers, panels, curtains and other methods is extremely important in order to restrict operators from accessing areas of the metal detectors that are potentially hazardous when the machine is operating. This section provides some guidance.

- Responsibilities and Disclaimer

  The metal detectors warranty provided by Loma Systems is subject to it being used and maintained in accordance with a set of guidelines included in this section.

- Safety Measures

  Before attempting to use the metal detectors, a number of basic checks should be carried out to ensure that it is in a safe condition and ready to be used. A list of recommended checks are included in this section.

- Intended Use of the Machine

  Loma metal detectors are designed to be used in an industrial environment for detecting metal contaminants in products presented in packets, pouches or loose products. Any improper use could invalidate the **EC Declaration of Conformity** issued with the metal detector and also the metal detector warranty. This section provides further details.

- Noise Levels

  Loma metal detectors do not emit a level of noise that is hazardous. However, in line with current legislation, the customer should verify that the overall noise levels within the operating environment are within defined limits.

- End of Life treatment

  The **Waste Electrical and Electronic Equipment recycling (WEEE) Regulations 2006** and the **CE Directive 2002/96/EC** require that electrical and electronic equipment must be recycled at the end of its useful life. This section provides some guidelines.

- Emergency Procedures

  This section lists the potential emergencies that may be encountered and the associated procedures.

- Quality Assurance

  If your business is operating under an approved Quality Management System, all activities covering the safe operation and maintenance of the metal detectors will need to be incorporated into the system to ensure continued compliance. This section provides some guidelines on what needs to be considered.

- End User Licence Agreement

  This section contains details of the End User Licence Agreement for the metal detectors software.

Safety Awareness

Loma metal detectors employ low-intensity electromagnetic fields in compliance with current legislation.

If used in close proximity to an electromagnetic field, the operation of pacemakers, cardiac defibrillators and other life support devices can be affected. Wearers of these devices should consult their doctor for advice on avoiding this hazard.

It is essential that all installation, operation and maintenance personnel read this guide before working on the Loma IQ4 PipelineVertical FallWafer Thin Metal Detection System and comply with the instructions and information contained herein.

It is also essential that all personnel engaged in activities associated with the installation, operation, servicing and maintenance of the Loma IQ4 PipelineVertical FallWafer Thin Metal Detection System have been adequately trained, and are appropriately qualified and experienced to do so.

All personnel should comply with the statutory requirements and regulations, including the provisions of the **Health and Safety at Work Act (UK)**, other EU relevant legislation, relevant OSHA regulations, and any amendments that may become legal requirements.

EC Declaration of Conformity

Provided it is installed, operated, serviced and maintained in accordance with the guidelines contained in this document and the appropriate User Guide, the metal detector addresses the fundamental safety and health requirements of the following directives:

- EC Machinery Directive **2006/42/EC**
- EC Electromagnetic Compatibility Directive **2004/108/EC**
- EU-Directive **1935/2004/EC** (Materials for Food Contact)
- EU-Directive **2023/2006/EC** (Good manufacturing practice for materials and articles intended to come into contact with food)
- EU-Directive **2011/10/EC** plus amendments **1282/2011/EC** and **1183/2012/EC** (Plastic Materials and Articles intended to come into contact with food).

A signed and dated EC Declaration of Conformity is provided with each metal detector delivered.

Any modifications made to any part of the metal detector without the prior written agreement of Loma Systems will invalidate the EC Declaration of Conformity and also product warranty

Safety Warnings

Listed below are the safety warnings that are applicable when using a Loma metal detectors. It is strongly recommended that personnel who are, or will be, responsible for installing, maintaining or operating the equipment described in this manual should read and understand these warnings.

Systems manufactured by Loma are specifically designed for automatic in-line operation. Operators are normally only required to work on the machine intermittently and this interaction is usually limited to either changing product settings via the system control panel or emptying product from the reject receptacle.

Engineers involved in installation, servicing and maintenance of the metal detectors may be exposed to hazards in the execution of particular actions so are advised to be particularly vigilant and take into account the potential hazards listed.

1. **LETHAL HAZARD – ELECTRICAL SUPPLIES**. A current of 100 milliamps passing through the body for one second can kill. This can occur at voltages as low as 35V ac or 50V dc. The equipment described in this manual uses electrical power which can be lethal. Unless absolutely necessary, cleaning, inspection and maintenance must not be carried out without first isolating the equipment from all electrical supplies.

2. **LETHAL HAZARD – COMPRESSED AIR SUPPLIES**. The equipment described in this manual may be supplied with a compressed air supply operating at a pressure which may be lethal. Unless absolutely necessary, cleaning, inspection and maintenance must not be carried out without first isolating the equipment from all compressed air supplies.

3. **NON-IONIZING RADIATION**. Loma metal detectors employ low-intensity electromagnetic fields in compliance with current legislation. If used in close proximity to an electromagnetic field, the operation of pacemakers, cardiac defibrillators and other life support devices can be affected. Wearers of these devices should, therefore, consult their doctor for advice on avoiding this hazard.

4. **WORKING ON EQUIPMENT**. If it is essential to work on the equipment with electrical and/or compressed air power connected, the work must be undertaken only by qualified personnel who are fully aware of the danger involved and who have taken adequate safety precautions to avoid contact with dangerous voltages and/or compressed air supplies. Before disconnecting the metal detector from power, removing the power plug or loosening the power terminals ensure that signal cables to other machines are disconnected first. Take care not to trap the earth wire or ribbon cable when closing the enclosure lid.

5. **REJECT DEVICES**. At no time, with compressed air and/or electrical power applied to an automatic reject device, should any part of the body be placed within the operating area of the reject device.

6. **EXCESSIVE NOISE**. When an air blast reject device operates, the noise emitted may constitute a noise hazard. While short exposure to this noise will not cause permanent damage to hearing, prolonged exposure may cause some damage. Modular belts, when running at higher speeds (typically above 50 m/min), can also generate noise levels in excess of 70dB(A). It is recommended that ear defenders are worn by personnel who are regularly exposed to the noise.

7. **HEAVY EQUIPMENT**. Loma metal detectors are extremely heavy and considerable care must be taken when handling them. Sufficient personnel and a suitable fork-lift truck or pallet truck must be used to ensure safe handling.

8. **LIFTING THE MACHINE**. Use only the correct slings and lifting tackle to move Loma metal detectors. Visually inspect all slings and lifting tackle prior to lifting the machine to ensure that:

    a. The safe working load will not be exceeded.

    b. There are no frayed or broken strands.

    c. Hooks, rings, etc. are not damaged.

9. **MOVING THE MACHINE**. The centre of gravity of some metal detectors is high. Lower the height adjustment to its minimum setting before moving. Care must be taken when moving a metal detector on a slope to ensure that it does not topple over. This could result in death or severe injury to an individual and/or severe damage to the equipment.

10. **CONTAMINANTS**. Oils and greases must always be handled with care. Prolonged bare skin exposure to certain oils and greases can cause skin irritiation. Always handle oils and greases in accordance with the manufacturer's instructions.

11. **TRAPPED FINGERS**. Do not place fingers on the underside of the conveyor when the metal detector is operating. It is possible for fingers to be trapped and subsequently crushed between a moving and fixed component.

12. **WARNING LABELS**. Loma metal detectors have a number of safety labels attached to highlight potentially hazardous areas. Particular attention should be paid to the location of these labels and their significance in operating the metal detector safely. If necessary, labelling is provided in the local language to meet legislative requirements.

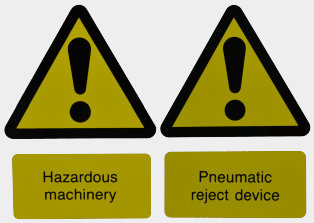
13. **GUARDS**. No metal detector is to be run without guards fitted unless for maintenance purposes and only if adequate precautions have been taken. Under no circumstances should an interlock be defeated.

14. **OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION WARNING**. In the USA, the Occupational Safety and Health Administration (OSHA) Acts quite clearly place the burden of compliance on the user of equipment, and the acts are generalised to the extent that determination of adequacy of compliance is a judgement decision on the part of the local inspector. Hence Loma cannot be held responsible for meeting full requirements of OSHA. with regards to any equipment supplied, nor can Loma be held liable for penalty which may be assessed for failure to meet the requirements of the acts as interpreted by an authorised inspector.

15. **LIABILITY**. This machinery contains high voltages of a hazardous and potentially fatal nature. Loma Systems cannot accept any liability for death or bodily injury resulting from improper work undertaken by unqualified operatives, or due to deviations from the maintenance instructions within this manual. This Liability statement is in addition to the terms of sale.

Safety Labels

Safety labels are attached or etched in appropriate places to highlight areas of the metal detector where caution should be taken to avoid potential hazards. The labels used are listed below.

Label	Message
	CE Mark / Machine identification etched on the machine includes: • Power supply data • Date of Manufacture • Serial Number
	**Caution: Electric Shocks** Includes voltage and phase details which will vary dependant on the available supply.
	**Caution: Hazardous Machinery** All machinery has a potential for being hazardous if the appropriate level of care is not taken and any safety warnings not followed. **Caution: Pneumatic Reject Device** Reject devices operate very quickly to remove contaminated products from a fast-moving production line. Care should be taken to avoid contact with a reject device when it is operating
	**Caution: Pinch Point** Moving parts of machines, specifically conveyors, provide opportunities for trapping fingers or even items of clothing in the mechanism if care is not taken.
	**Caution: Isolate Machine Before Maintenance** Electrical power should be disconnected before carrying out maintenance operations that expose staff to potentially lethal voltages. **Caution: Isolate air supply before maintenance** Compressed air should be disconnected before carrying out maintenance operations where reject devices could be activated accidentally.

Safety Guards

Under no circumstance must a machine be operated with any guarding removed or interlock switches defeated.

Guarding

For Loma metal detectors the use of guarding, including covers, panels, curtains and other methods is extremely important. They restrict operators from accessing areas of the machine that are potentially hazardous whilst the machine is operating, or to prevent exposure to potentially hazardous ionising and non-ionising radiation.

Interlock switches

On some machines, access hatches are incorporated into the guards to provide access to some areas of the machine to, for example, clear obstructions and remove products when required. These hatches are fitted with an interlock switch so that when a hatch is opened, the machine will switch off and a fault condition is generated.

Safety Relay and Circuits

As safety is paramount, at least one fail-safe relay is fitted to ensure that if a contact of the interlocks were to fail the safety relay will automatically detect the fault and therefore switch off the metal detectors and generate a fault condition.

