



IQ³+ Metal Detector User Guide

Table of Contents

Introduction	1
About this Guide	2
General	2
Audience	2
Purpose.....	2
Organisation	3
Document Change Control.....	4
Document Key	4
Notes and Warnings	4
Hyperlinks	4
Copyright and Acknowledgements.....	5
The Loma Group of Companies	6
About Metal Detection.....	7
How a Metal Detector Works.....	8
General	8
Balance Stability	8
General and Foil Wrapped Products	8
Product Effect and Phasing.....	8
Product Effect	8
Phasing	9
Tracker Feature	10
Metal Free Zone	10
Detector Performance	10
Types of Metal	12
Shapes and Orientation of Metal.....	12
Testing Metal Detector Performance.....	13
Test Frequency	13
Product Test Samples.....	14
Test Wands.....	14
Testing Guidelines	14
Test Records.....	14
Learn Feature	15
Full Learn	15
Update Learn	16
Reverse Learn	16
Learn Setup	16

Safety First	17
Safety Awareness.....	18
EC Declaration of Conformity.....	18
Safety Warnings	19
Safety Labels.....	20
Safety Guards.....	21
Guarding	21
Interlock switches.....	21
Safety Relay and Circuits.....	21
Responsibilities and Disclaimer.....	21
Safety Measures.....	22
Intended Use of the Machine	23
Permitted Use	23
Improper Use	23
Noise Levels	23
End of Life Treatment.....	23
Emergency Procedures	23
Quality Assurance	24
ISO9000	24
End User Licence Agreement	25
Technical Specifications.....	27
IQ3+ Metal Detector Head.....	27
European Belt Conveyors.....	28
Installation	29
Installing a Metal Detector Head	29
Warnings.....	30
Receiving and Unpacking	30
Moving the Detector Head	30
Detector Head Mounting Positions	32
Mounting a Detector Head onto a Conveyor	34
Connecting the Detector Head Electrical Supplies.....	38
Installing a Metal Detector System.....	41
Warnings.....	42
Receiving and Unpacking	43
Moving the Machine.....	43
Adjusting / Levelling the Conveyor	44
Clearance Requirements	44
Connecting the Air Supply	44
Connecting the Electrical Supplies	46

Checking Belt Tracking (PV belt system only).....	48
Setting Up Reject Mechanisms.....	48
Remote User Interface.....	48
Installing a Serial Link.....	48
Site Considerations	48
Electromagnetic Compatibility (EMC)	48
Selection of Frequency Band.....	49
Other EMC considerations.....	49
Radio Frequency Interference	49
About the Metal Detector Range.....	51
Introduction	51
Metal Detector Search Heads	52
Standard Features	52
Optional Features	52
Conveyor Belts	53
Flat Belts	53
Plastic Modular Belts	54
Reject Devices.....	55
Reject Devices	55
Stop On Detect	55
Air Blast.....	56
Pusher.....	56
Plough.....	56
Retracting Band	56
Powered Decliner.....	56
Signal Only.....	56
Reject Bins.....	57
Electrical Services Box.....	57
Guards.....	57
Air Pressure Switch	57
Optional Equipment.....	58
Audible Alarm.....	58
‘Bin Full’ Photo-eye	58
LED Lamp Stack	58
Overhead Electrical Services.....	59
Product Guides	59
Product Registration Photo-eye.....	59
PVS Indicator Lamp	59
Reject Actuation Confirmation	59

Reject Confirmation with Photo-eye	59
Lockable Reject Bin and Status Monitor	59
Pack Check Photo-eye	59
Getting Started	61
User Interface	61
User Access	62
Logging In and Out	63
Logging In	63
Logging Out	64
Starting and Stopping	65
Starting the Machine	65
Stopping the Machine	65
Emergency Stop	66
Starting the Machine after an Emergency Stop	66
The User Interface	67
General Navigation	67
Title Bar	67
Blue Banner Bar	67
Selection Options	68
Entering Data	68
Saving Settings	69
Screens	69
Main Run	71
Select Product to Run	73
Select Product to Setup	74
Product Options	75
Product Settings	76
Batch Reset	80
Threshold	81
Learn Options	82
Full Learn	82
Update Learn	83
Learn Setup	84
System Faults Log	87
Select Access Level	90
User Accounts	91
System Setup	92
System Settings	93
Screen Contents	93

Select Access Level.....	95
User Accounts Setup	96
User Account Details	97
Display	98
Calendar	99
Appearance Settings.....	99
Resultant.....	102
Language Setup.....	103
Calibrate.....	104
Clean Screen	105
Report Options.....	105
User Options	108
PVS Setup	109
Software	113
Remote Support.....	113
Advanced Settings	114
Auto-Learn Settings	115
LomaEnet Capture.....	118
LomaOPC Server.....	120
Serial Comms Setup	121
Diagnostics	123
PQ Analysis	124
Coil Current.....	125
Balance	126
EnviroScan.....	128
Product.....	132
Purpose.....	132
Service	137
Engineer / Loma Service.....	138
Search Head Setup.....	139
Conveyor Setup	142
Service Options.....	145
GP I/O	147
VF Balance	150
VF Drive	152
Select Product to Setup	154
Product Options	155
Product Settings.....	156
Conveyor Setup	160
Rejects Setup.....	163

Help Manual	168
Using the Metal Detector.....	169
Good Practice	169
Establishing a Good Product Learn.....	169
Establishing Detector Performance	170
Relative Detectability of Non-Ferrous Metals	170
Regular In-Line Detector Performance Testing.....	171
Handling Rejected Products	171
Getting the Results	171
Frequency Selection	172
Operating Instructions	173
Setting Up the Metal Detector	173
Setting the Time and Date	174
Setting the Language.....	175
Setting the Machine ID.....	177
Setting User Access Levels and Passwords	179
Configuring the Metal Detector.....	180
Setting Up the Search Head	181
Setting Up the Conveyor.....	182
Setting Up the Service Options.....	183
Setting Up the Monitoring Services	185
Setting the VF Balance	186
Setting the VF Drive.....	188
Setting Up the User Options	189
Setting Up Serial Links.....	190
Performing a Ferrite Tune.....	192
Setting Up Product Signal Tracking.....	195
Adding a New Product.....	200
Learning Products	201
Learning a Product.....	202
Reverse Learn	204
Using Performance Validation	205
Performance Validation System	205
Enabling the PVS Feature	206
Enabling PV Testing for a Product.....	207
Logs and Reports.....	209
Run Errors Log	210
Purpose.....	210
Screen Contents	211

Example Problems.....	211
System Faults Log.....	212
Purpose.....	212
Screen Contents	212
Example Problems.....	213
Contaminants Log	215
Purpose.....	215
Screen Contents	216
Batch Log	216
Purpose.....	216
Screen Contents	216
Configuring a Batch Log	217
PVS Log	218
Purpose.....	218
Screen Contents	219
Diagnostics Log.....	219
Purpose.....	219
Screen Contents	220
Example Messages.....	220
Setup Report	221
Purpose.....	221
Screen Contents	221
Learn Report.....	222
Purpose.....	222
Screen Contents	222
Status Report.....	222
Purpose.....	222
Screen Contents	223
Access Log	223
Purpose.....	223
Screen Contents	224
Example Actions	224
Configuration Report	224
Purpose.....	224
Screen Contents	225
Release Notes	226
Purpose.....	226
Log and Report Output Options	227
Report Languages	228

Maintenance	229
Maintenance Warnings.....	229
Cleaning	229
Cleaning regime.....	229
Cleaning solutions.....	230
Belt conveyor versions.....	230
Air Regulator Unit Maintenance	231
Conveyor Belt Maintenance	231
Plastic Modular Belt Section Replacement.....	231
Setting the Belt Tension and Tracking.....	231
Adjusting the Drive Chain Tension	232
Adjusting the Reject Devices.....	232
Pusher and Retracting Band Rejects.....	232
Air Blast Reject	232
Software Upgrades.....	232
Glossary	235
Index	239

Introduction

Inspection systems are widely used and integrated into production lines within a vast range of businesses, including the pharmaceutical, food and beverage industries, to identify metal contamination in products so that they may be 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 organised 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 email 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.

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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

General

This guide explains in plain language and by example how to use the IQ³+ Metal Detector Head and Conveyor. It begins with a conceptual overview of metal detection and then walks through the processes required to install, operate and maintain the machine. Each process is cross referenced to detailed information covering the concepts, controls, parts, assemblies, software and items associated with the process.

Audience

This guide is designed for anyone using the IQ³+ Metal Detector. There are four levels of user access to the available features and functionality available, each of which provides specific benefits to that user.

■ Operator

The guide benefits operators who need to use the machine functionality and features to carry out routine product inspections and remove any contaminated products from the production line.

■ Supervisor

The guide benefits supervisors who need to use the machine functionality and features to manage the selection and inspection of a range of products.

■ Quality

This guide benefits quality staff who monitor and analyse inspection data to ensure that acceptable quality standards are achieved and maintained for all products inspected to meet customer and legislative requirements.

■ Engineer

This guide benefits engineers and technicians who need to initially install, commission and integrate the machine into the production line and then carry out routine servicing and maintenance tasks to assure the high availability and performance of the machine.

Even if you are not involved directly in using the IQ³+ Metal Detector, this guide provides you with general information for using metal detection to prevent products containing contaminants from being shipped to customers.

Purpose

This guide has two integrated goals:

■ Immediate Success

The primary goal is to show 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 metal contaminants in products and remove them from the production line.

■ Continuing Success

The secondary goal is to provide metal detection guidelines that can be used when setting up the machine to reliably carry out inspection of specific products.

This guide provides technical and operational information that you can integrate into your in-house documentation, particularly to meet the requirements of legislation and other standards.

Organisation

This guide is organised into the following chapters:

- **[Introduction](#)**

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

- **[About Metal Detection](#)**

Guidelines provide an introduction to metal detection, including an explanation of the basic principles and good practice guidelines.

- **[Safety First](#)**

Guidelines identify 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

- **[Installation](#)**

Guidelines explain how to safely install the machine, including the connection of electrical and pneumatic supplies

- **[About the Metal Detector Range](#)**

Guidelines provide a summary of the available features and functions of the machine and descriptions of its component parts.

- **[Getting Started](#)**

Guidelines describe the basic controls and how to switch on, log in and prepare the machine for use.

- **[The User Interface](#)**

Guidelines describe how to navigate around the user interface and also provide descriptions of the screen through which you can setup and manage all parameters required for inspecting products and for the general operation of the machine.

- **[Using the Metal Detector](#)**

Guidelines provide information covering good practice, establishing detector sensitivities and how to get the best results from your machine.

- **[Operating Instructions](#)**

Instructions are provided describing how to carry set up and configure the machine, including adding new products for inspection and carrying out performance validation testing.

- **[Logs and Reports](#)**

Guidelines identify the types of logs and reports that are available and describe how to output them for analysis.

■ **Maintenance**

Guidelines provide information covering maintenance of the machine to ensure it continues to operate efficiently and safely.

Each chapter is organised in a logical operational sequence and includes cross-references where applicable to related guidelines.

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 and in line with any changes made to the system and its software.

Users are actively encouraged to suggest changes or additions to the contents of this guide directly to Loma Systems by sending an email to manuals@loma.com.

All document changes are processed in accordance with the standard Loma Systems document management system change process.

Document Key

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

Notes and Warnings



NOTE - Notes as used to provide supplementary information.



WARNING - 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.

Hyperlinks

[Main Run Screen](#)

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.

<http://www.loma.com>

Indicates a web hyperlink, so tapping on the text will open the page in your default web browser.

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Loma Systems
Summit Avenue
Southwood
Farnborough
Hampshire
GU14 0NY
England

Email: sales@loma.co.uk

Web: <http://www.loma.com>

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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
United Kingdom

Tel: 01252 893300

Fax: 01252 513322

E-mail: sales@loma.co.uk

Web: <http://www.loma.com>

USA and South America

Sales and Customer Service

Loma Systems
550 Kehoe Boulevard
Carol Stream
Illinois 60188
USA

Tel: 1-630-588-0900 / 1-800-USA-Loma

Fax: 1-630-588-1395

E-mail: sales@loma.com

Web: <http://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: cn.sales@loma.com /
cn.service@loma.com

Web: <http://www.loma.com>

France

Sales and Customer Service

Lock Inspection France
120, rue Jean Jaurès
92300 Levallois-Perret
France

Tel: +33 (0) 155 695778

Fax: +33 (0) 169 591621

E-mail: fr.sales@loma.com /
fr.service@loma.com

Web: <http://www.loma.com>

Poland

Sales and Customer Service

Loma Systems
Wiśniowy Business Park
ul. Iłżecka 26, Budynek E
02-135 Warszawa
Poland

Tel: +48 22 575 70 25

Fax: +48 22 575 70 01

E-mail: pl.sales@loma.com

Web: <http://www.loma.com>

Canada

Sales and Customer Service

Loma Systems
Unit 11, 333 Wyecroft Road
Ontario
L6K 2H2
Canada

Tel: 1-800-387-7987 / 905-842-4581

Fax: 905-842-3460

E-mail: sales@loma.com

Web: <http://www.loma.com>

Czech Republic

Sales and Customer Service

Loma Systems
U Lomy 1069
334 41
Dobruška
Czech Republic

Tel: +42 (0) 377 183810

Fax: +42 (0) 377 183820

E-mail: cz.sales@loma.com / cz.service@loma.com

Web: <http://www.loma.com>

Benelux

Sales and Customer Service

Loma Systems / Lock Inspection
Daalderweg 17
4879 AX Etten-Leur
Netherlands

Tel: +31 (0) 765 030212

Fax: +31 (0) 765 089800

E-mail: bnl.sales@loma.com / bnl.service@loma.com

Web: <http://www.loma.com>

Germany

Sales and Customer Service

Loma Systems
A division of ITW Test & Measurement GmbH
Magnusstr. 18
D-46535 Dinslaken
Deutschland

Tel: +49 (0) 2064 43724-0

Fax: +49 (0) 2064 43724-49

E-mail: de.sales@loma.com / de.service@loma.com

Web: <http://www.loma.com>

Brazil

Sales and Customer Service

Loma Systems / Brapenta Electronica
Barão 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: comercial@brapenta.com.br

Web: <http://www.loma.com> / www.brapenta.com

For details of other Loma offices and the worldwide distributor network, please visit www.loma.com.

About Metal Detection

Industrial metal detectors are used in the pharmaceutical, food, beverage, textile, garment, plastics, chemicals, lumber, and packaging industries.

Contamination of food by metal shards introduced during the manufacturing process is a major safety issue in the food industry. Metal detectors are widely used and integrated into production lines and play a vital role in preventing contaminated products from reaching customers.

The following sections contained in this chapter provide a conceptual overview to explain what metal detection is, the reasons for metal detection, how metal detection works and how to implement metal detection successfully:

- **[How a Metal Detector Works](#)**

All metals are magnetically conductive, electrically conductive or both. When they enter an electromagnetic field they create a detectable disturbance, or signal, in the field and this is used to detect the presence of metal contaminants in food and pharmaceutical products.

- **[Product Effect and Phasing](#)**

Explains what product effect is and how phasing is used to reduce its impact on detecting contaminants.

- **[Tracker Feature](#)**

The Tracker feature when enabled, continuously adjusts the product signal threshold automatically, using the average signal values obtained from a defined number of products that pass through the aperture.

- **[Metal Free Zone](#)**

Although the electromagnetic field is generated inside of the detector housing, some of the field emanates out of the aperture on both sides. This 'leakage' area is defined as the Metal Free Zone.

- **[Detector Performance](#)**

Provides details of factors that affect the performance of a metal detector and gives typical levels of detection performance for different product types.

- **[Types of Metal](#)**

Provides details of the types of metal that typically be detected and the ease of detection, dependant on their physical characteristics

- **[Shapes and Orientation of Metal](#)**

Provides information covering how the shape of a metal contaminant and its orientation when passing through the metal detector aperture can affect its detection.

- **[Testing Metal Detector Performance](#)**

Regardless of how sophisticated and reliable a metal detector is, it is only as good as the frequency and thoroughness of the testing programs supporting it. This section provides guidance for testing your metal detector performance.

- **[Learn Feature](#)**

The Learn feature incorporated into the metal detector completely automates the configuration of the detector settings for a product. The Learn process options available are described in this section.

How a Metal Detector Works

General

All metals are magnetically conductive, electrically conductive or both. When they enter an electromagnetic field they create a detectable disturbance, or signal, in the field.

Modern metal detectors allow this signal to be detected, providing the opportunity to operate a reject device to remove the contaminated product from the production line.

The head houses a transmitter coil that broadcasts a low to medium radio frequency (RF) signal which generates the electromagnetic field. Two receiver coils are also located in the head on either side of the transmitter coil.

The receiver coils pick up any disturbance as caused by a metal contaminant. This is then digitally processed to generate a resultant signal. If the signal exceeds the performance threshold set for the product being inspected then detection is triggered, providing an opportunity to remove the contaminated product from the production line.

Balance Stability

Very small movements of the metal detector, caused by temperature changes, vibration from nearby equipment and other factors, can disturb the balance of the three coils. This can cause the metal detector to falsely indicate the presence of metal; commonly called 'false triggering'.

The robust construction and excellence in electronics and software design of Loma metal detectors provides a stable and reliable product where the likelihood of false triggering is minimised.

General and Foil Wrapped Products

Modern metal detectors fall into two main categories. The first category consists of systems with a general purpose search head. These systems are capable of detecting ferrous and non-ferrous metals as well as stainless steels, in fresh and frozen products; either unwrapped or wrapped and even in metallized films.

The second main category consists of systems which have a ferrous-in foil search head that uses a series of magnets rather than a balanced coil. These systems are capable of detecting ferrous metals within fresh or frozen products which are packed in foil wrapping.

Product Effect and Phasing

Product Effect

Not only are all metals magnetically conductive, electrically conductive or both, but also the products being inspected can also have one or both of these characteristics. In effect, when a contaminated product is passed through the aperture, the metal detector sees a single resultant signal consisting of both the product signal and the metal contaminant signal.

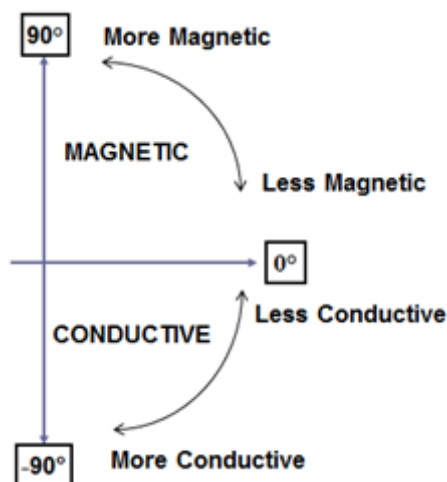
For example, iron enriched products such as cereals create a large magnetic signal that hampers the detectors ability to detect the magnetic signal of small pieces of metal. These are commonly called 'Dry' products which typically include meat, cheese, bread, fish, dairy products and salad items.

Conversely, products with high moisture and salt content such as bread, meat and cheeses, are electrically conductive, again hampering the metal detectors ability to detect small pieces of metal. These are commonly called 'Wet' products which typically include cereal, crackers, flour, powders, frozen food products and peanut butter.

For the metal detector to identify that the product contains a metal contaminant and trigger detection, the signal from the contaminant must therefore be greater than the product signal.

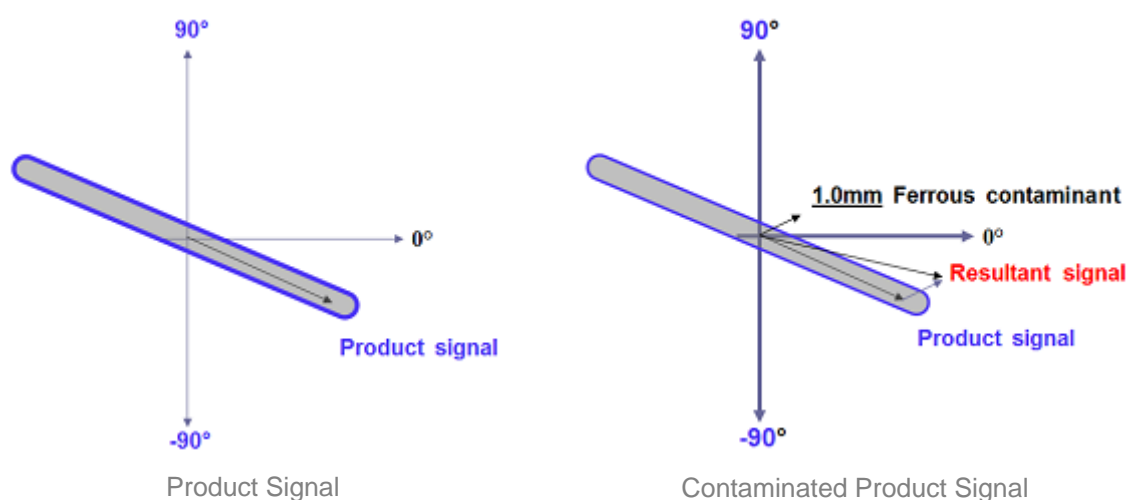
Phasing

The diagram below shows how the magnetic and conductive properties of a product affect the product phase angle.



Utilising the 'Learn' feature provided in the IQ³+ Metal Detector, an average for the net signal received from a product during inspection is digitally processed to provide a phase angle and amplitude.

This is then memorised for later recall against the product as a product 'window', as shown in the *Product Signal* diagram below and essentially provides a 'filter' so that signals of a known phase and amplitude can be ignored. This is called 'phasing out' the product signal.



The *Contaminated Product Signal* diagram above shows how a signal from a metal contaminant, although much smaller than the product signal, can be easily detected.

The metal detector sees the one resultant signal of the metal contaminant and product signals presented together at the same time.

This resultant signal still falls well outside of the product 'window' which then triggers detection and provides an opportunity for the contaminated product to be rejected from the production line.

Tracker Feature

As well as capturing and memorising the product 'window' during a 'Learn' process, the IQ³+ Metal Detector also includes a Tracker feature which when enabled continuously adjusts the product 'window' automatically, using the average signal values obtained from a defined number of products that pass through the aperture. This allows the detector to compensate for slight changes in the phase angle and amplitude of the product signal.

For example, for a frozen product the product effect is very small when the product has just come out of the freezer. This allows a low working threshold level to be used giving a high sensitivity to metal contaminants. However, if the line stops for any reason then the product could thaw slightly, or if the product were not fully frozen, a significant product signal increase may result. In this event the working threshold will have to be raised to allow the product to be passed, without false rejection. Raising the working threshold to allow thawed product to pass without false rejection may reduce the sensitivity to metal contamination. If the product becomes hard frozen the working threshold may be higher than it now needs to be, so the sensitivity to metal contamination will not be as good as it could be.

Tracking works by recording the product signal for each pack. From the values read, the working threshold continuously trends upward or downward between an upper and a lower limit. The rate and amount by which the working threshold changes together with limits between which it operates are controlled by user entered parameters for each product.

It should be noted that this type of system may allow metal contamination that would otherwise be detected if changes in the product force the working threshold to rise sharply.

Tracker initialisation will occur whenever the detector is powered on, the running product is changed or the tracking limit parameters are changed. Upon completion of the product learn routine the derived working threshold will be used unless the product signal initiates a change.

Metal Free Zone

Although the electromagnetic field is generated inside of the detector housing, some of the field emanates out of the aperture on both sides. This 'leakage' area is defined as the Metal Free Zone, meaning 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 and added to the signal being produced by the product and any contaminant. This could result in false triggering and rejection of good products.

Loma Systems generally employ the use of fixed plastic guards fitted around both ends of the aperture. This serves a dual purpose in effectively preventing access to those areas and the accidental introduction of any metal contaminants.

Detector Performance

For optimum detector performance, the search head must be of an appropriate size for the specified product. Smaller apertures generally allow smaller pieces of metal to be detected; the exception being products packaged in metallised film and highly conductive products such as large blocks of cheese.

In production, detector performance is affected by the following:

- Size of detector aperture
- Detector type
- Head operating frequency
- Product temperature
- Conveyor speed
- Environmental conditions
- Product presentation

The tables below provide typical predicted levels of detection provided by the IQ³+ Metal Detector, depending on the height of the head aperture and the product type being inspected.

Each value shown is the diameter in millimetres (mm) of a spherical metal contaminant, as contained in Loma test wands.



The detection performance figures quoted in the tables below are for indication purposes only and are based on previous experience with similar products and applications. The estimation of detection level does not take into account excessive product effect or interference. Full product tests are required to validate any detection performance estimation.

The figures are also based on heads up to 650mm wide. Above this width there will be a drop in performance that could be up to 0.5mm, depending on the width / length ratio.

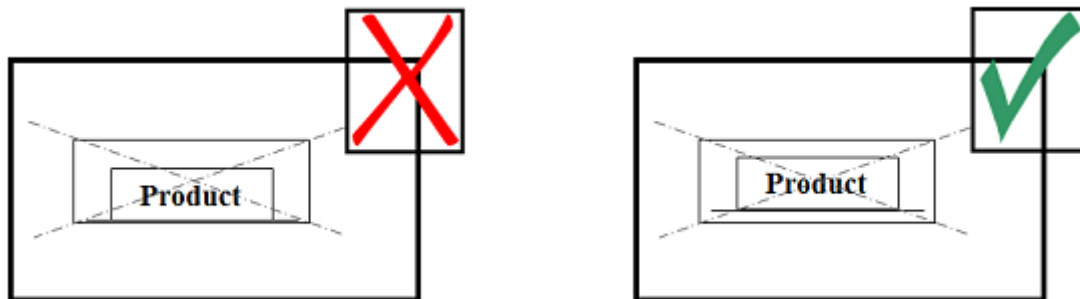
Standard Blue Head Aperture Liner

	Dry / Deep Frozen			Frozen / Light Wet			Conductive / Large Wet			Met. film / Difficult		
Aperture Height (mm)	Fe	NFe	304 S/S	Fe	NFe	304 S/S	Fe	NFe	304 S/S	Fe	NFe	304 S/S
100mm	0.8	0.8	1.2	0.8	1.2	2.0	1.0	1.5	3.0	Product testing is advised		
150mm	1.0	1.0	1.5	1.0	1.5	2.5	1.5	2.0	3.5			
200mm	1.2	1.2	2.0	1.5	2.0	3.0	2.0	2.5	4.5			
250mm	1.5	1.5	2.5	1.5	2.0	3.0	2.5	3.0	5.0			
300mm	2.0	2.0	3.0	2.0	2.5	3.5	3.0	3.5	5.5			
350mm	2.0	2.0	3.5	2.5	3.0	4.0	3.5	4.5	6.0			
400mm	2.5	2.5	4.0	2.5	3.0	5.0	4.0	5.0	7.0			
450mm	3.0	3.0	4.5	3.0	3.5	5.5	4.5	7.5	8.0			
500mm	3.0	3.0	5.0	3.0	3.5	6.0	5.0	8.5	9.0			

Ultra Harsh White Aperture Liner

	Dry / Deep Frozen			Frozen / Light Wet			Conductive / Large Wet			Met. film / Difficult		
Aperture height	Fe	NFe	304 S/S	Fe	NFe	304 S/S	Fe	NFe	304 S/S	Fe	NFe	304 S/S
100mm	1.0	1.0	1.5	1.19	1.5	2.0	1.5	2.0	3.5	Product testing is advised		
150mm	1.5	1.5	2.0	1.5	1.5	2.5	1.5	2.5	4.0			
200mm	2.0	2.0	2.5	2.0	2.0	3.0	2.0	3.5	5.0			
250mm	2.0	2.0	3.0	2.0	2.0	3.0	2.5	4.0	5.5			
300mm	2.5	2.5	3.5	2.5	2.5	3.5	3.0	4.5	7.0			
350mm	2.5	2.5	3.5	2.5	2.5	4.0	4.5	5.5	8.0			
400mm	3.0	3.0	4.0	3.0	3.5	4.5	5.5	6.5	9.0			
450mm	3.0	3.0	4.5	3.0	3.5	5.0	6.5	7.5	10.0			
500mm	3.5	3.5	5.0	3.5	4.0	5.5	7.5	8.5	11.0			

Detector performance is also affected by the position of the contaminant in the aperture. The least sensitive point is located in the geometric centre of the aperture, so this ideally is where to test the detector performance each time if practical, to ensure consistency. As metal gets closer to the sides (coils) of the aperture, the signal generated becomes larger, making it easier to detect.



Types of Metal

Metal detector performance is not the same for all types of metal. The ease of detection depends on how easily they are magnetised, the magnetic permeability, and the electrical conductivity of the metal. Metal detectors are calibrated for optimum detection performance of ferrous metals, non-ferrous metals and stainless steel.

■ Ferrous

Ferrous materials are any metal that is easily attracted to a magnet, such as steel and iron. Typically ferrous metals are easiest to detect and usually the most common contaminant outside of food processing plants.

■ Non-Ferrous

Non-ferrous materials are highly conductive, non-magnetic metals such as copper, aluminium, brass and phosphor bronze. When inspecting non-conductive products, these metals produce almost the same size signal as ferrous metals because they are all good conductors. When inspecting conductive products, increasing the test sphere size by at least 50% is a good practice.

■ Non-Magnetic Stainless Steel

High quality 300 series stainless steels, such as types 304 and 316, are the most difficult metals to detect due to their poor electrical conductive qualities and low magnetic permeability. These are commonly used in the food processing and pharmaceutical industries.

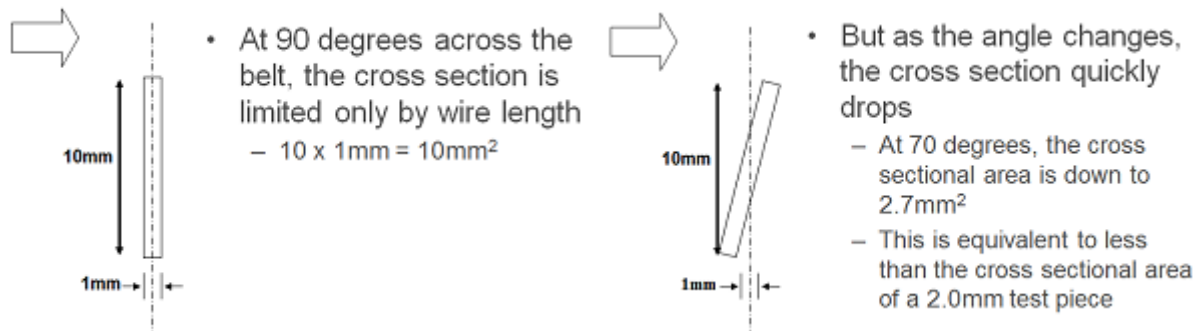
When inspecting non-conductive products, a stainless steel test sphere typically needs to be 50% larger than a ferrous sphere to produce the same size signal. When inspecting conductive products, a stainless steel test sphere needs to be 200% to 300% larger than a ferrous sphere to produce the same size signal.

When detection specifications include non-ferrous and/or stainless steel, the particular metals and sizes should be identified. Correct identification of what particles should be detected is critical because these metals have many varieties and they will all look slightly different to the metal detector.

Shapes and Orientation of Metal

Metal detector standards are based on testing using sphere shaped pieces of different types of metal and in different sizes. This is because spheres are the same shape and size when viewed from any angle.

Real contaminants are rarely spherical so may produce different signals depending on their orientation as they pass through the aperture. Wire contaminants are the most dramatic example of this as shown in the diagrams below.



A common solution to this problem is to use two metal detector heads positioned at different angles across the conveyor belt so that the contaminant is presented at a different angle to both detectors.

Testing Metal Detector Performance

Regardless of how sophisticated and reliable a metal detector is, it is only as good as the frequency and thoroughness of the testing programs supporting it.

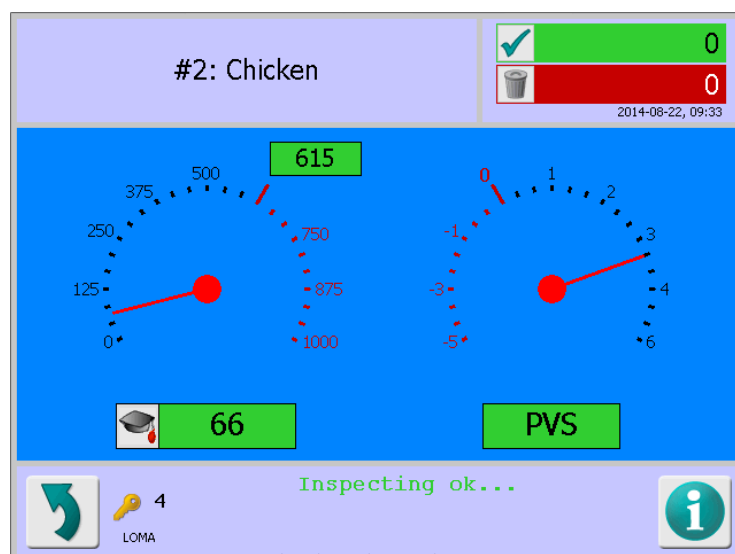
Testing and recording are essential components of any HACCP system and must be supported by clearly documented testing procedures that are communicated to all staff using the detector and are monitored and reviewed on a routine and regular basis to ensure compliance with customer and legislative requirements.

Test Frequency

Intervals between tests need to be short enough that if a fault is found, products potentially affected have not left your premises and can be identified, recalled and retested. Once again, if your company is a private label manufacturer, ensure that you agree upon any variation you make to testing procedures, in writing, with your retailer customers.

To facilitate effective testing, all of Loma's Metal Detectors have an integral [Performance Validation System](#) (PVS) feature. This feature can be set up to automatically prompt the operator to carry out the required test at a pre-set interval.

The screenshot below shows the Main Run screen with the performance validation countdown timer displayed, using the default interval of 6 minutes, to assist with HACCP compliance.



Product Test Samples

Some guidelines for the provision of product test samples are listed below.

- Ensure that the samples are representative of a good product in all respects.
- Ensure that the samples are free from metal contaminants.
- Mark or label the samples to identify them and prevent them being despatched to customers.
- Produce fresh samples for testing at a frequency that reflects the nature, durability and shelf life of the product concerned. 'Stale' test packs may produce different product signals.

Test Wands

Loma Systems metal detectors are supplied with a set of plastic test 'wands' which contain spherical pieces of various metals in different sizes. These are convenient and easy to place into your test samples and also make the testing process even more efficient.

Generally the types of metal and sizes provided will include those covering the specific detection requirements for the customer.

Loma Systems offer a wide variety of spare test wands. To purchase additional test wands please email teststicks@loma.com.



Testing Guidelines

You may be working to specific Customer Codes or Practice to test detector performance, but some general guidelines for testing product samples are listed below.

- Sample products should be tested with both ferrous and non-ferrous test wands.
- When testing finished packed products on a conveyor system, place the test wand, where possible, at the extreme end of the pack. If this is impractical, for example if you are testing individual small packs or sandwich wedges, place the test wand in the centre of the product.
- Test samples should be passed through the search head two times, first, with the test wand at the leading edge of the pack and then with the test wand at the trailing edge of the pack.
- When using a reject device, ensure that test samples which have a test wand attached successfully enter the reject bin or that the conveyor stops when using 'Stop on Detect'.
- Wherever possible, fit metal detection equipment on your production line AFTER products have been wrapped. Where this is not possible and you are manufacturing private label goods, it is advisable to agree to the testing routine, in writing, with the retailer concerned.
- For pipeline systems, place ferrous and non-ferrous test wands independently in the product flow and observe appropriate rejection. However, where that is not practical within a pipeline system, insert the test wand between the pipe and the search head and then observe for the appropriate rejection.
- Should any part of your test fail, isolate all products produced since the last satisfactory test and re-screen them, using another detector functioning to the same standard as the original system performing the test.

Test Records

PVS Testing

When testing is carried out using the in built [Performance Validation System](#) (PVS), the results are recorded automatically by the system.

They are available by navigating to the [Logs/Reports](#) screen and tapping on the PVS Log option from the list provided. The [PVS Log](#) screen is then displayed showing a complete set of test results.

Test reports can be automatically or manually sent directly to a printer or networked PC via LomaEnet when the metal detector is connected to a network. Alternatively the report may be saved to an SD card if fitted or to the flash disk.

The test log file in .csv format may also be downloaded onto a memory stick via the USB port and then opened for analysis in Microsoft Excel.

Manual Testing

When testing is carried out manually, the results must be manually recorded and should include the following:

- Line or detector identification
- Date and time of the test
- Details of the sample(s) used.
- Identification of the operator/tester
- Results of the test (pass / fail)
- Corrective action taken if the result was failure

Learn Feature

The Learn feature incorporated into the metal detector completely automates the configuration of the detector settings for a product. Two Learn process options are available.

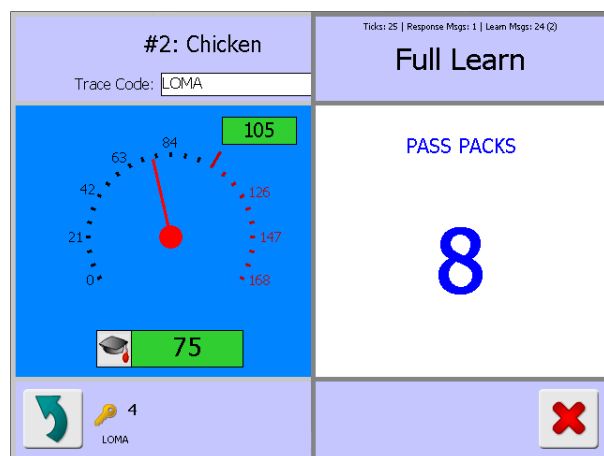
Full Learn

The Full Learn process consists of following on-screen instructions to pass a number of product samples through the detector aperture.

The product samples used during any Learn process must be representative of the product to be run and known to be free from metal contamination.

Normally at least eight product samples will be required. By using more than one sample the detector can make adjustments if necessary for differences that may occur across the samples used.

A single product sample could be repeatedly passed through the detector but the resulting Learn may not be as good and require an update when the product line is run .



The best results will be obtained by passing the product samples in succession through the detector in the time period dictated by the on-screen instructions. If possible you should Learn the product on a running line so that the detector learns a product as it would normally be run.

See the [Learning Products](#) section for further details.

Update Learn

The Update Learn process again consists of following on-screen instructions to pass a number of product samples through the detector aperture. This process can only be used for products that have already gone through a Full Learn process. A warning dialog will pop-up to inform you that a Full Learn is required if this has not been completed previously. See the Learning Products section for further details.



Reverse Learn

The Update Learn process consists of following on-screen instructions to pass a number of product samples through the detector aperture. The detector in this mode is used to pass products that are identified as containing a metal contaminant and reject products that do not.

For example, a product may contain a metal toy so the detector is used to pass products which contain the toy and reject those that don't.



Learn Setup

You are able to make some manual adjustments to the Learn process settings, either before or after carrying out a Learn process. See the [Learn Setup](#) screen for further details.

General configuration of the Learn processes is carried out in the [Auto-Learn Settings](#) screen.

Safety First

The safety of all people carrying out any activities associated with the installation and use of the metal detector 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 detector 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 detector complies with the appropriate EU Directives which are listed in this section. A signed EC Declaration of Conformity is supplied with each metal detector.

■ Safety Warnings

A number of general safety warnings appropriate for the use of Loma metal detectors is 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 detector 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 detector that are potentially hazardous which the machine is operating. This section provides some guidance on checking the guards.

■ Responsibilities and Disclaimer

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

■ Safety Measures

Before attempting to use the metal detector, 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 is included in this section.

■ Intended Use of the Metal Detector

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 detector 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 detector 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 IQ³+ metal detector 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 IQ³+ metal detector 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 detector. 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 detector 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 run 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 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 problems. 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 is any interlock to 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 or OHSA. 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 and described below.

Label	Message
	<p>CE Mark / Machine identification etched on the machine includes:</p> <ul style="list-style-type: none"> ■ Power supply data ■ Date of Manufacture ■ Serial Number
	<p>Caution: Electric Shocks</p> <p>Includes voltage and phase details which will vary dependant on the available supply.</p>
	<p>Caution: Hazardous Machinery</p> <p>All machinery has a potential for being hazardous if the appropriate level of care is not taken and any safety warnings not followed.</p>

	<p>Caution: Pneumatic Reject Device</p> <p>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</p>
	<p>Caution: Pinch Point</p> <p>Moving parts of machines, specifically conveyors, provide opportunities for trapping fingers or even items of clothing in the mechanism if care is not taken.</p>
	<p>Caution: Isolate Machine Before Maintenance</p> <p>Electrical power should be disconnected before carrying out maintenance operations that expose staff to potentially lethal voltages.</p> <p>Caution: Isolate air supply before maintenance</p> <p>Compressed air should be disconnected before carrying out maintenance operations where reject devices could be activated accidentally.</p>

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 in order to 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 detector and generate a fault condition.

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 this User Guide.