Safety Measures

Before attempting to use the metal detectors, carry out the following basic checks to ensure that it is in a safe condition and ready to be used:

- Check that the electrical power and air supply, if being used, are connected correctly and are working normally.
- Check that the conveyor is clean and clear of any products or other items.
- Check that there are no metal or other items resting on top of the metal detector, particularly around the search head.
- Check that all inspection hatches, the reject bin door and the electrical services box are closed and locked.
- Check the area in front of the metal detectors to ensure that it is clean and clear of any potential trip or slip hazards.
- Check the control panel to ensure the metal detectors is working correctly and no warning or error messages are being displayed.

In addition, the following points should be observed for the safe operation of the system:

- Installation, commissioning, operation and maintenance of the metal detectors should only be carried out by trained personnel, following the applicable safety measures.
- Servicing and repair of the metal detectors must be carried out by qualified Loma or approved customer personnel to avoid damaging the machine, which could result in the introduction of a safety hazard and the loss of warranty cover.
- Care should be taken when carrying out tasks in areas of the metal detectors that are potentially hazardous; as identified with an appropriate safety label.
- Removal of any guards, covers and other protective devices must only be carried out by authorized or qualified personnel after first switching off and removing any power from the metal detectors.

Interlocking devices are fitted to all inspection covers to automatically stop the conveyor when a cover is opened.

- For the protection of operating personnel, safety switches are installed in easily accessible places on the metal detectors, all of which trigger an **EMERGENCY STOP**.

All safety devices must be functional at all times! Damaged protective devices or covers must be repaired or replaced immediately!

- When safety components are replaced, the protective devices are to be properly attached and tested by the operator.

If you require spares or service / repair of your machine, please send an email to Enquiries@loma.com.

Intended Use of the Machine

Permitted Use

Loma metal detectors are designed to be used for detecting metal contaminants in products presented in packets, pouches or loose.

Loma metal detectors ensure product safety, equipment protection and regulatory compliance by automatically removing contaminated products from the production line, stopping the line, alerting the operator or a combination of these.

Improper Use

- Loma metal detectors are not domestic appliances and should only be used in an industrial environment.
- Loma metal detectors are not suitable for installation or use in explosive or potentially explosive atmospheres.
- metal detectors must only be installed, operated, serviced and maintained in accordance with the instructions included in this Guide.
- Electric arc welding must not be carried out on any part of the metal detectors unless authorised by Loma Systems.
- All mechanical and electrical protection devices must not be removed or reduced.
- The metal detectors is not designed for use in hazardous environments where there is a risk to the health and safety of the operator.
- The metal detectors must not be operated in very dry environments which can generate electrostatic charges.

Responsibilities and Disclaimer

Unless agreed otherwise in writing by Loma Systems, any warranty claims are subject to the following:

- No unapproved changes or additions to the electrical wiring system have been carried out.
- No unapproved mechanical changes or additions to the system have been carried out.
- No unapproved electronic changes or additions to the system have been carried out.
- No unapproved changes or additions to the system software have been carried out.
- Cleaning of the metal detector has been carried out in accordance with the cleaning guidance included in
- The metal detector has not been subjected to operation, or an environment, that is outside of the parameters included in the machine's technical specifications.
- The metal detector has only been used for the purpose for which it has been sold, as specified in the contract.
- Maintenance tasks have been carried out in accordance with the guidance included in this
- Any spare parts required are obtained from Loma Systems by sending an email to Enquiries@loma.com.

Noise Levels

Generally, in an industrial environment, some background noise is present due to the operation of electrical equipment and mechanical movements of machinery such as conveyors and motors.

Loma metal detectors do not emit a level of noise that is hazardous. However, in line with current legislation, the customer should verify that the overall noise levels within the operating environment are within defined limits.

End of Life treatment

In accordance with the **Waste Electrical and Electronic Equipment recycling (WEEE) Regulations 2012/19/EU** and **CE Directive 2002/96/EC**, electrical and electronic equipment must be recycled at the end of its useful life.

The metal detector is considered to be a Large-scale Stationary Industrial Tool (LSIT) as defined in Article 2 of the WEEE Regulations. Consequently, it is the responsibility of the user of the equipment to ensure the safe disposal of the machine at the end of its useful life.

Emergency Procedures

1. **EMERGENCY SHUTDOWN**. This metal detector is fitted with an emergency '**Stop**' button. This is mounted on the front panel and is coloured red. In the event of an emergency, which requires the System to be immediately stopped, press the '**Stop**' button. See Starting and Stopping for further details.
2. **DEALING WITH FIRE**. In the unlikely event of a fire occurring in an item of equipment manufactured by Loma Systems, it is important that a fire extinguisher containing the correct type of extinguishing material is used. Fire on electrical equipment must be extinguished using a dry powder extinguisher (Blue label).
3. **AUDIBLE WARNINGS**. A conveyor may be fitted with an alarm which operates when a metallic contaminant is detected in the product. The maximum volume of the alarm is type dependent and lies in the range of 110 dB(A) to 125 dB(A) at 1 metre.
4. **VISUAL INDICATIONS**. The metal detector may optionally be fitted with indicator lamps, which operate to show a particular status or in the event of a fault condition. Themetal detector must not be operated unless all such indicators are fully operational. There are also more detailed fault listings displayed on the operator screen.

Quality Assurance

By your selection of a Loma IQ4 PipelineVertical FallWafer Thin Metal Detection System you have demonstrated your intention to assure the quality of your products, and thereby protect

your customers.

The following points are recommended:

- Once your Loma metal detectors is installed you should contact your local Loma Service Department to have it commissioned.
- Regularly test the operation of the metal detectors to monitor its detection performance. Keep accurate records of those tests and any samples being used, along with the product details.
- If the metal detectors fails a test, quarantine the product from the last test and re-introduce through the system once the metal detector is fit for use.
- Have the metal detectors supported by a Planned Preventative Maintenance Contract. Details can be obtained from your local Loma Service Department.
- If you have or intend to have **BS EN 9000** accreditation, write a section into your Operating Procedures Manual covering the operation and maintenance of the metal detectors and have it regularly calibrated with a certificate issued.
- Finally, at least on a yearly basis and when any changes or additions have been made, have your operators, QA and maintenance personnel trained in the use of the metal detectors. Details of available training can be obtained from your local Loma Service Department or by sending an email to Enquiries@loma.com.

End User Licence Agreement

The software used within the IQ4 PipelineVertical FallWafer Thin Metal Detection System is protected by copyright laws and international copyright treaties. The software in the IQ4 PipelineVertical FallWafer Thin Metal Detection System is licensed not sold.

1. **Grant of Licence:**

   Loma Systems shall at all times have and retain title and full ownership of all software, firmware programming routines, documentation supplied for use with the equipment and of all copies thereof made by Buyer (collectively “software”).

   Loma Systems grants the Buyer a non-exclusive and non-transferable license to use such software solely for use with the equipment.

   The Buyer shall take all reasonable steps to protect Loma Systems proprietary interest in the software and shall not transfer or otherwise provide or sub-licence the software to any third party.

2. **Rights and Limitations:**

   The software is licensed as a component within the IQ4 PipelineVertical FallWafer Thin Metal Detection System only, and may not be separated for use elsewhere.

The software is licensed with the IQ4 PipelineVertical FallWafer Thin Metal Detection System as a single integrated product. The software may only be used with the IQ4 PipelineVertical FallWafer Thin Metal Detection System.

You may not rent or lease the software.

You may permanently transfer all of your rights under this EULA only as part of a sale or transfer of the IQ4 PipelineVertical FallWafer Thin Metal Detection System, provided you retain no copies, you transfer all of the software and the recipient agrees to the EULA.

3. **Patents:**

The following patents associated with the design of Loma Systems metal detector have been granted:

- **GB2499239B**
- **GB2506931B**

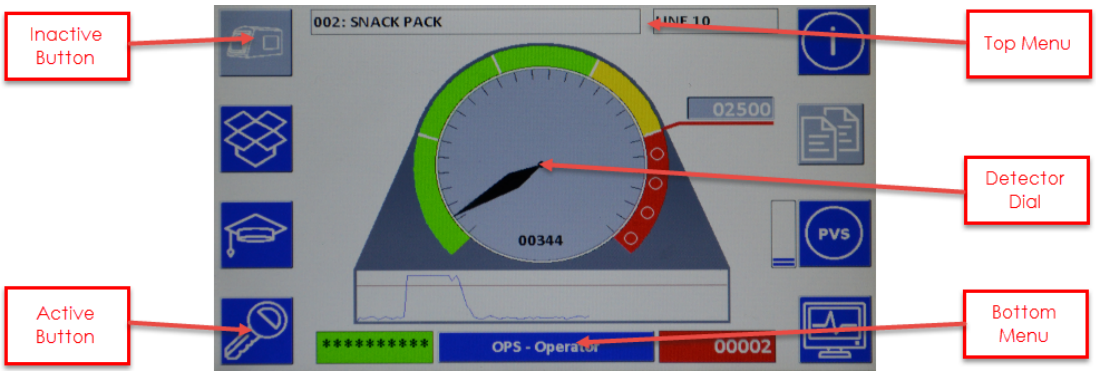
3: User Interface

The IQ4 metal detection system provides a touch screen user interface located at the front of the machine.

The default state of the system is access level zero (logged off).

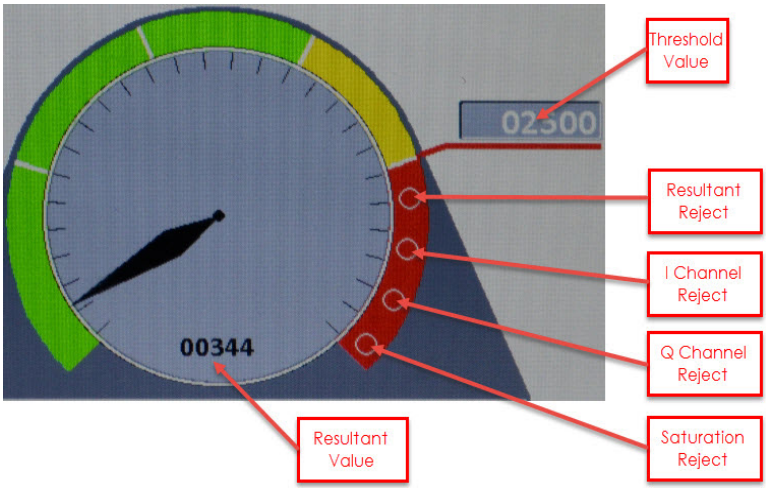
General Navigation

The user interface is divided into a number of areas that contain generic controls through which all features and settings for the system may be configured and run. Icons are used extensively throughout the system to assist in navigation, For more information on the Icons see the table below:



Top Menu

Detector Dial



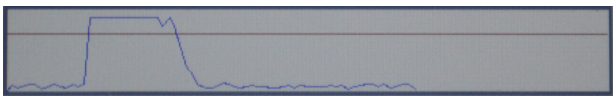
Located in the centre of the screen, the detector dial displays the real-time signal level being received for the product that is currently being inspected, with the pointer moving around the dial as the signal level changes.

The '**Green**' coloured section on the dial indicates an acceptable signal range within which a product is classed as being contaminant-free and passes inspection.

The '**Yellow**' coloured section on the dial indicates a product that is classed as contaminant-free and passes inspection but that has a higher than ususal signal range.

The '**Red**' coloured section on the dial indicates an unacceptable signal range within which a product is classed as containing a contaminant and is rejected.

Beneath the detector dial, there is a signal plot trace that shows a few seconds of product data, allowing you to catch rejects that you may otherwise miss.



Bottom Bar

Icons

The IQ4 metal detection system User interface uses various icons to aid with navigation the following table below gives a list of all icons used in the software along with a brief explanation of its function.

Available features are indicated by an active icon  , if a feature is unavailable it will be indicated by an inactive icon  .

Icon	Description	Icon	Description
	Access		Plus
	Advanced		Back
	Bin Lock		Bin Unlock
	Calendar Clock		Cancel
	Diagnostics		Down
	Menu Down		Edit
	Full Learn		Information
	Input / Output		Learn
	System Settings Screen		Network
	Page Overview		Page Down
	Page Up		Product Allignment Zoom
	Products		Performance Validation System
	Reports		Reset
	Run		Save
	Settings		Start
	Menu Up		Update
	USB Disabled		USB Enabled
	USB Insert		USB Reinsert
	View		

4: Operating instructions

This chapter provides guidance on how to use the IQ4 metal detection system.

It consists of the following sections:

- User Interface on page 23

  This section provides a description of the machine's user interface so that you may navigate around the system confidently.

- The Access Feature on page 28

  This section provides a description of the access features. It covers selecting, adding and editing user access levels.

- The Product Screen on page 32

  This section provides a description of the product features. It covers selecting, adding and editing Products.

- Product Learn Screen on page 39

  This section provides a description of the learn feature. It covers the full and updated learn process.

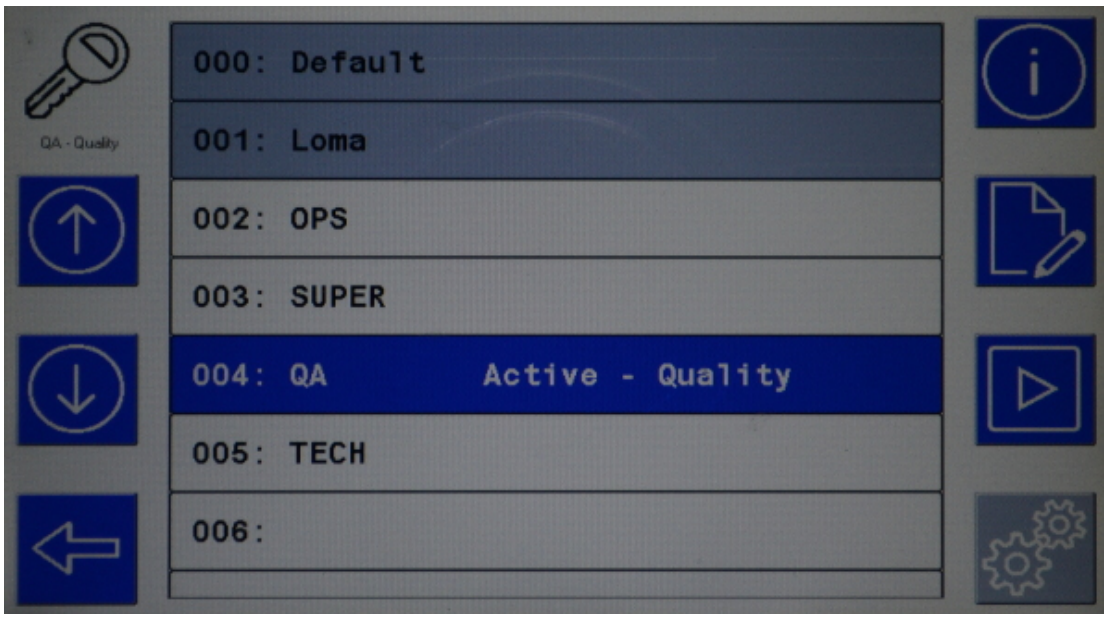
- The PVS Feature on page 43

  This section provides a description of the PVS features. It provides an explanation of the PVS feature as well as guidance on successfully running a PVS test.

- The System Setup Screen on page 45

  This section provides a description of the system setup screen. It covers reject, bin, transport and detector settings. It also covers locking and unlocking the BIn.

The Access Feature



User access to the features and functionality of the IQ4 PipelineVertical FallWafer Thin Metal Detection System is managed through one general and four password protected account levels. Named accounts are set up for each user, selecting a specific access level for them, with a unique password for each user.

The Loma engineer will, during installation and commissioning, set and provide you with passwords for accessing all user levels, which can then be used to provide user accounts to staff as required.

Users will only be able to interact with the features that are available to them at the current account level.

- Level 0 (Logged Off)

  This is the general access level used for selection when the machine is not being used but is to be left powered up. It provides no access to any features or functions.

  The system will always return to this access level if left unattended to prevent unauthorised access to features and functionality.

- Level 1 (Operator)

  This access level is aimed at operators who need to use the machines core functionality and features to carry out routing product inspection and remove any contaminated products from the production line.

- Level 2 (Supervisor)

  This access level is aimed at supervisors who may need to change the product being inspected and can also run PV testing when prompted by the system. it also includes access to all features and functionality from level one.

- Level 3 (Quality)

  This access level is aimed at staff who monitor and analyse inspection data to ensure that quality standards are achieved and maintained for all products inspected. it also includes access to all features and functionality from levels one and two.

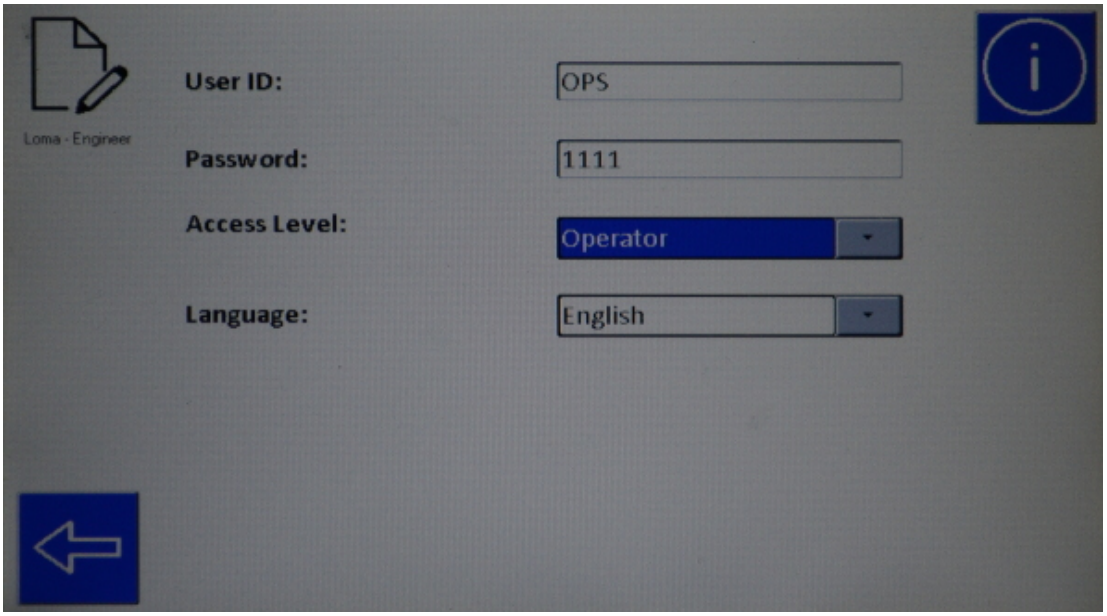
- Level 4 (Engineer)

  This access level is aimed at staff who need to carry out routine servicing and maintenance tasks to ensure the high performance and reliability of the machine. it also includes access to all features and functionality from levels three, two and one.

When this access level is selected you will be able to access some screens that cause inspection to stop until you navigate away from the screen.

To Add an Account

1. Tap  to open the Access screen.



3. Tap on an empty account to add a new account.
4. Tap  .

5. Enter a unique username for the account in the **User ID** field, which may be up to 25 characters long.
6. Enter a unique password for the new account in the **Password** field.

   Passwords must be unique across all users.

7. Choose the Access Level from the drop-down list.
8. Choose the Interface Language from the drop-down list.

   The interface language is now set at the Account level.

9. Tap  to return to the main run screen.

To Select an Account

1. Tap  to open the Access screen.
2. Tap the account to activate.

   If you are already logged in you will have to log out before changing Account.

3. Enter the Account Password using the on-screen keyboard.
4. Tap **OK** to activate the account.
5. Tap **Cancel** to close the dialog and return to the Access Screen.
6. Tap **Clear** if you wish to restart entering the account password.

   The Access screen is updated to reflect the new active account.

To Edit an Account

1. Tap  to open the Access screen.
2. Tap on the account to be edited.
3. Tap  .
4. Enter a unique username for the account in the **User ID** field, which may be up to 25 characters long.