- 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 User Guide.
- Any spare parts required are obtained from Loma Systems by sending an email to sales@loma.com.

Safety Measures

Before attempting to use the metal detector, 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 metal detector to ensure that it is clean and clear of any potential trip or slip hazards.
- Check the control panel to ensure the metal detector is working correctly and no warning or error messages are being displayed.

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

- Installation, commissioning, operation and maintenance of the metal detector should only be carried out by trained personnel, following the applicable safety measures.
- Servicing and repair of the metal detector 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 detector 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 detector.
- Note that 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 detector, 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 in loose products.

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 User Guide.
- Electric arc welding must not be carried out on any part of the metal detector unless authorised by Loma Systems.
- All mechanical and electrical protection devices must not be removed or reduced.
- The metal detector is not designed for use in hazardous environments where there is a risk to the health and safety of the operator.
- The metal detector must not be operated in very dry environments which can generate electrostatic charges.

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 checkweighers 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 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.

The metal 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 IQ³+ metal detector system you have demonstrated your intention to assure the quality of your products, and thereby protect your customers.

The following points are recommended:

1. Once your Loma metal detector is installed you should contact your local Loma Service Department to have it commissioned.
2. Regularly test the operation of the metal detector to monitor its detection performance. Keep accurate records of those tests and any samples being used, along with the product details.
3. If the metal detector fails a test, quarantine the product from the last test and re-introduce through the system once the metal detector is fit for use.
4. Have the metal detector supported by a Planned Preventative Maintenance Contract. Details can be obtained from your local Loma Service Department.
5. 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 detector and have it regularly calibrated with a certificate issued.
6. 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 detector. Details of available training can be obtained from your local Loma Service Department. Details of available training can be obtained from your local Loma Service Department or by sending an email to enquiries@loma.com.

ISO9000

Certificates of Calibration

This type of calibration is confined to the checking of the electronics of the metal detector against the original specification, carrying out any adjustments or repairs as necessary. This is normally carried out by the manufacturer against a written specification and using equipment traceable to national and international standards. A certificate of calibration would then be issued for the metal detector. Loma recommend this calibration should be done at least yearly.

Product Learn Process

This process is carried out by the user and involves passing the product through the metal detector according to the requirements of the particular calibration system in use. This optimizes the metal detector for the best performance.

Metal Test Wands

It is recommended that all detector performance checking is conducted using Loma test wands which use metal spheres certified and traceable to national and international standards and plastics which comply with the EU- Directive **2011/10/EC** (Plastic Materials and Articles intended to come into contact with food). Loma can supply upon request certificates of conformity for test wands supplied either with new equipment or as spare parts.

Please note that test wands do not require annual calibration. However, the condition of the test wands must be inspected regularly for damage or deterioration such as cracks, corrosion, water

ingress, general wear and loss of markings that could affect hygiene and performance. It is recommended that any suspect test wands are destroyed and replaced.

Loma can supply a vast range of test wand types / sizes at-stock. Specials can also be made to order. Please email teststicks@loma.com for further details.

Work Instructions, Training and Record Keeping

It is recommended that in line detector performance testing is covered by written instructions, thus ensuring a clear and consistent approach by operators at all times and providing the means to substantiate your methods to any assessment body who may ask.

It is recommended that all personnel who may conduct testing are suitably trained to do so and records are kept to substantiate that training.

Accurate, easily retrievable records should be kept in a safe place for a defined period.

End User Licence Agreement

The software used within the IQ³+ Metal Detector is protected by copyright laws and international copyright treaties. The software in the IQ³+ Metal Detector 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 IQ³+ Metal Detector only, and may not be separated for use elsewhere.

The software is licensed with the IQ³+ Metal Detector as a single integrated product. The software may only be used with the IQ³+ Metal Detector.

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 IQ³+ Metal Detector, 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 detectors have been granted:

- GB2499239B
- GB2506931B

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Technical Specifications

IQ3+ Metal Detector Head

The technical specification for the IQ³+ Metal Detector Head is provided in the table below. Please note that this specification lists the available options in some cases. The exact specification for your metal detector head will depend on the options you have selected.

General	
Dimensions	Metal detector heads are available in a range of heights and widths to suit a specific customer requirements, which are agreed prior to manufacture and confirmed on the Order Acknowledgement provided. Please review this document for dimensional information.
Power Requirements (Voltage)	
Standard Options	220/230V, 1-phase, 50Hz, neutral and earth 110/120V, 1-phase, 60Hz. neutral and earth
Environment	
Operating Temperature	- 10°C to 40°C
Relative Humidity	0 - 95% (non-condensing)

European Belt Conveyors

The technical specification for all European Belt Conveyors is provided in the table below. Please note that this specification lists the available options in some cases. The exact specification for your machine will depend on the options you have selected.

General	
Dimensions	Each machine is designed to suit a customer's requirements. These are agreed prior to manufacture and confirmed on the Order Acknowledgement provided. Please review this document for dimensional information.
Power Requirements (Voltage)	
Standard Options	380/400/440V, 3-phase, 50Hz. neutral and earth 380/400/440V, 3-phase, 50Hz. earth but no neutral 220/230/240V, 1-phase, 50Hz. neutral and earth 220/230/240V, 3-phase, 50Hz. earth but no neutral
US Voltage	120V, 1-phase, 60Hz, 240V, 1-phase, 60Hz
Control Voltage	24V ac, 50Hz
Power Consumption	350VA
Air Supply (Pusher and Retracting Reject)	
Optimum Pressure	80 psi (5.5 bar)
Minimum Pressure	65 psi (4.5 bar)
Maximum Pressure	90 psi (6.2 bar)
Capacity	10 litres/second at 100 psi (6.9 bar)
Air Supply (Air Blast Reject per nozzle)	
Optimum Pressure	100 psi (6.9 bar)
Minimum Pressure	100 psi (6.9 bar)
Maximum Pressure	120 psi (8.2 bar)
Capacity	27 litres/second at 100 psi (6.9 bar)
Environment	
Operating Temperature	- 10°C to 40°C
Relative Humidity	80% up to 31°C (86°F) reducing to 50% @ 40°C (104°F)

Installation

This chapter provides generic information covering the installation of the Loma IQ³+ Metal Detector in a logical sequence, both as a head only and as a system with the head fitted to a Loma conveyor.

The following sections provide more information:

- **[Installing a Metal Detector Head](#)**

Provides guidance for installing a metal detector head only.

- **[Installing a Metal Detector System](#)**

Provides guidance for installing a metal detector system, consisting of a metal detector head fitted to a Loma conveyor and including standard and optional equipment.

- **[Site Considerations](#)**

All Loma machines are designed and tested against recognised international standards for Electromagnetic Compatibility, to operate under factory conditions. This section provides further information on the impact of RF interference.

Installing a Metal Detector Head

This section provides information covering the installation of a Loma IQ³+ Metal Detector Head in a logical sequence.

The following sub-sections provide more information:

- **[Warnings](#)**

A list of applicable [safety warnings](#) to be observed when installing the metal detector head is provided.

- **[Receiving and Unpacking](#)**

Some basic checks should be carried out on receipt of the machine to ensure that it has not been damaged in transit.

- **[Moving the Detector Head](#)**

Depending on the size and weight of the detector head, either a crane or a fork-lift truck will be required to lift and move it into the final location. This section provides some guidance for moving the machine safely.

- **[Detector Head Mounting Positions](#)**

Diagrams are included to provide details for mounting detector heads in different positions.

- **[Mounting a Detector Head onto a Conveyor](#)**

There are a number of points to consider when fitting a new Loma Metal Detector head to an existing conveyor of whatever manufacture, or when building a new conveyor to incorporate a metal detector head. This section provides some guidance.

- **[Connecting the Detector Head Electrical Supply](#)**

This section provides guidance on connecting an electrical supply to the detector head.

Warnings

The following safety warnings apply when installing an IQ³+ Metal Detector head:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES
2. LETHAL HAZARD – COMPRESSED AIR SUPPLIES
3. NON-IONIZING RADIATION
4. WORKING ON EQUIPMENT
5. REJECT DEVICES
6. EXCESSIVE NOISE
7. HEAVY EQUIPMENT
8. LIFTING THE MACHINE
9. MOVING THE MACHINE
10. CONTAMINANTS

For details see the [Safety Warnings](#) section.

The following emergency procedures apply to these procedures:

2. DEALING WITH FIRE.

For details see the [Emergency Procedures](#) section.

Receiving and Unpacking

Receiving the Detector Head

- On receipt of your Loma metal detector head, we recommend that you check the external packing for any signs of damage.
- If the external packaging is damaged do not refuse the shipment but make a notation on the carriers delivery receipt and take pictures of the packaging damage.
- When moving the detector head, please follow the guidance included in the [Moving the Detector Head](#) section.

Unpacking the Detector Head

- Remove all packing and retain in case the detector head has to be repacked for return.
- If on unpacking the detector head it is subsequently found to be damaged, take further pictures of the damage and send them to Loma Systems. Loma Systems will then carry out an investigation, including a review of the applicable carriage terms / Incoterms, to decide what action is to be taken.

Moving the Detector Head

The detector head will be supplied on a wooden pallet in protective wrapping and secured to the pallet with nylon straps. Before unpacking, the detector head can be moved whilst attached to its pallet using a fork lift. Once the packing and retaining straps have been removed the detector head is best moved using a crane to move it into the final location.

Using a Crane

- Position the straps around the detector head so that it will not tilt when lifted. Then attach the straps to the crane.
- **NEVER** put straps through any aperture.



- Lift the detector head carefully and move it to the required location.
- Lower the detector head and remove the straps.

Using a Fork Lift

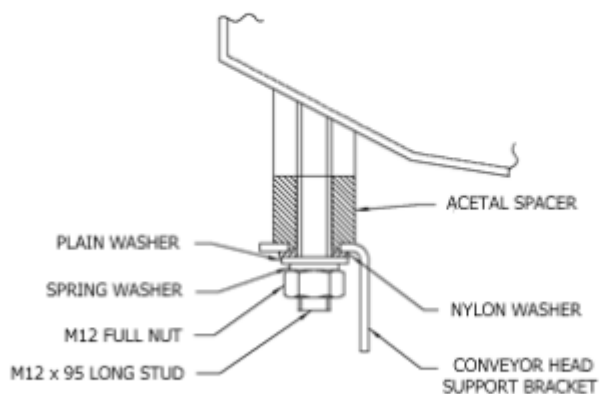
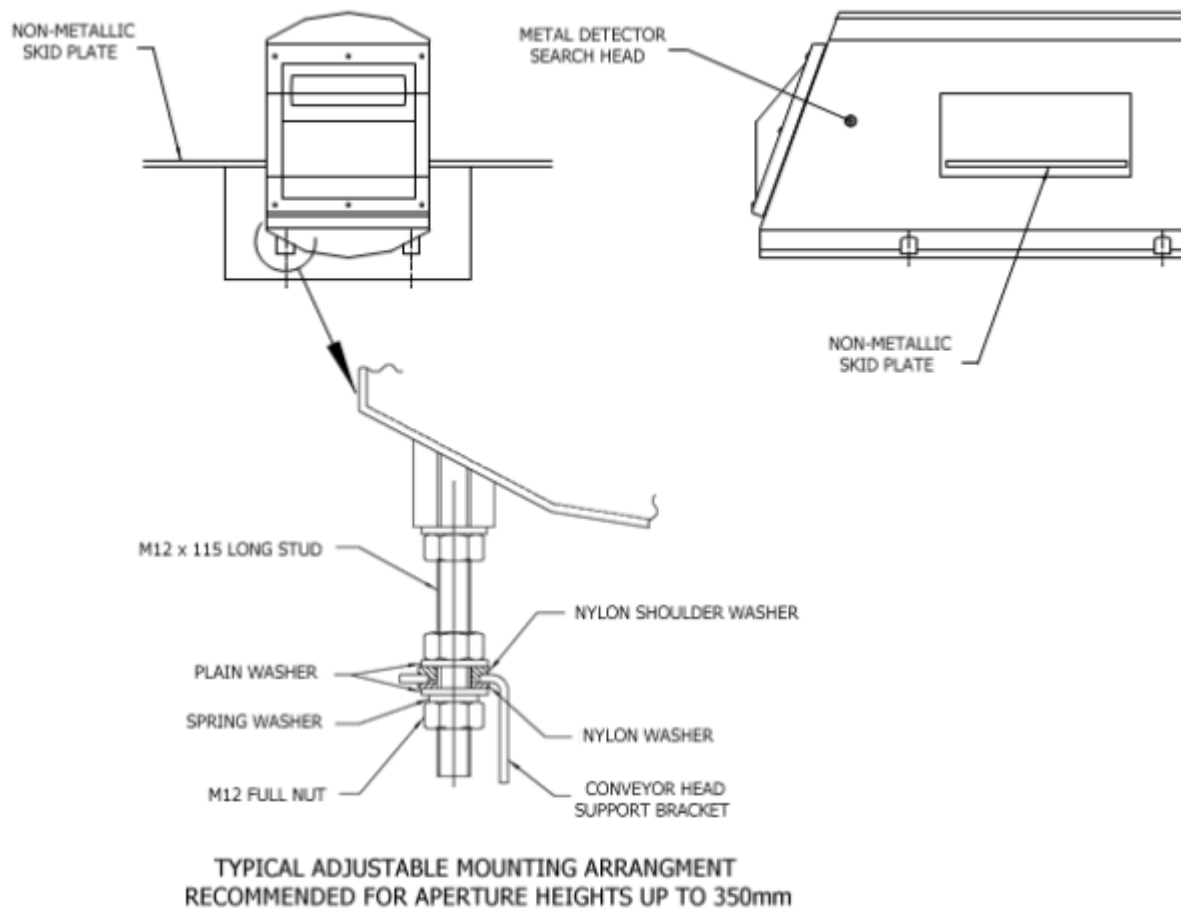
- Position the forks under the pallet and raise it sufficiently to clear of the ground and any obstacles.
- Carefully move the pallet to the required location.
- Lower the forks and withdraw them from the pallet.

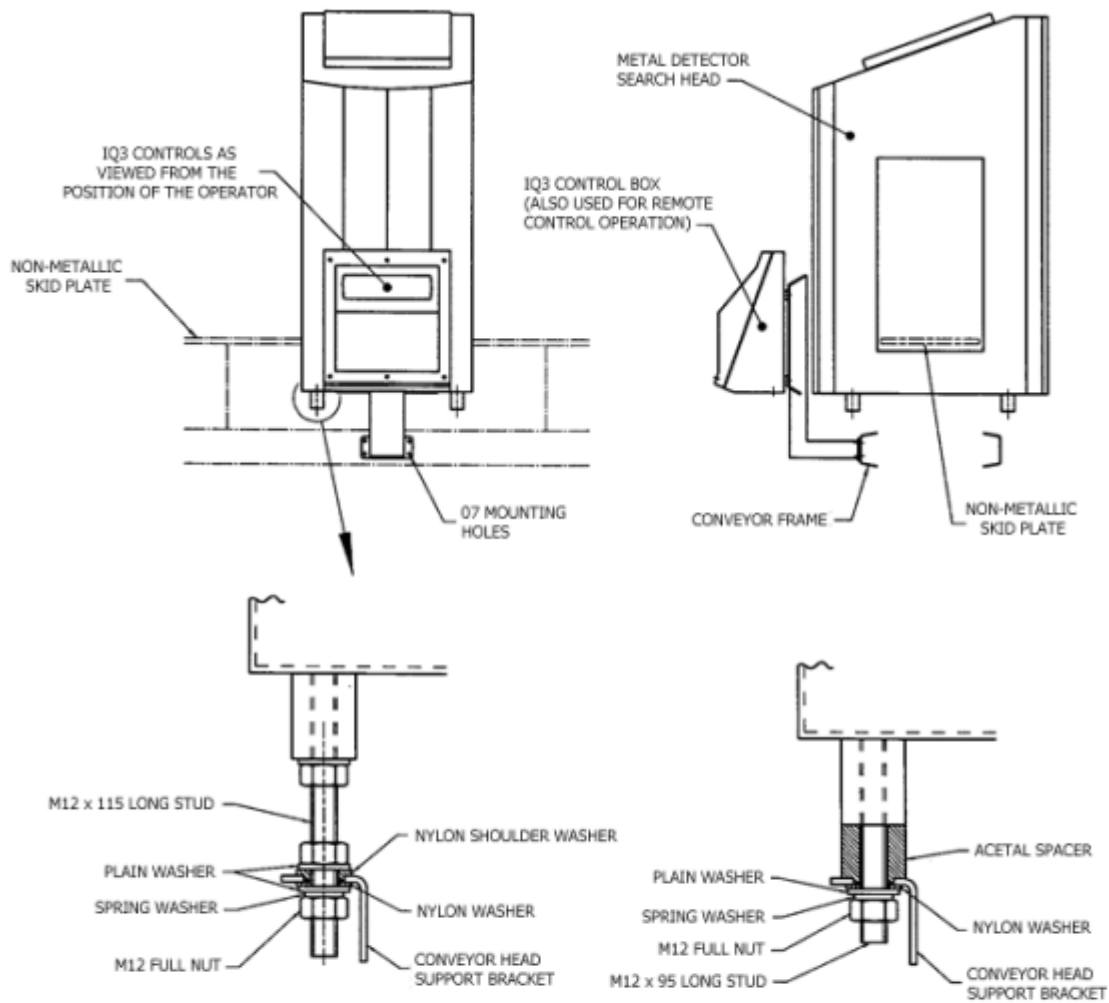
Detector Head Mounting Positions

This section contains standard mounting positions for Loma Metal Detector heads.



When refitting the head control panel cover, the cover fixing screws must be tightened to 4Nm torque to maintain the integrity of the IP69K rating for the head; preventing ingress of water or condensation.





TYPICAL ADJUSTABLE MOUNTING ARRANGEMENT
RECOMMENDED FOR APERTURE WIDTHS UP TO 350mm

TYPICAL FIXED MOUNTING ARRANGEMENT RECOMMENDED
FOR APERTURE WIDTHS GREATER THAN 350mm

NOTE:

THE COMMUNICATION CABLE BETWEEN THE METAL DETECTOR SEARCH HEAD AND IQ3 CONTROL BOX IS NOT TO EXCEED 2M IN LENGTH.

FOR REMOTE CONTROL OPTIONS WHERE THE CABLE LENGTH IS LIKELY TO EXCEED 2M A SEPARATE POWER SUPPLY UNIT IS SUPPLIED IN THE IQ3 CONTROL BOX.

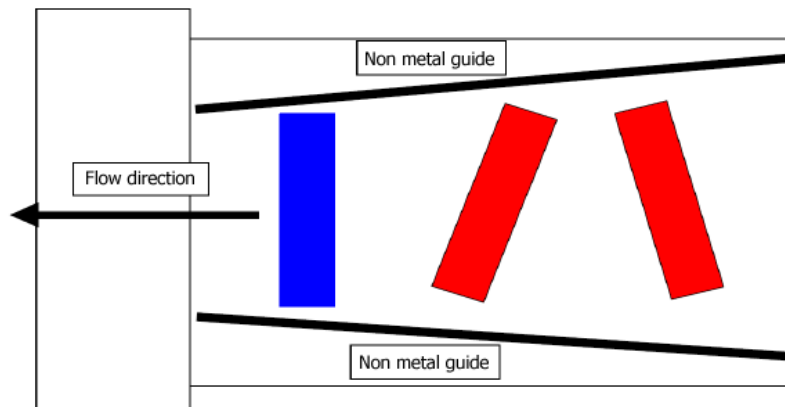
Mounting a Detector Head onto a Conveyor

Introduction

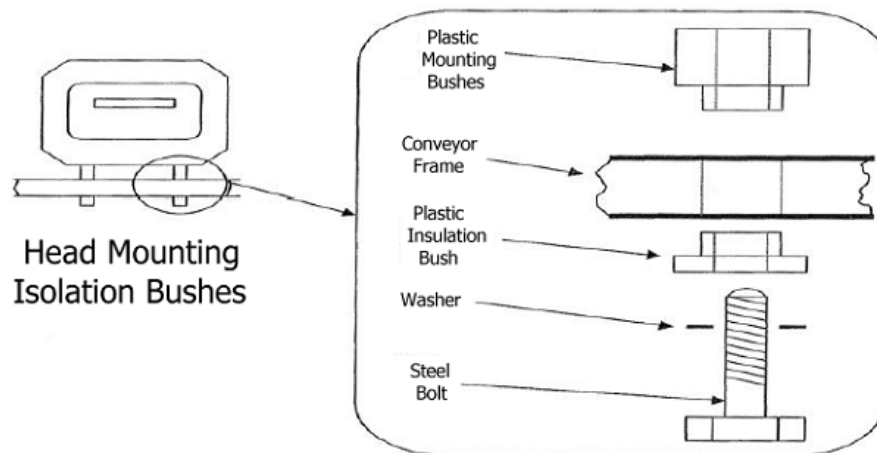
Loma Systems have been manufacturing metal detector systems for many years and our current conveyor design incorporates this wealth of experience. There are a number of integration rules that have to be followed when fitting a new detector head to an existing or third party conveyor to attain optimal performance and avoid nuisance triggering.

Basic Rules

1. The conveyor must be substantial and of welded **not bolted** construction.
2. The conveyor must have a means of height adjustment to level it to any infeed or outfeed conveyor systems and also to take out any unevenness of flooring. This is to provide conveyor stability.
3. No fixed metal is allowed nearer to the detector aperture than a distance of 1.5 times the smaller of the two aperture dimensions.
4. No moving metal is allowed nearer to the detector aperture than a distance of 3 times the smaller of the two aperture dimensions.
5. The detector head must be mounted on the conveyor using the supplied mounting kit.
6. The conveyor belt must be of a non metallic construction. The joint if applicable shall be heat sealed or vulcanised. Angled joints are preferred where possible, as are finger joints for thicker belts. Where modular belts are used, joining rods must be non metallic.
7. Rollers should be of a substantial construction to prevent bowing and crowned where applicable to help belt tracking on non modular belting.
8. Rollers can be PVC coated steel or aluminium or manufactured in a good quality stainless steel.
9. Rollers must be insulated from the main conveyor frame on at least one end to prevent the formation of eddy current loops as these can cause the detector to false trigger.
10. The conveyor belt must be supported through the detector aperture by a non metallic support such as a phenolic plastic or nylon strips. Whatever is used, it must be strong enough to support the intended product and not bow under the product weight.
11. Electrical interference: The reject relay usually switches inductive loads such as motor starter contactors and solenoid valves for air operated rejects. Its important that suitable suppressors are fitted to these devices.
12. Pack presentation: Consistent pack presentation is important to ensure optimal detection performance. Non Metal guides should be fitted to make sure that products do not randomly twist as they pass through the aperture. In the diagram below, where blue is good and red is bad, you can see that good guiding should present products correctly.



13. Head mechanical insulation: The head must be isolated from the conveyor metal work to reduce the transmission of vibration into the head. Isolation bushes must be fitted as shown in the diagram below



Reasoning Behind the Basic Rules

■ Nuisance triggering

Most problems with intermittent or nuisance triggering are due to insufficient appreciation of the basic rules of construction. For example: A bolted conveyor when brand new may appear to work perfectly well but over time bolts may work loose leading to nuisance triggering.

■ Conveyor construction

Where the product to be inspected is of a non conductive nature, such as powders or is hard frozen ($<-18^{\circ}\text{C}$ / -0.4°F) these can more than likely be run in the detectors DRY mode. In this mode it is inherently resistant to vibration/ shock

Where the product to be inspected is wet and salty and of a conductive nature, such as fresh meats, cheeses, pickles and sauces the detector uses a different mode of operation because it has to eliminate the product effect. When operating in this mode, the detector's resistance to vibration and shock is not as good as when operating in DRY mode.

Loma metal detectors are designed to minimise any vibration or shock effects when operating with conductive products. To further enhance this resistance the conveyor must be designed with consideration to the above rules.

The detector is a radio frequency (RF) transmitter and receiver device that sets up an electromagnetic field in the head aperture. The stainless steel case acts as a screen to prevent external metal or electrical or magnetic fields, affecting the search coil assembly and to retain the field within the case.

However because there is an opening (aperture) through which the product to be inspected must pass, some of this field radiates to the outside and, by induction, causes small electrical currents (eddy currents) to flow in nearby metallic structures that come within the effect of the field.

If these structures form closed electrical circuits (loops), then these "closed" loops will form part of the detector conveyor framework. Provided that the eddy current paths have a constant electrical resistance, the detector will normally ignore them.

Welding the framework of the conveyor ensures that most of the eddy current paths maintain a constant electrical resistance. It is impossible to guarantee this if the frame is bolted together – for example bolts can loosen slightly due to constant vibration or may not be fully tightened after general maintenance and bonding surfaces can corrode or be painted over, all of which will affect the resistance of a joint which can result in random false triggering.

With rollers it is virtually impossible to provide a constant resistance path mainly because the bearings are usually lubricated by grease that is non conductive. The bearings act as contacts and in consequence the contact resistance varies as they move through the grease.

The alternative approach of permanently open circuiting the loop must be taken. This can be done by electrically insulating one end of the roller shaft from the frame of the conveyor. In practice it does not matter whether the eddy current path is open or short circuited, provided it can guarantee to be constant throughout the life of the conveyor, since problems arise only when the resistance of the path varies.

Be careful also when installing a conveyor, since large eddy current loops can be formed by service conduits used for routing electrical and compressed air supplies. Only bring down one electrical conduit since it has to be bonded to the conveyor frame for safety electrical earthing purposes.

Ensure that the compressed air supply pipe, if metallic, is insulated where it touches the detector or the conveyor frame at any point, or the electrical conduit in the region of the conveyor. It is always better to bring the final air connection on a flexible nylon tube. To prove the point one may like to try a simple experiment. Take a piece of wire and form it into a loop a little smaller than the detectors aperture. Do not at this stage connect the two ends together. It will be found that the open circuit loop can be brought quite close to the aperture without causing the detector to trigger. If the ends of the loop are intermittently closed then open circuited, it will be seen that the detector will trigger at the instant of open or close circuiting, even if it is at some distance away from the head aperture.

Mounting Horizontal Heads for Use with Conductive Products

Loma heads up to 350mm in height are supplied with an adjustable height mounting kit. The purpose of the height adjustment is to enable the centre line of the conductive product to pass through the "centre line" of the head aperture.

Conductive Products and Mounting Heads Vertically

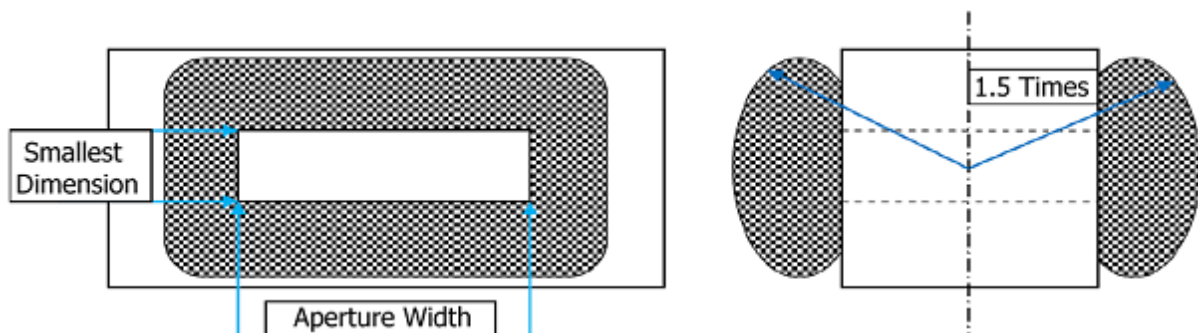
When mounting a metal detector head vertically, head the smallest dimension becomes the aperture width. The same rules apply as for centring a conductive product for a horizontal head. However the centre of the aperture now is in the vertical plane. For this set up, the product is centred using guides mounted on the conveyor, these channel the product centre through the aperture centre.

■ Fixed metal

Since the detector is efficiently screened, large masses of metal near the top, bottom or sides will not normally affect its performance. However metal that is nearer to the aperture than 1.5 times the smaller of the two aperture dimensions as measured from the centre of the case depth, can frequently be a major cause of poor performance, requiring the detector sensitivity to be reduced.

■ Moving Metal

Moving metal must be situated no nearer than 3 times the smaller aperture dimension from the detector as measured from the centre of the case depth



Moving metal excludes concentric rotating rollers. If they are concentric and can be guaranteed to stay that way, then they may be classed as fixed metal.

However it is important to reiterate that they must be insulated from the conveyor at one end or it is possible that they will cause false triggering by creating an intermittent eddy current path.

Other sources of moving metal can also include automatic reject devices, where the reject movement is detected or supply cables that are placed too close to the detectors aperture or not securely fixed down.

■ **Vibration**

It is important that the detector is not subjected to excessive vibration. The conveyor must be substantial and well supported (all feet/wheels should be touching the ground and locked) to keep the detector stable. Electrical services must be taken through flexible and not rigid conduit. Do not use the detector or control box as a convenient point to anchor any conduit or pipe work whatever, whether it be rigid or flexible. Do not use the detector or conveyor as a walkway or use the detector top to store items on.

■ **Belting**

Conveyor belts should be plastic or polyurethane. The belt joint is best angled, preferably at 60°, 90°. Joints are not preferred unless there is no other choice, joints must be vulcanised or heat sealed.

Clipped or sewn joints are not acceptable as product could become trapped making the belt less hygienic or contamination could become trapped. This will affect the performance of the detector.

Coloured belts sometimes contain oxide used as a colouring material. These are metallic in origin and therefore can be detectable resulting in either false triggering or a reduction in detector performance. Equally some belts have an antistatic coating that again can be detectable; this type of belt should be avoided.

Care must be taken when fitting and joining belts to ensure that all metallic swarf and filings have been cleared away. If any drilling of the conveyor frame is required at any time then great care must be taken to avoid accidental contamination of the belt.

Belt tracking systems should be easily adjustable. Crowned rollers can help tracking with non modular belt types. Always ensure that modular belt jointing pins are non-metallic.

■ **Skid Plate**

It is important that the belt does not touch the bottom or sides of the detector aperture. The belt must be supported through the aperture by a non-metallic material. Materials that can generate high levels of static charge from the continuous movement across the plate surface must be avoided. The material must be strong enough to support the weight of the product at all times. When fitted, the plate must not protrude above the level of the rollers. It is recommended to maintain at least a 10mm clearance between the undersides of the plate/belt to avoid contact with the bottom of the detector aperture.

■ **Electrical Interference**

The detector head operates at radio frequencies in the radio broadcast long wave spectrum. The detector has been designed with a high level of immunity to mains borne interference as well as airborne interference. If trouble is experienced, the interfering device/s should be located and the interference suppressed at source. However if this is not possible then the detector may have to be run at a reduced sensitivity.

It is also advised not to operate two metal detectors in close proximity that operate at the same fundamental frequency as interaction is possible.

To minimise this possibility two detectors interfering with each other, they should not be closer than a distance of not less than 16 times the smallest aperture dimension.

The presence of large amounts of metal such as from other conveyors or support frames in the vicinity of the detectors may mean the distance will have to be larger.

Other sources of airborne interference such as from speed controllers, radio paging devices, walkie-talkie radios and mobile telephones should not be operated in close proximity to the detector.

Post Installation Problems

■ Spurious Triggering

The Loma range of detectors is the product of many years experience and development. They are inherently reliable, provided that it is installed and set up correctly. Remember that the detector can detect moving metal anywhere within its metal free zone. This is up to a distance of 3 times the smaller of the aperture dimensions away from the detector.

Connecting the Detector Head Electrical Supplies



Connection of an electrical supply to the metal detector head must only be carried out by suitably trained and qualified personnel.

The supply voltage for the search head is indicated on the identification/rating label that is etched on the back of the search head. Diagrams are included to provide details for connection of the head to a suitable electrical supply and also for connection of the head to reject mechanisms, warning alarms and other external devices.

The following guidelines should be observed:

- The power source chosen should be clean and independent of any other equipment and have a good ground / earth connection.
- Power cabling must be rated at no less than 5A current carrying capability and be routed into the control box area through one of the four gland entry holes provided.
- Power cabling for a UL approved detector is 20 -16AWG fed from a locally positioned switch or power breaker that is within easy reach of the operator. The breaker must be labelled as the disconnecting device for the equipment. The cable tightening torque is 5.5in/lbs, routing into the control box area as described above.



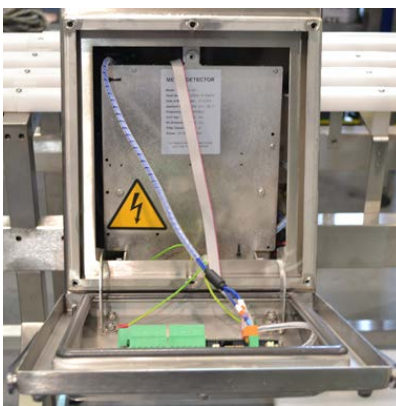
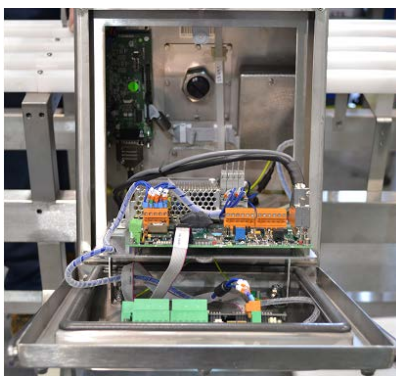
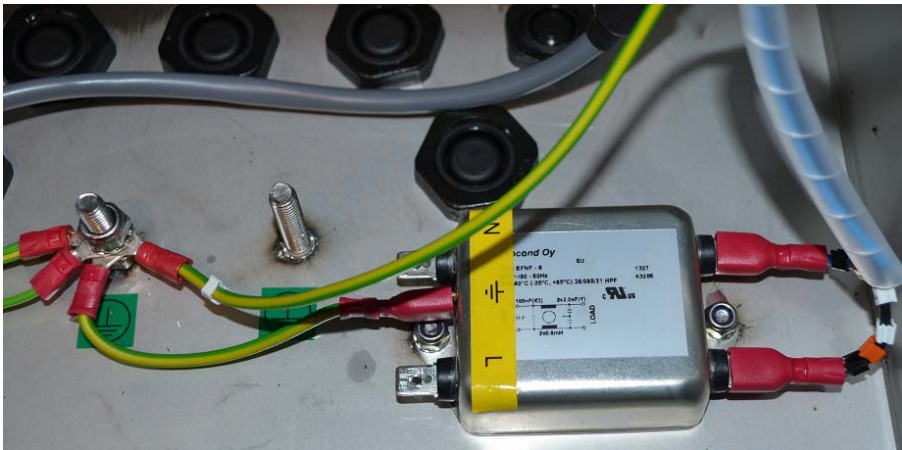
Do not use rigid conduit of any type. Rigid conduit can lead to vibration being transmitted to the head, resulting in spurious triggering.



When refitting the head control panel cover the cover fixing screws must be tightened to 4Nm torque to maintain the integrity of the IP69K rating for the head; preventing ingress of water or condensation.

The electrical supply is connected to the Mains Filter located inside the detector head front panel and then distributed around the head via a MEANWELL Power Supply.

To connect an electrical supply, proceed as follows:

1.	Remove the six front cover retaining bolts and drop down the cover until it is held against the supports	
2.	Remove the screw from the top of the metal cover plate and lower it down carefully	
3.	The Mains Filter is mounted inside the panel housing mounted on the right hand side. 	
4.	Push the mains cable up through one of the available cable glands. Then Split the cable inside the box and cut the wires to suitable lengths. An armoured/braided cable is recommended when cable conduit is not used. A suitable earth conductor is also to be fitted.	
5.	Crimp connectors onto the wires and connect to the Mains Filter as specified in the table below.	
6.	Check that all connections are secure then refit the metal cover plate and front cover.	



Ensure that the front panel cover fixing bolts have been tightened to 4Nm torque to maintain the integrity of the IP69K rating for the head; preventing ingress of water or condensation.

European	Colour	North America	Colour	Terminal
LIVE	Brown or Black	HOT	Black	L
NEUTRAL	Blue	NEUTRAL	White	N
EARTH	Green/Yellow	GROUND	Green	E
SCREEN	-	SCREEN	-	E



Do not use rigid conduit of any type. Rigid conduit can lead to vibration being transmitted to other components, resulting in spurious triggering / rejects.

Disconnecting the Power

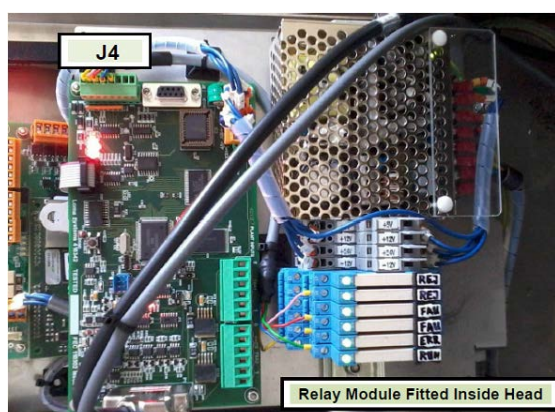
Before disconnecting the detector head from its power source, ensure that any signal cables connected to other equipment are disconnected first.

Input / Output Signal Information

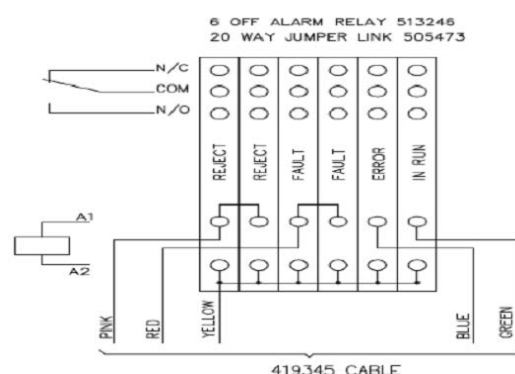
To connect to external devices a Relay kit, Loma part number 6120PL500, consisting of a relay module, a cable that connects the relay module to the mini control board and some cable ties, can be supplied.

Please refer to Loma Drawing 5000/C3/69405 – IQ³+ Miniboard External Relays Block Diagram. A copy of the diagram is supplied with the detector head and can also be obtained by contacting your local Loma Service Centre.

You can fit the relay module into the head using the supplied connecting cable as shown in the picture below or alternatively you can also fit the Relay module into an external electrical box. This will require a longer connecting cable (2.6 m) which is available from Loma under part number 419343.



Relay Module Wiring



To power external sensors and PECs, jumper JP7 on the mini control board is used to set the output voltage provided by the mini control board to either 12V or 24V as required.

When the jumper is set to the VEXT position, 24V is provided on TBA2 – Pin 6.

When the jumper is set to the +12V (VP) position, 12V is provided on TBA1 – Pin 6.

For any sensors that require +12V please use pin 2 of J1 for the supply feed.

When using the internal power module to supply power to the sensors, a link wire (GND) **must** be fitted from **TBA1** pin **5** to connection **7** (COM) of the Power supply module.

If this link wire is not fitted and the internal power supply is being used to supply power to the inputs/alarms/PEC they will not work as they will not be grounded.

Variable Speed Systems

On systems employing variable speed conveyors, special hardware is required to drive the CTB (conveyor time base) input on the micro control card. Conveyor systems supplied by Loma will already have this hardware fitted and commissioned, but when purchasing a detector head only, the following information should be observed when using a variable speed conveyor.

In order for the reject timing to work correctly, it must be supplied with information about how far the contaminant has travelled between the head and point of reject. This is achieved via a shaft encoder which supplies pulses to the CTB input of the micro control board.

The delay information, which is entered in the **Product setup** menu, then counts the CTB pulses out to time the contaminated product to the reject point. For this reason the delay is measured in distance, and should be set at the fastest conveyor speed in order for the reject device to actuate in time.

The dwell, on the other hand, should be set at the slowest belt speed to guarantee accurate rejection at all speeds. The dwell can be in units of time or distance depending upon the type of reject device.

Installing a Metal Detector System

This chapter provides generic information covering the installation of a Loma Metal Detector System in a logical sequence. The system includes a detector head fitted to a European conveyor belt.

The following sub-sections provide more information:

■ Warnings

A list of applicable [safety warnings](#) to be observed when installing the metal detector system is provided.

■ Receiving and Unpacking

Some basic checks should be carried out on receipt of the system to ensure that it has not been damaged in transit.

■ Moving the Machine

Depending on the size and weight of the system, either a crane or a fork-lift truck will be required to lift and move it into the final location. This section provides some guidance for moving the system safely.

■ Adjusting / Levelling the Conveyor

For systems supplied that incorporate a conveyor the operating height may need to be adjusted so that it can be integrated into your production line. This section provides some guidance for levelling the system.

■ Clearance Requirements

From safety and operational viewpoints, it is important that sufficient free space is left around the system, This section provides some guidance.