5. Enter a unique password for the new account in the **Password** field.

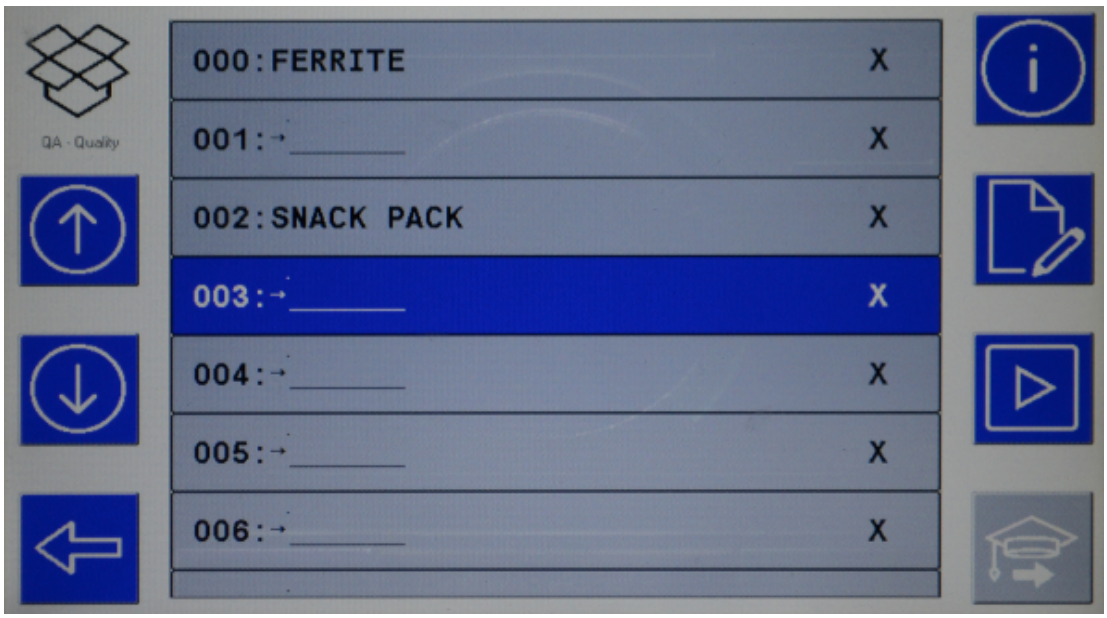
> **Passwords must be unique across all users.**

6. Choose the Access Level from the drop-down list.
7. Choose the Interface Language from the drop-down list.

> **The interface language is now set at the Account level**

8. Tap  to return to the main run screen.

The Product Screen



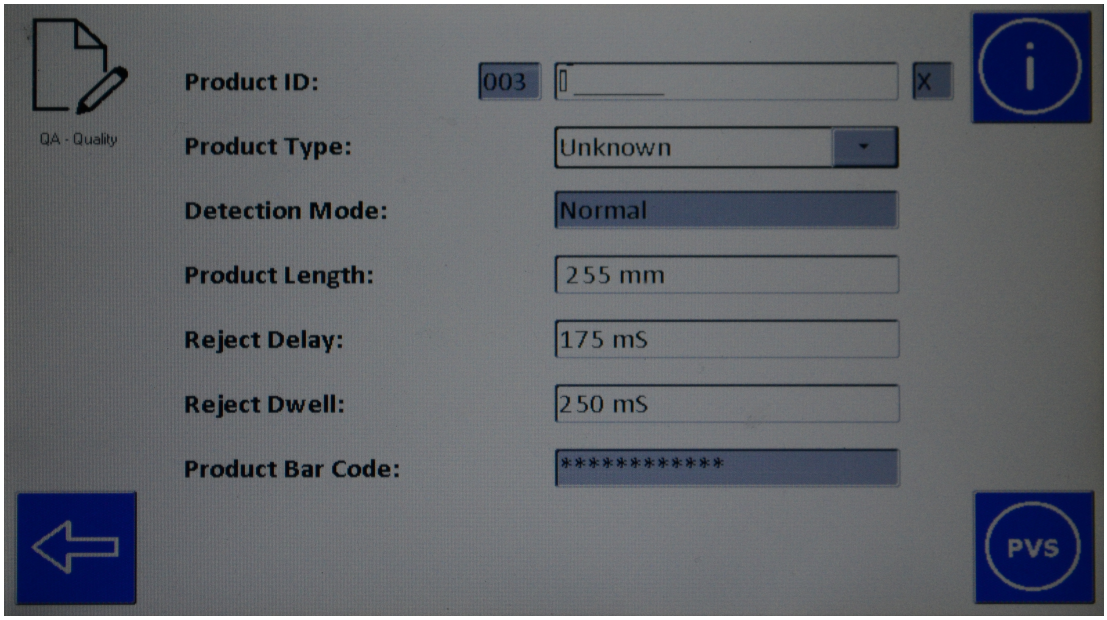
The **'Product screen'** provides users with options for; choosing the product to be inspected, editing the product settings and creating new products to be inspected. The number of individual products that can be created and stored with in the system is subject to a maximum of 200.

Each product can be configured with different settings which, together with any learnt parameters captured during the product learn process, are then automatically used to set the machine up for inspecting that product when it is selected.

If the *000: FERRITE* product is visible in the list it cannot be used for inspecting normal product, as it is a reserved product that is factory set.

To Add a Product

1. Tap  to open the Product screen.
2. To add a new product Tap on an empty product field.
3. Tap 



4. Enter a unique name for each product in the **Product ID** field, The Product ID can be up to 25 alphanumerical characters in length.
5. Tap on the arrow to the right of the **Product Type** field to display a drop-down list of options. Then tap on the best fit option for the type of product being inspected. The available options displayed are described below.

    - **Unknown**

      This is the default option and is recommended for selection if you are in any doubt whether the other options available are more appropriate. In effect, you are letting the detector decide which product type is most suitable to use.

      If during the product Learn process no product effect is exhibited, the detector will advise this and automatically select the Dry option anyway.

    - **Dry**

      Select this option if you are sure that the product will exhibit no product effect. The detector will then use the pre-set ferrite phase angle rather than learn from the actual product.

      If during the product Learn process a product effect is exhibited, the detector will advise that the Learn process has failed. You should then set the product type to Unknown and repeat the learn process.

    - **Metal film**

      Select this option if the product to be inspected is foil packed.

      This option will only appear if the Auto-Frequency option is selected and the Dry Working Mode option is not selected in the Learn Setup screen

6. Tap on the arrow to the right of the **Detection Mode** field to display a drop-down list of options. The available options displayed are described below.

   - **P-Mode**
   - **Q-Mode**
   - **Dry**

   The mode is automatically selected during a Full Learn process but may be manually set if required. For products with no electrical conductivity, the Dry option should be selected.

7. Tap in the **Product length** field to enter the product length in millimetres.

   The Product length field is displayed if a product registration photo-eye is in use and the PEC enable option has been selected in the **Conveyor Setup** screen. The detector needs to know the length of the pack to enable it to function correctly.

   Measure the product diagonally and enter that length to provide some tolerance and avoid the generation of false triggers and nuisance error messages.

   For example where the external packaging has curled up or packs are presented too close together.

8. Tap in the **Reject delay** field and enter the reject delay time in seconds, or metres for variable speed systems.

   Setting reject times is best done by passing the product, contaminated by a detectable metal test sample, through the machine and adjusting the delay (time or distance from detect to reject) and dwell (time or distance the reject device operates for) to obtain a clean removal of the contaminated product from the transport into the reject collection device. All units of time are in seconds.

   For systems where a Product Registration Photo-eye is not being used, the reject delay time is the time in seconds between when a contaminant is detected in a product to when the reject device is activated to remove it from the production line.

   The position of the contaminant within the product (length) will directly affect the reject delay. You must, therefore, make allowances in the delay time to ensure that wherever the contaminant is located in the product a clean rejection is achieved.

   For systems where a Product Registration Photo-eye is used, reject delay timing is always timed from when the leading edge of the product activates the photo-eye regardless of where in the product the metal contamination is situated.

   When using variable speed systems, the delay is timed by distance which is entered in metres in the Reject delay field.

To Select a Product

1. Tap  to open the Product screen.
2. Tap the Product you want to select.
3. Tap  .
4. The Product is highlighted indicating that it has been selected.
5. You are returned to the Main Screen.
6. The top menu will be updated to show that the product has changed to that selected.

To Edit a Product

1. Tap  to open the Product screen.
2. Tap on an existing Product field.
3. Tap 
4. Enter a unique name for each product in the **Product ID** field, The Product ID can be up to 25 alphanumerical characters in length.
5. Tap on the arrow to the right of the **Product Type** field to display a drop-down list of options. Then tap on the best fit option for the type of product being inspected. The available options displayed are described below.

    - **Unknown**

      This is the default option and is recommended for selection if you are in any doubt whether the other options available are more appropriate. In effect, you are letting the detector decide which product type is most suitable to use.

      If during the product Learn process no product effect is exhibited, the detector will advise this and automatically select the Dry option anyway.

    - **Dry**

      Select this option if you are sure that the product will exhibit no product effect. The detector will then use the pre-set ferrite phase angle rather than learn from the actual product.

      If during the product Learn process a product effect is exhibited, the detector will advise that the Learn process has failed. You should then set the product type to Unknown and repeat the learn process.

    - **Metal film**

Select this option if the product to be inspected is foil packed.

This option will only appear if the Auto-Frequency option is selected and the Dry Working Mode option is not selected in the Learn Setup screen

6. Tap on the arrow to the right of the **Detection Mode** field to display a drop-down list of options. The available options displayed are described below.

   - **P-Mode**
   - **Q-Mode**
   - **Dry**

   The mode is automatically selected during a Full Learn process but may be manually set if required. For products with no electrical conductivity, the Dry option should be selected.

7. Tap in the **Product length** field to enter the product length in millimetres.

   The Product length field is displayed if a product registration photo-eye is in use and the PEC enable option has been selected in the **Conveyor Setup** screen. The detector needs to know the length of the pack to enable it to function correctly.

   Measure the product diagonally and enter that length to provide some tolerance and avoid the generation of false triggers and nuisance error messages.

   For example where the external packaging has curled up or packs are presented too close together.

8. Tap in the **Reject delay** field and enter the reject delay time in seconds, or metres for variable speed systems.

   Setting reject times is best done by passing the product, contaminated by a detectable metal test sample, through the machine and adjusting the delay (time or distance from detect to reject) and dwell (time or distance the reject device operates for) to obtain a clean removal of the contaminated product from the transport into the reject collection device. All units of time are in seconds.

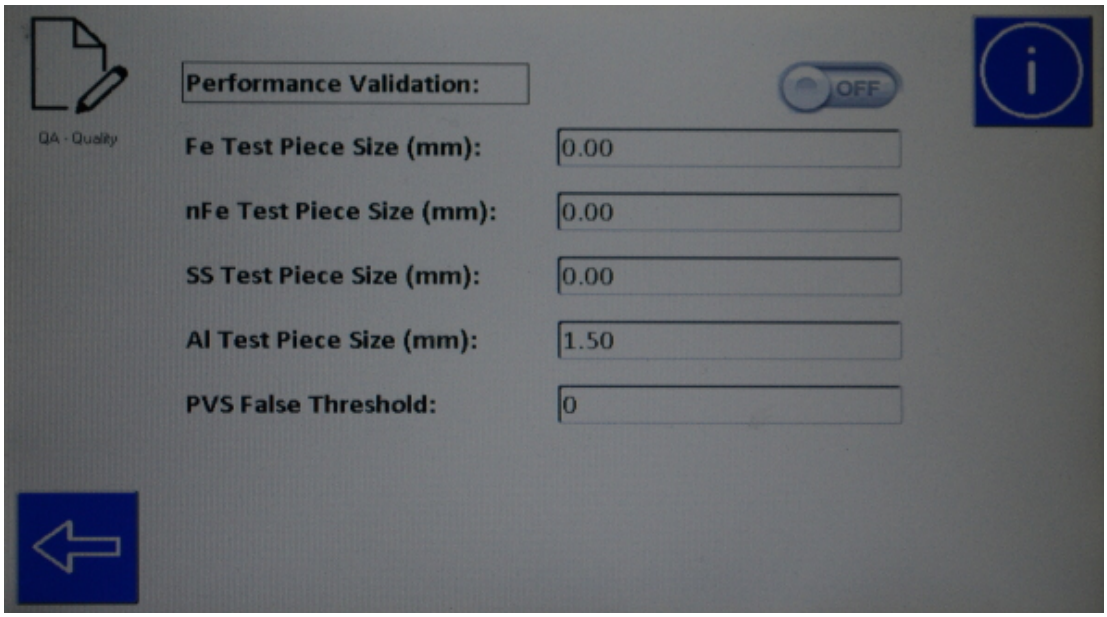
   For systems where a Product Registration Photo-eye is not being used, the reject delay time is the time in seconds between when a contaminant is detected in a product to when the reject device is activated to remove it from the production line.

   The position of the contaminant within the product (length) will directly affect the reject delay. You must, therefore, make allowances in the delay time to ensure that wherever the contaminant is located in the product a clean rejection is achieved.

   For systems where a Product Registration Photo-eye is used, reject delay timing is always timed from when the leading edge of the product activates the photo-eye regardless of where in the product the metal contamination is situated.

   When using variable speed systems, the delay is timed by distance which is entered in metres in the Reject delay field.

Product PVS Settings



Fe test piece size

1. Tap in the **Fe test** piece size field to display the pop-up numeric keypad screen and enter the ferrous (chrome steel) test piece size in mm to be used for PV testing.

   Leave the field blank if this test piece should not be used as part of the PV test.

Non-Fe test piece size

1. Tap in the **Non-Fe test** piece size field to display the pop-up numeric keypad screen and enter the non-ferrous (brass) test piece size in mm to be used for PV testing.

   Leave the field blank if this test piece should not be used as part of the PV test

St. Steel test piece size

1. Tap in the **S. steel test** piece sizefield to display the pop-up numeric keypad screen and enter the stainless steel (normally 304 annealed) test piece size in mm to be used for PV testing.

   Leave the field blank if this test piece should not be used as part of the PV test.

Al test piece size

1. Tap in the **Al test** piece size field to display the pop-up numeric keypad screen and enter the Aluminium I test piece size in mm to be used for PV testing.

   Leave the field blank if this test piece should not be used as part of the PV test.

False Threshold

The **False threshold** value is used to detect when metal test pieces are larger in size than those specified by the PV test.

If this threshold is exceeded at any time during a test it does not count towards a successful test. All PV test samples must be passed correctly for the PV test to be successful.

To ensure the correct false threshold value is entered, note the signal values obtained whilst passing all the test pieces used. The ideal false threshold value is the largest signal obtained plus a small margin added for error.

If you are not sure what margin for error to apply, test with the next size up test pieces, note the values obtained and then set the threshold about midway between the largest signal value from the test pieces to be used and the largest signal value from the next size up.

Note that PVS test pieces are not recorded in the Contaminants Log or included within the reject count.

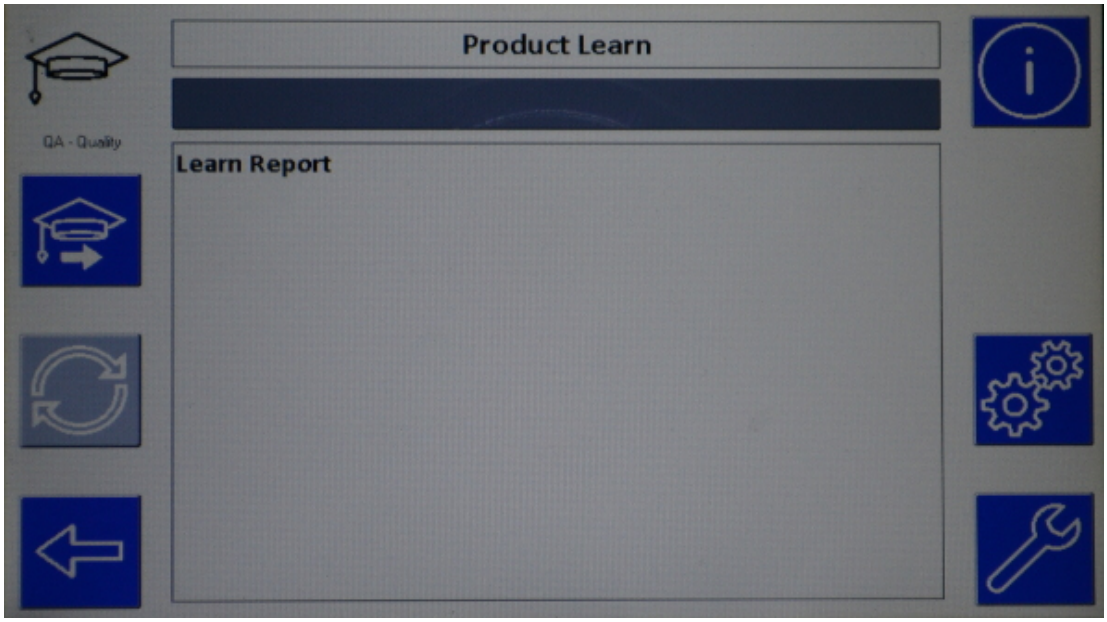
1. Tap in the **False threshold** field to display the pop-up numeric keypad screen and enter the threshold value to be used for PV testing.

Product Learn Screen

An essential part of inspecting products is to set up the metal detector parameters specifically for each product to optimise the detectors performance for each one. Loma metal detectors provide a Learn feature which automates this process.

The Learn process to be followed for both Full and Update Learns is defined in the Auto-Learn Settings and Learn Setup screens.

The metal detector provides two alternative Learn processes:



- Full Learn

  This process must be carried out initially on all products as it automatically configures and populates the system settings and parameters based on the effect of the product on the electromagnetic field as the product passes through the inspection aperture.

  The product samples used for the Learn process must be free of metal contaminants and fully representative of the normal products to be inspected.

  Following a Full Learn, any manual adjustment to the settings for a product can be accessed through the Learn Setup screen.

- Update Learn

  This process is only available if you have previously carried out a Full Learn process for the product. It fine-tunes the phase value to minimize the signal, while still checking for metal in the product. Use an Update Learn to update the signal when the production line is running if false rejects are occurring because the signal has drifted.

To Learn a Product's Settings

You should have several representative product samples ready to use for the Learn process. Samples should be presented to the system in a similar manner to the way they will be presented in proper production conditions.

1. Select the product to learn. For more information see To Select a Product on page 35
2. Tap  to open the product update learn screen.
3. Tap  to perform a full learn.
4. The Full learn process will change the frequency, drive and gain settings of the head if necessary and if allowed by the configuration in the Learn Setup screen.

The display will prompt you to pass sample product packs as necessary.

As packs are passed the number of packs will reduce and when the last pack has been passed the screen will display Test Complete before closing.

To Update a Product's Settings

You should have several representative product samples ready to use for the Learn process. Samples should be presented to the system in a similar manner to the way they will be presented in proper production conditions.

1. Select the product to learn. For more information see To Select a Product on page 35
2. Tap  to open the product Learn screen.
3. Tap  to perform an update Learn.
4. The Update Learn process will only recalculate the Compensation and Phase angle values for the product.

   Use an Update Learn to update the signal when the production line is running if false rejects are occurring because the signal has drifted.

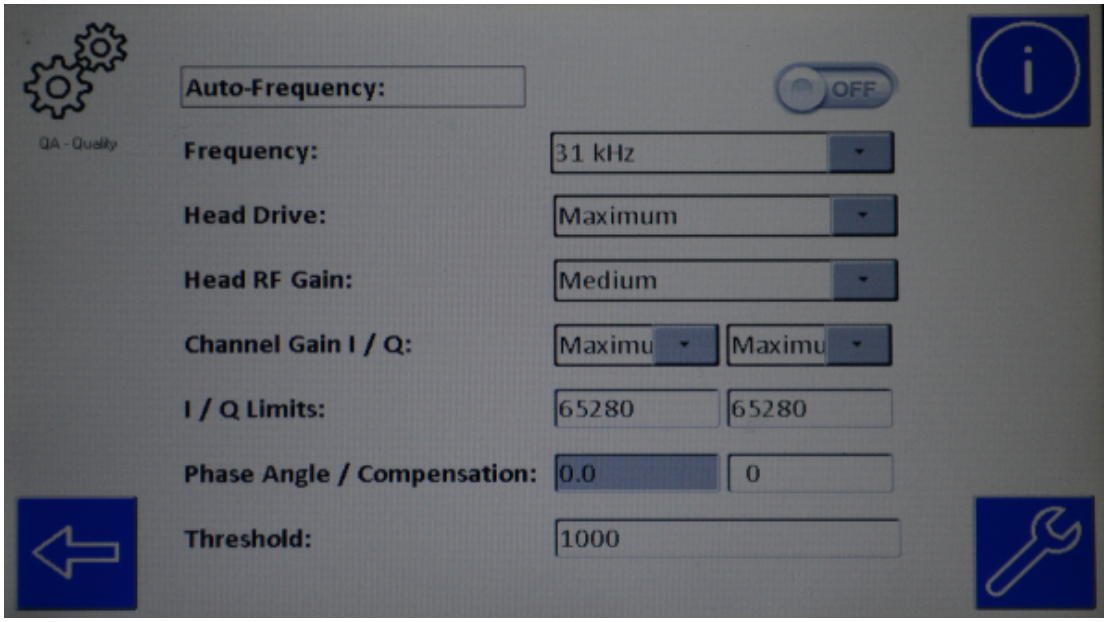
The display will prompt you to pass sample product packs as necessary.

As packs are passed the number of packs will reduce and when the last pack has been passed the screen will display Test Complete before closing.