■ Connecting the Air Supply

Except where a metal detector head only has been supplied, all Loma inspection systems require a clean and dry compressed air supply where optional automatic reject devices are fitted. This section provides some guidance on connecting the air supply.

■ [Connecting the Electrical Supplies](#)

The system should have its own dedicated electrical supply, unless the line supply is known to be clean. The earth should be robust, of low impedance and noise free. This section provides some guidance on connecting an electrical supply.

■ [Checking Guards](#)

The system should have its own dedicated electrical supply, unless the line supply is known to be clean. The earth should be robust, of low impedance and noise free. This section provides some guidance on connecting an electrical supply.

■ [Checking Belt Tracking](#)

The system should have its own dedicated electrical supply, unless the line supply is known to be clean. The earth should be robust, of low impedance and noise free. This section provides some guidance on connecting an electrical supply.

■ [Setting Up Reject Mechanisms](#)

The conveyor system is supplied with the reject mechanism correctly set up. Normally no further adjustment should be required.

■ [Remote User Interface](#)

The electronic controls for the metal detector are integrated into the search head along with the user interface, but the user interface can be mounted remotely in it's own housing where access would otherwise be difficult.

■ [Installing a Serial Link](#)

In order to use any of the serial link options your detector will require a cable and connector assembly which facilitates external connection to the on board serial link electronics.

Warnings

The following safety warnings apply when installing an IQ³ + Metal Detector head:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES
2. LETHAL HAZARD – COMPRESSED AIR SUPPLIES
3. NON-IONIZING RADIATION
4. WORKING ON EQUIPMENT
5. REJECT DEVICES
6. EXCESSIVE NOISE
7. HEAVY EQUIPMENT
8. LIFTING THE MACHINE
9. MOVING THE MACHINE
10. CONTAMINANTS

For details see the [Safety Warnings](#) section.

The following emergency procedures apply to these procedures:

2. DEALING WITH FIRE.

For details see the [Emergency Procedures](#) section.

Receiving and Unpacking

Receiving the machine

- On receipt of your Loma inspection machine, we recommend that you check the external packing for any signs of damage.
- If the external packaging is damaged do not refuse the shipment but make a notation on the carriers delivery receipt and take pictures of the packaging damage.
- When moving the machine, please follow the guidance included in the [Moving the Machine](#) section.

Unpacking the machine

- Remove all packing and retain in case the machine has to be repacked for return.
- If on unpacking the machine it is subsequently found to be damaged, take further pictures of the damage and send them to Loma Systems. Loma Systems will then carry out an investigation, including a review of the applicable carriage terms / Incoterms, to decide what action is to be taken.
- Wheels (if fitted) are screwed fully in and are locked (UK only), or supplied in a polythene bag which is placed inside the reject bin (Europe). Remove them from the reject bin and remove the packing material. Then fit the wheels to the out rigged legs of the machine frame. You may need to raise the machine to fit the wheels so please follow the guidance included in the [Moving the Machine](#) section.
- Feet may have been fitted for transit purposes or 20 mm bolts may be used to secure the machine to a pallet. Conveyors for customers in Europe may have been secured to the pallet by 20 mm bolts which are screwed into the underside of the legs. Remove these bolts if fitted. You may need to raise the machine to remove the transit bolts and fit the feet so please follow the guidance included in the Moving the Machine section.

Removing Bolts and Fitting Wheels

- Conveyors for customers in Europe may have been secured to the pallet by 20 mm bolts which are screwed into the underside of the legs. Remove these bolts if fitted
- If wheels have been supplied for the conveyor, remove them from the reject bin and remove the packing material. Fit the wheels to the outrigger legs of the conveyor. This is best done when the system has been raised up to take the weight off of the legs and allow room to screw in the wheels.

Moving the Machine

Depending on the size and weight of the machine, either a crane or a fork-lift truck will be required to lift and move it into the final location.

When a machine fitted with wheels is to be pushed on the wheels, it is important that it is moved carefully. Avoid hitting obstacles with the wheels as this can damage the plastic wheel inserts inside the legs.

Using a Crane

- Position the straps under the frame and around the machine so that it will not tilt when lifted. Then attach the straps to the crane.
- Lift the machine carefully and move it to the required location.
- Lower the machine and remove the straps.
- Do not attempt to lift or move a machine by a reject cover as they are easily damaged.

Using a Fork Lift Truck

- A machine tends to be top heavy so may topple forwards when lifted. For this reason it is advised that the machine is positioned on the forks with the front of the machine facing backwards.

- Raise the forks sufficiently to lift the machine clear of the ground and any obstacles.
- Carefully move the machine to the required location.
- Lower the forks and withdraw them from the machine.

Adjusting / Levelling the Conveyor

For systems supplied that incorporate one or a number of conveyors the operating height may need to be adjusted so that it can be integrated into your production line.

- Adjust the infeed and outfeed heights as necessary by means of either the adjustable feet or adjustable wheels. Then lock the wheels (if fitted).
- Ensure that all feet or wheels are firmly on the ground, and are evenly supporting the conveyor so that it does not rock.
- If necessary, anchor the conveyor to the ground using bolts screwed into the feet.
- Do not fasten the conveyor to any other piece of machinery as this could lead to vibration being transmitted to other parts of the machine, resulting in spurious triggering / rejects.
- If the conveyor is fitted with feet, you are recommended to apply silicone sealant around the feet and floor.

Clearance Requirements

From safety and operational viewpoints, it is important that sufficient free space is left around the machine, specifically the front and back, to enable commissioning and for maintenance personnel to easily gain access to components.

It is recommended that wherever possible a minimum of 1 metre free space is available at the front of the machine and 1 metre at the rear.

Connecting the Air Supply



Do not start the machine and initiate the use of any compressed air before the Loma commissioning engineer has approved the installation.

Except where a metal detector head only is being supplied, all Loma metal detector systems require a clean and dry compressed air supply, primarily to operate the optional automatic reject system.

It is therefore essential that the air supply is robust enough for correct operation of the system when the reject operates.

- **Pneumatic Assembly** – The pneumatic system consists of the following components:
 - **Isolator Switch** – The external air supply is connected to the switch which is used to turn the supply to the system on and off. The air supply is then fed into the Air Regulator.



The Isolator Switch can be locked in the 'OFF' position using a padlock to prevent accidental operation whilst carrying out servicing and maintenance activities.

- **Air Regulator** – The air regulator is used to set the air pressure being supplied to the system. A drain trap is provided to remove any water that collects in the system. See the [Maintenance](#) section for further details. The air supply is then fed into the Dump Valve.
- **Dump Valve** – The dump valve is a safety device that dumps air pressure from the system in an emergency to protect the operator. It also includes a soft start feature which allows air pressure to build slowly following an air pressure dump to prevent damage or injury. The air supply is fed from the valve to the input connection on the Reject Valve.



■ **Reject Valve** – The Reject Valve is attached to the pneumatic assembly and contains five ports as follows:

- **Air Supply Input Port** – The air supply from the dump valve is connected to the input.
- **Air Supply Output Port 1** – The air supply is fed to one side of a reject device. For example when fitted to one side of a double acting air cylinder, the air drives a rod attached to a nylon blade to push product off a conveyor into a reject bin.
- **Air Supply Output Port 2** - The air supply is fed to the other side of a reject device. For example when fitted to the other side of a double acting air cylinder, the air drives a rod attached to a nylon blade back to its start position.
- **Air Supply Dump Output Port 1** – When an emergency stop is activated, the air pressure captured in one side of the reject device is dumped through this port. A suppressor is fitted to the port to reduce any noise generated.
- **Air Supply Dump Output Port 2** – When an emergency stop is activated, the air pressure captured in the other side of the reject device is dumped through this port. A suppressor is fitted to the port to reduce any noise generated



In addition for fail-safe reasons an air pressure switch is fitted in order to alert the operator that the air supply is low (below 40psi / 2.8 bar) and to shut down the system; generating a fault condition.

The system will be supplied with the pneumatic system already fitted and connected to the applicable reject device.

Therefore the only actions required are to connect the air supply to the input side of the air regulator using 10mm O/D tubing and set the air pressure using the regulator.

The air pressure should be set to 80psi (5.5 bar) except when being used to supply an air-blast reject device when the pressure should be set to 100psi (6.9 bar). The minimum air pressure must not fall below 65psi (4.5 bar) when the reject operates.



Care should be taken when cutting the compressed air supply tube to length before fitting to ensure that no particles enter the tube as this may cause damage to or prevent the high precision air nozzles from operating correctly.

Connecting the Electrical Supplies



Connection of the machine to an electrical supply must only be carried out by suitably trained and qualified personnel.

The supply voltage for the machine is indicated on the identification/rating plate that is mounted on the frame. An electrical diagram is supplied with each machine to provide connection details.

The machine should have its own dedicated supply, unless the line supply is known to be clean. The earth should be robust, of low impedance and noise free.

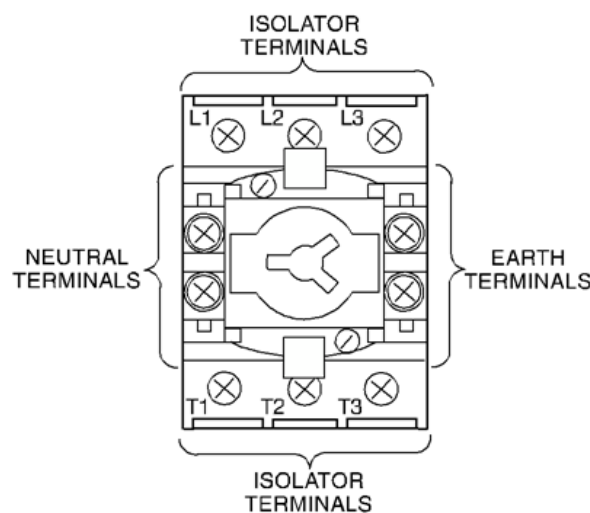
Any dedicated supply line should be run in its own conduit / trunking away from other noisy supplies. The input voltage should not be subject to voltage fluctuations outside the limits (NWML0320):

- Minus 15% to plus 10% of the nominal supply voltage (230V or 110V).
- Zero voltage for more than 20mS.
- 50% of nominal voltage for more than 40mS.
- 80% of nominal voltage for more than 100mS.

Operation outside these limits may cause loss of function until the supply condition recovers to within limits.

The standard metal detector conveyor is fitted with a starter isolator and a 24V ac control circuit. The supply voltage for the conveyor is indicated on the identification plate that is mounted on the frame.

The following illustration shows the isolator inside a typical electrical services box



The Isolator Switch can be locked in the 'OFF' position using a padlock to prevent electrical power being restored whilst carrying out servicing and maintenance activities.

To connect an electrical supply, proceed as follows:

1.	Unlock and open the Electrical Services Box to access the electrical services.
2.	The back of the Isolator Switch is located in the bottom right hand side of the cabinet when viewed from the rear. Beneath it on the bottom of the cabinet is the cable gland access for the power cable.
3.	Push the supply cable up into the Electrical Services Box through the cable gland.
4.	Split the cable inside the box and cut the wires to suitable lengths. An armoured/braided cable is recommended when cable conduit is not used. A suitable earth conductor is also to be fitted.
5.	Crimp connectors onto the wires and connect to the Isolator Switch as specified in the table below.
6.	Check that all connections are secure then refit the metal cover plate and front cover.



The supply to the conveyor must be either 5-core cable (3-core cable is suitable for single phase machines) fed through a flexible conduit or 5-core armoured cable. Insert the cable through the gland.

Do not use rigid conduit of any type. Rigid conduit can lead to vibration being transmitted to other components, resulting in spurious triggering / rejects.

Cable Connections

3-Phase, Earth and Neutral	
Core	Terminal
3-phases	L1, L2 and L3
Neutral	N
Earth	E
3-Phase, Earth, No Neutral	
Core	Terminal
3-phases	L1, L2 and L3
Neutral	Not used
Earth	E
1-Phase, Earth and Neutral	
Core	Terminal
1-phase	L1
Neutral	N
Earth	E



Do not start the machine and initiate the use of any electrical circuitry before the Loma commissioning engineer has approved the installation.

Checking Guards

- Check that all guards are securely fastened in place.
- On some conveyors that are made to special order, hatches may be fitted to permit access to some areas of the machine. These hatches are generally fitted with electrical interlocks which prevent the machine from operating whilst a hatch is open. Check that all hatches are closed.
- Check that the infeed and outfeed areas of the conveyor are clear of obstructions.

Checking Belt Tracking (PV belt system only)

The belt must be checked for correct tracking before running the conveyor for any length of time. If belt tracking needs to be reset. See [Conveyor Belt Maintenance](#) for further details.

Setting Up Reject Mechanisms

The conveyor system is supplied with the reject mechanism correctly set up. Normally, no further adjustment should be required. If adjustment is required see [Adjusting the Reject Mechanisms](#) for further details.

If the reject Delay and Dwell times need to be adjusted, these are set up via the user interface from the control panel. See [Adding a New Product](#) for further details.

Remote User Interface

The electronic controls for the metal detector are integrated into the search head along with the user interface, but the user interface can be mounted remotely in it's own housing where access would otherwise be difficult.

Two versions of remote user interface are available, one with an on-board power supply and one without. The model with the on-board power supply must be used where the cabling between the search head and user interface exceeds two metres in length.

Care must be taken when routing the cabling to the remote user interface to observe good EMC practice – do not run with mains or high energy switching cables.

Installing a Serial Link

The main control electronics board must have the optional serial link board fitted.

In order to use any of the serial link options your detector will require a cable and connector assembly which facilitates external connection to the on board serial link electronics. The connector is normally located on the underside of the control box.

If a serial link option was ordered with your detector the necessary internal cables and external socket complete with a blank mating external plug and connection diagrams will be supplied. If you wish to add a serial link to an existing system please contact your local Service Centre who will be pleased to assist. See the Setting Up Serial Links section for further details.

Site Considerations

Electromagnetic Compatibility (EMC)

All Loma machines are designed, and tested, to operate under factory conditions and have been tested to recognised international standards for Electromagnetic Compatibility (EMC), both in terms of not emitting excessively and not being subject to undesirable operation in the presence of other equipment whose emissions also meet the standards.

This approach allows Loma to offer stable operation, even in RF noisy environments, provided the other equipment is to the same standards and the field wiring is suitably 'hard'.

It is still necessary, however, to ensure that the machine is not subjected to excessive electrical noise via its supply or airborne sources.

Selection of Frequency Band

If two or more metal detectors sited within the same area are operating at the same frequency, then they will interfere with each other leading to false rejects and unstable operation.

To overcome this problem, the detectors can be set to operate on one of ten different bands through the [Search Head Setup](#) screen. It is therefore very important to ensure that detectors operating near one another are set to operate at different bands. See [Frequency Selection](#) for further details.

Other EMC considerations

Any signal I/O which is connected to the auxiliary connections should be in screened cable, grounded at one end by a low impedance path to RF, and kept free from sources of electrical noise (e.g. mains supplies for large electrical machines).

The metal detector is a highly sensitive RF measuring device, which is well screened from outside interference and has excellent electronic discrimination against unwanted electromagnetic fields. However, due to its sensitivity it is possible that other devices which emit high levels of RF noise at the operating frequency of the detector could cause interference, thereby degrading the performance of the detector.

It is therefore important to avoid siting the detector next to any devices which emit abnormally high levels of RF interference if proper operation is to be maintained.

Radio Frequency Interference

A metal detector is, essentially, a Radio Frequency (RF) transmitter and receiver. As such it is sensitive to RF noise in the general vicinity of the detector location. Whilst those frequencies not close to the operating frequency of the detector will usually be filtered out (this includes most 'walkie talkie' frequencies, unless the transmitter is held very close to the detector aperture), it is not uncommon for the control frequency (or multiple of it), used in modern speed controllers, to cause interference.

To reduce the risks of such interference causing false rejects or other symptoms of undesirable operation at the metal detector, the following recommendations should be followed:

- Always route speed controller input and output wiring away from the metal detector area. NEVER put speed controller wiring in the same conduit or on the same supply as the metal detector wiring.
- Run speed controller wiring in the general vicinity of the metal detector in a rigid steel conduit or use other techniques to ensure 100% screening of the cable.
- Always follow the speed controller manufacturer's instructions for installation, wiring, screening and grounding.

In addition to following these guidelines, most speed controller manufacturers supply input and output filters which can be fitted to the field wiring to dramatically reduce RF emissions if necessary.

All Loma metal detectors are designed, and tested, to meet the requirements of the FCC and the new stringent European regulations for RF emissions, both in terms of not emitting excessively and not being subject to undesirable operation in the presence of other equipment whose emissions also meet the standards. This approach allows Loma to offer stable operation even in RF noisy environments, provided the other equipment is to the same standards and the field wiring is suitable 'hard'.

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About the Metal Detector Range

Introduction

Loma's metal detectors are packed with some incredible patented innovations, which are all designed to make them compliant with current legislation and best in class.

Even more robust and reliable, the latest products continue to lead the way in tackling key industry challenges and standards, notably food inspection Codes of Practice and user traceability. Its breakthrough innovations, including a new touch screen display, can be easily retrofitted to older product versions on request.

The search head is available separately for fitting to your own conveyor or this can be supplied as a system, already fitted to a Loma conveyor. A Pipeline Metal Detector is also included in the range for inspecting pumped products.

The items numbered in the figure are listed and described below.

- 1 - [Metal Detector Search Heads](#)
- 2 - [Conveyor Belts](#)
- 3 - [Reject Devices](#)
- 4 - [Electrical Services Box](#)
- 5 - [LED Lamp Stack](#)
- 6 - [Product Guides](#)
- 7 - [Guards](#)



Metal Detector Search Heads

To cater for the requirements of different types of product the IQ³+ Metal Detector Search Head is available in a range of aperture heights and widths to suit the product to be inspected.



Standard Features

- **Variable Frequency Capability** - Loma is the only company in the industry that offers true variable frequency, operating between 40 - 900 kHz. This means that you can configure the same machine for use with a variety of products. Through the systems product 'Learn' feature, the correct frequency for a product can be automatically set in seconds, eliminating past performance restrictions caused by limited frequency metal detectors.
- **Environmental Protection Cover** – A plastic cover, mounted on hinges, is provided to go over the touch screen to prevent the screen being damaged during cleaning operations.

Optional Features

The following optional features are supplied with a detector search head:

- **Harsh Environment Protection Liner** – This white aperture liner is made from POM C Acetyl Copolymer and is suitable for harsh applications where the product temperature is > 30 degrees or if hose down or steam cleaning is to be used.
- **Remote Control Kit** - The remote controls is provided with a fully enclosed IQ³+ control box, a mounting kit and bracket to mount on a frame/structure with up to 10-meter cable. Remote boxes above a 2 metre distance from the search head have a local power supply unit fitted to run the touch screen display. A local mains power supply is required for the control box.
- **Lamp Stack** – A plastic LED lamp stack with audible alarm included (several sound alarm available and volume adjustable) is available. The lamp base is mounted on a pole on the side of the head and provides visual signalling as follows:
 - **Red Lamp** – System Error.
 - **Orange Lamp** – Detection / Rejection.
 - **Green Lamp** – Normal Running / Inspection.
 - **Blue Lamp** – Run Error / PVS Test.

- **Communication Packages** – The search head is compatible with the following communication packages:
 - **LomaEnet** (serial link board required) – The LomaEnet Capture application provides the facility to distribute copies of reports generated by the metal detector to other suitable devices that are on the same computer network as the metal detector. This allows personnel to analyse and archive data.
 - **LomaLink** (serial link board required) - A serial connection is used to communicate with the metal detector using a remote PC.
 - **Ethernet** (serial link & ethernet boards required).
 - **LomaOPC** (serial link & ethernet boards required) – The LomaOPC application is installed onto a remote PC and a serial connection established to pass data using OPC tags.

The search head can be fitted with a number of external sensors; an optional sensor board is required for this.

Conveyor Belts

Loma conveyors are fitted with either flat belts which are suitable for use with lighter products or plastic modular belts which are suitable for use with heavier products in a harsher environment.

The belts are positively driven from a central drive sprocket that is secured on a square-section drive shaft. This means that no slippage and no deviation in tracking can occur.

Flat Belts


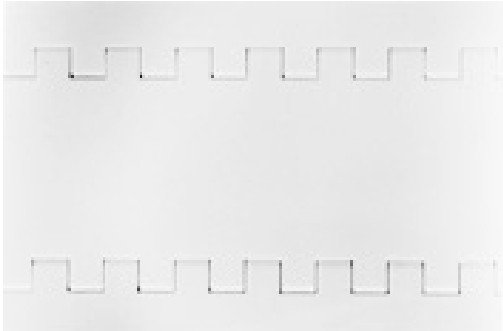
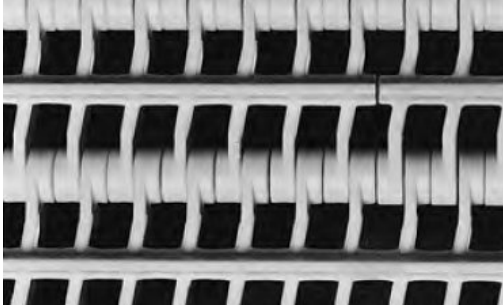
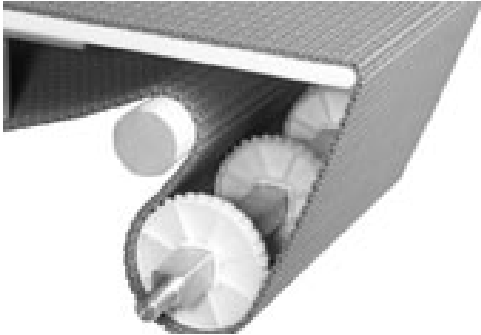
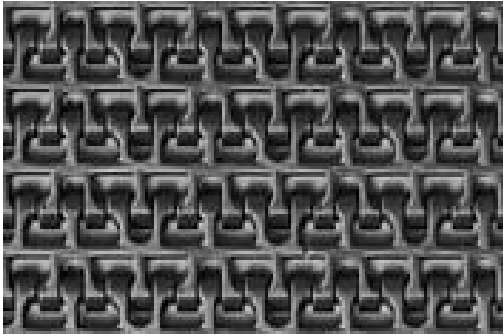
Flat belts are constructed from polyurethane and have a smooth surface. They are supplied as standard in white but blue coloured belts are available if required.



Plastic Modular Belts

The plastic modular belt conveyors use a belt constructed from injected-moulded plastic modules, assembled into an interlocked unit and joined by plastic hinge rods.

The following table gives details of the three different plastic modular belt types supplied by Loma:

Belt Type	Design	Applications
Flat top	Smooth closed surface	Wrapped or loose products
 		
Flush grid	Open grid pattern with a smooth surface	Boxed or wrapped products
 		
Lightweight flush grid	Open grid pattern with a smooth surface	Boxed or wrapped products
 		

Reject Devices

Reject Devices

Loma Systems offer a range of reject devices for removing contaminated products from your production line, based on a number of factors including the product type, its general dimensions, the general set up of your production line and of course how you wish to handle contaminated products.

The following reject devices are available and may be fitted to your machine:

- **Stop On Detect (SOD)**

The Stop-On-Detect reject device causes the conveyor to stop moving and an alarm to sound, indicating that a contaminant has been detected.

- **Air Blast**

The air blast reject device uses a high pressure blast of compressed air to push a contaminated product off the belt into the reject bin.

- **Pusher**

The pusher reject device pushes the contaminated product off the belt into the reject bin.

- **Plough**

The plough reject device swings across the belt to divert the contaminated product off the belt into the reject bin.

- **Retracting Band**

The retracting band reject device uses compressed air to activate a carriage retracting mechanism to create a gap in the conveyor belt. The contaminated product then falls through the gap and into a reject bin, which is mounted on the underside of the conveyor.

- **Powered Decliner**

The powered decliner reject device uses compressed air to activate a carriage declining mechanism which guides the contaminated product into a reject bin mounted on the underside of the conveyor. The carriage then returns to its original position,

- **Signal Only**

Alternatively, a conveyor can be supplied without a reject device but with 'Signal Only' output.

On detection of metallic contaminant in the product, the control unit provides an output signal only. This conveyor can be used in conjunction with the customer's choice of equipment.

As standard, a reject cover is fitted over the outfeed part of the belt and the reject device. This protective device is intended to stop any part of a person's body from being placed within the operating area of the reject device. The Stop-On-Detect reject is not fitted with a reject cover.

Stop On Detect

Stop On Detect is the simplest type of reject device available which is most suitable for removing heavy, awkward shaped and continuous strip contaminated products from your production line.

When a contaminated product is detected the conveyor belt will stop and an alarm will sound, allowing you to remove the product from the conveyor belt and dispose of it in accordance with your local procedures.

After removal of the contaminated product, you must then manually restart the conveyor.

Stop On Detect reject device are suitable for use with systems where a maximum of 60 packs are being presented for inspection per minute and the maximum individual pack weight is 60Kg.

Air Blast

The Air Blast reject device is suitable for removing contaminated wrapped products from your production line using a high pressure blast of compressed air to push the contaminated product off of the conveyor belt and into a reject bin.

Generally a single nozzle is specified but a second nozzle can be fitted when required to provide more control or to reject over or underweight packs into a separate reject bin where the metal detector is being used in combination with a checkweigher.

Air Blast reject devices are suitable for use with systems where a maximum of 250 packs are being presented for inspection per minute and the maximum individual pack weight is 500g.

Pusher

The Pusher reject device is suitable for removing contaminated wrapped products in rigid packaging from your production line.

An acetyl blade, driven by a blast of high pressure compressed air, pushes the contaminated product off of the conveyor belt and into a reject bin.

Generally the pusher blade pushes the product off of the conveyor belt from the side, but an overhead pusher can be fitted when required to suit the product or production line set up.

Pusher reject devices are suitable for use with systems where a maximum of 100 packs are being presented for inspection per minute and the maximum individual pack weight is 10Kg. However, a heavy duty pusher is available which can be used for pack weights up to 50Kg. A reject roller track, rather than a reject bin, is recommended for use with a heavy duty pusher to remove the product safely from your production line.

Plough

The Plough reject device, sometimes referred to as the diverter, is suitable for removing cylindrical products being presented at a low rate from your production line.

An acetyl blade, driven by a blast of high pressure compressed air, moves across the conveyor belt to divert the contaminated product off of the conveyor belt and into a reject bin.

Plough reject devices are suitable for use with systems where a maximum of 60 packs are being presented for inspection per minute and the maximum individual pack weight is 1Kg.

Retracting Band

The retracting band reject device is suitable for removing continuous loose products such as polythene bags and sachets from your production line.

The device uses compressed air to activate a carriage retracting mechanism to create a gap in the conveyor belt. The contaminated product then falls through the gap and into a reject bin, which is mounted on the underside of the conveyor.

Retracting band reject devices are suitable for use with systems where a maximum of 100 packs are being presented for inspection per minute and the maximum individual pack weight is 5Kg. However, multiple lanes may be employed to increase the overall number of packs that are presented for inspection per minute.

Powered Decliner

The Powered Decliner reject device uses compressed air to activate a carriage decliner mechanism to lower part of the conveyor belt and direct the contaminated product into a reject bin or run off area.

The carriage is then raised back up to its normal position.

Signal Only

Alternatively, a conveyor can be supplied without a reject device but with 'Signal Only' output. On detection of metallic contaminant in the product, the control unit provides an output signal only. This conveyor can be used in conjunction with the customer's choice of equipment.

Reject Bins

Two sizes of reject bin are available for collecting contaminated products removed from the conveyor belt using a pneumatic reject device. The size of the bin required is determined by the conveyor length and the size and weight of the product to be rejected.





Reject bins are fitted with a lockable door as standard and optionally with an electronically operated door lock mechanism that may be opened and locked by operators with a specific user level access account through the user interface. The bin is unlocked through the [Rejects Setup](#) screen.

In addition the bin can optionally be fitted with a 'Bin Full' photo-eye which generates a warning when the bin needs to be emptied. A 'test' paddle can also be fitted to manually check that the Bin Full photo-eye is working correctly. Monitoring of the 'Bin Full' status is enabled through the [GP I/O](#) screen.

Electrical Services Box

Electrical supplies to the conveyor are connected inside the electrical services box. The box is generally mounted at the front of the conveyor frame but can be overhead mounted. Supplies are connected via the Isolator Switch. The internal components may be mounted on a printed circuit board or on din rails if a PLC version is supplied.

The door of the box is fitted with the Isolator Switch, Conveyor 'Stop' and 'Start' buttons and the Emergency 'Stop' button as described in the table below.

	The Isolator Switch is located on the front of the Electrical Services Box and is shown here in the ON position. Power is being supplied to the machine.
	The Isolator Switch is shown here in the OFF position. Power is NOT being supplied to the machine.
	<p>The conveyor Start/Stop button is located on the front of the Electrical Services Box and is used to start and stop the conveyor.</p> <p>Pushing the green section at the top of the button starts the conveyor and the white LED located in the middle of the button is lit to indicate this.</p> <p>Pushing the red section at the bottom of the button stops the conveyor and the white LED is extinguished.</p>
	The Emergency Stop button is located on the front of the Electrical Services Box and is to be used in EMERGENCIES ONLY to stop the machine.

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 contaminated products and also areas of the detector that are potentially hazardous.

Air Pressure Switch

An air pressure failure switch is fitted if the conveyor is supplied with either a pusher reject or a retracting band reject. The switch is set by Loma to operate if the pressure of the compressed air supply to the reject falls below 40psi (2.8 bar). The conveyor then stops.

Optional Equipment

The following options are available, depending on the type of reject mechanism fitted:

Option	Stop On Detect	Air Blast	Pusher	Retracting Band
Audible Alarm	S	O	O	O
'Bin Full' Photo-eye	-	O	O	O
LED Lamp Stack	O	O	O	O
Overhead Electrical Services	O	O	O	O
Product Guides	O	O	O	O
Product Registration Photo-eye	-	O	S	O
PVS Indicator Lamp	O	O	O	O
Reject Actuation Confirmation	-	-	O	O
Reject Confirmation with Photo-eye	-	O	O	O
Lockable Reject Bin + Monitoring	-	O	O	O
Pack Check Photo-eye	-	O	O	O

S = Standard fitting, O = Optional fitting.

The options are described in the following sections:

Audible Alarm

The alarm sounds when a contaminated product is detected. The maximum volume of the alarm lies in the range of 110 to 125 decibels (dB) at 1 metre but the level can be adjusted.

'Bin Full' Photo-eye

Warns when the reject bin is full.

LED Lamp Stack

A plastic LED lamp stack, or alternatively a dome, which includes an adjustable audible alarm, is available. The lamp base is mounted on a pole on the side of the head and provides visual signalling as follows:

- **Red Lamp** – System Error.
- **Orange Lamp** – Detection / Rejection.
- **Green Lamp** – Normal Running / Inspection.
- **Blue Lamp** – Run Error / PVS Test.



Overhead Electrical Services

The Electrical Services Box may be mounted overhead instead of at the front of the conveyor as is standard.

Product Guides

Product guides are useful for centring products through the detector aperture and controlling product presentation to prevent skewing.

Three types are available. One type is situated at the infeed to the conveyor only, the second is fitted through the search head, and the third is fitted along the full length of the conveyor. The guides can easily be adjusted to suit the width of a specific product.



Product Registration Photo-eye

Conveyors that are supplied with a pusher reject are fitted with a product registration photo-eye which allows the system to count the total number of packs that have been presented for inspection. It also provides the system with a timing reference for activating reject devices and works in conjunction with other optionally fitted photo-eyes to confirm that good packs have been passed and bad packs rejected..

As standard, the photo-eye is mounted on the side of the conveyor. It is used to register the position of the products on the conveyor. As an option, the photo-eye may be mounted directly above the belt. This is particularly suitable for the registration of products that have very little depth.

PVS Indicator Lamp

Illuminates when a pre-programmed Performance Validation System test is required. The normal colour is blue but it can be white if the system uses two search heads.

Reject Actuation Confirmation

Stops the conveyor when a contaminated product is detected and the reject solenoid fails to trigger.

Reject Confirmation with Photo-eye

A photo-eye is fitted across the entrance to the reject collection device to confirm that a pack has been rejected.

Lockable Reject Bin and Status Monitor

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 Supervisor access account. The status of the door lock is monitored by the software.

Pack Check Photo-eye

A photo-eye fitted onto the outfeed section of the conveyor after the reject mechanism works in conjunction with the Product Registration photo-eye to confirm that a good pack exits the system but a bad pack does not.

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Getting Started

This chapter provides some basic guidelines for initially using the IQ³+ Metal Detector.

The following sections provide more information:

- [User Interface](#)

This section provides brief a description of the machine's user interface so that you may navigate around the system to make the right selections.

- [User Access](#)

User access to the features and functionality of the machine is managed through one general and four password protected levels, listed and described below which are described in this section.

- [Logging In and Out](#)

Once a user account has been provided for you this section describes how to log in and out of your account.

- [Starting and Stopping](#)

Guidance is provided for each inspection machine type, describing how to start and stop the machine; including stopping the machine in an emergency.

User Interface

The IQ³+ Metal Detector provides a touch screen user interface located on the front of the machine control panel.

Through the user interface you can set up and manage all parameters required for inspecting products and for the general operation of the machine.







*To select an option on the touch screen you must **'tap'** the screen in the appropriate place. For consistency, we have used the terms **'tap'** and **'tapping'** throughout this guide to mean making a selection on the display screen.*



The user interface has been carefully designed to be as intuitive as possible, using common actions and symbols that you will see and use for operating other machines and computers.

You may not have access to a computer or printed copy of the User Guide when operating the machine, so some guidance and help is provided which is accessible within the user interface.

When the IQ³+ Metal Detector head is supplied fitted to a Loma conveyor, the following switches and buttons are also provided, mounted on the Electrical Services Box:

	The Isolator Switch is located on the front of the Electrical Services Box and is shown here in the ON position. Power is being supplied to the machine.
	The Isolator Switch is shown here in the OFF position. Power is NOT being supplied to the machine.
	<p>The conveyor Start/Stop button is located on the front of the Electrical Services Box and is used to start and stop the conveyor.</p> <p>Pushing the green section at the top of the button starts the conveyor and the white LED located in the middle of the button is lit to indicate this.</p> <p>Pushing the red section at the bottom of the button stops the conveyor and the white LED is extinguished.</p>
	The Emergency Stop button is located on the front of the Electrical Services Box and is to be used in EMERGENCIES ONLY to stop the machine.

User Access

User access to the features and functionality of the IQ³+ Metal Detector is managed through one general and four password protected levels, listed and described below, with each level providing access based on the user function.

During installation and commissioning, the Loma Engineer will set and provide you with passwords for accessing all user levels, which you can then provide to staff as required.

Named accounts may then be set up for each user, selecting a specific access level for them, with a unique password for each user to log in to the machine.

If you attempt to access a screen that is only available to user levels above your current logged in level, you will be prompted to enter a valid password for the required user level.

■ Log Off - (Level 0)

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. Any attempt to access other screens will display the [Select Access Level](#) screen

■ Operator - (Level 1)

This level of access is aimed at operators who need to use the machine functionality and features to carry out routine product inspections and remove any contaminated products from the production line. Users can view the Main Run Screen and are also able to open the Select Access Level screen.

■ Supervisor - (Level 2)

This level of access is aimed at supervisors who need to use the machine functionality and features to manage the selection and inspection of a range of products. It also includes access to features and functionality available to the Operator user. The user can change the product being run and can also run PV testing when prompted by the system.

■ Quality - (Level 3)

This level of access benefits staff that monitor and analyse inspection data to ensure that acceptable quality standards are achieved and maintained for all products inspected to meet customer and legislative requirements. It also includes access to features and functionality available to the Operator and Supervisor users. The user can reset batches, adjust thresholds, perform product learns, setup product parameters, perform log and report functions, setup the calendar, setup logs and reports, setup PV tests and also setup user accounts.

■ Engineer - (Level 4)

This level of access is aimed at engineers and technicians who need to carry out routine servicing and maintenance tasks to assure the high availability and performance of the machine. It also includes access to features and functionality available to the Operator, Supervisor and Quality users. The user can set up data comms, rejects, conveyor settings, user options, search head settings, VF drives, languages and perform LOMA service functions

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.



*It is recommended that you select the **Log Off** access level once you have completed your activities to prevent unauthorised access to features and functionality.*

Logging In and Out

This section provides guidance for logging in and out of the IQ³+ Metal Detector.

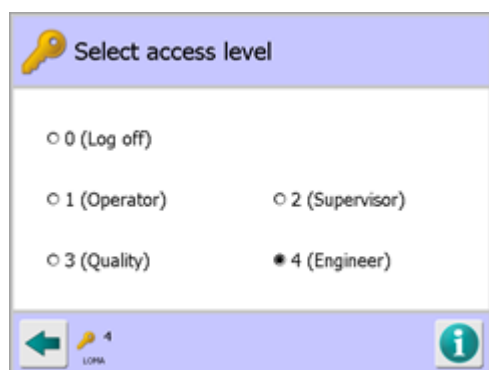




The following procedures assume that the machine is switched on and working normally, that the last user selected the Log Off access level and that your account has been added at the ENGINEER access level.

Logging In

To log in to the machine using your account details, proceed as follows:

1. Select the **Key** symbol at the bottom left hand corner of the currently displayed screen to display the [Select Access Level](#) screen.

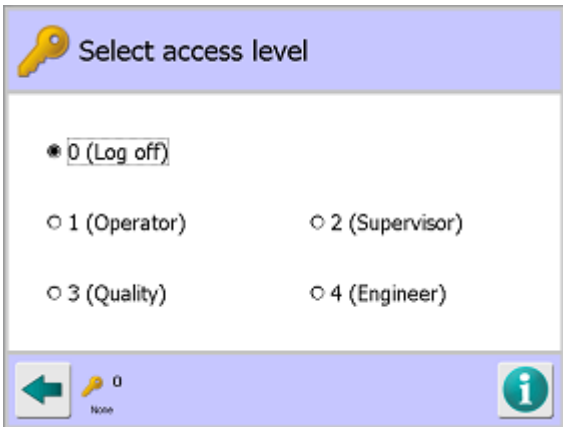


2.	<p>Select the Engineer access level option. The User Accounts screen will be displayed containing a list of all user accounts set up at the selected access level.</p> 
3.	<p>Select your account name in the list to display the Enter Password screen. Then enter your password number using the buttons provided and select the Tick button.</p> 
4.	<p>You are now logged in to your user account. The Main Run screen will be displayed.</p>

Logging Out

It is recommended that you change the User level to 'Log Off' once you have finished using the machine to preclude misuse of the system by untrained / unauthorised staff.

After around 10 minutes of inactivity the machine will automatically reset the user level to Log Off, but to change it manually proceed as follows:

1.	<p>Select the Key symbol at the bottom left hand corner of the currently displayed screen to display the Select Access Level screen. Then select the 'Log Off' option.</p> 
2.	<p>Select the GoTo button in the bottom left hand corner of the screen to complete the log off process. The Main Run screen will be displayed.</p>

Starting and Stopping


This section provides guidance for starting and stopping the IQ³+ Metal Detector, including stopping the machine in an emergency. It is assumed that the search head is mounted on a Loma conveyor.



The following procedures should only be carried out once all installation and commissioning activities have been completed and operators trained in the use of the machine.

Starting the Machine

To start the machine, proceed as follows:

1.	Ensure that the machine is connected to a suitable power supply and, if a pneumatic reject device is fitted, a suitable air supply .
2.	Turn the Isolator Switch , located on the electrical services box, in a clockwise direction. This will switch on the electrical supply to the machine.
3.	The machine will then start to load its operating software, during which it will also calibrate the touch screen.
4.	By default the Main Run screen is displayed, showing the operating status of the machine. 
5.	Push the green section of the Start/Stop button, located on the front of the electrical services box, to start the conveyor.
6.	The machine is now ready to start inspecting the selected product.

Stopping the Machine

To stop the machine, proceed as follows:

1.	Push the red section of the Start/Stop button, located on the front of the Electrical Services Box, to stop the conveyor.
2.	If you have finished using the machine, turn the Isolator switch in an anti-clockwise direction. This will switch off the electrical supply to the machine.

Emergency Stop

To stop the machine in an emergency, proceed as follows:

1.	Press the red Emergency Stop button, located on the front of the Electrical Services Box. The conveyor will then automatically stop.
----	---

Starting the Machine after an Emergency Stop

To start the machine after an emergency stop, proceed as follows:

1.	Ensure that any issue that caused you to stop the machine has been cleared.
2.	Turn the red Emergency Stop button clockwise and then release the button which will then pop out to its original position. The power supply to the conveyor is now restored.
3.	Push the green section of the Start/Stop button to restart the conveyor.
4.	The machine is now ready to start inspecting the selected product.

The User Interface

The user interface, located on the front of the machine control panel, enables you to access all of the features and functionality provided by the IQ³+ Metal Detector.

Through the user interface you can setup and manage all parameters required for inspecting products and for the general operation of the machine.