Learn Settings

This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

The Learn Settings screen contains the following parameters for configuration:

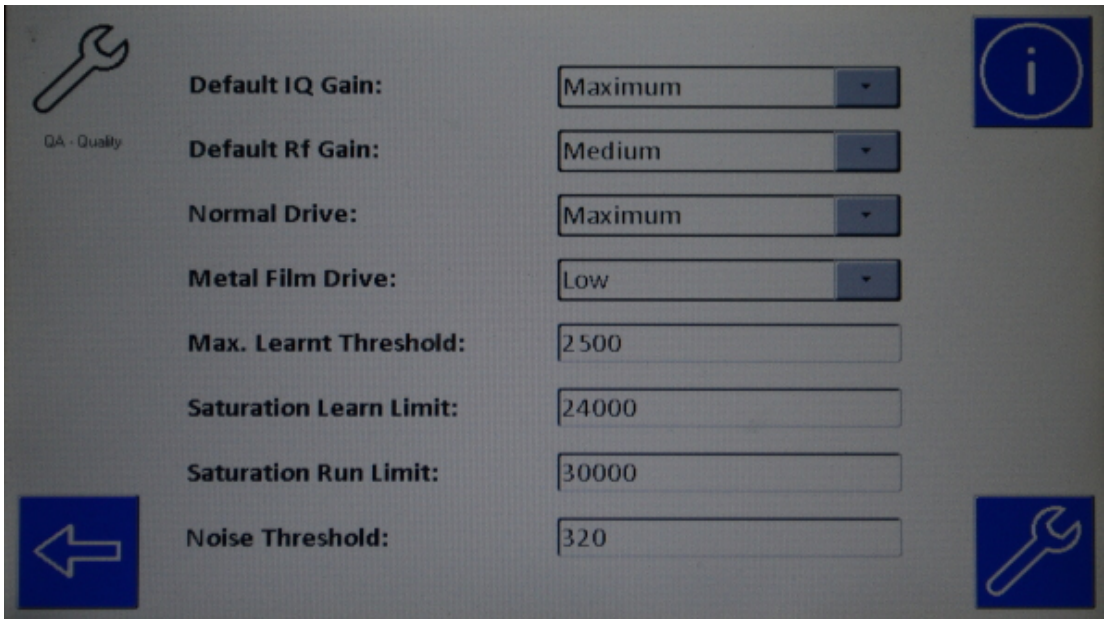


Learn Advanced Settings

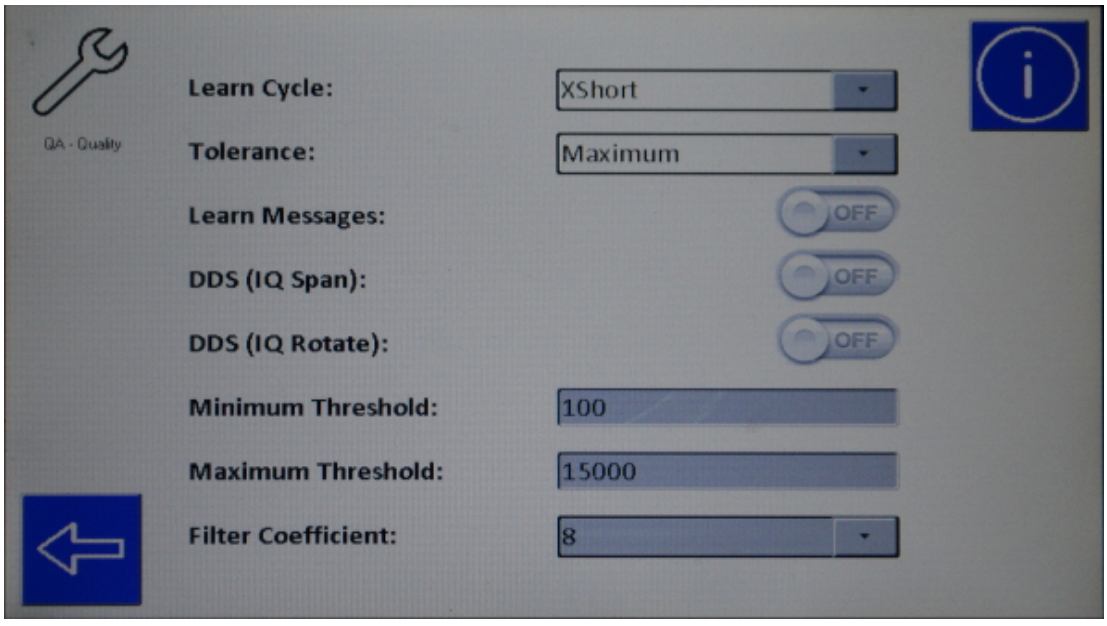
This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

The Advanced Settings screen enables the configuration of the following options.

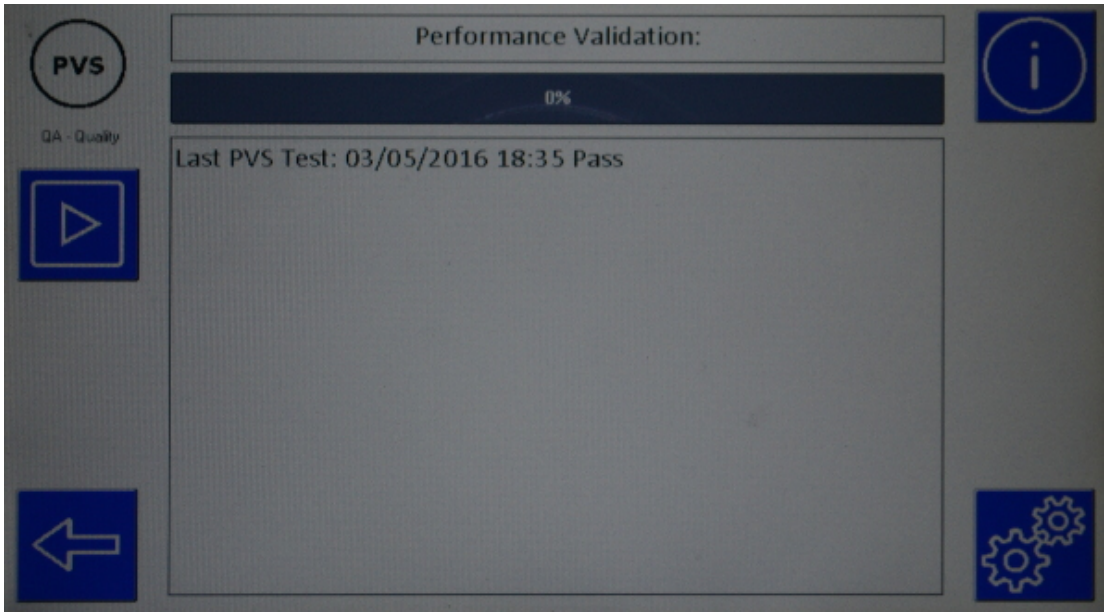
Advanced Settings Page one



Advanced Settings page two



The PVS Feature



This chapter describes the benefits of the Performance Validation (PV) System (PVS)and explained how to set up the metal detector for PV testing, with information about each of the parameters that need to be specified.

Regular checking of the metal detector's sensitivity should be a normal part of any quality assurance procedure. This is particularly important should it become necessary to demonstrate due diligence to address customer or legislative requirements.

To assist in maintaining quality assurance controls the metal detector includes an automatic Performance Validation System. This can be set up to automatically prompt the operator to perform quality assurance checks on a regular basis. It then guides the operator through a test sequence using standard test samples. At the end of the Performance Validation test the results are saved in memory and can be outputted in a number of ways

A complete set up comprises: test type, timing, number of test piece passes required, allotted test completion time, test piece size and type (Ferrous, Non-ferrous and Stainless Steel) based upon the specification for the specific product/detector relationship and a false threshold value.

To run a test is simply a matter of pressing a single key in answer to the screen message. The system automatically prompts for an operator ID (traceability) followed by the previously programmed size/type/quantity of metal contaminants. Each successful pass is indicated upon the control unit display, with a final `+Successful+` message upon completion of the full test sequence. When running a test sequence the correct operation of the reject device together with any confirm systems in use must form part of the test. The test sequence can be aborted at any time or run at anytime.

Failure to respond to a test prompt or successfully complete a test within the allotted time window will result in a fault condition being generated. Operation of the reject on a permanent basis will occur, together with conveyor stoppage should the conveyor control circuits be connected through the detector fault relay circuit. The option to generate this condition from a test failure is user selectable.

During the running of a test the signal levels generated can be viewed to enable fault diagnosis in the event of the correct test pieces not being detected.

Normal operation of the detector is not impaired at anytime during testing; therefore the user is not at risk of allowing genuinely contaminated product past the detector. This also allows the reject system to be checked for correct operation.

To Run a PVS Test

The system will indicate when a PVS test is required by:

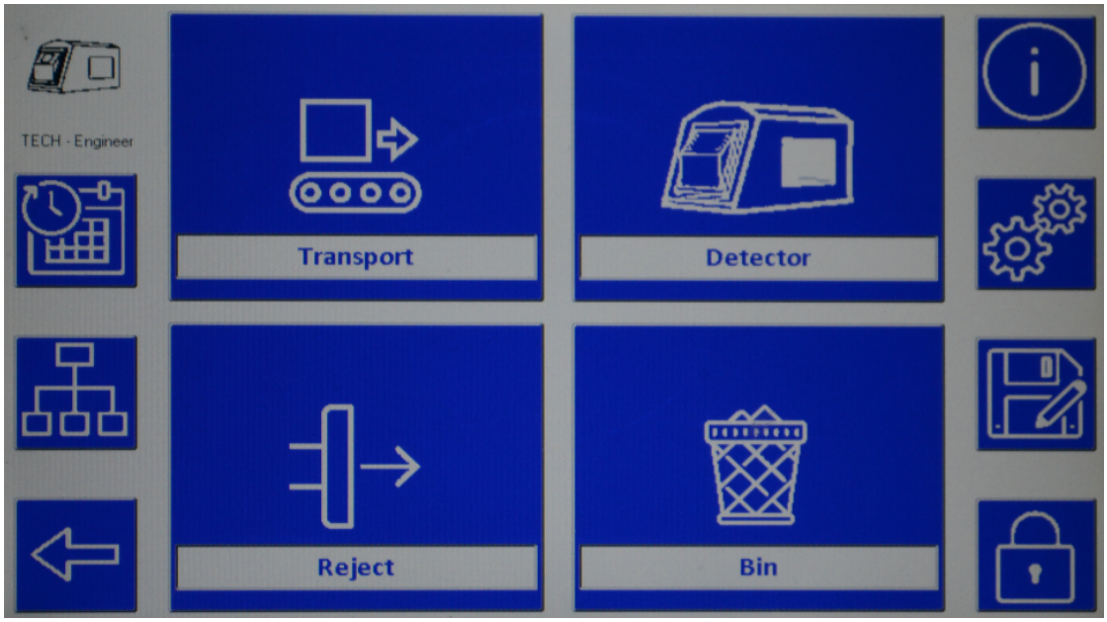
- **Illuminating the PVS Indicator Lamp.**
- **The PVS Timer Icon showing as filled.**