The following sections provide more information:

■ [General Navigation](#)

The user interface has been carefully designed to be as intuitive as possible, using common actions and symbology that you will see and use when operating other equipment and computers. For further assistance, this section is included to describe how to find your way around the user interface, highlighting some common functionality that makes things simple to do.

■ [Screens](#)

The user interface provides a hierarchy of screens that are presented in a logical sequence for setting up the machine for inspecting products and accessing system and inspection information. Although you will quickly learn how to navigate through the screens to access the ones you want, this section provides some assistance for you to get started. A full description for each of the screens is available and where applicable additional information is included to explain the principles behind some of the more complex settings available.

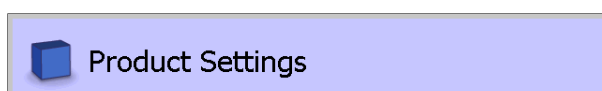
General Navigation

The user interface is divided into a number of areas which contain generic controls through which all features and settings for the metal detector may be configured and run. Icons are also used extensively throughout the system to assist in navigation.

There are two main screens, the [Main Run](#) screen and the [System Setup](#) screen, through which all other screens may be accessed and these contain different features to the other screens.

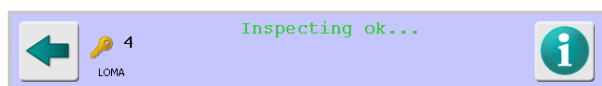
The generic navigation controls provided in most other screens are listed and described below.

Title Bar





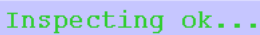



This bar is displayed at the top of the screen and will generally show the title of the screen and an associated icon. The bar will include some additional icons for some screens which when selected will display other related screens.

Blue Banner Bar

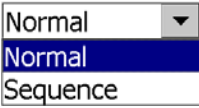





This bar is displayed at the bottom of every screen. It contains various navigation controls and provides information depending on the screen being displayed. The generic controls provided on every screen are described in the table below.

	This is known as the "Go To" button, and tapping it displays the System Setup screen, providing access to other areas of the system for setting up all aspects of the machine.
	This is known as the "Back" button and tapping it displays the previous screen. If you have made any changes in the screen settings then the Save Settings screen will pop-up for you to confirm the changes.
	This is another "Back" button which is displayed in some 'Service' screens. When a Service screen is accessed the metal detector must stop inspecting products until any setting changes have been made and saved. Tapping on this button provides a short cut to take you back to the Main Run screen immediately and the detector starts inspecting products again.
	Displays the name of the currently logged in user and their access level. Tap on the key icon to display the Select Access level screen to select a different access level or user login.
	The area at the bottom of the screen acts as a message centre, displaying the current machine status in green and important messages that may need attention in flashing red. Tap on this area to display the System Faults Log screen
	This icon indicates help text is available for the screen you are viewing. Tap on the icon to view the text.

Selection Options

Controls used throughout the system for selecting options are included in the table below.

	Drop Down List - Tapping on the down arrow presents a list of options for selection.
	Option Check Box - Tapping in the box enables the associated option and puts a tick in the box. Enabling an option often provides additional settings in a screen which then need to be configured.
	Option Radio Button - Radio buttons are generally used where more than one option is available. Tapping on the button selects the associated option.
	Field - You can tap into a field to enter a value. Depending on the value to be entered either a numeric keypad or keyboard will be displayed so that you can enter the required value. See Entering Data below for more details.

Entering Data

To enable you to enter values into fields the following controls are provided:

Numeric Keypad

When you tap into a field that requires a number to be entered a numeric keypad will be displayed in a pop-up screen.

You can enter a number by tapping on the number buttons. Then tap on the green tick button to close the screen and save the number into the selected field.



Reject dwell (m):

0.250

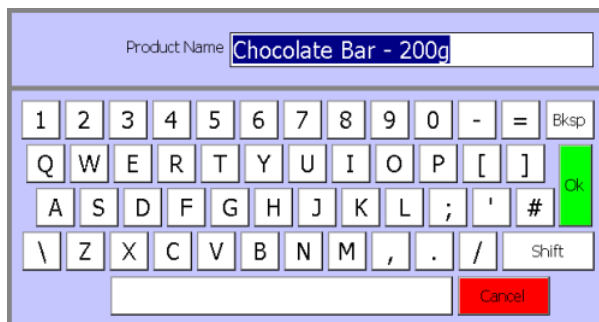
0.025 49.995

1	2	3	Bksp
4	5	6	✖
7	8	9	✔
0	.		

Keyboard

When you tap into a field in which you can enter characters and numbers a keyboard will be displayed in a pop-up screen.

You can enter characters and numbers by tapping on the keyboard buttons. Then tap on the green OK button to close the screen and save the entry into the selected field.





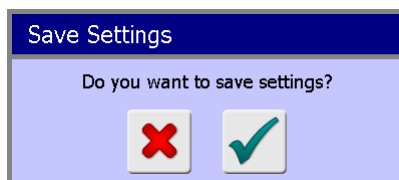
Product Name: Chocolate Bar - 200g

1	2	3	4	5	6	7	8	9	0	-	=	Bksp
Q	W	E	R	T	Y	U	I	O	P	[]	Ok
A	S	D	F	G	H	J	K	L	;	'	#	
\	Z	X	C	V	B	N	M	,	.	/	Shift	

Cancel

Saving Settings

When tapping on either the Back  or Go To  button to exit a screen in which you have made some setting changes the Save Settings pop-up screen is displayed.



Save Settings

Do you want to save settings?

✖ ✔

Tapping on the green tick will save the changes and close the screen. Tapping on the red cross will close the screen without saving the changes.

Screens

The user interface provides a hierarchy of screens that are presented in a logical sequence for setting up the machine for inspecting products and accessing system and inspection information.

Although you will quickly learn how to navigate through the screens to access the ones you want, this section provides some assistance for you to get started.

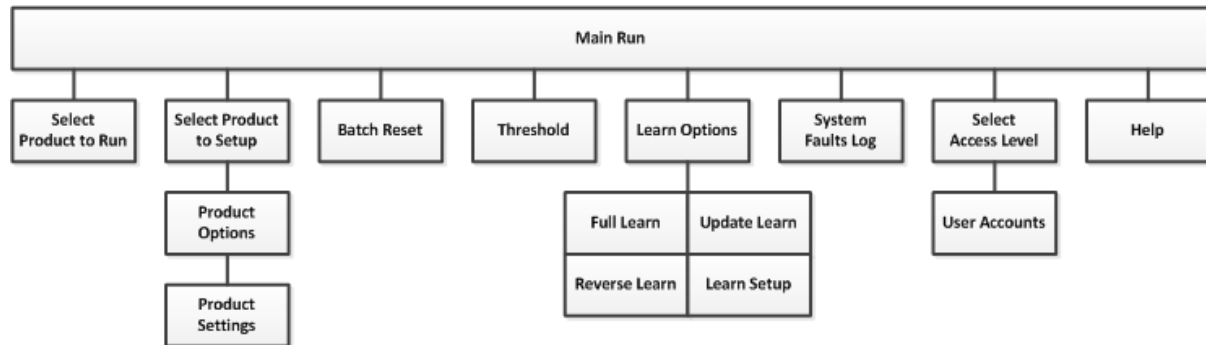
There are two main screens provided from which all other screens are accessed. These are the [Main Run](#) screen and the [System Setup](#) screen. Tables are provided below to show the hierarchy of screens that are accessible from them.



The screens that you are able to access are subject to the access level selected for your user account when it was set up for you.

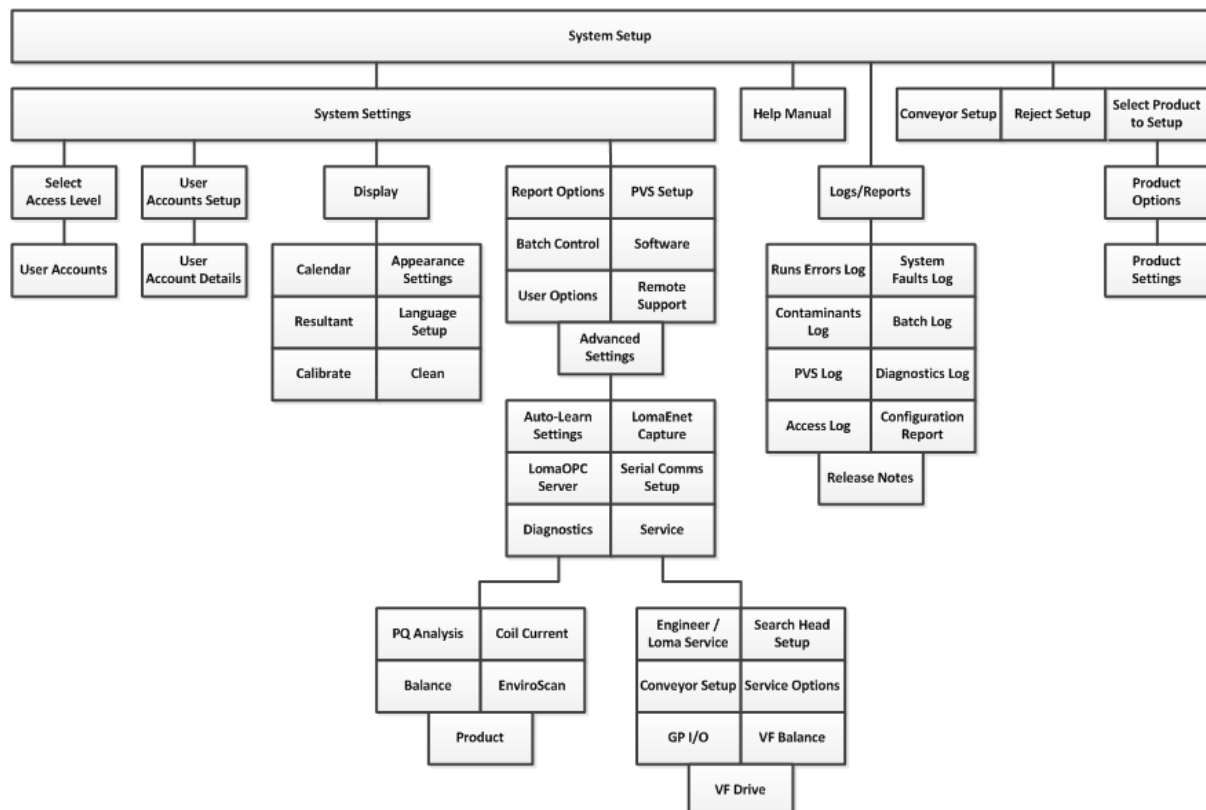
Main Run Screen

The chart below displays the screens that can be accessed from the Main Run screen and the order in which they are available.



System Setup Screen

The chart below displays the screens that can be accessed from the System Setup screen and the order in which they are available.



Main Run

Purpose

The purpose of the Main Run screen is to provide you with real time and historical information for the product that you are currently inspecting.

This enables you to monitor exactly what is happening at any time and if necessary take some appropriate action. For example, you may have a local rule that states that if 10 products in a batch are consecutively rejected then inspection is stopped to allow for an investigation to determine the cause.

As well as providing visual inspection information, you can also navigate to other screens that, depending on your access level, allow you to change inspection parameters.



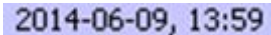
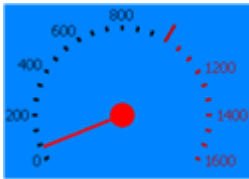



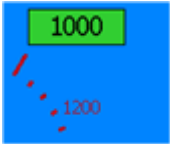

Navigating to a screen that allows you to edit some parameters or carry out actions that will affect product inspection, such as instigating a new product Learn session, will cause the system to STOP inspecting until the action is completed.

Screen Contents

The Main Run screen contains the following contents for displaying information and providing navigation to other screens:

<p>#2: Chicken</p>	<p>Each product, initially entered and edited through the Select Product to Setup screen, is given a unique number so that the system can store its setup and configuration settings. This unique number and the name of the currently selected product is displayed at the top of the screen.</p> <p>Tapping on the product name will display the Select Product to Setup screen so that you can select another product to inspect, edit a products settings, add or delete a product.</p> <p>Alternatively, if you only have Operator (level 1) user access then the Select Product to Run screen will be displayed which only provides the option for you to choose a different product to inspect. You cannot edit product settings or add new products.</p>
<p>Trace Code: <input type="text" value="1234"/></p>	<p>If the 'Traceability code' option has been selected in the Batch Control screen, the batch code entered in the field provided is displayed under the product name at the top of the screen.</p> <p>You can enter a new batch code by selecting this field. Also, as the 'Traceability code' option has been selected, when a new batch is started, you are automatically prompted to enter a new trace code.</p>

	<p>A number panel displays the total number of products for a batch that have been passed through the machine for inspection and have been found to be free from any contaminants.</p> <p>This feature relies on a Product Registration Photo-eye being fitted to your system to count the total number of products passed through the machine for inspection.</p> <p>Selecting the Tick displays the Batch Reset screen to allow you to reset the current batch number to zero.</p>
	<p>A number panel displays the total number of products for a batch, that have been passed through the machine for inspection and have been rejected as they contain contaminants.</p> <p>Again this feature relies on a Product Registration Photo-eye being fitted to your system to count the total number of products passed through the machine for inspection.</p> <p>Selecting the Trash Can displays the Batch Reset screen to allow you to reset the current batch number to zero.</p>
	<p>The current machine date and time is displayed below the reject count. You should ensure that this is accurate at all times for reporting purposes.</p> <p>You can change the date and time if required through the Calendar screen. See the Setting the Time and Date section.</p>
	<p>Located in the centre of the screen, the product signal 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; much like the speedometer in your car when you speed up or slow down.</p> <p>The 'black' coloured numbers on the dial specify the acceptable signal range within which a product is classed as being contaminant free and passes inspection.</p> <p>The 'black' coloured numbers end at a thick 'red' line on the dial which is known as the Threshold. This indicates the signal level, specified either automatically by the machine through a Learn process or manually through the Threshold screen, at which the product is considered to contain a contaminant and is therefore rejected.</p> <p>The 'red' coloured numbers on the dial appear after the Threshold and therefore specify the unacceptable signal range within which a product is classed as containing a contaminant and is rejected.</p> <p>You can change the appearance of the Main Run screen, such as the background and button colours, through the Appearance Settings screen.</p> <p>You can also replace the signal dial with a signal plot (trace) which has similar functionality to the dial but in addition shows a few seconds of product data allowing, allowing you to catch rejects that might otherwise be missed.</p> 

	<p>The currently set Threshold signal level is displayed in a number panel opposite the thick 'red' Threshold line on the product signal dial. Products with a signal value above this level will be rejected.</p> <p>Tap on the threshold value to display the Threshold pop-up screen to adjust it, and therefore the sensitivity of the detector: High numbers give lower sensitivity; smaller numbers higher sensitivity. Setting the Threshold too low will lead to false rejects. This value is set automatically by the product learn process.</p>
	<p>Located under the product signal dial, a number panel is provided that displays the current real-time signal level, referred to as the Resultant, for you. To the left of the panel a Learn icon is displayed.</p> <p>Selecting either the number panel or the Learn icon displays the Learn Options screen, through which you can access the Learn features available for the currently selected product.</p>

In addition to the above, when a PV test is being carried out a second PVS product signal dial will appear on the right of the screen.

Selecting the number panel under the PVS product signal dial will start the PV test and you can follow the on-screen prompts to complete the test. See [Using Performance Validation](#) for further details.

Other standard navigation features available in the screen are described in the [General Navigation](#) section.

Select Product to Run

Purpose

The Select Product to Run screen provides you with options for choosing the product to be inspected and is displayed to Users with Level 1 Operator access instead of the Select Product to Setup screen as it does not provide access to other features for adding new products and editing product settings.

If the '# F : FERRITE' product is visible in the list it MUST NOT be used for inspecting normal product. You should advise your Supervisor so that they can hide it from view to avoid accidental use.



Screen Contents

The Select Product to Run screen contains the following contents for displaying information and providing navigation to other screens:

■ Product List

A list containing a row for the number of products selected in the [Search Head Setup](#) screen is displayed.

For each existing product its unique number and product name are displayed.

A product may be chosen for inspection by selecting the row containing the product name.

Other standard navigation features available in the screen are described in the [General Navigation](#) section.

Select Product to Setup

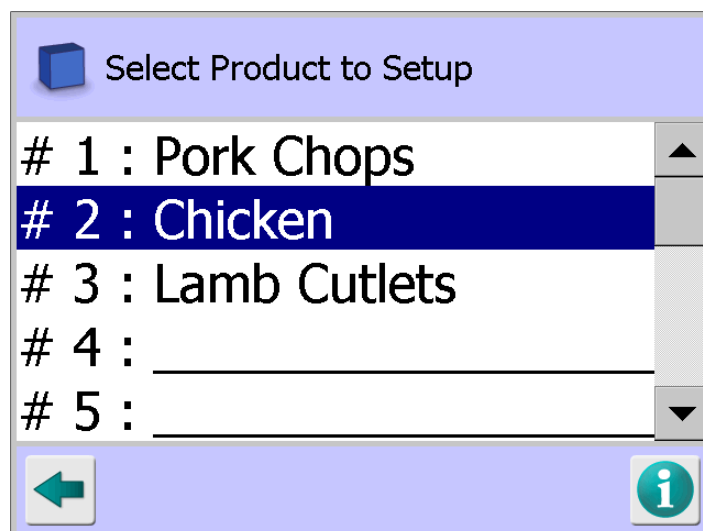
Purpose

The Select Product to Setup screen provides you with options for choosing the product to inspected, editing a products settings and creating new products to inspect.

The number of individual products that can be created and stored for recall is set in the Search Head Setup screen; subject to a maximum of 200. This then sets the number of product rows that are displayed and available for use in this screen.

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 '# F : 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 hide the FERRITE product, navigate to the User Options screen and deselect the Access Ferrite option. This will avoid accidental use.



Screen Contents

The Select Product to Setup screen contains the following contents for displaying information and providing navigation to other screens:

■ Product List

A list containing a row for the number of products selected in the Search Head Setup screen is displayed.

For each existing product its unique number and product name are displayed.

New products can be added to the list by selecting a row that does not contain a product name and then selecting the Edit option in the Product Options screen when it is displayed. The new product name and settings can then be added through the Product Settings screen.

Existing products can be added to the list by selecting the row containing the product name and then selecting the Edit option in the Product Options screen when it is displayed. The product settings can then be edited in the Product Settings screen.

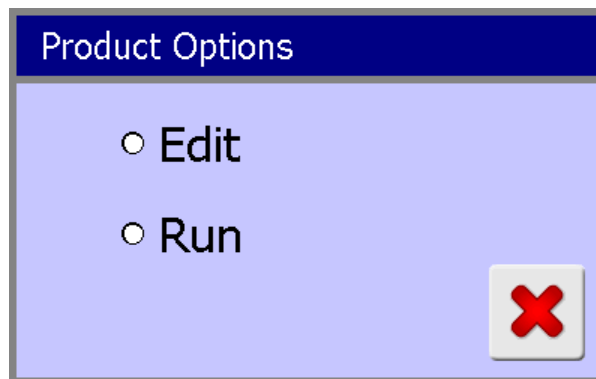
A product may be chosen for inspection by selecting the row containing the product name and then selecting the Run option in the Product Options screen when it is displayed.

Other standard navigation features available in the screen are described in the [General Navigation](#) section.

Product Options

Purpose

The Product Options screen provides you with options for running inspections for a selected product, editing its settings or entering settings for a new product.



Screen Contents

The screen contains the following contents for displaying information and providing navigation to other screens:

■ Edit

Choosing this option displays the [Product Settings](#) screen so that you can edit the settings for the product selected in the [Select Product to Setup](#) screen.

You should also choose this option if you are creating a new product, after selecting a blank row in the Select Product to Setup screen.

■ Run

Choosing this option recalls the settings for the selected product and sets up the machine to start inspecting it.

A pop-up message is briefly displayed to advise you that the current product settings are being changed to those for the selected product.

If a Learn process has not yet been carried out for the product, a pop-up message will be briefly displayed advising you of this and you should carry out a [Full Learn](#) process before starting inspections.

If you are using [Batch Control](#) to identify batches of product being inspected, as you are effectively starting a new batch a keyboard screen will be displayed so that you can enter a Trace Code for the new batch.

The Product Options screen is then automatically closed and the [Main Run](#) screen is displayed. You are now ready to start inspecting the selected product.

Selecting the red X control at the bottom of the screen at any time will close the screen.

Product Settings

Purpose

Before a product can be inspected a number of basic details and parameters for the product must be entered into the Product Settings screen which are then used by the metal detector software to control how the product is inspected.

Great care should therefore be taken to ensure that the correct details are entered and selections made as they will directly affect how the machine will operate.

Entering incorrect details may cause false triggering and allow contaminated products to go undetected.



Some options may not be displayed if access to them is not enabled.

Screen Contents

The Product Settings screen contains the following contents for displaying information and providing navigation to other screens:

■ #(number)

To assist with identification and selection, you should give all products a unique name, which can be up to 25 alphanumeric characters in length.

Tap in the name field to display the pop-up keyboard screen and then enter the product name.

■ Barcode

The product barcode can be scanned or entered manually. This allows product changes to be activated automatically using a barcode scanner fitted to the conveyor infeed. Tap the Barcode field to display the Enter product barcode screen.

Tap the 'Cancel' red X button to display the pop-up keyboard screen and then enter the barcode.

Alternatively select the 'OK' green tick button and scan the product barcode with your barcode reader.



Note that this field is only displayed in the screen if you are using a barcode reader and have enabled the 'Barcode reader' option in the Service Options screen.

■ Reject delay

The following should be noted before setting up the Reject Delay and Reject Dwell timing for a product.

Setting reject times is best done by passing the product, contaminated by a detectable metal test sample, through the machine and the 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. See the [Conveyor Setup](#) screen for further information covering the available speed mode options.

Tap in the Reject delay field to display the pop-up numeric keypad screen and enter the reject delay time in seconds.

Or for variable speed systems, tap in the Reject delay field to display the pop-up numeric keypad screen and enter the distance in metres.

■ Reject dwell

Reject dwell is the time or distance that the reject device operates for to remove a contaminated product from the conveyor belt and into the reject collection device. It must therefore be set to ensure clean removal of the contaminated product.

Please read through the information contained in the Reject delay section above for further guidance. Reject timings may also be set in the [Rejects Setup](#) screen.

Tap in the Reject dwell field to display the pop-up numeric keypad screen and enter the time in seconds.

Or for variable speed systems, tap in the Reject delay field to display the pop-up numeric keypad screen and enter the distance in metres.

■ Pack length

The Pack 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.

Tap in the Pack length field to display the pop-up numeric keypad screen and enter the pack length in millimetres.

■ **Product type**

Tap on the arrow to the right of the 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.

You should first read the [About Metal Detection](#) section to gain an understanding of the terms used 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.

Note that 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.

■ **PVS**

Select this option if you are using the Performance Validation System to carry out product testing at specific times and have configured this in the [PVS Setup](#) screen. You can also access the [PVS Log](#) to view the test details.

When the PVS option is selected the following additional items are displayed in the screen:

○ **Fe test**

Tap in the Fe test 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**

Tap in the Non-Fe test 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**

Tap in the S. steel test field 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.

- **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.

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.

■ **Tracker**

The Tracking feature allows the detector to automatically adjust the working threshold for a product between Maximum and Minimum limits set in this screen, to enable the sensitivity of the detector to be optimised in situations where the product signal drifts up and down with changes in product effect. See the Setting Up Product Signal Tracking section for further details.

- **Min limit**

This field is used to set the lowest product signal level to be used by the Tracker feature when making automatic threshold adjustments. The value defaults to the working threshold calculated by the detector during the product Learn process and cannot be set any lower than this value.

If you wish to increase the Min limit value, tap in the field to display the pop-up numeric keypad screen and enter the required value.

- **Max limit**

This field is used to set the highest product signal level to be used by the Tracker feature when making automatic threshold adjustments. The value defaults to twice the working threshold calculated by the detector during the product Learn process. The value cannot be set less than the Minimum limit but may be increased up to the value of your choice.

It is strongly advised to set this value to just greater than the typical amount by which the product signal is expected to change. All signals that exceed this value will be rejected.

If you wish to change the Max limit value, tap in the field to display the pop-up numeric keypad screen and enter the required value.

- **Max limit lock**

Once the Max limit value for the product signal has been entered the value can be locked to prevent an automatic change during a re-Learn process.

Tap in the option check box to select it.

- **Adjustment**

This field is used to set a percentage by which the product signal threshold may be changed.

Tap in the Adjustment field to display the pop-up numeric keypad screen and enter the adjustment percentage value to be used.

- **Number of packs**

This field is used to set the number of packs to be included in the Tracker calculations. The range is 1 – 100, where 100 provides the finest control. The default value is 10.

Tap in the Number of packs field to display the pop-up numeric keypad screen and enter the required number of packs to be used.

Batch Reset

Purpose

The Batch Reset pop-up screen is displayed when you tap on either the red or green panels located in the top right hand side of the main Run screen which show the product pass and reject totals for the current batch.

It is used to reset the batch totals to zero so that a new batch of the product may be inspected.

Details for the current batch are automatically saved into the [Batch Log](#) for later viewing and analysis when the batch totals are reset.

If the Traceability code option has been enabled in the Batch Control screen, on resetting the batch totals the pop-up keyboard screen is displayed to enable a new Trace code to be entered for use with the new batch.



Screen Contents

The screen contains the following contents for displaying information and providing navigation to other screens:

- **Tick (OK)**

Choosing this option resets the total number of passed and rejected products to zero.

- **X (Close)**

Choosing this option cancels the operation and the pass and reject totals are left unchanged.

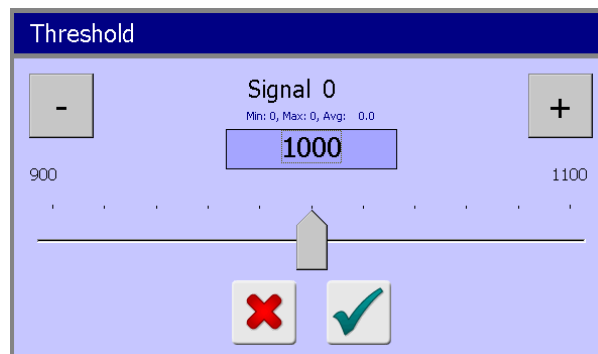
Threshold

Purpose

The currently set product Threshold signal level is displayed in a number panel opposite the thick 'red' Threshold line on the product signal dial in the [Main Run](#) screen. Products with a signal value above this level will be rejected. This value is set automatically during the product Learn process.


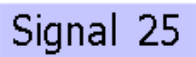



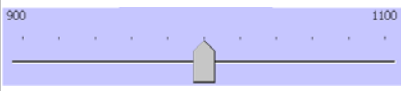
Tapping on the threshold value displays the pop-up Threshold screen through which you can adjust the threshold value manually and therefore the sensitivity of the detector:

High numbers give lower detector performance and smaller numbers give higher detector performance. Setting the Threshold too low will lead to false rejects.



Screen Contents

The Threshold screen contains the following controls:

	Each time you tap the button once it reduces the threshold value by 0.5% of its current value. The current product signal being displayed and the position of the slider then change to show the new value and position.
	Displays the product signal being received at the time the Threshold screen was first displayed.
	Displays the minimum, maximum and average product signal values available at the time the Threshold screen was first displayed.
	Displays the current product signal threshold value. Tapping on the value displays the pop-up numeric keypad display so that you can manually enter a new value.
	Each time you tap the button once it increases the threshold value by 0.5% of its current value. The current product signal being displayed and the position of the slider then change to show the new value and position.
	Displays a scale and slider. The scale range starts at minus 10% of the current threshold value up to plus 10% of the value. The slider is located in the centre of the scale, indicating the current threshold value. Place your finger on the slider and move it to the right or left, up

and down the scale, to change the signal threshold value.

The current product signal being displayed then changes to show the new value.

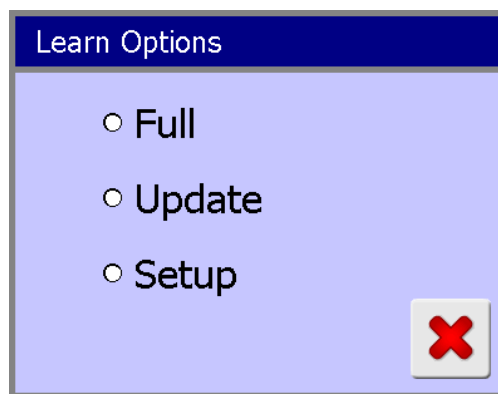
Tap on the green tick 'OK' button to change the signal threshold value and close the screen.

Tap on the red cross 'Cancel' button to close the screen without changing the signal threshold value.

Learn Options

Purpose

The Learn Options pop-up screen is displayed by tapping on the current product signal value panel or the Learn icon in the [Main Run](#) screen. It provides options for setting up and starting a Learn process for the currently selected product.



Screen Contents

The Learn Options contains the following option radio buttons for selection:

■ Full

Tapping on this option starts the Full Learn process. See the Full Learn screen for further details.

■ Update

Tapping on this option starts the Update Learn process. See the Update Learn screen for further details.

■ Setup

Tapping on this option displays the Learn Setup screen through which you can manually configure the Learn parameters if required.

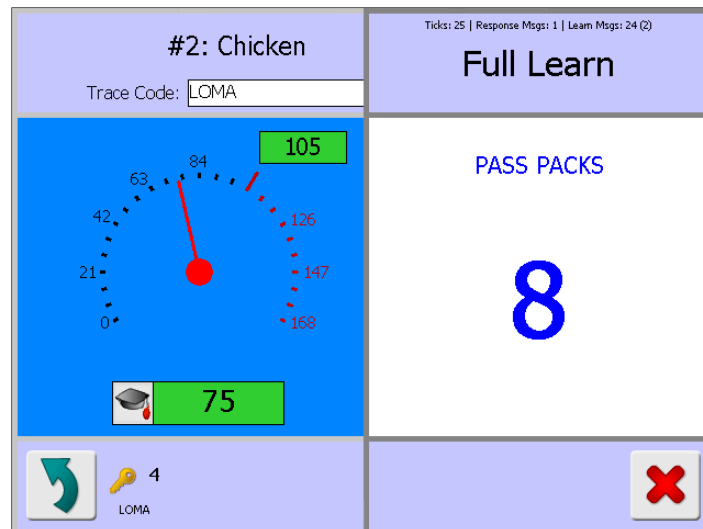
Tap on the red cross 'Cancel' button to close the screen without selecting an option.

Full Learn

Purpose

The Full Learn screen is displayed on top of the Main Run screen and guides the operator through the Full Learn process by displaying on-screen instructions.

Once the process is complete the Full Learn screen closes, displaying the [Main Run](#) screen.



Screen Contents

The screen only has one control which is a red cross 'Cancel' button. Tapping on the button cancels the Full Learn process and closes the screen. Alternatively, the screen will also be automatically closed if no activity is detected for a period of time.

If the Full Learn is not successful this could be because you have selected the ""Dry"" product type in the [Product Settings](#) screen. If so, select the ""Unknown"" product type and repeat the Full Learn process.

Update Learn

Purpose

The Update Learn screen is displayed on top of the Main Run screen and guides the operator through the Full Learn process by displaying on-screen instructions.

Once the process is complete the Update Learn screen closes, displaying the [Main Run](#) screen.



Screen Contents

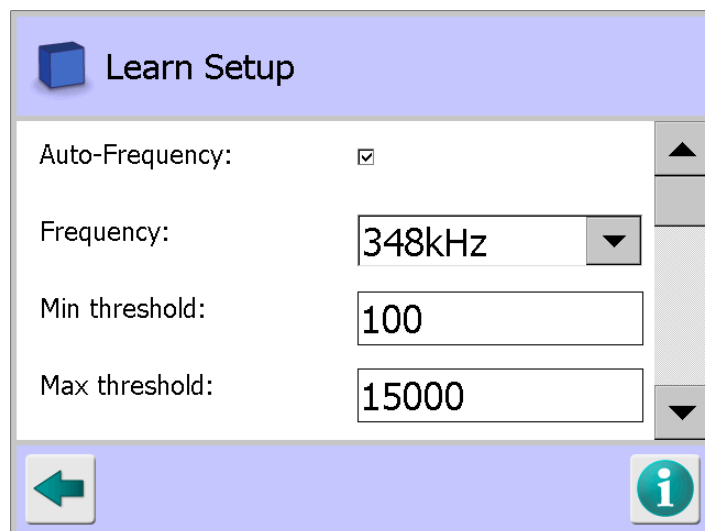
The screen only has one control which is a red cross 'Cancel' button. Tapping on the button cancels the Update Learn process and closes the screen. Alternatively, the screen will also be automatically closed if no activity is detected for a period of time.

Learn Setup

Purpose

The Learn Setup screen contains the Learn parameters used by the detector for the currently selected product. Default values are used before the product has been Learnt but following completion of a Learn process the values are automatically updated based on the results achieved.

The screen contains some options that are enabled manually and you may also change other parameter values if required. See the [Learning Products](#) section for further details.



Screen Contents

The Learn Setup screen contains the following parameters for configuration:

■ Auto-Frequency

If this option is enabled, the operating frequency to be used by the detector for the product being Learnt is automatically selected.

Tap in the option check box to select the Auto-Frequency option.

If the option is not enabled then the Frequency to be used is manually selected from the drop down list provided.

■ Frequency

The operating frequency for the detector, assigned to a product memory, is displayed or can be selected when operating manually.

Tap on the arrow to the right of the field to display a drop down list of frequencies for selection.

■ Min threshold

The value entered here sets the lowest threshold that the detector can set during any Learn process.

Tap in the Min threshold field to display the pop-up numeric keypad screen and enter the value to be used.

■ Max threshold

The value entered here sets a level that during any Learn process if exceeded will abort the process. Its purpose is to prevent a successful Learn being achieved for a contaminated sample product.

Tap in the Max threshold field to display the pop-up numeric keypad screen and enter the value to be used.

■ **Threshold**

This is the detectors working threshold, set after a completed Learn process.

Tap in the Threshold field to display the pop-up numeric keypad screen and enter the value to be used.

■ **P span threshold**

This field is only displayed if the PQ span option is enabled in the Auto-Learn Setup screen. It is used to set the P span signal threshold ($P_{max} - P_{min}$) to be used during inspection.

Tap in the P span threshold field to display the pop-up numeric keypad screen and enter the value to be used.

■ **Q span threshold**

This field is only displayed if the PQ span option is enabled in the Auto-Learn Setup screen. It is used to set the Q span signal threshold ($Q_{max} - Q_{min}$) to be used during inspection.

Tap in the Q span threshold field to display the pop-up numeric keypad screen and enter the value to be used.

■ **Phase angle**

This is the product compensation angle computed from a Learn process.

Tap in the Phase angle field to display the pop-up numeric keypad screen and enter the value to be used.

■ **Phase lock**

Enabling this option locks the phase angle so that the detector cannot change it during a Learn process.

Tap in the Phase lock option check box to enable it.

■ **Compensation**

This is the product compensation set automatically from a Learn process. It cannot be manually changed.

■ **Head drive**

The level of transmitter power is selected here from a drop down list which provides options of MAX (maximum) full power, MED (medium) half power and LOW quarter power.

For dry products the level is normally set to MAX.

For difficult products such as metal film or products with a high or non-uniform level of conductivity, a lower drive setting may achieve a better result.

Tap on the arrow to the right of the field to display the list of options and select the appropriate one.

■ **Head lock**

Enabling this option locks the Head drive setting, thus preventing the detector from changing it during a Full Learn process.

Tap in the Head lock option check box to enable it.

■ **Head RF gain**

This is a specialised setting for use with metallised film or very difficult conductive products. The head RF gain is adjusted through the software by changing the setting in this screen but may also be adjusted manually through the fitting of links onto the Transmitter Board.

The software adjustment is made automatically during a Full Learn process based on the product effect on the electromagnetic field.

Manual adjustment is not recommended unless absolutely necessary. Options of MAX, MED, LOW and MIN are available in a drop down list.

Tap on the arrow to the right of the field to display the list of options and select the appropriate one.

■ **Head P gain**

The signal level of the P channel (in phase signal) is adjusted here. The adjustment is made automatically during a Full Learn process based on the product effect on the electromagnetic field.

Manual adjustment is not recommended unless absolutely necessary. Options of MAX, MED, LOW and MIN are available in a drop down list.

Tap on the arrow to the right of the field to display the list of options and select the appropriate one.

■ **Head Q gain**

The signal level of the Q channel (90 degree phase signal) is adjusted here. The adjustment is made automatically during a Full Learn process based on the product effect on the electromagnetic field.

Manual adjustment is not recommended unless absolutely necessary. Options of MAX, MED, LOW and MIN are available in a drop down list.

Tap on the arrow to the right of the field to display the list of options and select the appropriate one.

■ **Gain lock**

Enabling this option locks the Head P and Q gain settings, thus preventing the detector from changing them during a Full Learn process.

It is suggested to use the lock function only if necessary. It should be noted that the ferrite memory always uses a locked head gain.

Tap in the Gain lock option check box to enable it.

■ **Working mode**

The level of transmitter power is selected here from a drop down list which provides options of P-Mode, Q-Mode and 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

Tap on the arrow to the right of the field to display the list of options and select the appropriate one.

■ Working lock

Enabling this option locks the Working mode setting, thus preventing the detector from changing it during a Full Learn process.

Tap in the Working lock option check box to enable it.

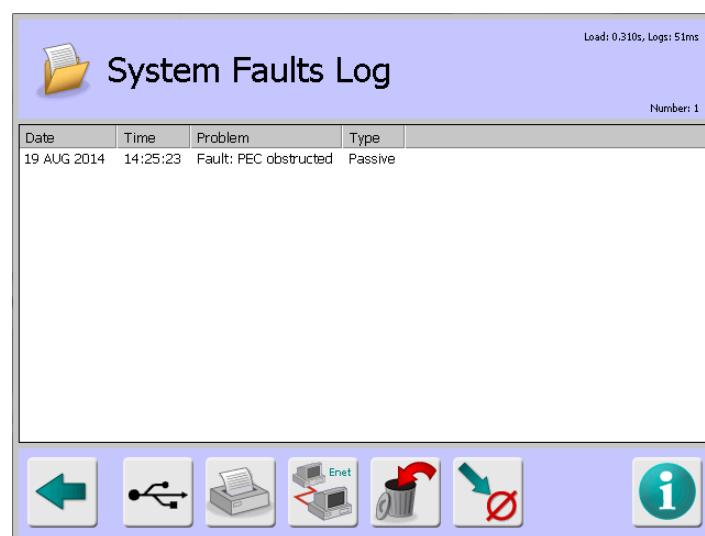
System Faults Log

Purpose

System faults are classified as serious and require immediate action. When a fault is generated the fault relay operates, permanently operating the reject device and/or stopping the conveyor transport.

This log is useful for monitoring the types of faults being generated that interrupt production and looking for potential trends so that improvements may be made to reduce production down time.

Selecting the System Faults Log option in the [Logs/Reports](#) screen displays the System Faults Log screen.



Screen Contents

The screen displays a list of system faults under the following column headings:

- **Date** – Displays the date that the error occurred.
- **Time** – Displays the time that the error occurred.
- **Problem** – Displays a brief description of the reason why the error has been generated. See Example problems below.
- **Type** – This column displays the current status of the error:
 - **Active** – The error is current and has not been cleared.
 - **Event** – The error has been cleared.
 - **Passive** – The error has been listed for advice only

The log can hold up to 20 system fault records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

Example Problems

Some example system faults problems that may be displayed and suggested remedial actions are listed below.

- **Problem:** 5V out of spec - the 5V rail is less than 4.75V.
 - **Action:** Contact your local Loma service centre for assistance.

- **Problem:** +12V out of spec - the +12V rail is less than 11.40V.
 - **Action:** – Contact your local Loma service centre for assistance.
- **Problem** – Verdict too late - a pack has arrived at the reject point before the detector has sent a reject decision.
 - **Actions:**
 1. Increase the reject delay time.
 2. If a product registration photo-eye is installed, reduce the pack length.
- **Problem:** Verdict mismatch - the system has more reject verdicts than packs passed.
 - **Action:** Power machine off and on.
- **Problem:** Rej confirm fail - the reject system has attempted to reject a pack but could not confirm that the pack entered the reject bin and was removed from the line, within the specified time. When this fault occurs, the conveyor should be cleared before the transport can be restarted.
 - **Action:**

If the pack has been correctly rejected:

 1. Check the reject confirmation sensor is working.
 2. Check the reject confirmation timing parameters are correct.

If the pack has not been correctly rejected, the transport system will have stopped:

 1. Collect and remove from the line all product/s both in the aperture and after the detector. If there is any possibility that the contaminated product may have left the detector transport system, then any possible contaminated product beyond the detector transport will need to be cleared as well. It is advised that any removed product be properly identified and securely segregated from good product.
 2. Recheck the setup parameters and the function of the reject and confirm systems before restarting the line.
- **Problem:** Rej con wind fail - reject confirm window failure. The reject confirmation system has detected two packs in one reject confirm window.
 - **Actions:**
 1. Check for the possibility of a single pack double triggering the reject confirmation photo-eye.
 2. If two packs were supposed to be rejected than reduce the Reject confirmation window time.
 3. Reduce the reject dwell time.
- **Problem:** Confirm sensor fault - the reject confirm sensor has been blocked for greater than the Reject confirmation timeout.
 - **Actions:**
 1. Check the sensor for blockage.
 2. Check the sensor is working correctly.

- **Problem:** Bin full - the reject bin full sensor has been blocked for longer than 5 seconds and the transport system has stopped. The bin will need to be emptied before the transport can be restarted.
 - **Action:**
 - If the bin is full:
 1. Remove, identify and segregate the product. Once the sensor is unblocked the fault will automatically clear.
 - If the bin is not full:
 1. Check the Bin full sensor is working correctly.
- **Problem:** Link corrupted - data corruption has occurred between the detector and LomaLink PC or other controlling device. The operation of the detector is unaffected.
 - **Action:**
 1. Check cabling and link connectors from remote device.
 2. Check LomaLink PC or other controlling device for reported errors.
- **Problem:** Link failure - a break in communication between the detector and LomaLink PC/other controlling device. The operation of the detector is unaffected.
 - **Action:**
 1. Check cabling and link connectors from remote device.
 2. Check connections between the detector and LomaLink PC or other controlling device for loose or broken wiring/connectors.
- **Problem:** PV test timeout - an automated prompt for the PV test has either not been actioned or completed within the window time set. The transport system may have stopped.
 - **Action:** Clear system fault (restart the transport if stopped) and perform a [PV test](#).
- **Problem:** PEC obstructed - the product registration photo-eye has remained blocked for greater than 6 consecutive pack lengths. This fault is only generated if the PEC fault is enabled.
 - **Actions:**
 1. Check the PEC for blockage.
 2. Check the PEC is working correctly.
 3. Check pack flow length entry is adequate, ensuring an allowance is made for pack skew.
 4. Ensure the correct belt speed is entered.
- **Problem:** Wrong flash c/sum - the software has compared the flash checksum currently stored in its memory with the checksum for recently installed software. This occurs if a software update has been done and a hardware cold start was not performed after installation.
 - **Action:**
 1. Perform an update checksum from the tick button found in the [Search Head Setup](#) screen.

2. Perform a hardware cold start by moving link JP6 across pins 1-2 from 2-3 on the Control Board, then power on/off. This will wipe all system and product setup data from the detector. Therefore a complete setup of the detector will be required. This should only be done in the event of extreme difficulties. Return the link to its original position before entering any data.

- **Problem:** Drive too low - (IQ3 only) the transmitter drive current is not set.
 - **Action:** From the [VF Drive](#) screen perform the auto configure operation. This will automatically reset all the drives for each of the detector operating frequencies. This will take several minutes to complete. This action will not affect any other detector settings.

Select Access Level

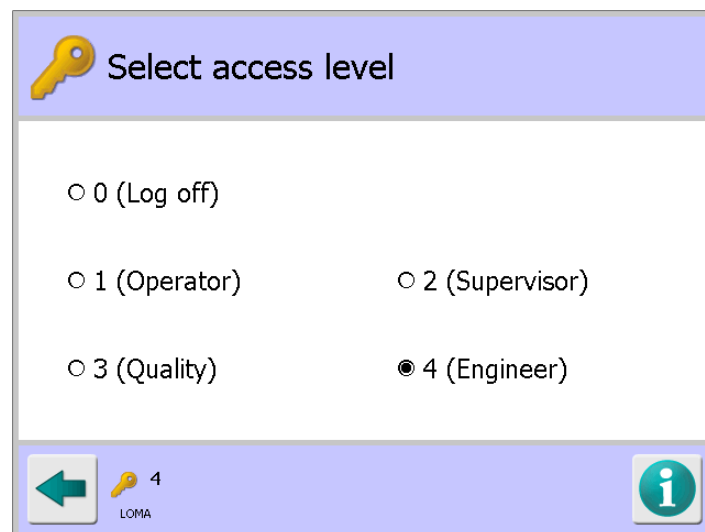
Purpose

Each User Account created in the system is assigned an access level which determines what access they have to the different features and functionality available, preventing a user making any unauthorised changes. See the [User Access](#) and [Setting User Access Levels and Passwords](#) sections for further details.

The Select access level screen has several purposes:

- A currently logged in user can change to a lower access level.
- A currently logged in user can select and log into a User Account set up at a higher access level provided they know the password for the User Account.
- A currently logged in user can log off.

If the 'Auto log off' feature has been enabled in the User Options screen and the Main Run screen is being displayed, the current user will be automatically logged off when the timeout period expires and the user account will be displayed as "None".



Screen Contents

The Select access level screen contains the following option radio buttons for selection:

- **0 (Log off)**

Selecting this option logs the current user off.
- **All other levels**

Selecting any other access level when logging in displays the User Accounts screen which contains a list of User Accounts that have access to that level.

Selecting an account displays a pop-up 'Enter Password' numeric keypad so that you can enter the appropriate password for that account.

The same functionality is provided if you wish to change from your currently logged in access level to a higher access level. If your User Account has access to the higher level anyway, then the User Accounts screen is not displayed.

If you wish to change from your currently logged in access level to a lower access level then the User Accounts screen is not displayed as you will automatically have access to a lower level anyway.

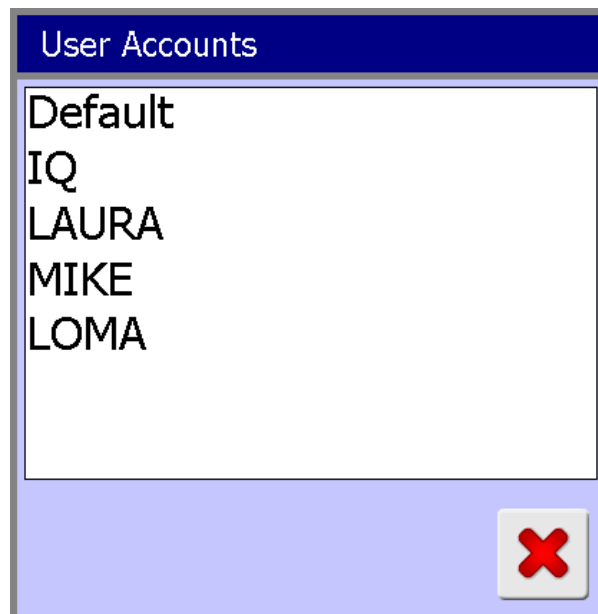
User Accounts

Purpose

The User Accounts screen is displayed when an access level is selected in the Select access level screen.

It provides a list of accounts that have access rights to the selected access level as follows:

- Level 4 User Accounts will always be included in the list as they have access to all levels.
- Level 3 User Accounts will be included in the list if a level 3, 2 or 1 access level is selected.
- Level 2 User Accounts will be included in the list if a level 2 or 1 access level is selected.
- Level 1 User Accounts will be included in the list if a level 1 access level is selected.



Screen Contents

The screen contains a list of User Accounts that can be used to log on at the selected access level.


Selecting a User Account in the list displays either a pop-up numeric keypad or keyboard, depending on the Password character option selected in the [User Options](#) screen.

Then enter the password for the selected User Account to log into the system under that account.

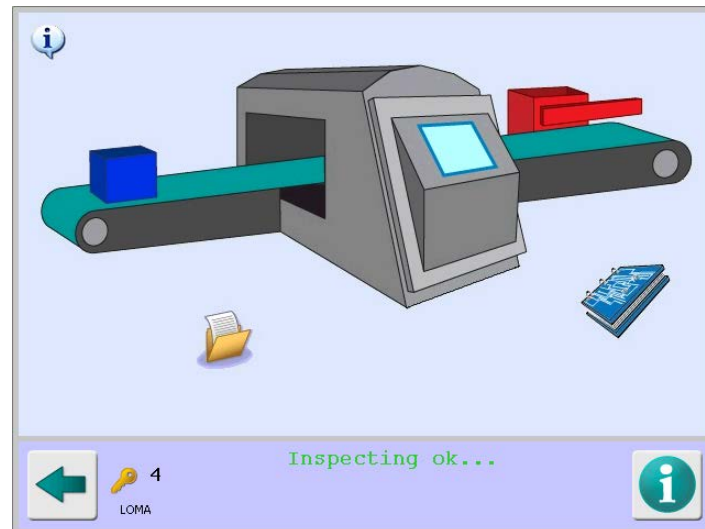
User Accounts are managed through the User Accounts Setup screen which is accessed by tapping on the Users icon in the System Settings screen.

System Setup


Purpose

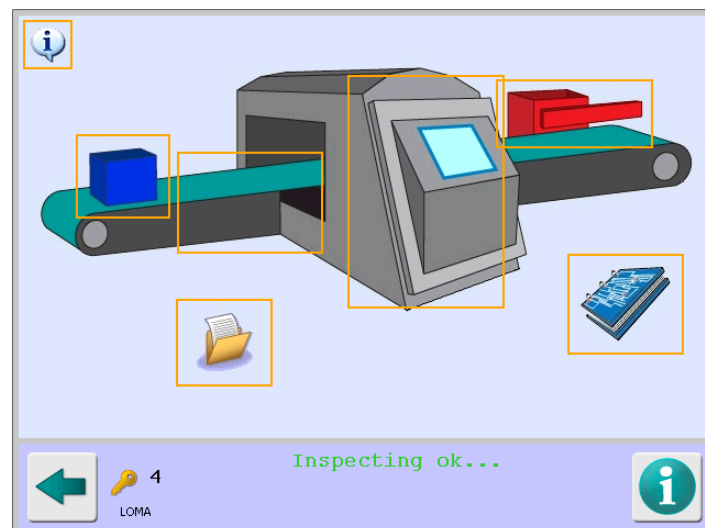
The System Setup screen is displayed by tapping on the "Go To" button  in the [Main Run](#) screen.

It displays a mimic of the metal detector and 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.



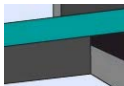





Screen Contents

Tap on the information icon  in the top left corner of the screen to display the available hotspot areas on the screen as shown in the screen shot below. These are shown as rectangular boxes with an orange border.




Tapping within one of the boxes then displays a related screen as described in the table below.

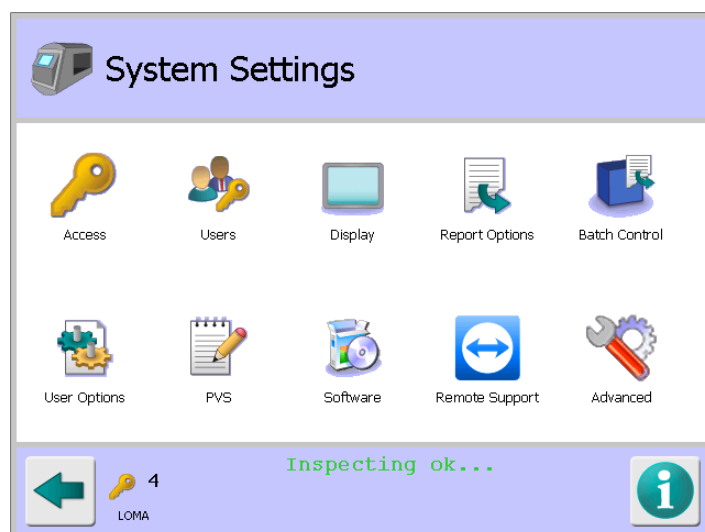
	Display the System Settings screen through which you can access and manage all system parameters.
	Displays the Select Product to Setup screen through which you can add, edit and remove products and their settings.
	Displays the Conveyor Setup screen through which you can view the current conveyor settings.
	Displays the Rejects Setup screen through which you can adjust reject timings and select various options.
	Displays the Logs/Reports screen which displays a list of available logs and reports for selection.
	Displays the Help Manual which provides product information.

System Settings

Purpose











The System Settings screen is displayed by tapping on the control panel area  in the [System Setup](#) screen.

The purpose of the screen is to provide access to all areas of the system so that their related settings can be configured as required.



Screen Contents

The screen contains a number of icons described in the table below which when selected provide access to other screens.

 Access	Tap on the Access icon to display the Select Access Level screen to log in to the metal detector system or change your login level.
 Users	Tap on the Users icon to display the User Accounts Setup screen through which you can add, edit and delete user accounts.
 Display	Tap on the Display icon to show the Display screen which provides access to other screen for setting up the system time and date, the display appearance, the system language and other general settings.
 Report Options	Tap on the Report Options icon to display the Report Options screen through which you can enable some system features and select the report types to be included for viewing.
 Batch Control	Tap on the Batch Control icon to display the Batch Control screen for setting up the batch units, start and length setting and enable the traceability feature if required.
 User Options	Tap on the User Options icon to display the User Options screen through which you can enable several features including Tracker and PVS.
 PVS	Tap on the PVS icon to display the PVS Setup screen where you can set the type and frequency of the testing.
 Software	Tap on the Software icon to display the Software screen which shows the versions of the currently installed software. An option button is also included to allow you to exit the software.
 Remote Support	Tap on the Remote Support icon to enable the metal detector for remote access through a VNC connection.
 Advanced	Tap on the Advanced icon to display the Advanced Settings screen which provides access to service, diagnostics, auto-learn and network connection screens.

Select Access Level

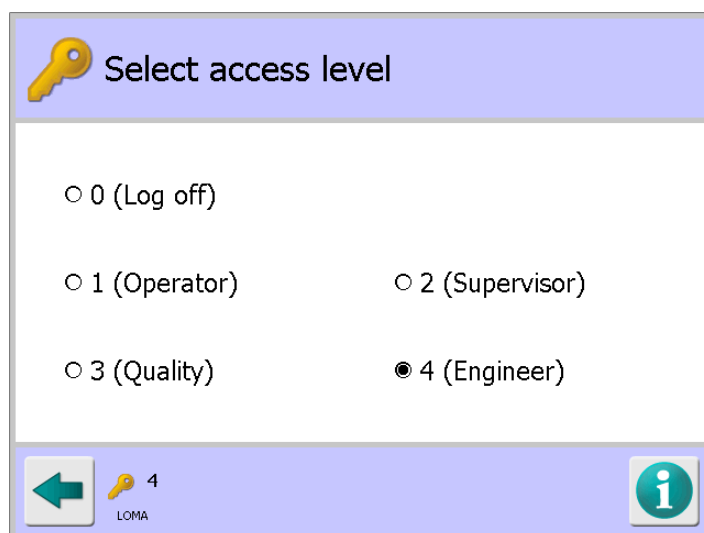
Purpose

Each User Account created in the system is assigned an access level which determines what access they have to the different features and functionality available, preventing a user making any unauthorised changes. See the [User Access](#) and [Setting User Access Levels and Passwords](#) sections for further details.

The Select access level screen has several purposes:

- A currently logged in user can change to a lower access level.
- A currently logged in user can select and log into a User Account set up at a higher access level provided they know the password for the User Account.
- A currently logged in user can log off.

If the 'Auto log off' feature has been enabled in the User Options screen and the Main Run screen is being displayed, the current user will be automatically logged off when the timeout period expires and the user account will be displayed as "None".



Screen Contents

The Select access level screen contains the following option radio buttons for selection:

- **0 (Log off)**

Selecting this option logs the current user off.

- **All other levels**

Selecting any other access level when logging in displays the User Accounts screen which contains a list of User Accounts that have access to that level.

Selecting an account displays a pop-up 'Enter Password' numeric keypad so that you can enter the appropriate password for that account.

The same functionality is provided if you wish to change from your currently logged in access level to a higher access level. If your User Account has access to the higher level anyway, then the User Accounts screen is not displayed.

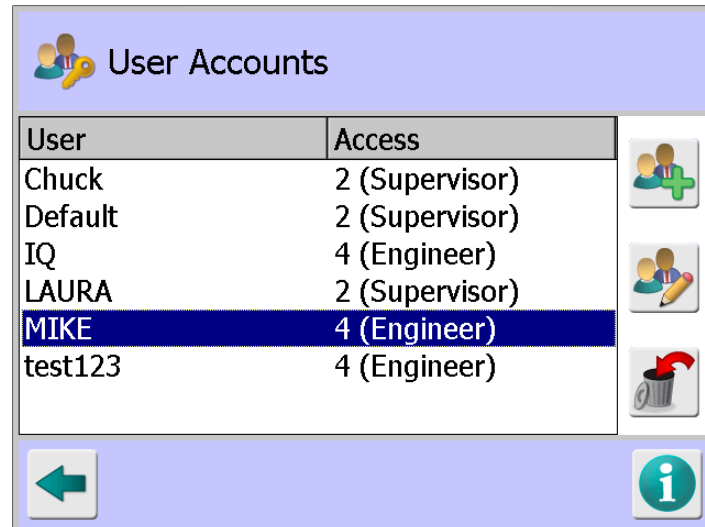
If you wish to change from your currently logged in access level to a lower access level then the User Accounts screen is not displayed as you will automatically have access to a lower level anyway.

User Accounts Setup

Purpose

The User Accounts Setup screen is displayed by tapping on the Users icon in the [System Settings](#) screen.

Through this screen you can add, edit or delete User Accounts.



Screen Contents

The screen contains a list of User Accounts showing their access levels and a number of buttons on the right hand side of the screen that are described in the table below.

	Add User - Tap on the button to display the User Account Details screen and enter details for the new User Account.
	Edit User - Tap on the button to display the User Account Details screen and edit details for the User Account selected in the list.
	Delete User – Tap on the button to delete the User Account selected in the list. A pop-up confirmation dialog will be displayed. Tap on the green tick OK button to delete the account or on the red cross Cancel button to cancel the deletion. <div> <div>Delete user</div> <div>Are you sure you want to delete account MIKE?</div> <div> </div> </div>

User Account Details

Purpose

The User Account Details screen is displayed by tapping on either the Add User or Edit User button in the [User Accounts Setup](#) screen.

The screen is used to enter the account details for all users.

Add mode
Edit mode

Screen Contents

The screen contains the following options and parameters for setting up a user account:

■ User ID

Tap in the field to display a pop-up keyboard screen. Then enter a unique user name for the account, which may be up to 25 characters long.



This field is only editable when adding a new account. When editing an existing account it is greyed out.

■ Access level

Tap on the arrow to the right of the field to display the access level options (1 to 4) and select the required level for the account. See the [User Access](#) section for further details.

■ Password

Tap in the field to display either a pop-up numeric keypad or keyboard screen, depending on the 'Password character' option selected in the [User Options](#) screen.

If the numeric keypad is displayed you can enter a password of up to 5 numbers.

If the keyboard is displayed you can enter a password of up to 8 alphanumeric characters.

■ Confirm

Tap in the field to display either a pop-up numeric keypad or keyboard screen and enter the same password as entered in the Password field above

Display

Purpose







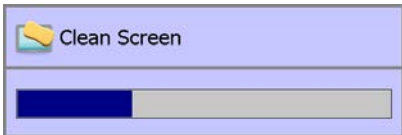
The Display screen is displayed by tapping on the Display icon in the System Settings screen.

The purpose of the screen is to provide access to screens that affect how information is displayed in the user interface.



Screen Contents

The screen contains a number of icons described in the table below which when selected provide access to other screens or start a process.

 Calendar	Tap on the Calendar icon to display the Calendar screen in which you can set the system time and date.
 Appearance	Tap on the Appearance icon to display the Appearance Settings screen in which you can change the screen colours and how information is displayed.
 Resultant	Tap on the Resultant icon to display the Resultant screen in which you can modify the average signal values displayed on the Main Run screen. This is a useful feature when operating two metal detectors side by side to align the average signal values displayed.
 Language	Tap on the Language icon to display the Language Setup screen in which you can select another language to be used by the metal detector. Once selected all screens are displayed in that language.
 Calibrate	Tap on the Calibrate icon to start an on-screen interactive process to calibrate the touch screen. This may be required from time to time to ensure that the touch screen responds correctly when you tap it.
 Clean Screen	Tap on the Clean Screen icon if you wish to clean the touch screen with a damp cloth or sponge. The screen is disabled for a period of time, indicated by a progress bar, so that you can clean it. <div>  </div>

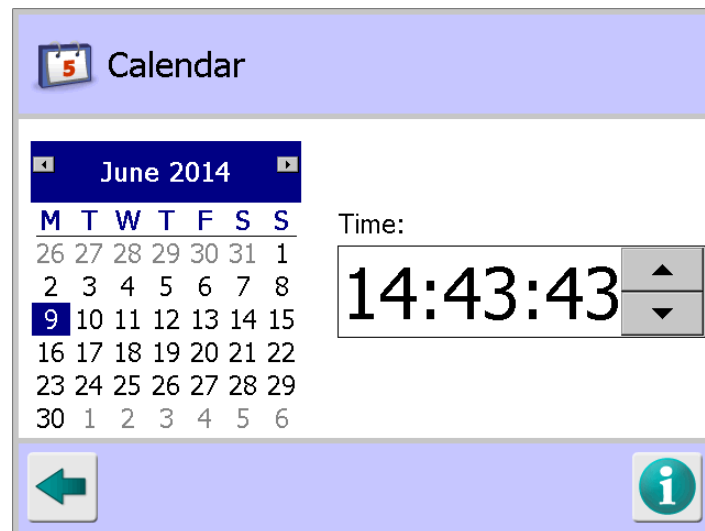
Calendar

Purpose

The Calendar screen is displayed by tapping on the Calendar icon in the [Display](#) screen.

The purpose of the screen is to allow you to change the time and date used by the metal detector, useful where your local time is different to GMT.

You may also wish to change the time and date to synchronise with other equipment for operational reasons.



Screen Contents

The screen contains the following controls for setting the time and date:

■ Calendar Control

Use the left and right arrows at the top of the control to change the month displayed and then select the applicable day by tapping on it.

■ Time Control

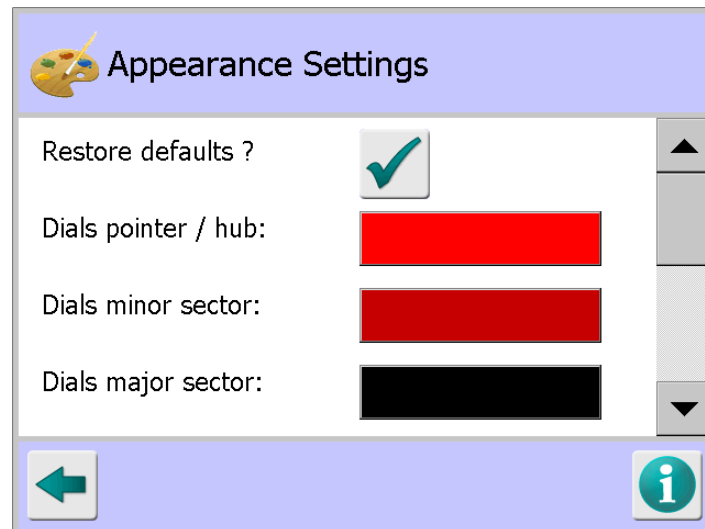
Click on the hours, minutes and seconds values in turn and use the up and down arrows provided to increase or decrease each value as required.

Appearance Settings

Purpose

The Appearance Settings screen is displayed by tapping on the Appearance icon in the [Display](#) screen.

The purpose of the screen is to allow you to personalise the Main Run screen by selecting the colours to be used in various areas of the screen. You can also change the way that data is displayed in the Main Run screen.



Screen Contents

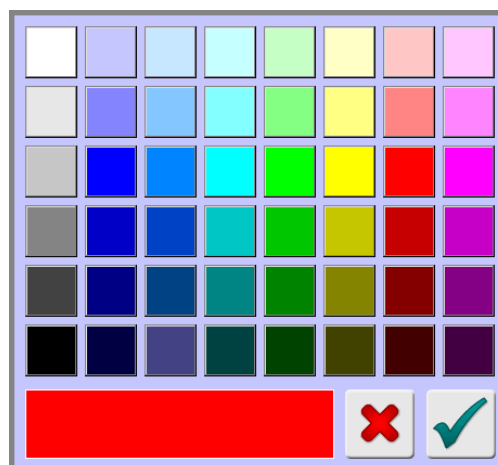
The Learn Setup screen contains the following parameters for configuration:

■ Restore defaults?

Tapping on the green tick button resets all of the parameters contained in the screen to their default values.

■ Dials pointer / hub

Tapping on the colour panel displays a pop-up colour palette screen shown below. Tap on the required colour block to select it and tap on the green tick OK button to make the change and close the screen.



■ Dials minor sector

Tapping on the colour panel displays the pop-up colour palette screen. Tap on the required colour block to select it and tap on the green tick OK button to make the change and close the screen.

■ Dials major sector

Tapping on the colour panel displays the pop-up colour palette screen. Tap on the required colour block to select it and tap on the green tick OK button to make the change and close the screen.

■ Buttons

Tapping on the colour panel displays the pop-up colour palette screen. Tap on the required colour bock to select it and tap on the green tick OK button to make the change and close the screen.

■ Background

Tapping on the colour panel displays the pop-up colour palette screen. Tap on the required colour bock to select it and tap on the green tick OK button to make the change and close the screen.

■ Show plot

Tapping in the option check box enables this option which changes the way that the product signal is displayed in the Main Run screen to show a scrolling plot instead of the dial and pointer.

■ Plot scaling

This drop down list is displayed if the Show plot option has been enabled. The drop downlist provides options of Threshold (default) and Max threshold for selection. The Max threshold option is generally selected where the threshold is likely to change frequently during a production run, for example if the Tracker feature has been enabled.

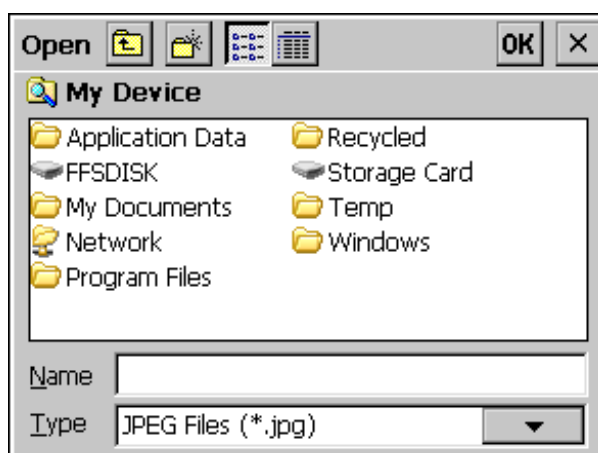
■ Rotate screen

Tapping in the option check box enables this option which rotates the touch screen display if it has been mounted upside down. This option is normally only required on pipeline systems.

■ Start logo

This feature allows you to select your own company image or logo to be used by the metal detector for display on initial start up.

Tapping on the default Loma logo displays a standard file browser dialog showing the My Device folder contents on the metal detector Windows operating system. You can copy your image from a connected USB memory stick to the folder. Then select it and click on the OK button to close the dialog. The image file can be in either .jpg or .bmp format and the recommended aspect ratio (W:H) of the image should be approximately 3:2.



Resultant

Purpose

The Resultant screen is displayed by tapping on the Resultant icon in the [Display](#) screen.

The Resultant value, or current product signal value, is displayed in a number panel located under the product signal dial in the Main Run screen.

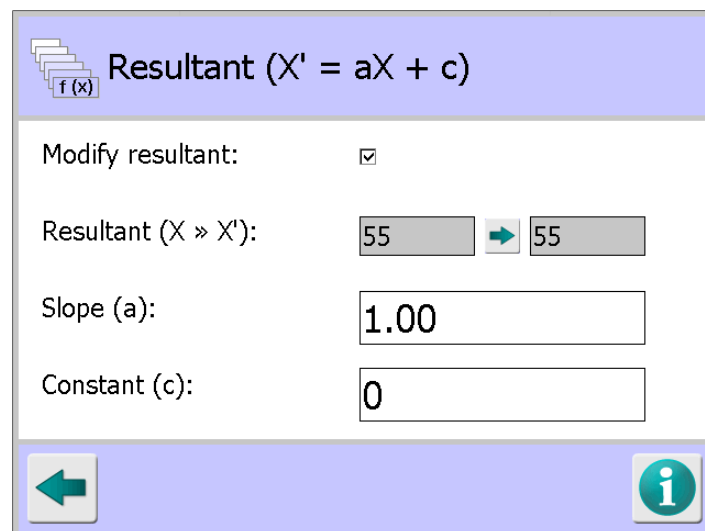
It is sometimes desirable to modify the Resultant value displayed by changing the parameter values used to calculate it.

For example, you may have two metal detectors working side by side that are inspecting the same or similar products. One detector may display on average a resultant value of 500 whilst the other may display an average a value of 200.

By changing the Resultant parameters in this screen on the detector displaying a value of 200 it is possible to make it display a value of around 500.

Note that these are effectively cosmetic settings only and do not affect the operation of the detector.

This feature is for advanced users only. Please contact your Loma Service Centre before using this feature.



The screenshot shows a screen titled "Resultant ($X' = aX + c$)" with a small icon of a stack of papers and the text "f(x)" to the left. Below the title, there is a section with the following elements:

- "Modify resultant:" followed by a checked checkbox.
- "Resultant ($X \gg X'$):" followed by two input fields, both containing the value "55", separated by a right-pointing arrow.
- "Slope (a):" followed by an input field containing the value "1.00".
- "Constant (c):" followed by an input field containing the value "0".

At the bottom of the screen, there is a blue bar containing a left-pointing arrow on the left and an information icon (a lowercase 'i' inside a circle) on the right.

Screen Contents

The Resultant screen contains the following parameters for configuration:

■ Modify resultant

Tapping in this option check box enables the parameters in the screen so that the Resultant value may be modified.

■ Resultant ($X \gg X'$)

Two non-editable resultant values are displayed, being the current value and the value after the Slope and Constant parameters have been modified.

■ Slope (a)

Tapping in the field displays a pop-up numeric keyboard into which you can enter a new Slope value.

■ Constant (c)

Tapping in the field displays a pop-up numeric keyboard into which you can enter a new Constant value.

The formula for calculating the Resultant value (X^1) to be displayed is Slope (a) x X (Product Signal) + Constant (c) or $X^1 = aX + c$, as shown in the screen title bar..

So if we change the the Resultant value of 55 shown in the screenshot above to 120, we need to add a Slope (a) value of 2 and a Constant (c) value of 10, so that $X^1 = 2 \times 55 + 10 = 120$, as shown in the screenshot below.

Resultant ($X' = aX + c$)

Modify resultant: ☒

Resultant ($X \gg X'$): 55 → 120

Slope (a): 2.00

Constant (c): 10

← ⓘ

Once the changes are saved, the product signal in the Main Run screen will now be changed from 55 to display 120.

Language Setup

Purpose

The Language Setup screen is displayed by tapping on the Language icon in the [Display](#) screen.

The purpose of the screen is to enable you to select the language to be used by the metal detector. Once selected all screens are then displayed in that language.

Language Setup (English-UK)

English Français Nederlands Deutsch Español

Čeština Italiano Português

← ⓘ

Screen Contents

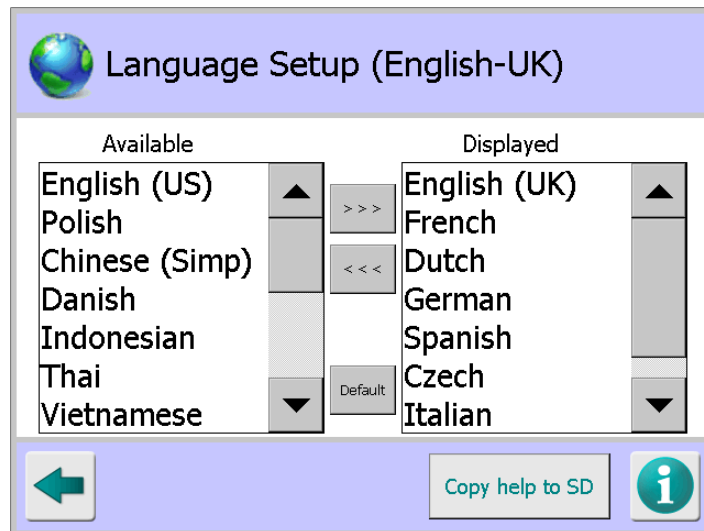
The screen contains the following controls for selecting a language:

■ Country Flags

Tapping on a flag selects it for use when you save the setting changes on exiting the screen.

■ Edit button

If the flag for the required language is not displayed for selection, tapping on the Edit button located on the right hand side of the title bar at the top of the screen, will display other options as shown in the screen shot below, through which additional languages may be selected for inclusion in the Language Setup screen.



See the [Setting the Language](#) section for further details.

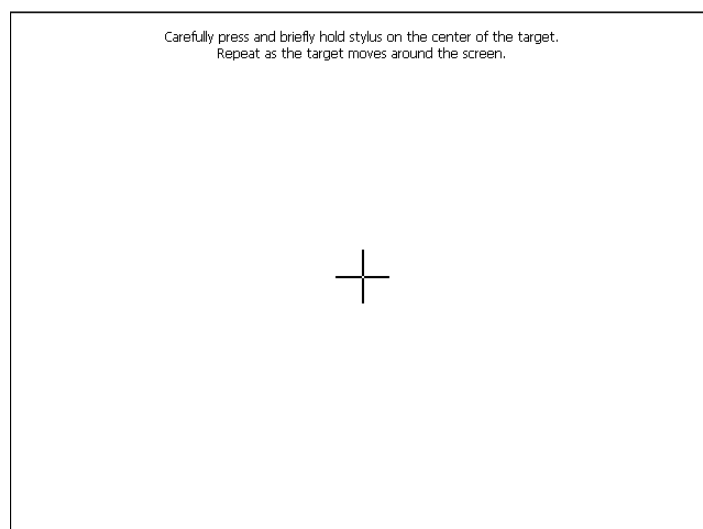
Calibrate

Purpose

The Calibrate screen is displayed by tapping on the Calibrate icon in the [Display](#) screen.

Calibration of the touch screen is required from time to time to ensure that the touch screen responds correctly when you tap on it.

Calibration is achieved through an on-screen interactive process which starts when the screen is displayed.



Screen Contents

The screen displays a target which moves to various locations around the screen. You must tap in the centre of the target at each location.

At the end of the process you must tap the screen to confirm selection and use of the new calibration values captured. Or leave the screen for 30 seconds to retain the original values.

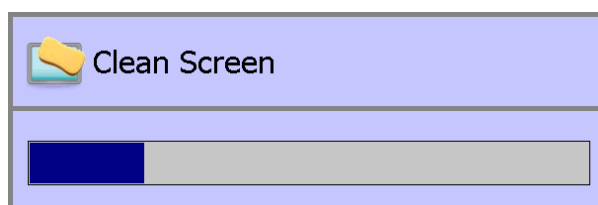
Clean Screen

Purpose

You may wish to clean the touch screen from time to time with a damp cloth or sponge but touching the screen whilst it is active could inadvertently change a setting.

To resolve this issue the Clean Screen feature disables the touch screen for a defined period of time, shown in a progress bar, during which you can clean the screen without affecting anything.

Tapping on the Clean Screen icon immediately disables the touch screen and displays the progress bar as shown below.



Screen Contents

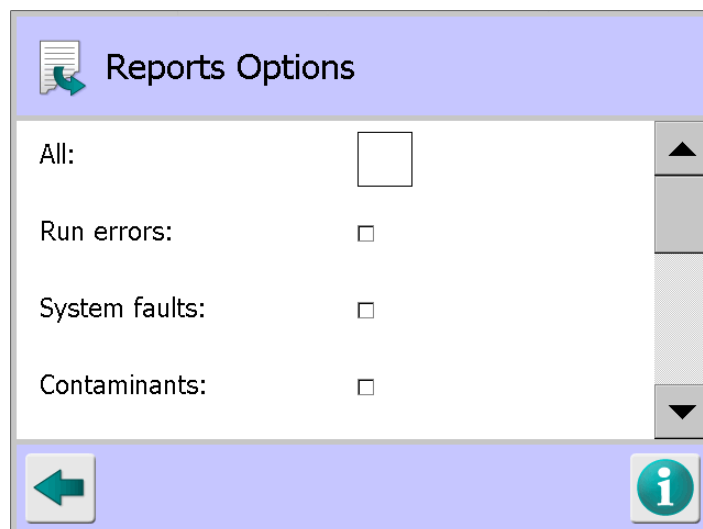
The Clean Screen progress bar is displayed. Once the time period is reached the screen closes and the touch screen becomes active.

Report Options

Purpose

The Report Options screen is displayed by tapping on the Report Options icon in the [System Settings](#) screen.

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. You can also enable the Batch feature by selecting this option in the screen.



Screen Contents

The screen contains the following report options for selection:

- **All**
Tapping in this option check box selects all of the report options available in the screen. It is recommended that this option is selected.
- **Run errors**
Tapping in this option check box will enable exporting of the [Run Errors](#) Log.

■ **System faults**

Tapping in this option check box will enable exporting of the [System Faults](#) Log.

■ **Setup**

Tapping in this option check box will enable exporting of the [Setup Report](#).

■ **Learn**

Tapping in this option check box will enable exporting of the [Learn Report](#).

■ **Status**

Tapping in this option check box will enable exporting of the [Status Report](#).

■ **Batch**

Tapping in this option check box will enable exporting of the [Batch Log](#) and also enable the Batch feature for use. The Batch Control icon is then displayed in the System Settings screen to provide access to the [Batch Control](#) screen.

■ **PVS**

Tapping in this option check box will enable exporting of the [PVS Log](#).

■ **Form Feed**

Tapping in this option check box will include the form feed character at the end of the exported log or report file. This option is selected by default.

■ **Carriage return**

Tapping in this option check box will include the carriage return character at the end of the exported log or report file. This option is selected by default.

Batch Control

Purpose

The Batch Control screen is displayed by tapping on the Batch Control icon in the [System Settings](#) screen.



The Batch Control icon is only displayed for selection in the System Settings page if the Batch option has been enabled in the Report Options screen.

The purpose of the screen is to define what constitutes a batch, which could be a specified number of packs or any number of packs passed through the detector during a specified time period.

Screen Contents

The screen contents will vary depending on the Batch units option selected as follows:

■ **Packs** option selected:

○ **Batch packs**

Tap in the field to display a pop-up numeric keyboard and enter the number of packs that signifies a batch.

○ **Traceability code**

Tap in the option check box to enable this option which enables you to assign a trace code to each batch.

- **Code**

This field is displayed when the Traceability code option is selected. Tap in the field to display a pop-up keyboard and enter the required batch code to be used.

The code is displayed in the [Main Run](#) screen and may also be updated from there by tapping on the code in the screen.

The keyboard also pops-up for you to enter a new batch code after resetting the batch totals to zero in the Main Run screen.

Packs Selected
Time Selected

- **Time option selected:**

- **Batch start**

Tap in each field in turn to display a pop-up numeric keyboard and enter the time in hours and minutes when you would like the batch to start. The 24 hour clock is used so a 6pm start time should be set to 18:00.

- **Batch length**

Tap in each field in turn to display a pop-up numeric keyboard and enter the batch duration in hours and minutes. For example, set it to 01:00 for a batch duration of 1 hour.

- **Traceability code**

Tap in the option check box to enable this option which enables you to assign a trace code to each batch.

- **Code**

This field is displayed when the Traceability code option is selected. Tap in the field to display a pop-up keyboard and enter the required batch code to be used.

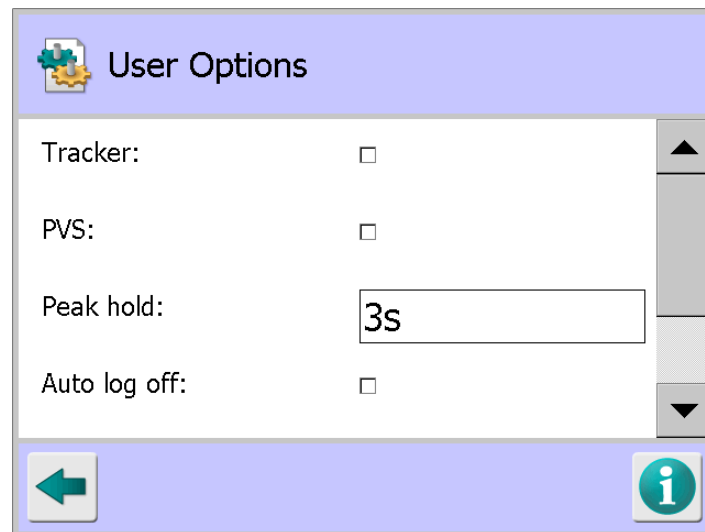
The code is displayed in the Main Run screen and may also be updated from there by tapping on the code in the screen.

The keyboard also pops-up for you to enter a new batch code after resetting the batch totals to zero in the Main Run screen.