1. Tap 

2. Follow the on-screen instructions

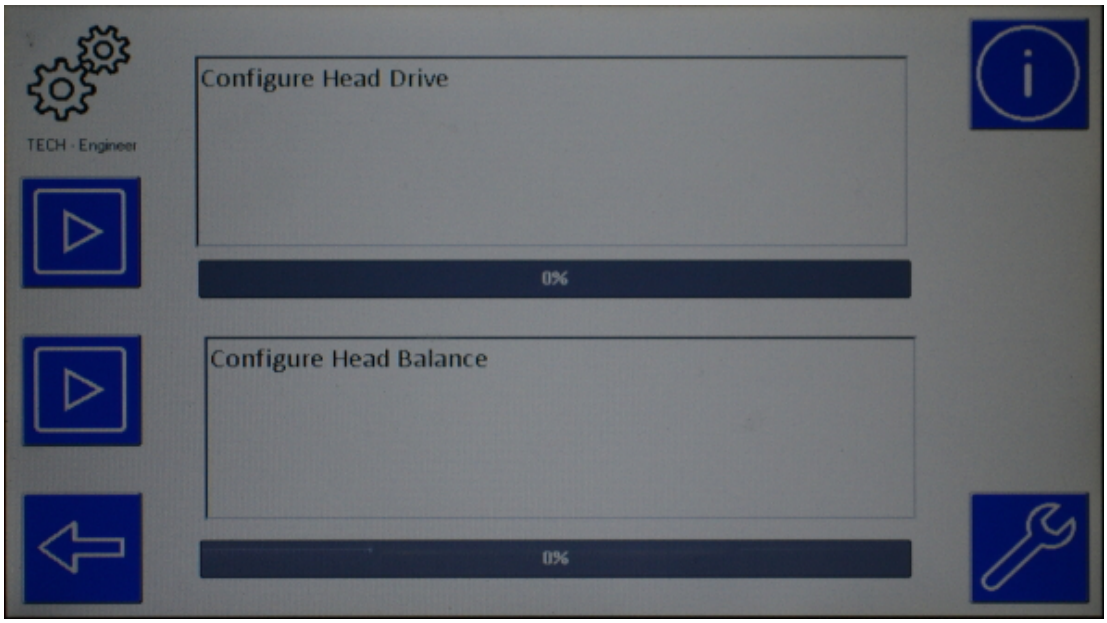
The System Setup Screen

The System Setup screen contains a number of hotspots which provide quick access to other screens through which all the parameters for setting up and operating the metal detector can be configured.



This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

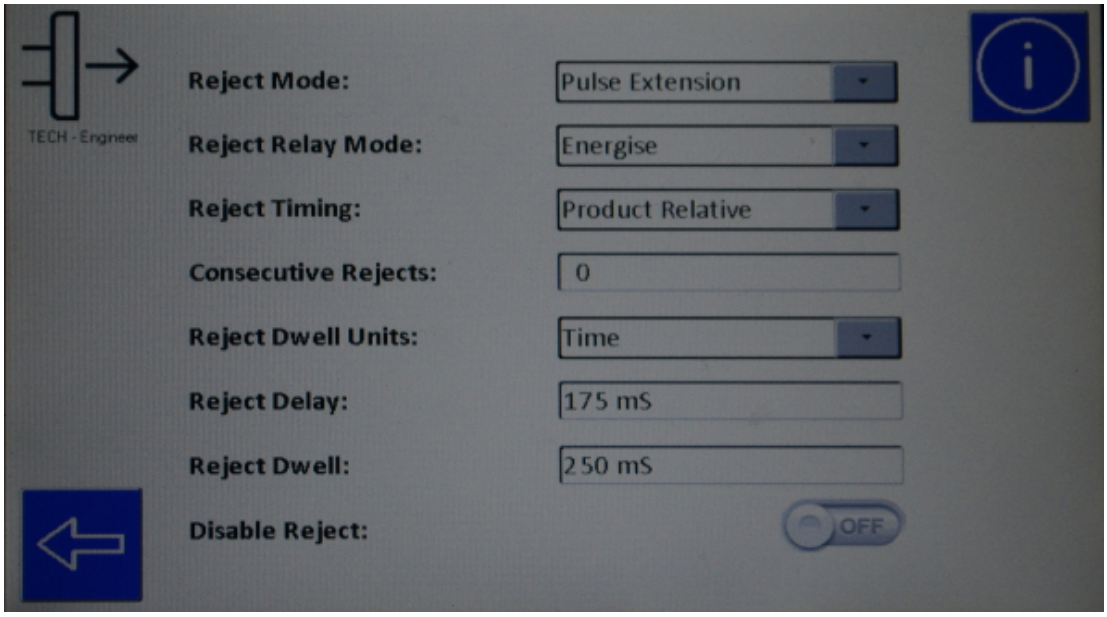
Head Settings



Please refer to the Reference Guide for more information on these screens

Reject Settings

The screen provides options for configuring the conveyor based on the optional items fitted to the conveyor and its method of operation.

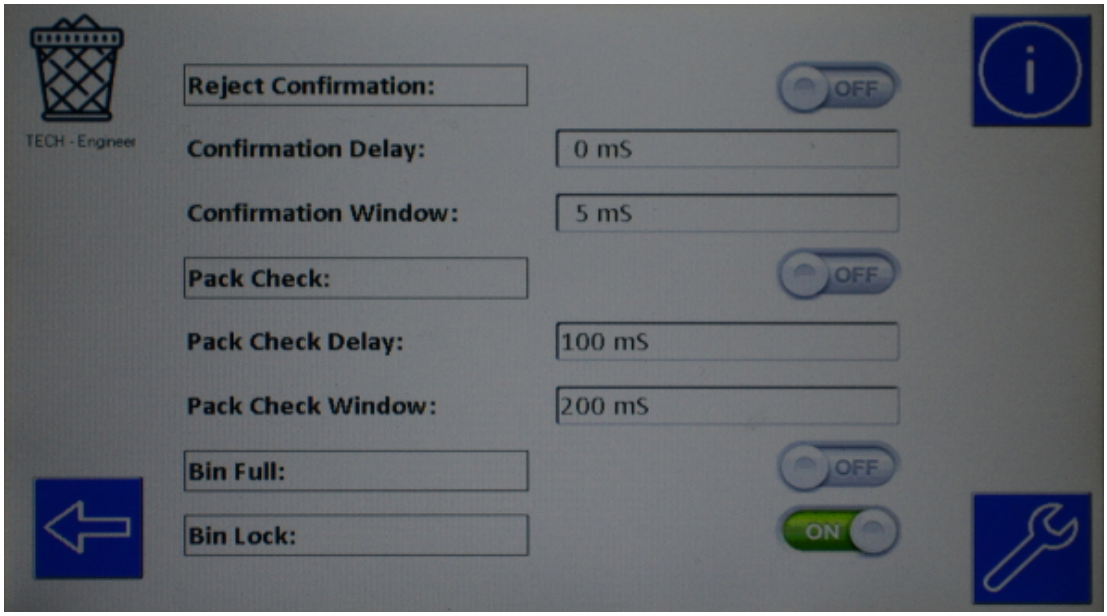


This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

Bin Settings

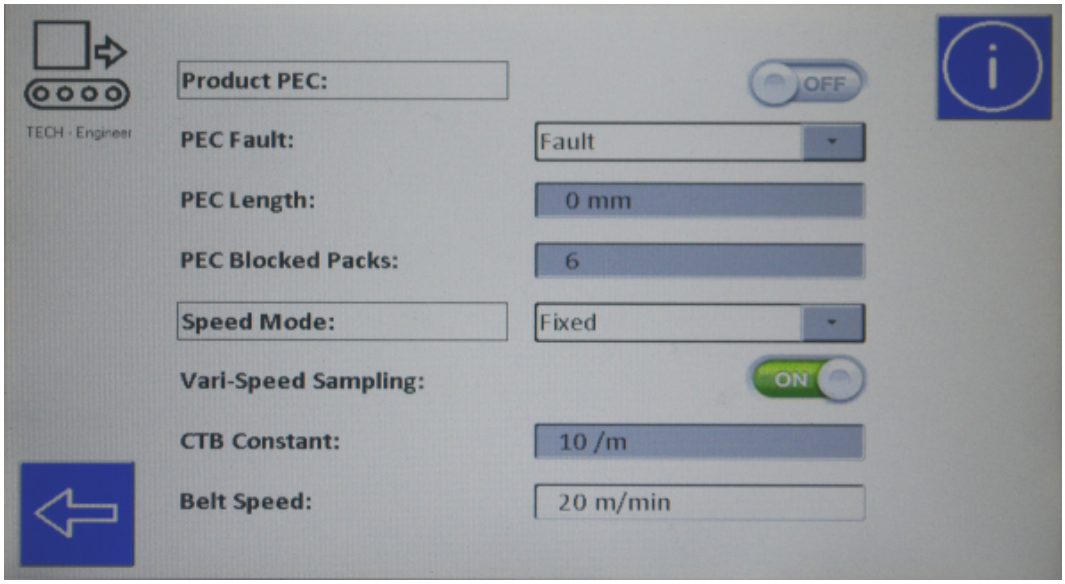
The screen provides options for configuring the bin based on the optional items fitted to the bin and its method of operation.