User Options

Purpose

The User Options screen is displayed by tapping on the User Options icon in the [System Settings](#) screen.



The purpose of the screen is to allow you to enable or disable some of the optional features available in the detector.

Screen Contents

The screen contains the following options and settings:

■ Tracker

Tap in the option check box to enable the Tracker functionality which allows the product threshold value to follow any changes in measured product effect. This option is only available when a product registration photo-eye is in use. See the [Enabling the Tracker Feature](#) and [Enabling and Configuring Tracker for a Product](#) sections for further details.

■ PVS

Tap in the option check box to enable the PVS functionality which is used to set up regular metal detector performance validation testing routines. See the [Using Performance Validation](#) chapter for further details.

■ Peak hold

Tapping in the field displays the pop-up numeric keypad for you to enter the time in seconds that large signal values will remain displayed in the digital signal panel on the Main Run screen.

■ Auto log off

Tap in the option check box to enable this feature which ensures that the detector automatically logs off the current user, setting the access level to 0 –Log off, if no activity has been detected in the Main Run screen for a period of around 5 minutes.

■ Operator reset fault?

Tap in the option check box to enable this option to allow users with Level 1 – Operator access to reset faults. If it is not selected, then a user with Level 2 – Supervisor access or above will need to log in to clear the fault. The option is enabled by default.

■ Password character

Tap on the arrow to the right of the field to display a drop down list of options for setting the format to be used for user passwords.

Selecting the “0-9” option means that users will need to enter a numeric password that contains numbers only. The password must contain at least one number and can be up to five numbers long. The pop-up numeric keypad screen will be displayed to the user when adding or editing the password.

Selecting the “0-9, a-z, A-Z” option means that the user can enter an alphanumeric password that can contain both characters and numbers. The password must contain at least one but can be up to eight characters/numbers long. The pop-up keyboard screen will be displayed to the user when adding or editing the password.

PVS Setup

Purpose

The PVS Setup screen is displayed by tapping on the PVS icon in the [System Settings](#) screen.

The screen is used to set up the PV test routine that is to be used for all products, including how the test is to be carried out and whether tests are automatically started based on an event or manually started as required by the operator.

Screen Contents

The screen contains the following options and settings:

■ Test type

Tap on the arrow to the right of the field to display a drop down list of options for setting the test type to be used.

○ Normal

Selecting this option enables the normal test process. The size of the Fe (Ferrite), Nfe (Non-Ferrite) and S.St (Stainless Steel) test wands being used must first be entered into the fields provided in the [Product Settings](#) screen, which are displayed after enabling the PVS option.

When the PV test starts the user will be prompted to pass the Fe test wand type through the detector where it will be inspected to confirm that the metal contaminant in the test wand can be detected. If it cannot then a warning message will be displayed and a larger metal contaminant may need to be used.

Once a successful inspection of the Fe test wand has been completed, the user is prompted to pass the same test wand through the detector a number of times, set in the Number of passes field in this screen, until they have all passed inspection and the test is complete in the PVS screen as shown below.

The user is then prompted to repeat the above process for the Nfe and then the S.St test wands.

Once all test wands have been completed successfully the PVS screen will close and normal inspection can be continued.



The test wands are colour coded RED – Fe (Ferrite), GREEN – NFe (Non-Ferrite) and BLUE – S.St (Stainless Steel). These colours are also used to identify the test wand types in the PVS screen.

○ Sequential

Selecting this option enables the sequential process which is basically the same as the Normal process with the exception that each of the test wand types is passed one after the other through the detector rather than one type at a time until they have all passed inspection and the test is complete.

■ Test timing

Tap on the arrow to the right of the field to display a drop down list of options for setting the test timing to be used.

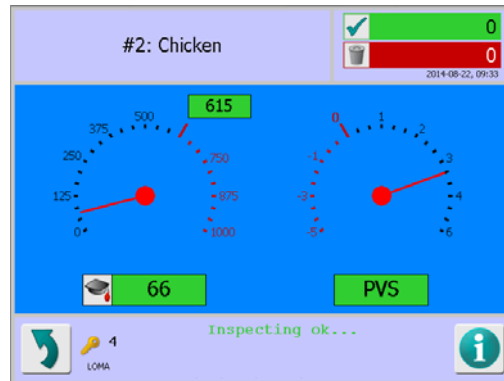
○ Off

Selecting this option means that the user will initiate a PV test manually. To enable the user to do this do a Notepad icon is included in the Main Run screen as shown below. Tapping on the icon will start the test.



○ Interval

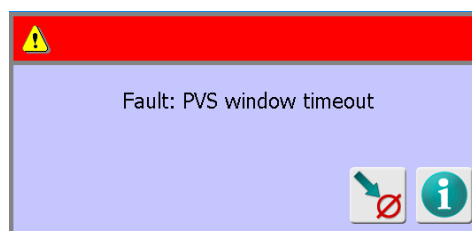
Selecting this option means that the user will be automatically prompted to initiate a PV test after a specified time. A separate PVS dial is displayed on the main Run screen and the pointer will count down the time until a PV test is due. An interval of 6 minutes, which is the minimum time interval you can set, was used for the example screen shot below



Once the PV test is due the PVS panel goes red and an error message is displayed. Tapping on the PVS panel will start the PV test process.

Once the pointer passes the time the PV test was due it continues to move into the red negative time section of the dial.

If the Fault on timeout option has been enabled in this screen, after the pointer reaches the end of the scale, shown as 5 minutes on the screenshot above, a system error will be logged and the error message shown below will be displayed.



○ Batch

Selecting this option means that the user will be automatically prompted to initiate a PV test when a new batch is started or when a batch ends. The 'PVS on product start' and 'PVS on product end' options in this screen are provided to enable this functionality.



A Product Registration Photo-eye must be fitted to use the Interval and Batch options.

■ Interval

This option only appears when the Interval Test timing option is selected. It is used to set the time interval in hours and seconds between carrying out PV tests. See the Interval information under Test timing above for further details.

Tap in the Hour field to display a pop-up numeric keypad screen and enter the number of hours required. Then tap in the Minutes field and repeat the process.

■ Synchronisation

This option only appears when the Interval Test timing option is selected. Its purpose is to set the exact time to start a PV test.

This is useful in a situation where many detectors are in use to stagger the tests to enable operators to complete them in an orderly fashion.

■ **Synch time**

This option only appears when the Synchronisation option is selected. It is used to set the exact time in hours and minutes, using the 24 hour format, to start a PV test.

Tap in the Hour field to display a pop-up numeric keypad screen and enter the number of hours required. Then tap in the Minutes field and repeat the process.

■ **Window**

This field is only displayed when either the Interval or Batch Test timing option is selected. It is used to set a length of time in minutes to successfully complete a PV test, commencing from the generation of the prompt. When using the Interval Test timing option, the length of time set cannot be shorter than the time set in the Interval field.

Tap in the field to display a pop-up numeric keypad screen and enter the time in minutes required.

■ **Fault on timeout**

This option is displayed for all test type and timing options. When enabled it forces a system error to be generated if a PV test is not carried out when required.

Tap in the option check box to enable the option.

■ **Number of passes**

This field is displayed for all test type and timing options. It is used to set the number of passes required for each test wand type to complete a PV test.

○ **Guidance on determining the number of passes to be used**

For products that exhibit no product effect and where no Product Registration Photo-eye is fitted, place each test wand type onto the product sample at the leading edge for the first pass and then on the trailing edge for the second pass to ensure that the change of reject timing point still results in the correct rejection of the product. A minimum of two passes per test wand type is therefore suggested.

For products that exhibit no product effect but where a Product Registration Photo-eye is fitted, you can place each test wand type anywhere within the product length. In this case a minimum of one pass per test wand type is sufficient.

For products that exhibit a product effect, regardless of whether a Product Registration Photo-eye is fitted, place each test wand type onto the product sample at the leading edge for the first pass, in the middle for the second pass and on the trailing edge for the third pass to ensure not only that the reject timing is correct for non photo-eye systems but also to obtain better detection coverage of the product sample itself. A minimum of three passes per test wand type is therefore suggested.

Tap in the field to display a pop-up numeric keypad screen and enter the number of passes required.

■ **Sample in stats**

Tap in the option check box to enable the inclusion of packs passed during the PV test process in the [Batch Log](#) statistics.

■ PVS on product start?

This option is displayed for selection for all test types and timings. If selected, a PV test is required when you change the product being run to start inspection a different product.

Tap in the option check box to enable this option.

■ PVS on product end?

This option is displayed for selection for all test types and timings. If selected, a PV test is required when you change the product being run to a different product to end inspection of the product.

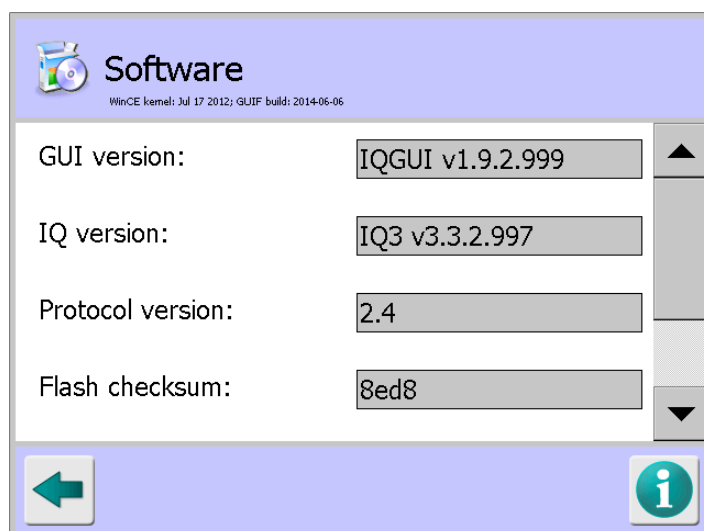
Tap in the option check box to enable this option.

Software

Purpose

The Software screen is displayed by tapping on the Software icon in the [System Settings](#) screen.

The purpose of the screen is to display the currently installed software versions to the user. This is useful information to provide to Loma Service Engineers when reporting an issue as they can then investigate whether the issue can be resolved by carrying out a software upgrade.



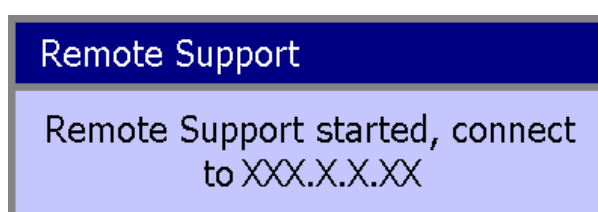
Remote Support

Purpose

If the metal detector has been connected to a network, tapping on the Remote Support icon in the [System Settings](#) screen enables users to connect remotely to the metal detector from their PC using the VNC Viewer.

The screenshot shown below is briefly displayed until the remote connection facility has been enabled.

Note that the IP address for the metal detector will be displayed but this has been replaced with XXX.X.X.XX in the screenshot.

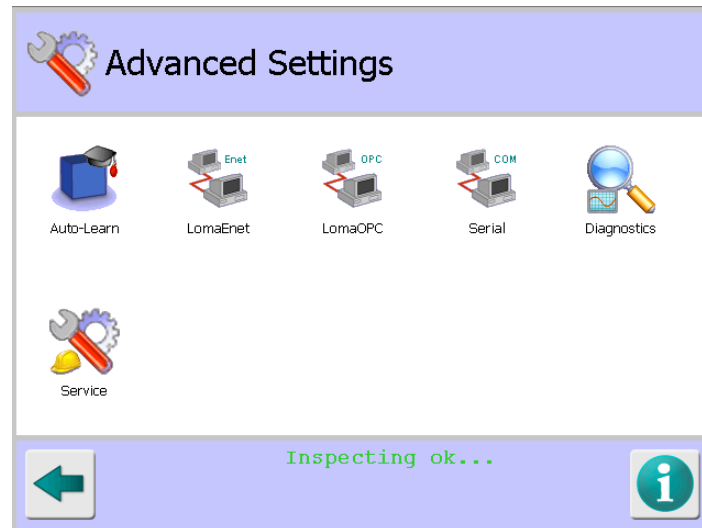


Advanced Settings

Purpose







The Advanced Settings screen is displayed by tapping on the Advanced icon in the [System Settings](#) screen.

The purpose of the screen is to provide access to advanced areas of the system so that their related settings can be configured as required.



Screen Contents

The screen contains a number of icons described in the table below which when selected provide access to other screens.

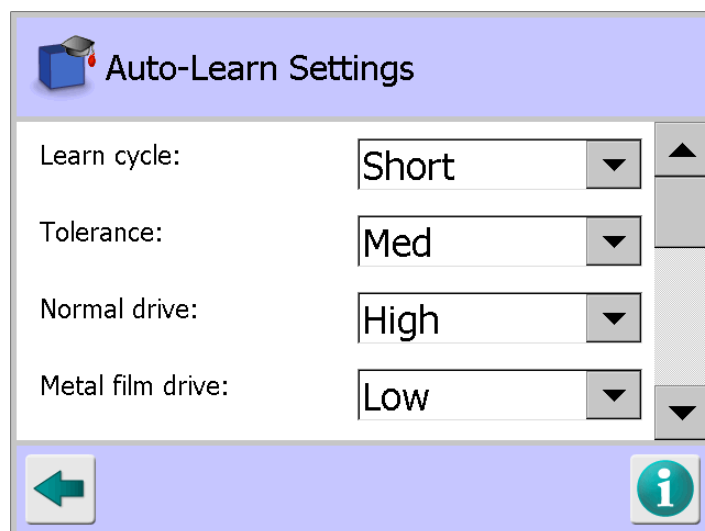
 Auto-Learn	Tap on the Auto-Learn icon to display the Auto-Learn Settings screen to select and configure the options to be used for the Learn process.
 LomaEnet	Tap on the LomaEnet icon to display the LomaEnet Capture screen in which you can view the latest report sent to the LomaEnet Capture application, enter or change the address and communications Port number for the server and view any diagnostic messages.
 LomaOPC	Tap on the LomaOPC icon to display the LomaOPC Server screen in which you can view the latest message received from the LomaOPC application and the reply sent, enter or change the communications Port number that the metal detector will use to communicate with the LomaOPC application and view any diagnostic messages.
 Serial	Tap on the Serial icon to display the Serial Comms Setup screen in which you can set up a serial connection to another device for sending and receiving data from and to the metal detector . You can also select the data type to be sent and received .
 Diagnostics	Tap on the Diagnostics icon to display the Diagnostics screen which provides access through a number of icons to various related screens.
 Service	Tap on the Service icon to display the Service screen which provides access through a number of icons to various related screens .

Auto-Learn Settings

Purpose

The Auto-Learn Settings screen is displayed by tapping on the Auto-Learn icon in the [Advanced Settings](#) screen.

The purpose of the screen is to configure the detector settings to be used when carrying out a Learn process.



Screen Contents

The screen contains the following options and settings:

■ Learn cycle

Tap on the arrow to the right of the field to display a drop down list of options for setting the Learn cycle option to be used.

○ Short

If a Product Registration Photo-eye is fitted, selecting this option means that when a Learn process is started, the system requests that you pass 8 packs (product samples) through the detector. The number of packs to be passed is displayed on the screen, reducing as each pack is passed. Once all 8 packs have been passed the screen closes.

If a Product Registration Photo-eye is **NOT** fitted, selecting this option means that when a Learn process is started, the system requests that you pass packs (product samples) through the detector for a period of 20 seconds. The time remaining to pass packs is displayed on the screen. Once the time available has reduced to zero the screen closes.

○ Long

If a Product Registration Photo-eye is fitted, selecting this option means that when a Learn process is started, the system requests that you pass 20 packs (product samples) through the detector. The number of packs to be passed is displayed on the screen, reducing as each pack is passed. Once all 20 packs have been passed the screen closes.

If a Product Registration Photo-eye is **NOT** fitted, selecting this option means that when a Learn process is started, the system requests that you pass packs (product samples) through the detector for a period of 60 seconds. The time remaining to pass packs is displayed on the screen. Once the time available has reduced to zero the screen closes.

■ **Tolerance**

This feature is used to add a percentage safety margin to the product signal threshold, captured and set during the Learn process, to allow for any small variances in product signal values during normal running conditions.

Tap the arrow to the right of the field to display a drop down list of options for setting the Tolerance percentage to be used. Options of Low, Med, High and Max are available, with Med being the default providing around 15% of tolerance.

■ **Normal drive**

This feature is used to set the drive level used when carrying out a Full Learn process when the Unknown or Dry Product type option has been selected in the [Product Settings](#) screen.

Tap the arrow to the right of the field to display a drop down list of options for setting the drive level to be used. Options of Low, Med, High and Max are available, with High being the default value.

■ **Metal film drive**

This feature is used to set the drive level used when carrying out a Full Learn process when the Metal film Product type option has been selected in the [Product Settings](#) screen.

Tap the arrow to the right of the field to display a drop down list of options for setting the drive level to be used. Options of Low, Med, High and Max are available, with Low being the default value.

■ **PQ Gain**

This feature is used to set the initial P and Q gain levels to be used when starting a Full Learn process.

Tap the arrow to the right of the field to display a drop down list of options for setting the gain level to be used. Options of Min, Low, Med and Max are available, with Max being the default value.

■ **RF Gain**

This feature is used to set the initial RF gain level to be used when starting a Full Learn process.

Tap the arrow to the right of the field to display a drop down list of options for setting the gain level to be used. Options of Min, Low, Med and Max are available, with Med being the default value.

■ **Max learnt threshold**

This feature is used to set the maximum signal value to be used during a Full Learn process. If the signal exceeds this threshold then the frequency is automatically reduced.

Tap in the field to display a pop-up numeric keypad and enter the value required. The default value is 5000.

■ **Saturation learn limit**

This feature is used to set the maximum saturation learn signal value to be used during a Full Learn process. If the signal exceeds this limit then the gain or frequency is automatically reduced.

Tap in the field to display a pop-up numeric keypad and enter the value required. The default value is 1900.

■ Saturation run limit

This feature is used to set the maximum signal value for the saturation point during a Full Learn process. If this value is exceeded, the digital signal display in the Main Run screen displays SAT.

Tap in the field to display a pop-up numeric keypad and enter the value required. The default value is 1500.

■ PQ span?

Tap in the option check box to enable this option which enables P-span and Q-span checking during a Full Learn process. This option requires a Product Registration Photo-eye to be fitted.

■ Noise threshold

This feature is used to set the P,Q signal value below which the Product type parameter is automatically set to Dry in the Product Settings screen.

Tap in the field to display a pop-up numeric keypad and enter the value required. The default value is 20.

■ Learn messages

This feature is generally for Loma Service use only. If enabled, additional diagnostic messages will be displayed during the Learn process.

The following table lists the messages that may appear during calibration:

Message	Explanation
+Use ferrite+	This only applies to the ferrite product (F) and indicates that either the ferrite wand is not being passed through the machine, or that there is not enough ferrite within the wand (check that it is the wand that was supplied with the machine).
+Head overload+	The Gain cannot be reduced any further to stop the head overloading. Possible reasons for this could be that the sample pack contains a large metal contaminant, the product being inspected is not suitable for the machine or the product packaging is highly conductive. If in doubt, call your nearest Loma Service Centre.
+Working dry+	The product has so little moisture content that it produces no product effect and therefore the detector has chosen to set the compensation to minimize the effects of vibration (i.e. the working mode of detection has automatically been set to DRY).
+Bad pack+	The threshold which the machine is calculating for this product is exceeding the maximum threshold set in the Learn Setup screen. This would typically be because the sample pack is contaminated or is too conductive for the maximum threshold setting. Check that the sample pack is representative of a production pack (eg. for frozen product, the sample pack must be frozen). If in doubt, call your nearest Loma Service Centre.
+Gain reducing+	The detector is reducing the Gain to account for the product effect of the product.

Message	Explanation
+Head locked+	The detector is using the Gain value set for the product in the Learn Setup screen, rather than determining it itself, as the Gain lock option has been enabled in the Learn Setup screen.
+Mode locked+	The detector is using the Working mode option set for the product in the Learn Setup screen, rather than determining it itself, as the Working lock option has been enabled in the Learn Setup screen.
+Dry product+	The product has little product signal, and therefore the wrong Working mode option has been selected and locked in the Learn Setup screen.
+Calibrate complete+	Full calibration was successful.

See the [Learning Products](#) section for further details on the Learn feature.

LomaEnet Capture

Purpose

The LomaEnet Capture screen is displayed by tapping on the LomaEnet icon in the [Advanced Settings](#) screen.

The purpose of this screen is to allow you to view the latest report sent to the LomaEnet Capture application, enter or change the address and communications Port number for the server and to view any diagnostic messages.

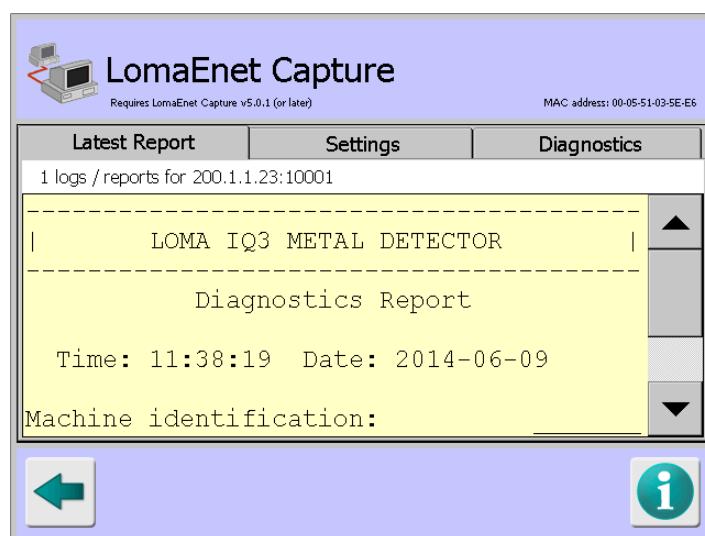
Screen Contents

The screen is divided into three tabs which are described below.

■ Latest Report

Reports can be sent manually to the server on which the LomaEnet Capture application has been installed by clicking on the LomaEnet button provided at the bottom of the Report/Log screen. Some reports can also be set up to be automatically sent to the application. See the [Logs and Reports](#) chapter for further details.

This tab displays the latest report received by the LomaEnet Capture application.



■ Settings

This tab displays the network address details for the metal detector and allows you to enter the IP address and Port number for the server on which the LomaEnet Capture application has been installed so that they can communicate to each other, e.g. the metal detector can send the application a report.

To change any of the IP address or Port number details, tap in a field to display a pop-up numeric keypad and enter the required value.

The screenshot shows the 'Settings' tab of the LomaEnet Capture application. The title bar includes the application icon, the name 'LomaEnet Capture', the requirement 'Requires LomaEnet Capture v5.0.1 (or later)', and the MAC address '00-05-51-03-5E-E6'. Below the title bar are three tabs: 'Latest Report', 'Settings' (which is selected), and 'Diagnostics'. The main content area contains five settings, each with a label and a value field. The first three settings (Machine IP address, Subnet mask, and Default gateway) have a '(DHCP enabled)' note below the label. The values are entered using a numeric keypad interface. The 'Capture IP address' and 'Capture port number' fields are also present. At the bottom of the screen, there is a blue bar with a green back arrow on the left and a green information icon on the right.

Label	Value
Machine IP address: (DHCP enabled)	200 1 2 52
Subnet mask: (DHCP enabled)	255 255 252 0
Default gateway: (DHCP enabled)	200 1 1 20
Capture IP address:	200 1 1 23
Capture port number:	10001

■ Diagnostics

This tab displays advanced diagnostic messages about reports sent and communications with the LomaEnet Capture application. The last 50 diagnostics messages are displayed.

The screenshot shows the 'Diagnostics' tab of the LomaEnet Capture application. The title bar is identical to the Settings tab. Below the title bar are three tabs: 'Latest Report', 'Settings', and 'Diagnostics' (which is selected). The main content area is a yellow scrollable list displaying diagnostic messages. Two messages are visible: '11:38:22: Connection failed, IP: 200.1.1.23, Port: 10001' and '11:38:19: Diagnostics Report; took 3ms to build'. At the bottom of the screen, there is a blue bar with a green back arrow on the left and a green information icon on the right.

Message
11:38:22: Connection failed, IP: 200.1.1.23, Port: 10001
11:38:19: Diagnostics Report; took 3ms to build

■ Diagnostics

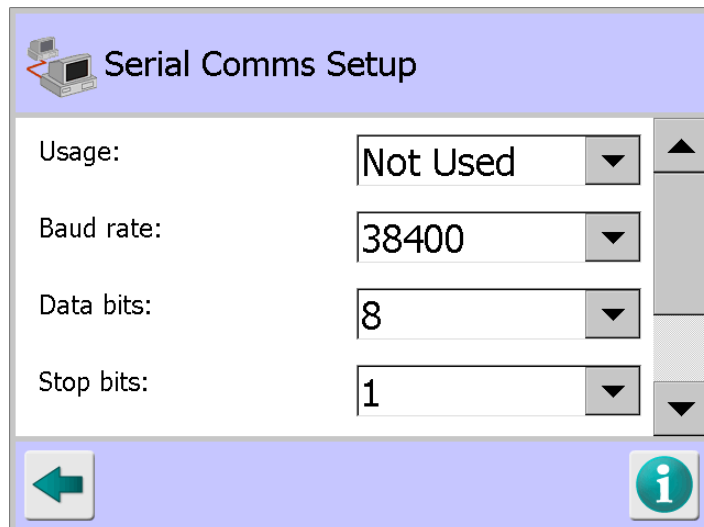
This tab displays advanced diagnostic messages about reports sent and communications with the LomaOPC application. The last 50 diagnostics messages are displayed.

Serial Comms Setup

Purpose

The IQ³+ Metal Detector has built in Ethernet capabilities for LomaEnet and LomaOPC but for transmitting and receiving LomaLink and resultant data, a serial connection is required.

The Serial Comms Setup screen is displayed by tapping on the Serial icon in the [Advanced Settings](#) screen and its purpose is to allow you to set up a serial connection, selecting what data type is to be transmitted and/or received and the data protocol to be used.



The image shows a 'Serial Comms Setup' dialog box. It has a title bar with a computer icon and the text 'Serial Comms Setup'. Below the title bar, there are four rows of settings, each with a label and a dropdown menu. The settings are: 'Usage' with 'Not Used', 'Baud rate' with '38400', 'Data bits' with '8', and 'Stop bits' with '1'. To the right of these dropdowns is a vertical scrollbar. At the bottom of the dialog, there is a blue bar containing a green left-pointing arrow on the left and a green circle with a white 'i' (information icon) on the right.

Screen Contents

The screen provides the following for setting up a serial connection:

■ Usage

Tap the arrow to the right of the field to display a drop down list of options for selecting how the connection is going to be used. Four options are available which are described below.

○ Not used

Select this option if you do not wish to use a serial connection.

○ Lomalink

Select this option if you wish to create a connection with the LomaLink application for two-way communication and control.

LomaLink enables data to be requested from and sent to the metal detector, and enables remote control of the metal detector.

○ Reports

Select this option if you wish to send Reports and Logs over the serial connection either manually or automatically. See [Logs and Reports](#) for further details.

○ Resultant

Select this option if you wish to send product resultant signals over the serial connection. If a Product Registration Photo-eye is fitted then a signal is sent for each pack as it is inspected. If a Product Registration Photo-eye is not fitted then the current signal is sent over the connection about once a second.

The remaining menus determine the required serial connection protocol. Whichever settings are chosen they must match those used by the equipment the detector is communicating with.

■ Baud rate

Tap the arrow to the right of the field to display a drop down list of options for selecting the baud rate to be used for the connection.

■ Data bits

Tap the arrow to the right of the field to display a drop down list of options for selecting the number of data bits to be used for the connection.

■ Stop bits

Tap the arrow to the right of the field to display a drop down list of options for selecting the number of stop bits to be used for the connection.

■ Parity

Tap the arrow to the right of the field to display a drop down list of options for selecting the parity to be used for the connection.

■ Flow control

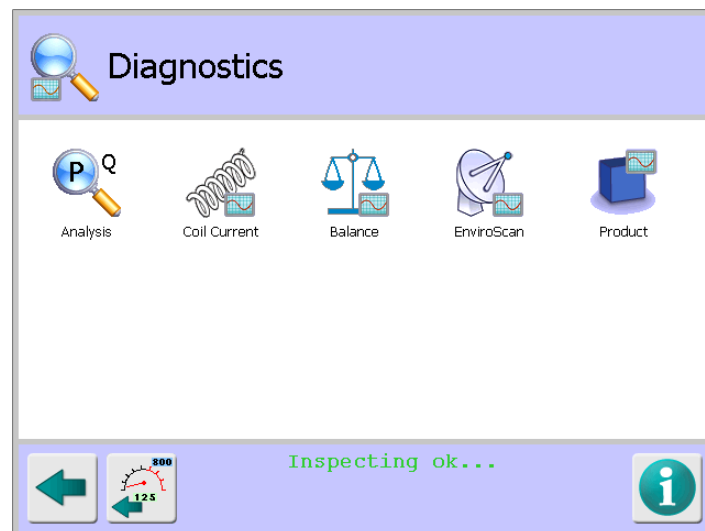
Tap the arrow to the right of the field to display a drop down list of options for selecting the flow control to be used for the connection.

Diagnostics

Purpose




The Diagnostics screen is displayed by tapping on the Diagnostics icon in the [Advanced Settings](#) screen.



The purpose of the screen is to provide access to a number of screens that provide real time data and settings details to enable analysis of the detectors current performance.



Screen Contents

The screen contains a number of icons described in the table below which when selected provide access to other screens.

 Analysis	Tap on the Analysis icon to display the PQ Analysis screen to view the current and average P and Q signal values and adjust them manually or automatically if necessary to achieve a balance.
 Coil Current	Tap on the Coil Current icon to display the Coil Current screen which displays the configuration and run current values and provides the option to restore the drive for the frequency being used by the currently running products.
 Balance	Tap on the Balance icon to display the Balance screen to display the frequency and balance values for the current product.

 EnviroScan	Tap on the EnviroScan icon to display the EnviroScan screen which may be used to identify sources of RF noise in the local environment around the metal detector. This enable investigations to reduce or eliminate the noise to improve metal detection performance and reduce false triggering.
 Product	Tap on the Product icon to display the Product screen which is used to display current detector settings, displays communications statistics between the detector head and the control panel and to capture and display raw data from the detector head for analysis.

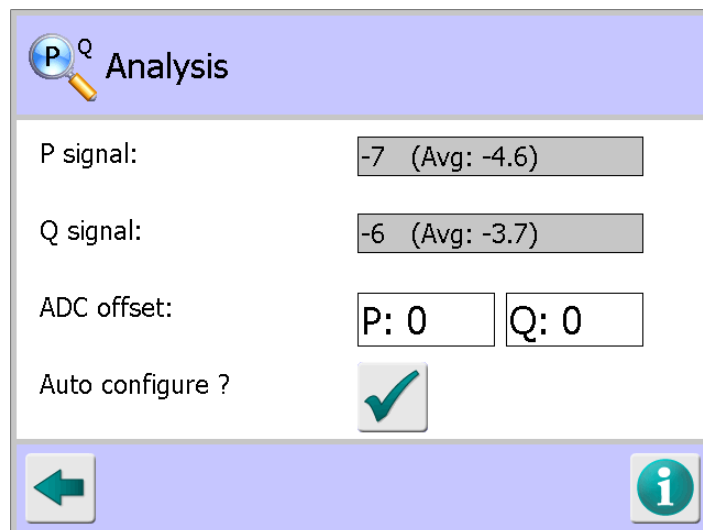
PQ Analysis

Purpose

The PQ Analysis screen is displayed by tapping on the Analysis icon in the [Diagnostics](#) screen.

This screen is intended for use by Loma Service Engineers or Customer Engineers only following the replacement of a Control board.

It is used to balance out the P and Q channel signals being received from the Receiver board, when the detector is transmitting a signal but not inspecting products, by applying a positive or negative DC offset to each channels analogue to digital convertor on the Control board.



Screen Contents

The screen contains the following:

■ P signal

The current P channel quiescent signal value is displayed, along with the average signal value.

■ Q signal

The current Q channel quiescent signal value is displayed, along with the average signal value.

■ ADC offset

Tap in each field to display a pop-up numeric keypad and enter a positive or negative DC offset value for the P and Q channels.

■ Auto configure?

Tap on this button to set the P and Q ADC offset values automatically. Ensure that the readings are as stable as possible when using this feature.

Adjusting the P and Q ADC offset values

The following procedure may be used when setting the ADC offset values:

1. Select an unused row in the Select Product to Setup screen and then select the Run option in the Product Options screen
2. Tap on the Learn icon in the Main Run screen to display the Learn options screen and select the Setup option.
3. In the Learn Setup screen, set the Head drive, Head RF gain, Head P gain and Head Q gain options to Max. Then exit the screen and save the changes.
4. Stop the conveyor and do not pass any product through the detector.
5. Navigate to the PQ Analysis screen and monitor the P channel signal. The numbers will be continually updating
6. Observe the numbers and their sign to determine if the average movement is symmetrical about zero (no adjustment required) or if it is biased in a positive or negative direction.
7. If the bias is positive, enter a negative value in the P channel ADC offset field to bring the movement back towards the target value of zero.
8. If the bias is negative, enter a positive value in the P channel ADC offset field to bring the movement back towards the target value of zero.
9. Repeat the procedure for the Q channel.

Alternatively, you can use the EnviroScan screen to determine the offset values to use as follows:

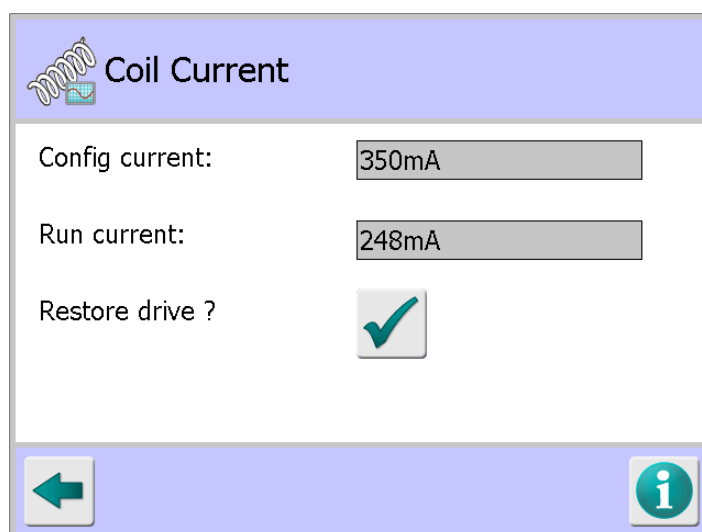
1. Select the P v Q tab in the EnviroScan screen.
2. Allow the head to stabilise, then press the Reset button and allow the noise ball of the head to build up.
3. Note the average P and Q channel positive and negative values being displayed and use them to determine the ADC offset values to enter in the PQ Analysis screen.


Coil Current

Purpose

The Coil Current screen is displayed by tapping on the Coil Current icon in the [Diagnostics](#) screen.

This screen is intended for advanced diagnostics use by Loma Service Engineers or Customer Engineers only. It displays the configuration and run current values and can be used to restore the drive for the frequency in use by the currently running product.





 **Coil Current**

Config current:

Run current:

Restore drive ? ☒

Screen Contents

The screen contains the following:

- **Config current**

This field displays the target transmitter drive current. If required the value can be changed in the [VF Drive](#) screen.

- **Run current**

This field displays the run current for the frequency of the currently running product.

- **Restore drive?**

Tap this button to initiate a process to restore the drive for the frequency in the currently running product.

Balance

Purpose

The Balance screen is displayed by tapping on the Balance icon in the [Diagnostics](#) screen.

This screen is intended for advanced diagnostics use by Loma Service Engineers or Customer Engineers only.

It displays the balance values for all or individual system frequencies in a graphical format to assist in analysis of the detector operation. The current head drive and channel gain settings are also displayed.

Screen Contents

The screen is divided into three tabbed panes and includes other items as described below.

The following information is displayed in the top right hand corner of the screen:

- **Capture**

This field displays 'Active' when the data capturing process is in progress and 'Not active' when it has been stopped.

- **Balance reads**

This field displays the current balance value.

- **Graph**

This field displays the last time taken to redraw the graph, in milliseconds.

- **Elapsed**

This field displays the total time that has elapsed since the data capture process was initiated.

- **Frequency**

This field displays the frequency number, from 1 to 70, currently being used; followed by a percentage completion figure for the whole process. This information is only displayed when the Frequency tab is selected.

The following items and information are displayed at the bottom of the screen:

- **Frequency**

This field displays the currently selected frequency in kHz.

- **Signal**

This field displays the P and Q channel signals for the currently selected frequency.

■ Balance

This field displays the balance signal. This is shown as a voltage in brackets below the signal value. This is calculated by dividing the current balance value by 54 and then adding 0.75.

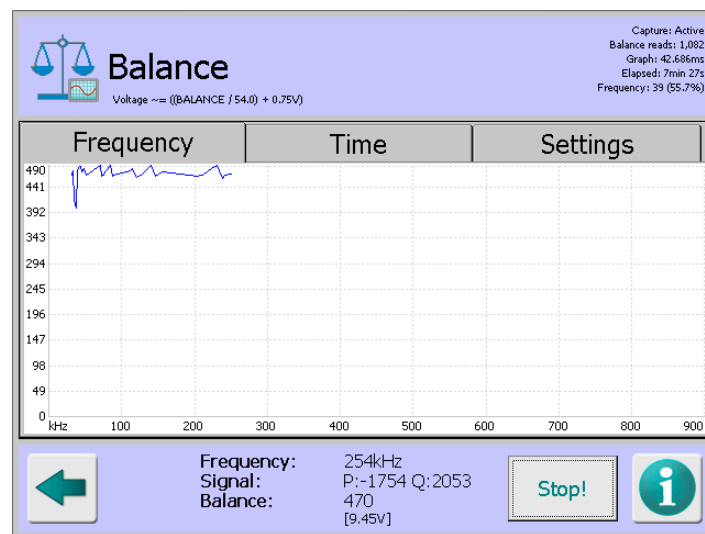
■ Capture / Stop

This button is used to start and stop the data capture process when either the Frequency or time tabs are selected. The button legend toggles between 'Capture', which indicates that the process has not been started and 'Stop', which indicates that the process has been started.

The information displayed in each of the tabbed panes is as follows:

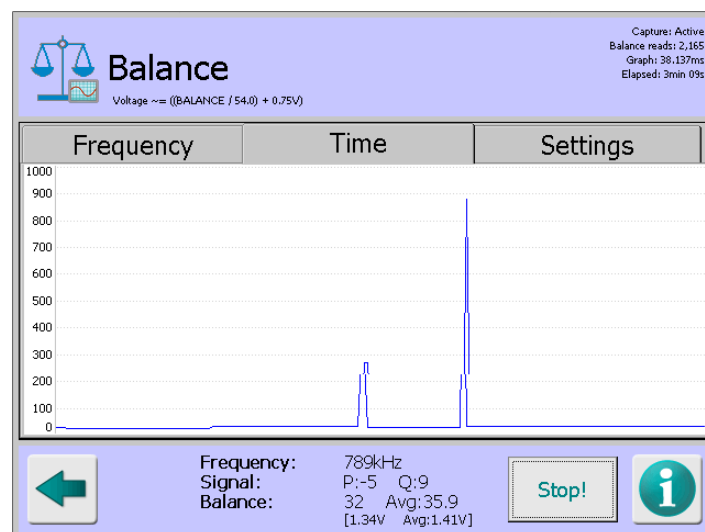
■ Frequency tab

Tapping on the Capture button with the Frequency tab selected starts a process that steps through each of the 70 available frequencies, captures the balance values at each frequency and displays them on a graph which updates in real time

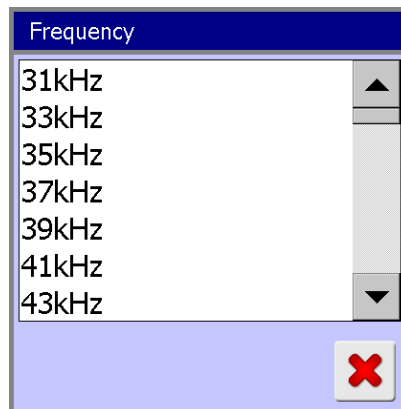


■ Time tab

Tapping on the Capture button with the Time tab selected starts a process that captures the balance value at the currently set frequency and displays a scrolling graph of that signal over time.

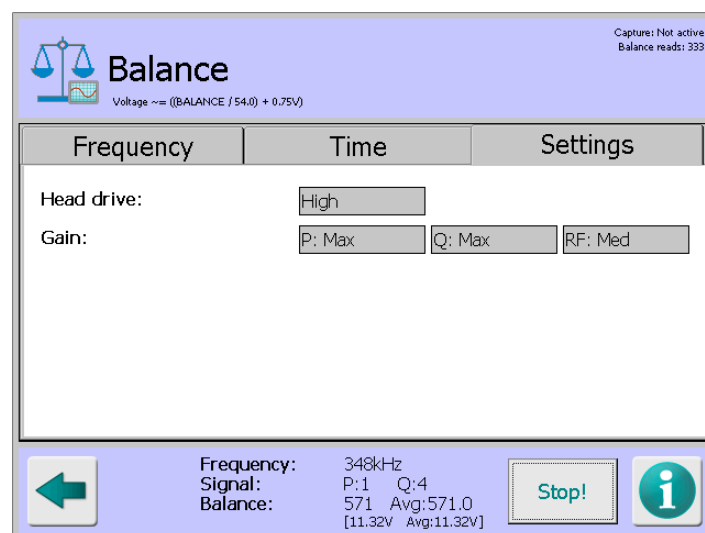


Tapping anywhere within the graph pops up the Frequency screen which displays a list of the 70 available frequencies. Tapping on a frequency selects it and closes the screen. The selected frequency is then used and displayed in the plot



■ Settings tab

Tapping on the Settings tab displays the currently set Head drive, P gain, Q gain and RF gain settings for the currently selected product. These values are set up in the [Learn Setup](#) screen for each product



EnviroScan

Purpose

The EnviroScan screen is displayed by tapping on the EnviroScan icon in the [Diagnostics](#) screen.

This screen is intended for advanced diagnostics use by Loma Service Engineers or Customer Engineers only.

It is designed to identify sources of RF noise in the environment of the metal detector. For example, one source of noise may be another nearby metal detector operating at the same frequency!

By helping to identify the source of RF noise it is possible to trace their cause and eliminate them or to select an operating frequency for the detector which is not so affected by the noise. This will maximise the performance of the detector.

A scan is generally carried out by the Loma Service Engineer when carrying out commissioning of the metal detector before use.

Screen Contents

The screen is divided into four tabbed panes and includes other items as described below.

The following information is displayed in the top right hand corner of the screen:

■ Capture

This field displays 'Active' when the data capturing process is in progress and 'Not active' when it has been stopped.

■ P,Q reads

This field displays the number of separate P and Q channel signal value readings that have been taken from when the screen was first accessed.

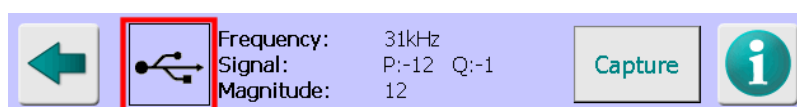
■ Graph

This field displays the last time taken to redraw the graph, in milliseconds.

The following items and information are displayed at the bottom of the screen:

■ USB icon

When a USB memory stick is installed in the port provided on the side of the control panel a standard USB icon is displayed.



When the P V Q tab is selected, tap on the USB icon to save the graph and available data to the USB memory stick.

When the Frequency tab is selected and a data capture process has been started, the EnviroScan raw data will automatically be downloaded to the USB memory stick after completion.

When the Time tab is selected, tap on the USB icon to save the graph currently being displayed to the USB memory stick. On the P v Q graph, up to 10,000 raw P,Q values will also be saved as a CSV file for offline analysis.

The saved raw data can be analysed on another computer or alternatively, sent to Loma Service for analysis.

■ Frequency

This field displays the currently selected frequency in kHz.

■ Signal

This field displays the P and Q channel signals for the currently selected frequency.

■ Magnitude / P / Q / Resultant

This field toggles to display raw **P** signal values, **Q** signal values, a combination of the P and Q signal values (**Magnitude**) or the **Resultant** signal value taken directly from the detector head, depending on the Plot option selected in the Settings tab.

■ Capture / Stop

This button is used to start and stop the data capture process when either the Frequency or Time tabs are selected.

The button legend toggles between 'Capture', which indicates that the process has not been started and 'Stop', which indicates that the process has been started.

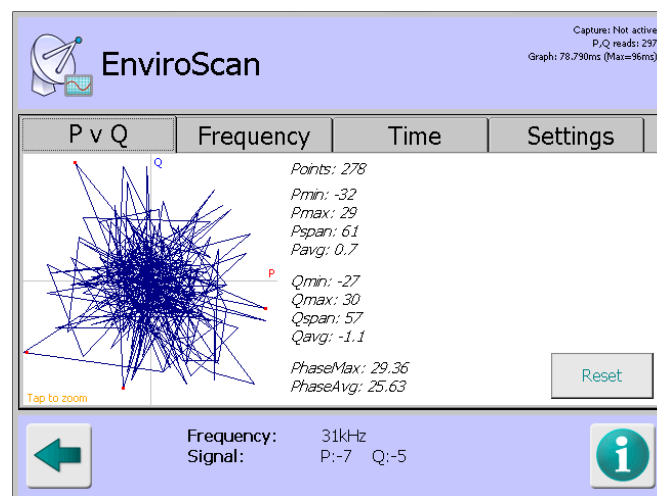
The information displayed in each of the tabbed panes is as follows:

■ P v Q tab

Tapping on the Reset button with the P v Q tab selected starts a process that captures a graphical signal "noise ball" for the system when no product is passing through the head. This can help to identify sources of RF interference or contamination on the belt.

By passing uncontaminated product through the metal detector, the full range of expected P,Q values during production can be displayed.

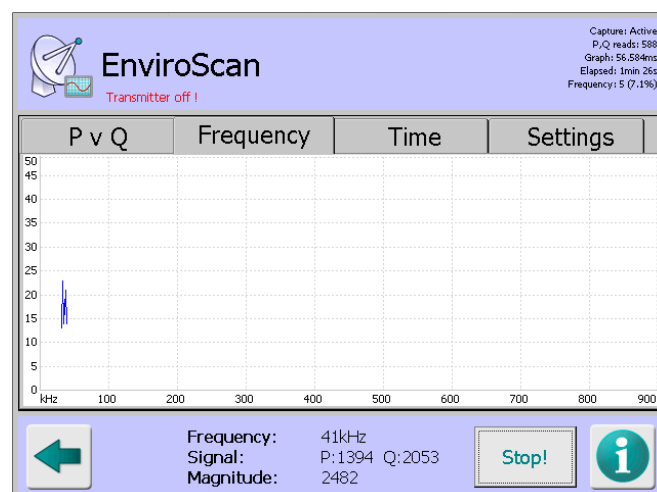
As well as the graphical display the screen also includes data values and phase angle information for the background noise detected.



■ Frequency tab

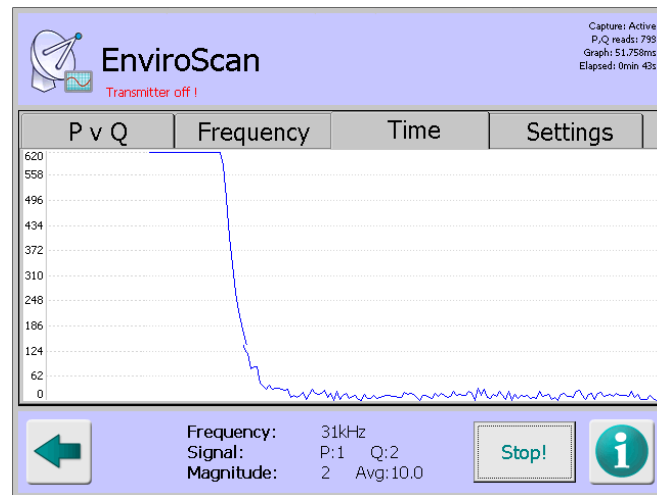
Tapping on the Capture button with the Frequency tab selected starts a process that steps through each of the 70 available frequencies, captures the background noise levels at each frequency and displays them on a graph which updates in real time.

If any frequency is particularly noisy, it may be possible to identify the source of the noise. For example, there may be another machine, such as a metal detector, close by that is producing interference at that frequency. If this source of noise cannot be corrected, this frequency should be avoided during setup of the metal detector. This can often be done by selecting an appropriate frequency Band to be used by the detector in the [Search Head Setup](#) screen.



■ Time tab

Tapping on the Capture button with the Time tab selected starts a process that captures the signal at the currently set frequency and displays a scrolling graph of that signal over time.



Tapping anywhere within the graph pops up the Frequency screen which displays a list of the 70 available frequencies. Tapping on a frequency selects it and closes the screen. The selected frequency is then used and displayed in the graph.

■ Settings tab

The Settings tab contains and displays the following options and information:

○ Plot

Tap on the arrow to the right of the field to choose an option for displaying the raw P,Q values, a combination of them or the resultant signal value received directly from the detector head.

○ Y-axis scale

The Frequency scale used on the graph Y axis in the Frequency tab is displayed. This is set automatically and is not editable.

The Time scale used on the graph Y axis in the Time tab is editable by tapping in the field to display a pop-up numeric keypad screen and then entering a suitable value to be used for the time scale.

- **Head drive**

The currently set Head drive option is displayed. This option is set up in the [Learn Setup](#) screen for each product.

- **Gain**

The currently set P gain, Q gain and RF gain options are displayed. These options are set up in the Learn Setup screen for each product.

Product

Purpose

The Product screen is displayed by tapping on the Product icon in the [Diagnostics](#) screen.

The screen is used to display the current detector settings, display communications statistics between the detector head and the control panel and to capture and display raw data from the detector head for analysis.

Screen Contents

The screen displays seven separate screens, accessed through a drop down list as described below. It also contains other items also described below.

The following information is displayed at the top of the screen:

- **Capture / P,QvT / PvQ / PhasevT / CompvT**

These fields display the time that the detector has taken to capture the set of data and then the time taken to redraw each screen using the new data.

The following information for Panel to Head Messages is displayed in the top right hand corner of the screen:

- **Success / Retries / Corruptions / Tx fails / Rx fails / Max message length / Max message dataset**

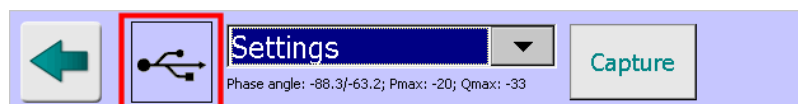
These fields contain values for the messages that have passed between the detector head and the control board from the time that the metal detector was powered up.

If there are values in the Retries, Corruptions, Tx fails or Rx fails fields you are advised to contact Loma Service for assistance.

The following items and information are displayed at the bottom of the screen:

- **USB icon**

When a USB memory stick is installed in the port provided on the side of the control panel a standard USB icon is displayed. Tapping on the icon saves the graph currently being displayed onto the memory stick.

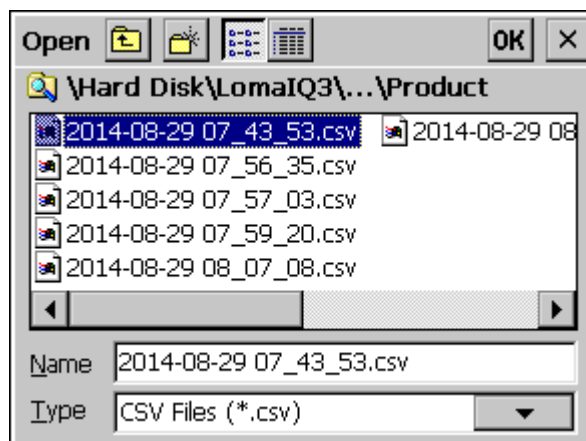


When the Capture button is selected, on completion of the data capture process a copy of the data is saved onto the USB memory stick as a .csv file. The file is saved in the location **Hard Disk\LomaIQ3\Diagnostics\Product** in the format **'2014-08-29 07_43_53.csv'**, showing the date and time that the file was saved. Note that the USB memory stick is called the 'Hard Disk'.

A very useful feature, particularly when demonstrating the diagnostics features of the metal detector when it is not possible to run product through the detector, is to load previously captured data from the USB memory stick so that it can be used to show how data is displayed in each screen.

This is achieved by selecting the Service Options screen, selecting the USB stick option from the Capture drop down list and then tapping on the Capture button.

A standard file browser dialog is displayed. Double-tap on the 'LomaIQ3', 'Diagnostics' and 'Product' folders in turn to display the available data files. Then tap on the required file to select it and tap on the OK button to close the dialog and load the data from the selected file.



The data will initially be displayed in the P,Q v T screen but other screens can be selected as normal to display the data using the Screen Selection drop down list at the bottom of the screen.

Tapping on the Capture button will open the standard file browser dialog again for you to select a different saved file to use.

To go back to using raw data from the detector head rather than from a saved file, select the Service Options screen, select the Metal Detector option from the Capture drop down list and then tap on the Capture button to start a new data capture process. Once the process has completed the new data will be displayed.

■ **Screen Selection**

A drop down list is included to provide access to the seven screens described below.

■ **Phase angle**

This field displays the maximum and minimum phase angle values captured.

■ **Pmax**

This field displays the maximum P channel signal value captured.

■ **Qmax**

This field displays the maximum Q channel signal value captured.

■ **Capture / Stop**

This button is used to start and stop a data capture process to obtain raw data from the detector head. The button legend toggles between 'Capture', which indicates that the process has not been started and 'Stop', which indicates that the process has been started.

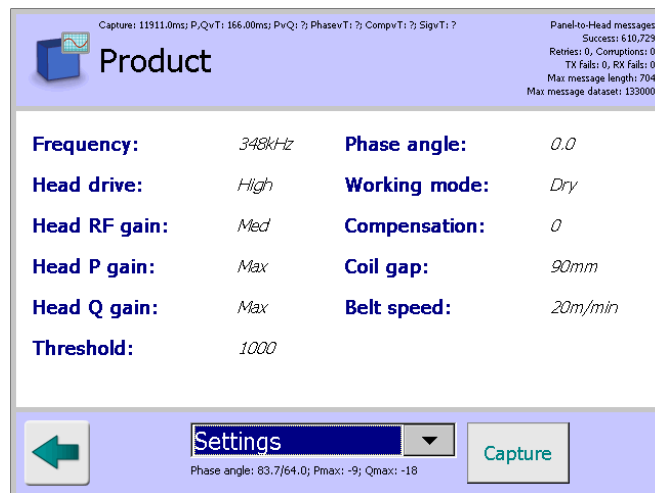
The data capture process consists of passing a sample product pack through the detector head at the same time as the Capture button is selected. The captured data set will consist of approximately 200 data points, so the time scale used will depend on the belt speed.

The data is then utilised by each screen as it is selected to show the data in a plot, trace or graphical format. Tapping on the 'Capture' button again whilst in any screen will start a new data capture process, following which the new data set will be utilised by each screen.

The information displayed in each of the selectable screens is as follows:

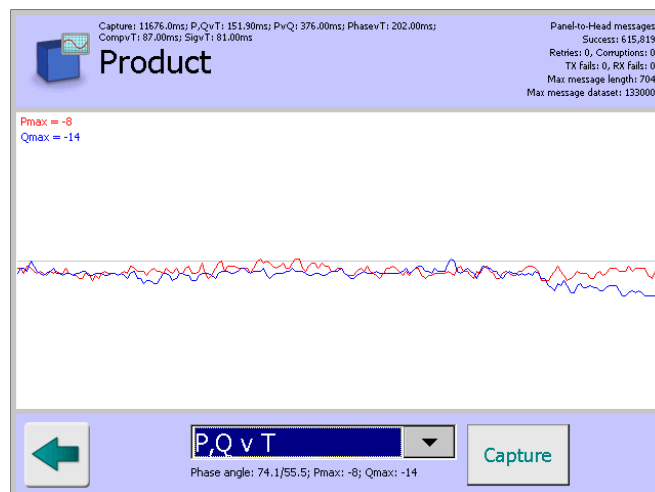
■ Settings screen

The Settings screen is selected by default when the Product screen opens. It displays the detector settings for the currently selected product which are mostly manually entered through the [Learn Setup](#) screen and automatically selected by the detector as part of the Learn process. Some parameters selected in the [Conveyor Setup](#) screen are also displayed.



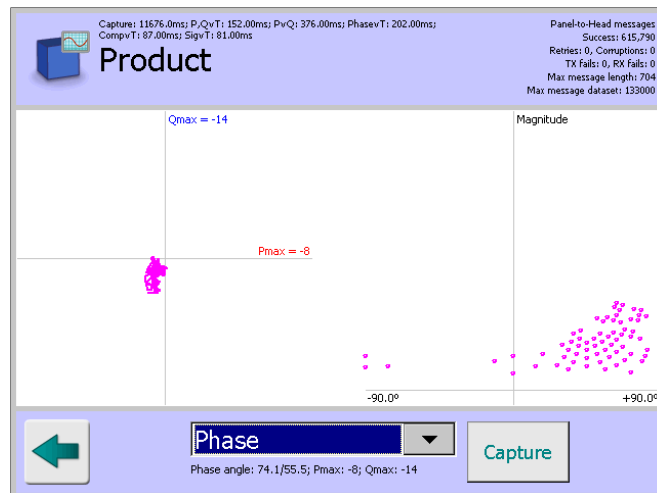
■ P,Q v T screen

The P,Q v T screen displays a trace of the raw P and Q channel signals against time. The Pmax and Qmax values are displayed which may be used when determining the ADC offset values to use when balancing out the P and Q channel signals in the [PQ Analysis](#) screen.



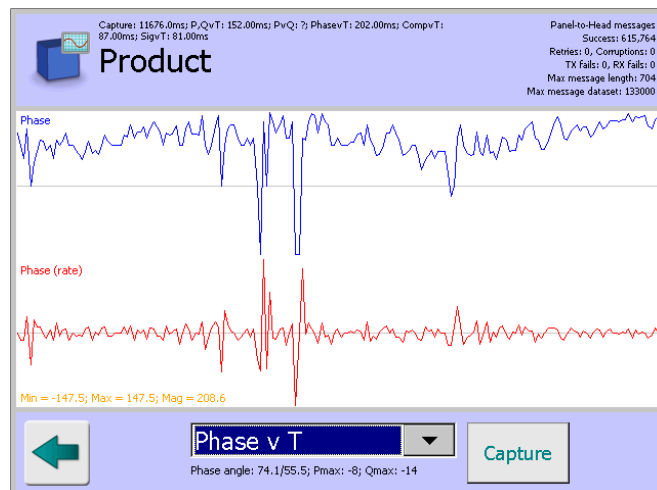
■ Phase screen

The Phase screen displays a plot of the P and Q channel signals on the left hand side and a scatter graph showing the Magnitude (combined P and Q channel signal values) values captured.



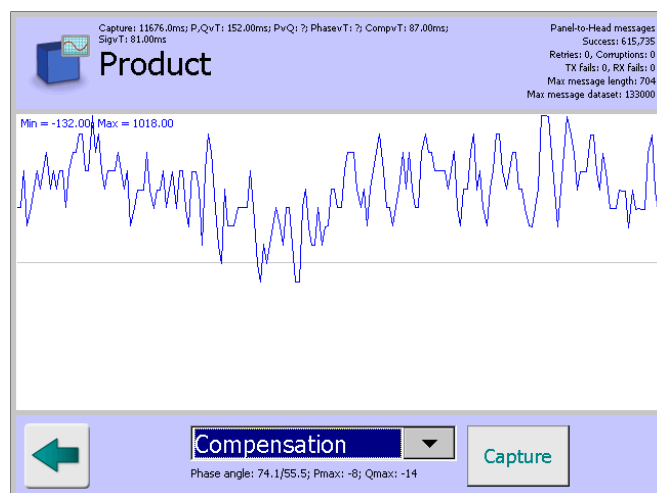
■ Phase v T screen

The Phase v T screen displays two graphs showing the phase angle and rate of change of the phase angle against time for the product signal. The Min, Max and Mag (combined) angles are also displayed.



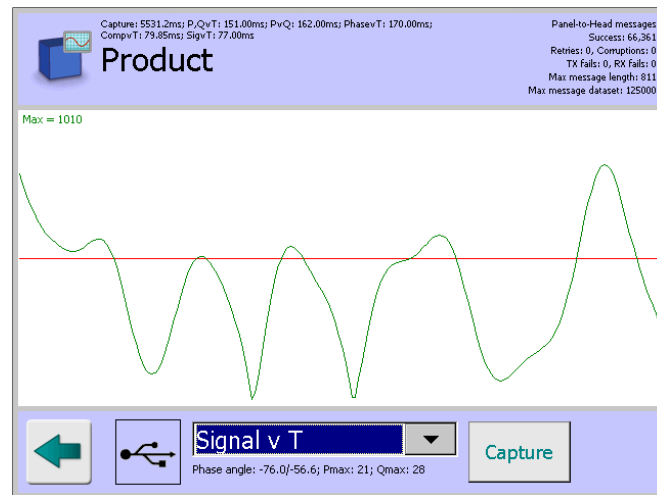
■ Compensation screen

The Compensation screen displays changes in the product compensation value, initially set up in the [Learn Setup](#) screen, as the product signal changes over time.



■ Signal v T screen

The Signal v T screen displays a graph of the product signal over time. The Max value is also displayed.



■ Service Options screen

The Service Options screen provides options through a drop down list to select what data is used for displaying in the screens. The following options are available for selection:

○ Metal Detector

When this option is selected, tapping on the Capture button whilst passing a sample product pack through the detector, will start a data capture process to obtain a set of raw data directly from the detector head. This data is then used for display in each screen.

○ USB Stick

When this option is selected and a USB memory stick is fitted, tapping on the Capture button will display a standard file browser dialog for you to locate a file on the memory stick, referred to as the 'Hard Disk' in the dialog, that contains a previously saved set of data. The data from the selected file is then used for display in each screen. Further details are available under the USB icon heading included earlier in this section.

○ SD Card

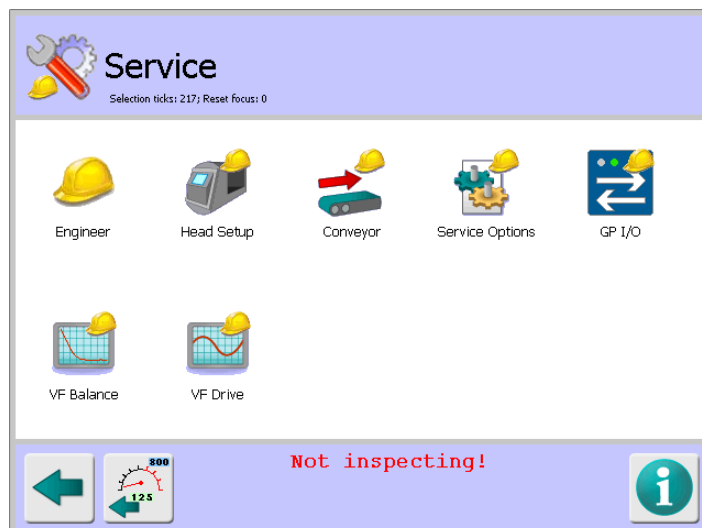
When this option is selected and an SD Card is fitted, tapping on the Capture button will display a standard file browser dialog for you to locate a file on the SD Card, referred to as the 'Storage Card' in the dialog, that contains a previously saved set of data. The data from the selected file is then used for display in each screen.

Service

Purpose








The Service screen is displayed by tapping on the Service icon in the [Advanced Settings](#) screen.

The purpose of the screen is to provide Engineers and Loma Service Engineers access to a number of service screens that provide options for setting up the metal detector.



Screen Contents

The screen contains a number of icons described in the table below which when selected provide access to other screens.

 Engineer	Tap on the Engineer icon to display the Engineer / Loma Service screen in which you can copy and load product settings using a USB memory stick and carry out advanced actions to debug the system.
 Head Setup	Tap on the Head Setup icon to display the Search Head Setup screen which provides options for configuring the detector hardware that are required for the detector to work correctly.
 Conveyor	Tap on the Conveyor icon to display the Conveyor Setup screen which provides options for configuring the conveyor based on the optional items fitted to the conveyor and its method of operation.
 Service Options	Tap on the Service Options icon to display the Service Options screen to enable and configure a number of options covering the Learn process, rejects, products and data communications.
 GP I/O	Tap on the GP I/O icon to display the GP I/O screen through which you can set up monitoring of standard and optional features. The status of enabled options is then displayed.
 VF Balance	Tap on the VF Balance icon to display the VF Balance screen which is used to manually or automatically balance the raw P and Q channels for all available operating frequencies.
 VF Drive	Tap on the VF Drive icon to display the VF Drive screen which is used to set up the transmitter drive for all available operating frequencies.

Engineer / Loma Service

Purpose

The Engineer / Loma Service screen is displayed by tapping on the Engineer icon in the [Service](#) screen.

The purpose of the screen is to enable Engineers and Loma Service Engineers to copy and load product settings using a USB memory stick, use the detector setting for Product #1 for all products set up in the system and carry out advanced actions to debug the system.



Screen Contents

The screen contains the following items:

■ Copy product 1?

Tap on this button to use the settings for Product #1 for all other products added to the system.

■ Save to flash?

Tap on this button to save the metal detector settings for the currently running product onto the onboard SD flash memory card as an XML file. The file will be named IQ3ProdSettings.xml

■ Save product settings to USB

Tap on this button to save the metal detector settings for all currently stored products onto the USB memory stick as an XML file. The file will be named IQ3ProdSettings.xml. This option allows backup of product memory data.

■ Load product settings from USB

Tap on this button to load the product settings xml file contained on the USB memory stick onto the metal detector. This option allows quick setup of multiple detectors that are inspecting the same products.

■ Debug system

Tap the arrow to the right of the field to display a drop down list of options for selecting the debug system to be used.

■ Debug mask

Tap in the field to display a pop-up numeric keypad then enter the required debug mask value.

Search Head Setup

Purpose

The Search Head Setup screen is displayed by tapping on the Head Setup icon in the [Service](#) screen.

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

Screen Contents

The screen contains the following items for configuring the system hardware:

■ Head type

Tap the arrow to the right of the field to display a drop down list of options for selecting the detector head type to be used.

■ Machine type

Tap the arrow to the right of the field to display a drop down list of options for selecting the machine type to be used.

■ Machine identification

Tap in the field to display a pop-up keyboard, then enter a unique ID for the metal detector. The ID is included in all [Logs and Reports](#) generated by the system so is useful when using more than one metal detector.

■ Product limit

Tap in the field to display a pop-up numeric keypad, then enter a product limit number. This restricts the number of products that you can add to the system through the [Select Product to Setup](#) screen by only providing the number of rows to be displayed that you enter as the product limit.

■ Boards

The type of electronic boards installed in the system are displayed. The top line refers to the Control board. The bottom line refers to the Transmitter board.

■ Display type

Tap the arrow to the right of the field to display a drop down list of options for selecting the display type to be used.

■ GP I/O

The GP I/O board provides additional functionality as described below in the [GP I/O](#) screen section. Options of Enabled and Disabled are available for selection. The Enabled option must be selected to use the functionality provided by the board.

Tap the arrow to the right of the field to display the drop down list of options and select the option to be used.

■ Units

The metal detector is able to work with imperial or metric units. Tap the arrow to the right of the field to display the drop down list of unit options and select the option to be used.

■ Band

Frequency bands are used to prevent crosstalk between adjacent metal detectors that are operating on the same frequency.

Tap the arrow to the right of the field to display the drop down list of options and select the band to be used.

The options are OFF, or 1 through 10. If OFF is selected then all seventy (70) frequencies, 31 through 882, will be available for use for all products, making frequency selection and subsequent Learns a manual process.

If a band number is selected then the 7 frequencies available in that band are used by the metal detector when selecting the optimum inspection frequency for any product.

The available frequencies are banded as listed below, with all values shown in kHz:

- **Band 1:** 31, 71, 111, 203, 300, 405 and 576
- **Band 2:** 33, 73, 115, 208, 319, 416 and 600
- **Band 3:** 35, 75, 121, 211, 326, 428 and 625
- **Band 4:** 37, 77, 126, 217, 333, 441 and 652
- **Band 5:** 39, 79, 131, 223, 340, 454 and 681
- **Band 6:** 41, 81, 136, 231, 348, 468 and 714
- **Band 7:** 43, 83, 141, 238, 357, 500 and 750
- **Band 8:** 46, 85, 146, 242, 365, 517 and 789
- **Band 9:** 48, 87, 151, 250, 375, 535 and 833
- **Band 10:** 52, 89, 156, 254, 384, 555 and 882

■ Default frequency

With banding set to OFF the initial operating frequency for all products defaults to the lowest available of 31KHz. This of course can be changed to whichever frequency it is desired to start from.

Tap the arrow to the right of the field to display the drop down list of available frequencies and select the frequency to be used.

When banding is set then it is recommended to set the default frequency as suggested by the following:

- Aperture dimension in the range of 75 - 125mm - depending upon the band selected, use the 405kHz upwards range.

- Aperture dimension in the range of 150 - 200mm - depending upon the band selected, use the 300kHz upwards range.
- Aperture dimension in the range of 225 - 300mm - depending upon the band selected, use the 203kHz upwards range.
- Aperture dimension in the range of 325 - 550mm - depending upon the band selected, use the 111kHz upwards range.

Subsequent change to the value after the Search Head Setup screen is exited will change all product memories back to the new value selected. Therefore it is advised not to revisit this entry unless necessary.

■ Ferrite frequency

The IQ³+ Metal Detector uses a product called “Ferrite” to provide a pre-set compensation value that the detector can recall to use with any product that when learnt exhibits no signals when passed through the detector aperture.

Irrespective of whether banding is used or not the „Ferrite“ product has to be set up using the “Tune for resistive” clear plastic wand found within the control box area. Learning the wand is the same as learning a product and can only be done when the PEC enable option in the Conveyor Setup screen has been disabled.. Once Ferrite has been learnt then further access should be denied to prevent accidental use. To do this, navigate to the [Service Options](#) screen and un-tick the Access ferrite option check box.

Factory frequency setting for ferrite is selected from the smallest aperture dimension and will be the same as the default frequency. Therefore, depending upon the band selected, it will be from the same range listed above. Should there be a change to the set band then the ferrite memory would have to be re-learnt using a frequency from the new band used.

The ferrite frequency is normally set to the same value as the default frequency. Tap the arrow to the right of the field to display the drop down list of available frequencies and select the frequency to be used.

■ Alarm sense

This option allows you to set the electrical state for the alarm circuit, which will affect the fault and run error outputs. Options of Energise and De-Energised are available with the default being Energise.

Tap the arrow to the right of the field to display the drop down list of available options and select the one to be used.

■ Lamp type

This option allows you to select the lamp type that you are using so that the software can integrate with it correctly. Options of Tower and Dome are available for selection.

Tap the arrow to the right of the field to display the drop down list of available lamp type options and select the one to be used.

■ Noise filter

This option allows you to select the type of low-level filter to use to convert raw signals into a resultant signal. Options of Off, Low and High are provided for selection.


Tap the arrow to the right of the field to display the drop down list of available noise filter level options and select the one to be used.

■ Coil gap

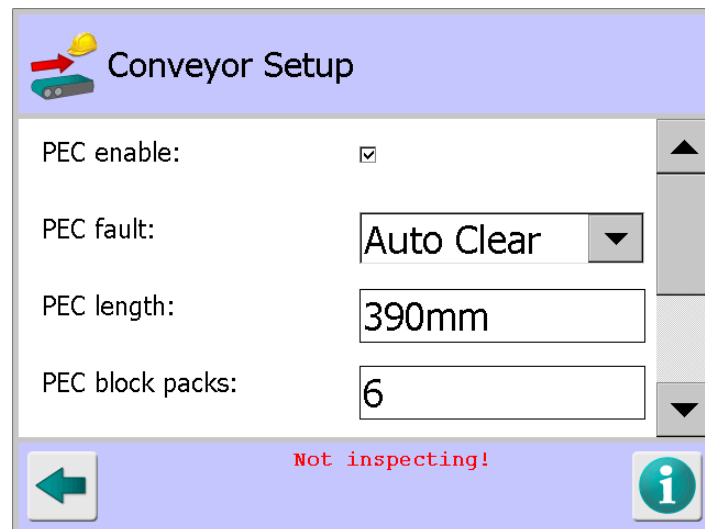
The coil gap required can be found on the serial number plate located within the control panel.

Conveyor Setup

Purpose

The Conveyor Setup screen is displayed by tapping on the Conveyor area  in the [Service](#) screen.

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



Screen Contents

Select or enter the appropriate parameter values in the screen as follows:

■ **PEC enable**

This option refers to the optional Product Registration Photo-eye that is located on the infeed of the conveyor. When the option is enabled the photo-eye acts as a timing start point for both correct detection and subsequent reject timing functions.

Tap in the option check box to enable or disable it.

■ **PEC fault**

This option is displayed if the PEC enable option has been selected. When the option is enabled, should the photo-eye become blocked for any reason a system fault will be generated. Depending on the reject and conveyor setup the conveyor will then stop and/or a reject actuation will occur. Three options are available for selection as follows:

○ **Off**

Selecting this option disables the PEC fault functionality.

○ **Latched**

Select this option if the fault must be manually cleared after the PEC has been unblocked.

○ **Auto Clear**

Select this option if the fault is automatically cleared after the PEC has been unblocked.

Tap the arrow to the right of the field to display the drop down list of available noise filter level options and select the one to be used. The PEC fault option, set to Auto Clear, is set by default.

■ PEC length

To ensure the correct operation of the detector and reject systems it is extremely important to ensure that this setting is correct.

The calculation for this entry measured in mm or inches depends on the Units option selected in the [Search Head Setup](#) screen. It is calculated as follows:

1. Measure the distance from the Product Registration Photo-eye to the face of the detector (L).
2. Measure the depth of the detector case (D).
3. Note the (Rx) distance recorded on the detector serial plate located behind the detector control panel cover.
4. Put the values into the formula - $PEC\ length = A + (0.5 \times D) + Rx$.
5. Tap in the PEC length field to display a pop-up numeric keypad, then enter the value as required.

■ PEC block packs

If the Product Registration Photo-eye is blocked for the selected number of packs, the detector will identify this as a fault. Any number of packs may be entered but the default is 6.

Tap in the field to display a pop-up numeric keypad and enter the required number of packs.

■ Speed mode

There are three options available for selection as follows:

○ Fixed

Select this option if you are using a fixed speed conveyor system. When selected, both reject delay and dwell timing must be set in the Rejects Setup screen.

○ Variable

Select this option if you are using a conveyor system where the speed is variable or can be stopped from an external control source. When in use the conveyor drive will have a shaft encoder fitted that provides timing pulses to the detector electronics whilst the conveyor is running. A CTB constant entry field and an option to log speed problems will be visible. When selected both reject delay in distance and dwell timing in time or distance must be set in the Rejects Setup screen.

○ Freerun

Select this option when there is no transport system in use, other than the effects of gravity. When selected, the reject dwell timing must be set in the Rejects Setup screen. A DSP enable option will be visible.

Tap the arrow to the right of the field to display the drop down list of available speed mode options and select the one to be used.

■ Belt speed

This field is displayed if the Fixed speed mode option has been selected. It is important for the correct operation of the overall system that this entry reflects the actual conveyor speed. The value can be in metres per minute or feet per minute depending upon the Units option selected in the [Search Head Setup](#) screen.

■ CTB constant

This field is displayed when the Variable Speed mode option is selected.

The value entered is derived from the relationship between the shaft encoder and circumference of the roller to which it is fitted.

This parameter is the number of pulses (ticks) per metre/foot of belt travel. To calculate this figure for entry into the CTB constant field, use either the following metric or imperial formula:

- **Metric systems**

$$\text{CTB} = \text{Encoder pulses per revolution} \times 100 \times \pi \times d$$

Where: d = the diameter of the roller to which the encoder is fitted in millimetres.

- **Imperial systems**

$$\text{CTB} = \text{Encoder pulses per revolution} \times \pi \times d$$

Where: d = the diameter of the roller to which the encoder is fitted in inches. The number of pulses provided directly relates to the transport speed. JP7 on the detector control board must be set in position 1-2.

Tap in the field to display a pop-up numeric keypad and enter the CTB constant required.

- **Log speed prob**

Because the detector can only work within a predetermined speed range it is possible for the belt speed to move outside the limit of reliable operation of the machine. Selecting the Log speed prob option will generate either speed too slow or speed too fast run errors to advise operators.

Tap in the option check box to enable or disable this option.

- **DSP type**

DSP stands for Digital Signal Processing. The following options are available for selection:

- **Off**

The resultant signal is based directly on how much the product signal deviates from the Learnt product reference. Use this option where there is a high level of environmental noise.

- **Standard**

The resultant signal is produced using a tuned detection filter. This is the standard method of detection for conveyor and pipeline heads. For reactive product the Rate option can give enhanced performance.

- **Wide**

This detection filter is used where the product speed is not known. For example in free fall and pharmaceutical applications.

- **Rate**

This filter is based on how quickly the field changes. This is the recommended option for reactive product.

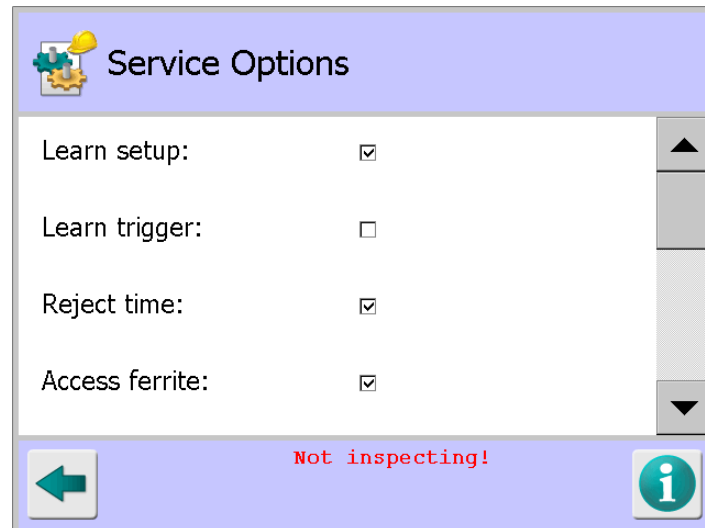
Tap the arrow to the right of the field to display the drop down list of available DSP types and select the one to be used. The PEC fault option, set to Auto Clear, is set by default.

Service Options

Purpose

The Service Options screen is displayed by tapping on the Service Options icon in the [Service](#) screen.

Through this screen you can enable and configure a number of options covering the Learn process, rejects, products and data communications.



Screen Content

Select or enter the appropriate parameter values in the screen as follows:

■ Learn setup

Selecting this option enables access to manual adjustment of Learnt product parameters in the [Auto-Learn Settings](#) screen.

Tap in the option check box to enable or disable it.

■ Learn trigger

Selecting this option means that the Max learnt threshold signal value set in the [Auto-Learn Settings](#) screen must be exceeded to initiate a Learn process.

Typically this is used on pipeline systems where within the normal continuous flow of product air pockets exist. This function enables the detector to quickly perform a Learn process to prevent false rejection when encountering pockets of air.

At least one normal Full Learn process should be completed for all products to ensure the correct function of this option.

Tap in the option check box to enable or disable it.

■ Reject time

Selecting this option enables the Reject delay and Reject dwell fields in the [Rejects Setup](#) screen so that their time values may be updated.

Therefore, leaving this option disabled prevents accidental changes being made to the reject timings.

Tap in the option check box to enable or disable it.

■ **Access ferrite**

Selecting this option allows access to the Ferrite (F) product in the [Select Product to Setup](#) screen.

As this product is setup in the factory and its settings used by the detector as the baseline for inspecting Dry products, access should be disabled to avoid incorrect use.

Access is generally enabled by a Loma Service Engineer when the Ferrite product needs to be re-learned following replacement of a circuit board or upgrading of the detector software..

Tap in the option check box to enable or disable it.

■ **Reject during learn**

If this option is selected all packs will be rejected during a product learn process, regardless of whether they include contaminants.

Tap in the option check box to enable or disable it.

■ **Reverse detection**

If this option is selected then the detector will work in reverse by passing 'contaminated' products and rejecting 'good' products.

This is useful when for example a product contains a metal 'toy' so products that do not contain the 'toy' are to be rejected.

Note that a Product Registration Photo-eye must be fitted to use this option.

Tap in the option check box to enable or disable it.

■ **Auxiliary relay**

The following options are available for selection, depending on what function the relay is providing:

○ **In run**

Select this option if you are using the relay to signal that the metal detector is inspecting product.

○ **Reject**

Selecting this option provides an additional set of reject activated contacts.

○ **Check debug**

Select this option to assist with setting up the Pack check feature, enabled in the Rejects Setup screen

Tap the arrow to the right of the field to display the drop down list of available options and select the one to be used.

■ **Line cleared on fault?**

When this option is selected, internal pack queues are cleared whenever a fault is generated that stops the conveyor. This option should be enabled when using the Pack check feature.

Tap in the option check box to enable or disable it.

■ Barcode reader

Select this option to activate a handheld serial barcode reader on the detector. A Barcode field is then included in the Product Settings screen so that you may enter the barcode to be used for each product. Barcodes can be used to change the current product automatically.

Tap in the option check box to enable or disable it.