This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information



Transport Settings

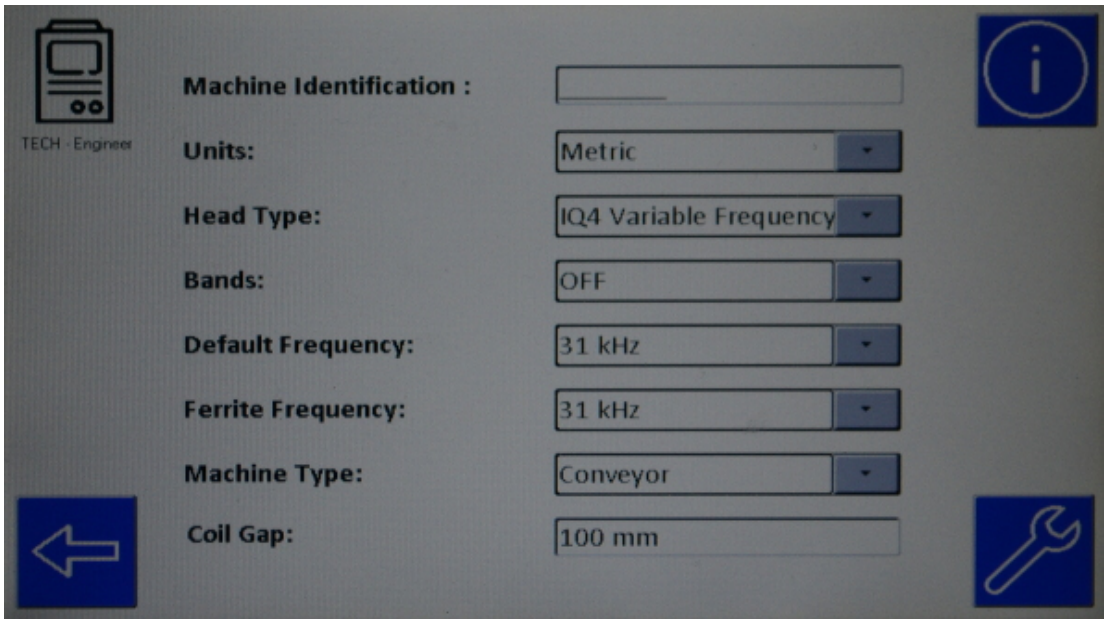
The purpose of the screen is to enable you to set up the product transport based on the optional items fitted and its method of operation.



Please refer to the Reference Guide for more information on these screens

Detector Settings

The purpose of the screen is to configure the detector hardware settings required for the detector to work correctly.



This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

Bin Lock

The reject bin door is locked and unlocked through the user interface rather than with a standard key.

Permission to open and lock the door is provided in the software to users with a Level 2 access account.

The status of the door lock is monitored by the software. When enabled, the reject bin will be locked during normal operation to prevent unauthorised access to any rejected product. This aims to prevent reject product being accidentally introduced back into production.

The bin lock status is not monitored whilst a PV test is in process.

Enable Bin Lock

Enabling this will cause the reject bin to be locked during normal operation to prevent unauthorised access to rejected product. This prevents reject product being accidentally introduced back into production.

1. Tap  to open the system settings screen.
2. Tap  to enable the Bin Lock.

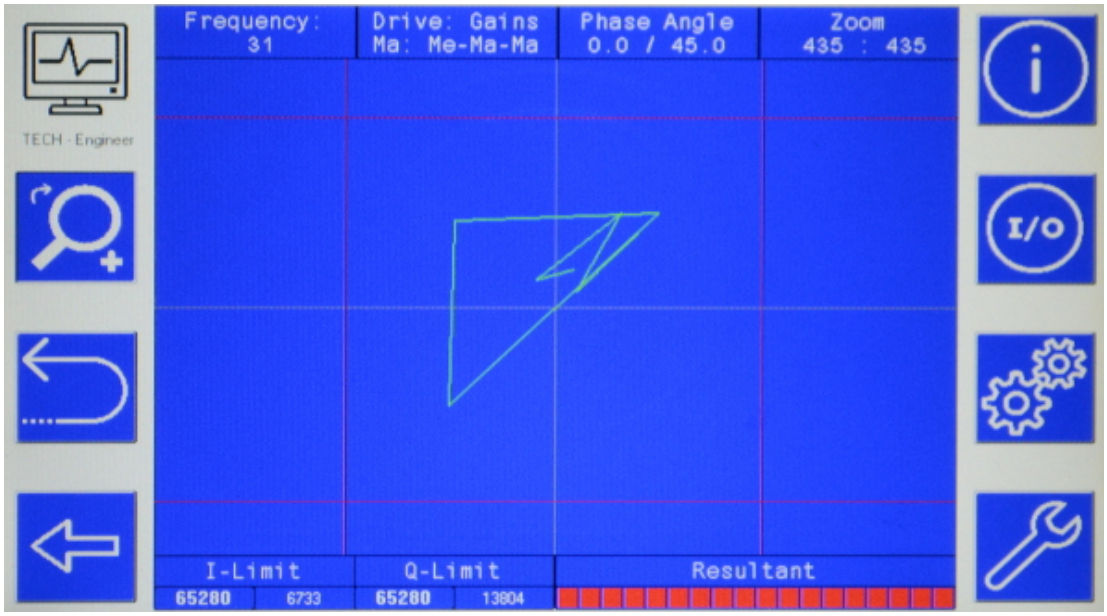
Disable Bin Lock

Disabling the Bin Lock will enable access to any rejected product.

1. Tap  to open the system settings screen.
2. Tap  to enable the Bin Lock

The Diagnostic Feature

The Diagnostic feature gives users access to the DIgital Data Signal Display (DDS). The DDS is a graphical representation of the detection envelope.



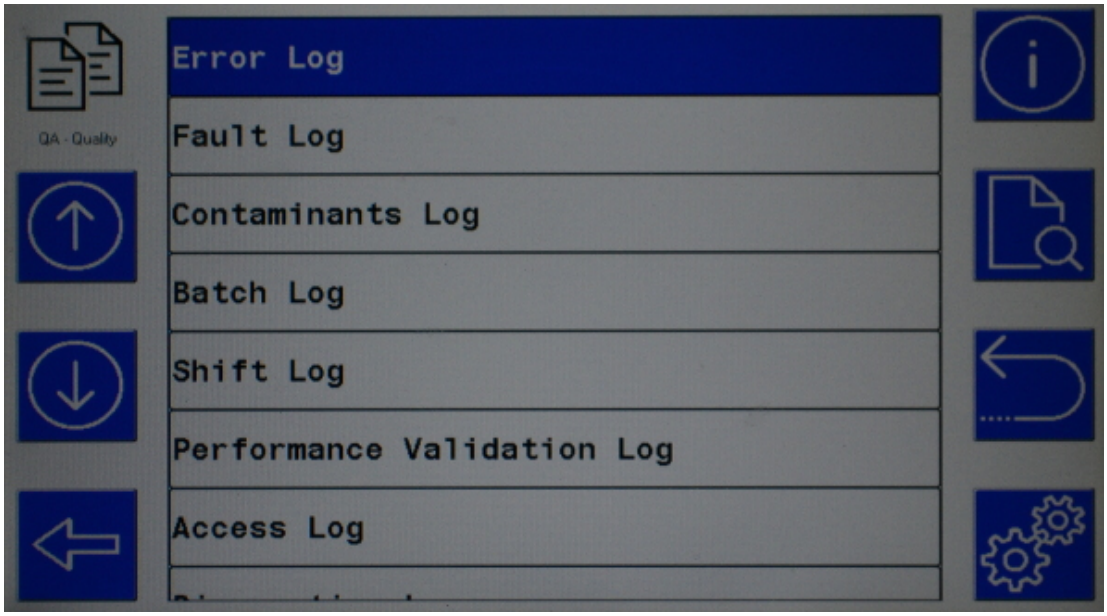
This feature is only available for access level 3 or above. Please refer to the Reference Guide for more information

PAZ Zoom

1. Click  to view a product signal bound by the envelope height and sensitivity.

The Reporting Feature

The purpose of the screen is to select some of the logs and reports that are displayed for selection in the Logs/Reports screen, to enable them for exporting to a printer, over LomaEnet or to another external device.



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To select a Log or Report

1. Tap  to open the Logs / Reports screen.
2. Tap the Log / Report to open.
3. Tap  to view the log / Report.

Glossary

A

Aperture
The area through which product is passed.

AutoBalance
A patented detector feature that automatically makes balance adjustments for each of the 70 available frequencies to provide optimum detector performance.

B

Bin Full
An option which uses a PEC to indicate when a reject bin is full and meends to be emptied.

C

Conductivity
The measured amount of eddy current generation created on a metal surface.

D

Detector Performance
Relates to how well the metal detector can reliably detect metal contaminants

E

Eddy Current
Small circulating electric currents generated when an electromagnetic field contacts the surface of a metal object. Secondary electromagnetic fields are generated by these currents and picked up by the receiver coils. This causes an inductive imbalance to occur between the transmitter and receiver coils which is used to identify and reject contaminated products.

Electromagnetic Field

An invisible electrical field emanating from a transmitter coil. This field is generated by the flow of alternating oscillator frequency current around the transmitter coil's windings.

F

False Triggering

Product rejects caused by external effects and not by a contaminant in the product itself.

Ferrous

A metal mainly composed of iron which also has magnetic properties.

Frequency

The number of alternating current cycles per second (Hz) produced by the transmit oscillator. The metal detector's electromagnetic operating frequencies are measured in Kilohertz (kHz). Low signal frequencies penetrate the product deepest, but sensitivity to smaller targets is low. Higher frequencies have a more shallow detecting depth but high sensitivity to small targets.

L

Learn

The process of passing sample products through the metal detector so that it can automatically select the optimum detector settings based on the product effect.

M

Metal Free Zone

An area external to the metal detector aperture which must be free of any fixed or moving metal as it generates a signal that will be picked up by the metal detector

N

Noise

Electrical signals generated by local sources such as un-suppressed solenoids and inverters, which can cause False Triggering or reduce detection performance.

Non-Ferrous

A metal, including alloys, that does not contain any iron in appreciable amounts, is highly conductive and non-magnetic.

P

PEC

Photo-Electric Cell - Generates a beam of light which when broken by the passing of a product triggers an action through the software such as activating a reject device or updating a product count value.

Performance Validation

Regular testing of the detector performance to validate that it is operating correctly and detecting metal contaminants of the required type and size

Product Effect

Signals produced by the product when it is passed through an electromagnetic field that can be seen by the metal detector.

R

Reject

A product containing a detected metal contaminant that has been removed from the production line by the metal detector.

S

Serial Link

A network connection which allows the metal detector to communicate with another device connected to the network.

Shaft Encoder

A device fitted to variable speed conveyors to enhance the accuracy of the reject timing.

Stainless Steel

An iron alloy which contains a minimum of 10.5% chromium and is corrosion and rust resistant.

T

Test Wand

Item that contains a spherical metal contaminant, of a specific type and size, that is attached to a product to assist in testing detector performance.

Threshold

Product signal limit, set as either a minimum or maximum value, which can be used to identify products for rejection.

Tracker

A feature which automatically adjusts the working frequency used to inspect the current product based on a calculated average product signal.

U

USB

Universal Serial Bus used to transfer data to and from the metal detector using a USB data stick.

User

A person who operates the metal detector. Different user access levels are available which are used to manage access to specific features and functionality.