■ Remote support

Selecting this option enables you to control the detector remotely through a VNC connection.

Tap in the option check box to enable or disable it.

■ LomaEnet

Select this option to enable LomaEnet reporting. Reports need to be enabled in the [Report Options](#) screen before they are sent to LomaEnet. Reports are always saved on the SD card on the machine (if fitted). See the [LomaEnet Capture](#) screen section for further details.

Tap in the option check box to enable or disable it.

■ LomaOPC

Select this option to enable LomaOPC. This allows dynamic data to become available from the head via OPC tags and historical data can be saved to a SQL database. See the [LomaOPC Server](#) screen section for further details.

Tap in the option check box to enable or disable it.

■ Enable/Disable DHCP?

DHCP stands for Dynamic Host Configuration Protocol and is used to dynamically assign IP addresses to devices on a network. The alternative is to use a static IP address for each device. The option button toggles between Disable DHCP and Enable DHCP. The metal detector will need to perform a system restart when this option is changed.

Tap on the button to enable the option displayed.

GP I/O

Purpose

The GP I/O screen is displayed by tapping on the GP I/O icon in the [Service](#) screen.

The screen is used to enable some standard and optional features and select them to be automatically monitored. Their current status is then displayed by the detector.



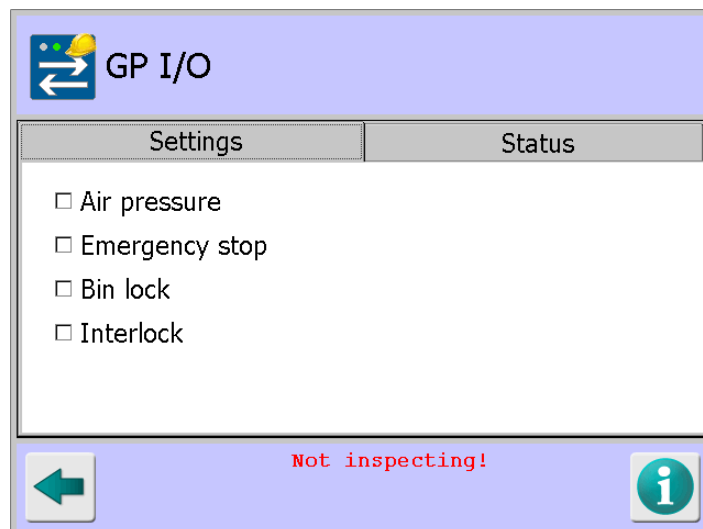
Note that GP I/O needs to be set to Enabled in the [Search Head Setup](#) screen for it to be available for use.

Screen Contents

The screen is divided into two tabs which are described below.

■ Settings Tab

This tab is displayed by default when the screen opens. It contains the options listed below. The current status of each selected option is then constantly monitored and displayed in the Status Tab.



○ **Air pressure**

Select this option to monitor the air pressure to the reject device. If the air pressure drops, the detector may not be able to reject product correctly. If the low air pressure is continuously triggered for an extended period, the system will go into fault and alert the operator to the failure. To monitor air pressure, this option must also be enabled in the Rejects Setup screen.

Tap in the option check box to enable or disable it.

○ **Emergency stop**

Select this option to monitor an external safety contact and alert the operator when the emergency stop has been activated.

Tap in the option check box to enable or disable it.

○ **Bin lock**

Select this option to monitor a lock on the reject bin. When enabled, the reject bin will be locked during normal operation to prevent unauthorised access to rejected product. This aims to prevent reject product being accidentally introduced back into production.

The reject bin can be unlocked in the Rejects Setup screen, provided the user has sufficient access. The bin lock status is not monitored whilst a PV test is in process.

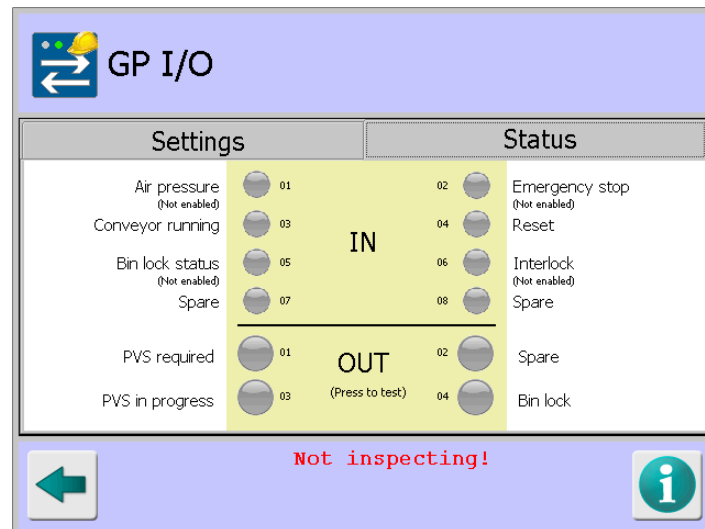
Tap in the option check box to enable or disable it.

○ **Interlock**

Select this option to monitor any external interlock, such as the product guide used on Free Fall metal detectors.

■ **Status Tab**

This tab is used to monitor inputs and outputs on the GP I/O board. Outputs can be toggled by tapping on the button alongside the relevant output. When the feature associated with the input or output is not enabled, the text "(Not enabled)" will appear alongside that input or output.



○ Inputs

▪ Air pressure - (input 01)

Monitors the air pressure to the reject device (if applicable). If the air pressure goes low for a continuous period of 3s or longer, the detector will generate a fault and the Air pressure status indicator will turn red.

▪ Emergency stop - (input 02)

Monitors the detector emergency stop status, normally on the metal detector conveyor. When the emergency stop has been activated the status indicator will turn red.

▪ Conveyor running - (input 03)

Monitors whether the detector conveyor belt is running.

▪ Reset - (input 04)

Use this input to send a remote fault reset pulse to the IQ+ metal detector.

▪ Bin lock status - (input 05)

Monitors whether the reject bin is locked (see above). If input 05 goes low for an extended, the machine will generate a fault. The timeout period can be set in the Rejects screen.

▪ Interlock - (input 06)

Monitors whether a required safety interlock is activated or not.

Inputs 07 and 08 are currently not allocated.

○ Outputs

To test any output, tap the circle for the output to be tested. When this screen is exited, all outputs are returned to their correct state.

▪ PVS required - (output 01)

Set when a PV test is due. Typically, this output is used to light a lamp which will alert operators that a PV test is required.

Output 02 is currently spare

▪ PVS in progress - (output 03)

Set when the PV test is in progress. The output is typically used to stop the infeed conveyor to the detector during the PV test.

- **Bin lock - (output 04)**

Set when the reject bin should be locked. The reject bin can be unlocked in the Rejects setup screen. When a PV test is in progress the bin will also be unlocked.

If the bin remains unlocked for an extended period, the machine will generate a fault. The timeout period can be set in the Rejects Setup screen where you can also enable the bin lock feature.

VF Balance

Purpose

The VF Balance screen is displayed by tapping on the VF Balance icon in the [Service](#) screen.

The screen is used to manually or automatically balance the raw P and Q channels for all available operating frequencies.

Screen Contents

The screen contains the following options and parameters for setting up the VF Balance:

- **Frequency**

The IQ³+ has seventy (70) different operating frequencies ranging from 31kHz up to 882kHz. Each of the available frequencies can be selected from the drop down list



Note that the frequency selected in this screen is independent of the frequency for the currently running product.

When a frequency is selected from the list, the current setting for the receiver P and Q channel potentiometer positions together with the balance can be viewed.

When the screen is exited, the detector will restore the current running products' operating frequency.

Tap on the arrow to the right of the field to display a drop down list of frequencies and select the required frequency.

- **Pot position**

The potentiometer positions for the P and Q channels of the selected operating frequency are displayed.

The potentiometers are used to select the signal size that is injected into each channel to balance them out.

These values are automatically set for the selected frequency by the software when the AutoBalance feature is used.

The potentiometer positions can be manually adjusted within this screen, but this is not recommended.

■ **Balance setpoint**

The target value for the balance between the P and Q channels is displayed. The default value is 100.

■ **Balance**

The measured balance between the P and Q channels on the receiver board is displayed as a read-only value.

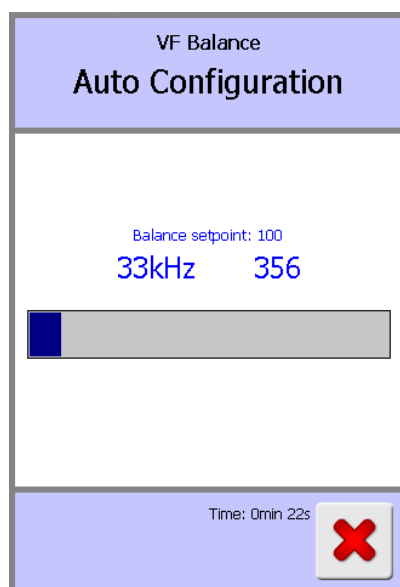
When the detector has been configured correctly, the measured balance will generally be lower than the balance setpoint.

If in doubt contact your local Loma service centre for assistance.

■ **Auto configure**

Selecting this option starts the AutoBalance process for all operating frequencies. The process commences by resetting the potentiometer positions for the P and Q channels for each frequency to 50. The configuration progress is displayed and will close automatically upon completion.

Tap on the button to start the auto configure process.



■ **Balance reset**

Selecting this option resets the potentiometer positions for the P and Q channels for each frequency to 50. This will often be done prior to manually balancing the head (usually at 31kHz). Remember to run the Auto configure process afterwards.

Tap on the button to start the balance reset process.

VF Drive

Purpose

The VF Drive screen is displayed by tapping on the VF Drive icon in the [Service](#) screen.

Within this screen the transmitter drive for all available operating frequencies are set up to maximise sensitivity of the detector. This is carried out during the manufacturing process so should not need adjustment under normal operating conditions.

However, if any of the electronics are replaced it is recommended that the setup is repeated. This is normally done using the AutoBalance feature by selecting the Auto configure option which automatically makes any P and Q channel balance adjustments necessary for each of the available frequencies.

Manual adjustment is also possible and this is carried out by Loma Service Engineers when required.

Screen Contents

The screen contains the following options and parameters for setting up the VF Drive:

■ Frequency

The IQ³⁺ has seventy (70) different operating frequencies ranging from 31kHz up to 882kHz. Each of the available frequencies can be selected from the drop down list.



Note that the frequency selected in this screen is independent of the frequency for the currently running product.

Tap on the arrow to the right of the field to display a list of frequencies and select the required frequency from the list.

■ Drive on

The drive on time for the selected operating frequency of the transmitter is shown here. It can be manually adjusted within this menu, though this is not recommended.

Next to the Drive on field, the Drive off time for the selected operating frequency of the transmitter is shown. This value is read-only and cannot be changed.

Tap in the field to display a pop-up numeric keypad and enter the required value for the drive on time.

■ **Config current**

This entry sets the target transmitter drive current that the auto configure process will use, subject to a maximum figure of 350mA.

For conveyor detectors using the standard board, the default value is 230mA. For conveyor detectors using the auto-balance board, the default value is 350mA. For pipeline detectors, the default value is 100mA.

Tap in the field to display a pop-up numeric keypad and enter the required value for the Config current.

■ **Drive current**

The drive current for the selected operating frequency is displayed as a read only value. This value is controlled by the drive on time setting. When the detector has been configured correctly, the value will generally be close to the Config current value set.

Larger aperture detectors operating at above 600kHz are likely to show a lower value. If in doubt contact your local Loma service centre for assistance.

■ **Auto configure**

Select this option to start the full setup process for all operating frequencies. The process commences by resetting the on time values for each frequency to zero.

The configuration progress is displayed and will close automatically upon completion.

Tap on the button to start the Auto configure process.

■ **Restore drive**

The transmitter can drop into safe mode operation 100kHz at a low drive current. For example the Drive On time of a particular operating frequency may have been manually increased causing the current limit value to be exceeded. Even when the on time may have been manually reduced from within this screen to a safe level (usually less than 10) the transmitter will not automatically restart. Select this option to restart the transmitter.

A restored drive will display a drive current that is greater than the safe mode value. If this is the case it is recommended to start the auto configure process rather than attempt a manual on time adjustment. If the drive does not restore then the transmitter may be in shutdown.

Remove the control box front panel then drop down the internal hinged main control board to allow visual access to the left hand transmitter board. If the bottom red LED is illuminated then the transmitter is in shutdown. If only the orange led is illuminated then the transmitter is still in safe mode. In this case, try lowering the on time value a little more and perform another restore drive.

If the red LED stays on then contact your local Loma service centre for assistance.

Select Product to Setup

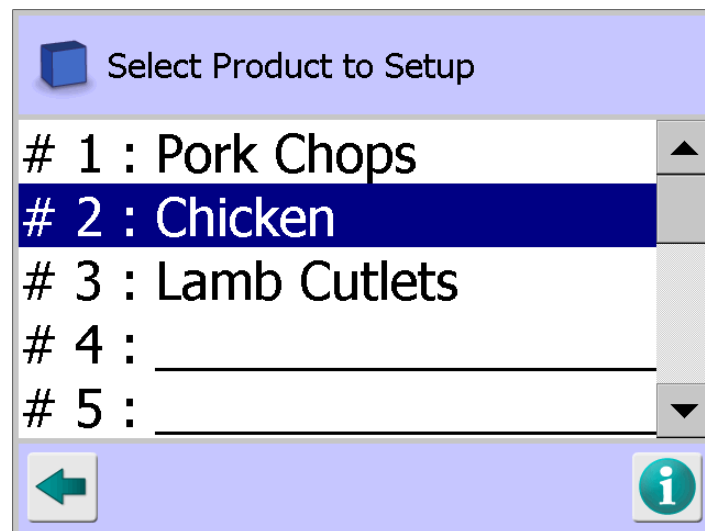
Purpose

The Select Product to Setup screen provides you with options for choosing the product to inspected, editing a products settings and creating new products to inspect.

The number of individual products that can be created and stored for recall is set in the Search Head Setup screen; subject to a maximum of 200. This then sets the number of product rows that are displayed and available for use in this screen.

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 '# F : 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 hide the FERRITE product, navigate to the User Options screen and deselect the Access Ferrite option. This will avoid accidental use.



Screen Contents

The Select Product to Setup screen contains the following contents for displaying information and providing navigation to other screens:

■ Product List

A list containing a row for the number of products selected in the Search Head Setup screen is displayed.

For each existing product its unique number and product name are displayed.

New products can be added to the list by selecting a row that does not contain a product name and then selecting the Edit option in the Product Options screen when it is displayed. The new product name and settings can then be added through the Product Settings screen.

Existing products can be added to the list by selecting the row containing the product name and then selecting the Edit option in the Product Options screen when it is displayed. The product settings can then be edited in the Product Settings screen.

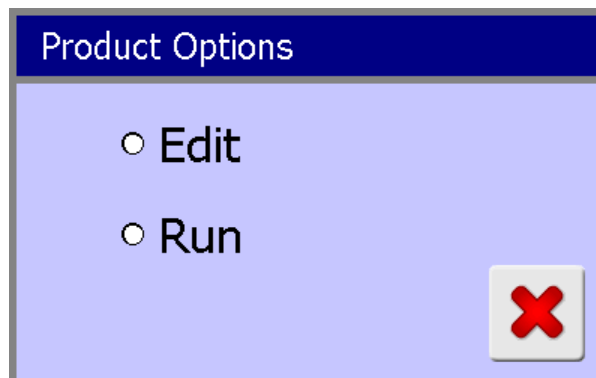
A product may be chosen for inspection by selecting the row containing the product name and then selecting the Run option in the Product Options screen when it is displayed.

Other standard navigation features available in the screen are described in the [General Navigation](#) section.

Product Options

Purpose

The Product Options screen provides you with options for running inspections for a selected product, editing its settings or entering settings for a new product.



Screen Contents

The screen contains the following contents for displaying information and providing navigation to other screens:

■ Edit

Choosing this option displays the [Product Settings](#) screen so that you can edit the settings for the product selected in the [Select Product to Setup](#) screen.

You should also choose this option if you are creating a new product, after selecting a blank row in the Select Product to Setup screen.

■ Run

Choosing this option recalls the settings for the selected product and sets up the machine to start inspecting it.

A pop-up message is briefly displayed to advise you that the current product settings are being changed to those for the selected product.

If a Learn process has not yet been carried out for the product, a pop-up message will be briefly displayed advising you of this and you should carry out a [Full Learn](#) process before starting inspections.

If you are using [Batch Control](#) to identify batches of product being inspected, as you are effectively starting a new batch a keyboard screen will be displayed so that you can enter a Trace Code for the new batch.

The Product Options screen is then automatically closed and the [Main Run](#) screen is displayed. You are now ready to start inspecting the selected product.

Selecting the red X control at the bottom of the screen at any time will close the screen.

Product Settings

Purpose

Before a product can be inspected a number of basic details and parameters for the product must be entered into the Product Settings screen which are then used by the metal detector software to control how the product is inspected.

Great care should therefore be taken to ensure that the correct details are entered and selections made as they will directly affect how the machine will operate.

Entering incorrect details may cause false triggering and allow contaminated products to go undetected.



Some options may not be displayed if access to them is not enabled.

Screen Contents

The Product Settings screen contains the following contents for displaying information and providing navigation to other screens:

■ #(number)

To assist with identification and selection, you should give all products a unique name, which can be up to 25 alphanumeric characters in length.

Tap in the name field to display the pop-up keyboard screen and then enter the product name.

■ Barcode

The product barcode can be scanned or entered manually. This allows product changes to be activated automatically using a barcode scanner fitted to the conveyor infeed. Tap the Barcode field to display the Enter product barcode screen.

Tap the 'Cancel' red X button to display the pop-up keyboard screen and then enter the barcode.

Alternatively select the 'OK' green tick button and scan the product barcode with your barcode reader.



Note that this field is only displayed in the screen if you are using a barcode reader and have enabled the 'Barcode reader' option in the Service Options screen.

■ Reject delay

The following should be noted before setting up the Reject Delay and Reject Dwell timing for a product.

Setting reject times is best done by passing the product, contaminated by a detectable metal test sample, through the machine and the 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. See the [Conveyor Setup](#) screen for further information covering the available speed mode options.

Tap in the Reject delay field to display the pop-up numeric keypad screen and enter the reject delay time in seconds.

Or for variable speed systems, tap in the Reject delay field to display the pop-up numeric keypad screen and enter the distance in metres.

■ Reject dwell

Reject dwell is the time or distance that the reject device operates for to remove a contaminated product from the conveyor belt and into the reject collection device. It must therefore be set to ensure clean removal of the contaminated product.

Please read through the information contained in the Reject delay section above for further guidance. Reject timings may also be set in the [Rejects Setup](#) screen.

Tap in the Reject dwell field to display the pop-up numeric keypad screen and enter the time in seconds.

Or for variable speed systems, tap in the Reject delay field to display the pop-up numeric keypad screen and enter the distance in metres.

■ Pack length

The Pack 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.

Tap in the Pack length field to display the pop-up numeric keypad screen and enter the pack length in millimetres.

■ **Product type**

Tap on the arrow to the right of the 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.

You should first read the [About Metal Detection](#) section to gain an understanding of the terms used 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.

Note that 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.

■ **PVS**

Select this option if you are using the Performance Validation System to carry out product testing at specific times and have configured this in the [PVS Setup](#) screen. You can also access the [PVS Log](#) to view the test details.

When the PVS option is selected the following additional items are displayed in the screen:

○ **Fe test**

Tap in the Fe test 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**

Tap in the Non-Fe test 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**

Tap in the S. steel test field 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.

- **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.

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.

■ Tracker

The Tracking feature allows the detector to automatically adjust the working threshold for a product between Maximum and Minimum limits set in this screen, to enable the sensitivity of the detector to be optimised in situations where the product signal drifts up and down with changes in product effect. See the Setting Up Product Signal Tracking section for further details.

- **Min limit**

This field is used to set the lowest product signal level to be used by the Tracker feature when making automatic threshold adjustments. The value defaults to the working threshold calculated by the detector during the product Learn process and cannot be set any lower than this value.

If you wish to increase the Min limit value, tap in the field to display the pop-up numeric keypad screen and enter the required value.

- **Max limit**

This field is used to set the highest product signal level to be used by the Tracker feature when making automatic threshold adjustments. The value defaults to twice the working threshold calculated by the detector during the product Learn process. The value cannot be set less than the Minimum limit but may be increased up to the value of your choice.

It is strongly advised to set this value to just greater than the typical amount by which the product signal is expected to change. All signals that exceed this value will be rejected.

If you wish to change the Max limit value, tap in the field to display the pop-up numeric keypad screen and enter the required value.

- **Max limit lock**

Once the Max limit value for the product signal has been entered the value can be locked to prevent an automatic change during a re-Learn process.

Tap in the option check box to select it.

- **Adjustment**

This field is used to set a percentage by which the product signal threshold may be changed.

Tap in the Adjustment field to display the pop-up numeric keypad screen and enter the adjustment percentage value to be used.

- **Number of packs**

This field is used to set the number of packs to be included in the Tracker calculations. The range is 1 – 100, where 100 provides the finest control. The default value is 10.

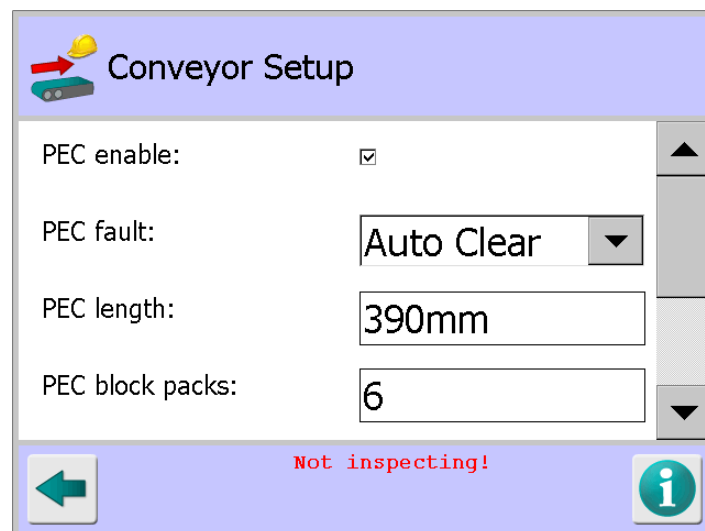
Tap in the Number of packs field to display the pop-up numeric keypad screen and enter the required number of packs to be used.

Conveyor Setup

Purpose

The Conveyor Setup screen is displayed by tapping on the Conveyor area  in the [Service](#) screen.

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



Screen Contents

Select or enter the appropriate parameter values in the screen as follows:

- **PEC enable**

This option refers to the optional Product Registration Photo-eye that is located on the infeed of the conveyor. When the option is enabled the photo-eye acts as a timing start point for both correct detection and subsequent reject timing functions.

Tap in the option check box to enable or disable it.

■ PEC fault

This option is displayed if the PEC enable option has been selected. When the option is enabled, should the photo-eye become blocked for any reason a system fault will be generated. Depending on the reject and conveyor setup the conveyor will then stop and/or a reject actuation will occur. Three options are available for selection as follows:

○ Off

Selecting this option disables the PEC fault functionality.

○ Latched

Select this option if the fault must be manually cleared after the PEC has been unblocked.

○ Auto Clear

Select this option if the fault is automatically cleared after the PEC has been unblocked.

Tap the arrow to the right of the field to display the drop down list of available noise filter level options and select the one to be used. The PEC fault option, set to Auto Clear, is set by default.

■ PEC length

To ensure the correct operation of the detector and reject systems it is extremely important to ensure that this setting is correct.

The calculation for this entry measured in mm or inches depends on the Units option selected in the [Search Head Setup](#) screen. It is calculated as follows:

1. Measure the distance from the Product Registration Photo-eye to the face of the detector (L).
2. Measure the depth of the detector case (D).
3. Note the (Rx) distance recorded on the detector serial plate located behind the detector control panel cover.
4. Put the values into the formula - $\text{PEC length} = A + (0.5 \times D) + Rx$.
5. Tap in the PEC length field to display a pop-up numeric keypad, then enter the value as required.

■ PEC block packs

If the Product Registration Photo-eye is blocked for the selected number of packs, the detector will identify this as a fault. Any number of packs may be entered but the default is 6.

Tap in the field to display a pop-up numeric keypad and enter the required number of packs.

■ Speed mode

There are three options available for selection as follows:

○ Fixed

Select this option if you are using a fixed speed conveyor system. When selected, both reject delay and dwell timing must be set in the Rejects Setup screen.

○ Variable

Select this option if you are using a conveyor system where the speed is variable or can be stopped from an external control source. When in use the conveyor drive will have a shaft encoder fitted that provides timing pulses to the detector electronics whilst the conveyor is running.

A CTB constant entry field and an option to log speed problems will be visible. When selected both reject delay in distance and dwell timing in time or distance must be set in the Rejects Setup screen.

- **Freerun**

Select this option when there is no transport system in use, other than the effects of gravity. When selected, the reject dwell timing must be set in the Rejects Setup screen. A DSP enable option will be visible.

Tap the arrow to the right of the field to display the drop down list of available speed mode options and select the one to be used.

- **Belt speed**

This field is displayed if the Fixed speed mode option has been selected. It is important for the correct operation of the overall system that this entry reflects the actual conveyor speed. The value can be in metres per minute or feet per minute depending upon the Units option selected in the [Search Head Setup](#) screen.

- **CTB constant**

This field is displayed when the Variable Speed mode option is selected.

The value entered is derived from the relationship between the shaft encoder and circumference of the roller to which it is fitted.

This parameter is the number of pulses (ticks) per metre/foot of belt travel. To calculate this figure for entry into the CTB constant field, use either the following metric or imperial formula:

- **Metric systems**

$$\text{CTB} = \text{Encoder pulses per revolution} \times 100 \times \pi \times d$$

Where: d = the diameter of the roller to which the encoder is fitted in millimetres.

- **Imperial systems**

$$\text{CTB} = \text{Encoder pulses per revolution} \times \pi \times d$$

Where: d = the diameter of the roller to which the encoder is fitted in inches. The number of pulses provided directly relates to the transport speed. JP7 on the detector control board must be set in position 1-2.

Tap in the field to display a pop-up numeric keypad and enter the CTB constant required.

- **Log speed prob**

Because the detector can only work within a predetermined speed range it is possible for the belt speed to move outside the limit of reliable operation of the machine. Selecting the Log speed prob option will generate either speed too slow or speed too fast run errors to advise operators.

Tap in the option check box to enable or disable this option.

- **DSP type**


DSP stands for Digital Signal Processing. The following options are available for selection:

- **Off**
The resultant signal is based directly on how much the product signal deviates from the Learnt product reference. Use this option where there is a high level of environmental noise.
- **Standard**
The resultant signal is produced using a tuned detection filter. This is the standard method of detection for conveyor and pipeline heads. For reactive product the Rate option can give enhanced performance.
- **Wide**
This detection filter is used where the product speed is not known. For example in free fall and pharmaceutical applications.
- **Rate**
This filter is based on how quickly the field changes. This is the recommended option for reactive product.

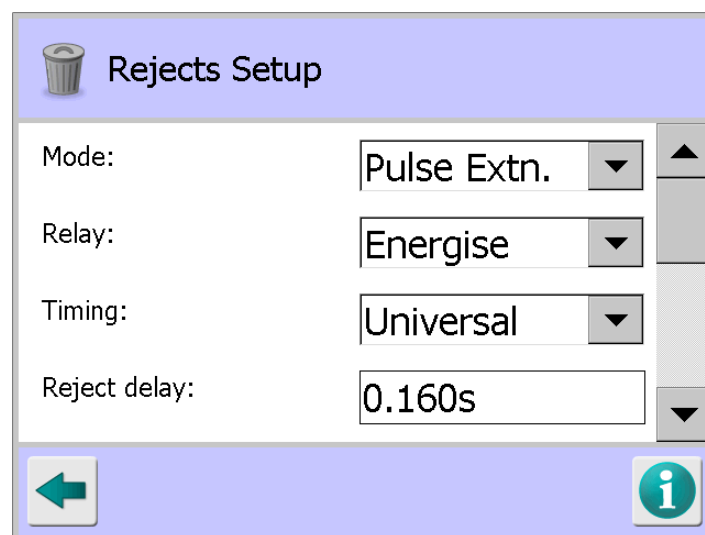
Tap the arrow to the right of the field to display the drop down list of available DSP types and select the one to be used. The PEC fault option, set to Auto Clear, is set by default.

Rejects Setup

Purpose

The Rejects Setup screen is displayed by tapping on the Reject area  in the [System Setup](#) screen.

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



The image shows the 'Rejects Setup' screen. It has a purple header with a trash can icon and the title 'Rejects Setup'. Below the header, there are four rows of settings, each with a label on the left and a dropdown menu on the right. The settings are: Mode (Pulse Extn.), Relay (Energise), Timing (Universal), and Reject delay (0.160s). To the right of the dropdown menus is a vertical scrollbar. At the bottom of the screen, there is a blue bar with a green left-pointing arrow on the left and a green circle with a white 'i' (info icon) on the right.

Screen Contents

The screen contains the following options and parameters for setting up rejects:

■ Unlock bin

This button is displayed if the Bin lock option has been enabled in the [GP I/O](#) screen. When the operator is alerted that the reject bin is full, they can quickly navigate to this screen and tap on the button to unlock the bin and remove the rejected products.

The door will automatically lock after the time set in the Bin lock timeout field provided in this screen or after exiting the screen.

■ Mode

The following Mode options are provided for selection:

○ **Pulse (only available if a photo-eye is fitted)**

If this option is selected, when a contaminated package is detected the reject delay time is counted down, in order for the package to travel from the photo-eye to the reject device, where-upon the reject is turned on for a time equal to the reject dwell time. Typically, this mode of reject would be used for air blast or pusher type rejects for the accurate rejection of small packages at high speed.

○ **Pulse Extension**

This option provides the same functionality as the Pulse option, except that the dwell time is extended if a second contaminated product reaches the reject point before the dwell time from the first contaminated product has timed out. This could typically be used with an air blast or retracting band reject device, but not a pusher type device. This reject mode is always available.

○ **Toggle (only available if a photo-eye is fitted)**

If this option is selected, when a contaminated package is detected the reject delay time is counted down, in order for the package to travel to the reject device, where upon the reject device state is toggled.



The Reject dwell field will not be displayed for configuration in the [Product Settings](#) screen as it is not used.

○ **Dwell Extension**

If this option is selected, when a contaminated product is detected the reject device is immediately activated, and stays activated for a time equal to the reject dwell time. If a second reject product is detected before the dwell time has timed out, then the dwell time is counted down from the beginning again.



The Reject delay field will not be displayed for configuration in the [Product Settings](#) screen as it is not used.

○ **Reject till accept**

If this option is selected, when a contaminated product is detected the delay time is timed out, at which point the reject device becomes activated. The reject device will then stay activated until an uncontaminated product reaches the reject point.



The Reject dwell field will appear not be displayed for configuration in the [Product Settings](#) screen as it is not used.

Tap on the arrow to the right of the field to display the list of Mode options and select the appropriate one.

■ Relay

The reject relay can be set to be either normally energised or normally de-energised. For failsafe applications, the relay state should be normally energised so that if there is a fault in the reject system the relay will drop out causing rejection of all product.

Tap on the arrow to the right of the field to display the list of Relay options and select the appropriate one.

■ **Timing**

Two timing options are available for selections as follows:

○ **Product relative**

If this option is selected, you can set the Reject dwell and delay times to different values for each product in the [Product Settings](#) screen.

○ **Universal**

If this option is selected, the Reject dwell and delay times set in this screen are initially used for all products.

Changing the values in the [Product Settings](#) screen for one product will automatically update the values for all other products and also the values set in this screen.

Tap on the arrow to the right of the field to display the list of Timing options and select the appropriate one.

■ **Reject delay**

This field is used to set the time in seconds between a contaminated product being detected and it being in the correct position on the conveyor belt for rejection. The value set relates to the current running product. The Reject delay time can also be set for each product in the [Product Settings](#) screen.

Although the Reject delay timings may be calculated mathematically using the length of the product, the speed of the belt and the distance between the point of detection and the reject device, carrying out practical testing with representative products and varying the timing will enable you to obtain the best results.

Tap in the field to display a pop-up numeric keypad and enter the timing value required.

■ **Reject dwell**

This field is used to set the time in seconds required for the reject device to remove the contaminated product from the belt. The value set relates to the current running product. The Reject dwell time can also be set for each product in the [Product Settings](#) screen.

As for the determining the correct Reject delay time to use, carrying out practical testing with representative products and varying the timing will enable you to obtain the best results.

Tap in the field to display a pop-up numeric keypad and enter the timing value required.

■ **Bin full**

Enable this option if a bin full sensor has been fitted to your system. This sensor is fitted inside the bin towards the top. As contaminated products stack up inside the bin, once they break the sensor beam a system fault is generated to warn the operator that the bin must be emptied.

Tap in the option check box to enable or disable it.

■ **Confirmation**

Enable this option if a Reject Confirmation Photo-eye is fitted to your system. This photo-eye is fitted across the entrance to the reject bin to confirm that the contaminated product has entered the bin. A system fault is generated if a confirmation signal is not received by the detector.

Tap in the option check box to enable or disable it.

■ **Confirmation delay**

This field is only displayed when the Confirmation option is enabled and a Product Registration Photo-eye is fitted and enabled in the Conveyor Setup screen. It is used to set a time to compensate for the actuation time, Reject dwell time, of the reject device to allow the Confirmation window time to be set as accurately as possible.

Tap in the field to display a pop-up numeric keypad and enter the time required.

■ **Confirmation window**

This field is only displayed when the Confirmation option is enabled. If a reject confirmation signal for the rejected product is not detected within the time set, a system fault is generated.

If a Product Registration Photo-eye is not fitted, the timing is taken from when the reject device is activated.

Tap in the field to display a pop-up numeric keypad and enter the time required.

■ **Confirmation timeout**

This field is only displayed when the Confirmation option has been enabled and a Product Registration Photo-eye is fitted and enabled in the Conveyor Setup screen. If the Reject Confirmation Photo-eye is blocked for the set period of time, a system fault is generated.

Tap in the field to display a pop-up numeric keypad and enter the time required.

As for setting up reject timings, confirmation setup is best done through practical testing using representative contaminated product. The objective is to set the timing to reliably confirm a reject in the shortest time possible so that in the event of a non-confirmation, a system fault is generated quickly to contain the contaminated product within the length of the detector conveyor.

Generally speaking the Confirmation delay value can be initially set to a nominal 0.005 - 0.010s. Then adjust the Confirmation window timing only. A longer Confirmation delay time should only be needed if the confirmation system is situated a long distance from the reject device.

For failsafe operation, the fault relay should be wired into the conveyor drive and/or reject circuitry to ensure that no contaminated product can pass in the event of a reject or bin full failure.

■ **Pack check**

Select this option to ensure that packs that are counted onto the detector conveyor are counted off. This option also helps to ensure that packs that should have been rejected, but did not enter the reject bin, do not leave the detector conveyor by stopping it. This option only appears if a Product Registration Photo-eye has been fitted and enabled in the Conveyor Setup screen and the Pack Check Photo eye has been installed.

Tap in the option check box to enable or disable it.

■ **Check delay**

Set this to compensate for the time it takes for the pack to move from the reject device to the Pack Check Photo-eye. Setting this allows the Check window to be set as accurately as possible.

Tap in the field to display a pop-up numeric keypad and enter the check delay time required.

■ **Check window**

If a Pack Check signal for the un-rejected (i.e. good) product has not been received from the Pack Check Photo-eye within the time set, a system fault is generated.

Tap in the field to display a pop-up numeric keypad and enter the check window time required.

■ **Check timeout**

If the Pack Check Photo-eye is blocked for this length of time, a system fault is generated.

■ **Missing pack**

This field is only displayed if the Pack check option is enabled and it is only editable if the Reject mode is set to Pulse Extn. Otherwise the default option of Fault is selected.

Select the option required when a pack that is detected by the infeed photo-eye is not detected by the Pack Check Photo-eye.

In some circumstances, for example when a retract band reject mechanism is fitted, it may be impossible to prevent occasional multiple packs entering the reject bin. If the conveyor should not stop each time this occurs, select the Error option.

Tap on the arrow to the right of the field to display a list of options and select the option required.

As for setting up reject timings, pack check setup is best done through practical testing using representative uncontaminated product. The objective is to set the timing to reliably confirm that an uncontaminated pack has been successfully transported through the detector using the shortest time possible. This is so that in the event of an uncontaminated pack being held up on the metal detector conveyor, a system fault is generated as quickly as possible.

In the [Service Options](#) screen, set the Auxiliary relay to Check debug to assist in setup. When this is set, the Inspecting lamp on the lamp stack will be lit when the Check window is open. Observe the pack as it is transported through the detector as well as the inspecting lamp, to visually verify the pack check settings.

Pass an uncontaminated pack through the detector and confirm that the check window opens just before the pack reaches the Pack Check Photo-eye, and closes just after the pack has fully passed the photo-eye.

Repeat this with several packs to confirm that the settings use the smallest times possible whilst ensuring that no false alarms are raised.

Remember to reset the Auxiliary relay after completing the setup.

■ **Air pressure**

The status of the air pressure is displayed, which will show as either Enabled or Disabled. Monitoring of the Air pressure is enabled/disabled in the [GP I/O](#) screen.

If the air pressure drops below a target pressure for longer than 3s, a system fault is generated.

■ **Bin lock**

The status of the bin lock is displayed, which will show as either Enabled or Disabled. Enabling of the Bin lock feature and monitoring of its status is carried out in the [GP I/O](#) screen.

During a PV test, the bin is automatically unlocked to allow for PV test product to be easily removed from the reject bin.

■ Bin lock timeout

In this field you can set the time before the reject bin will automatically relock again. The range is 5 to 30s.

Tap in the field to display a pop-up numeric keypad and enter the time required.

■ Double bag

Select this option to reject products if the length is longer than expected. For example, bags in a continuous stream may need to be separated prior to being inspected and this separation may have failed, resulting in a double-bag entering the detector. This option is only available if a Product Registration Photo-eye has been installed.

Tap in the option check box to enable or disable it.

■ Disable rejects?

Tapping this button temporarily disables the reject device. This feature is intended for Loma Service Engineer use only.

Help Manual


Purpose

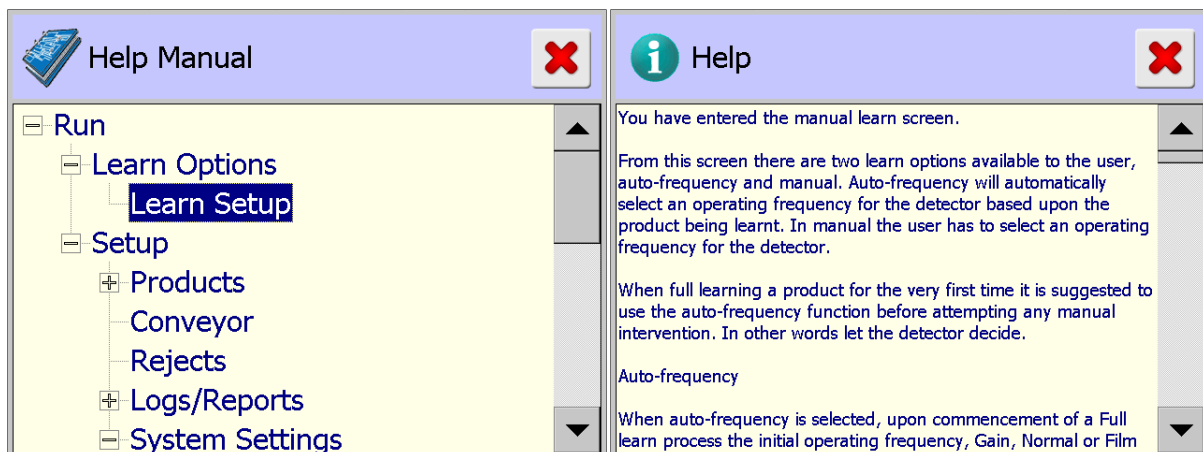
The Help Manual screen is displayed by tapping on the book icon  in the [System Setup](#) screen.

The screen is used to locate and open Help text files which provide information for setting up and operating the metal detector.

Screen Contents

The screen displays a hierarchy of nodes and sub-nodes, much like Windows Explorer, that can be expanded to display lists of associated Help text files that are available. Tapping on the Help text file then opens it in a new screen.

These are the same files that are displayed when tapping on the help button  in the related screen.



Help Manual - Table of Contents

Selected File (displayed in a new window)

Tapping on the red cross Cancel button in the title bar at the top of the Help screen will close the screen.

Tapping on the button in the Help Manual screen will close the screen and display the System Setup screen.

Using the Metal Detector

This chapter provides general information about using the metal detector, including some guidance on setting up the detector to provide the best results.

The following sections provide more information:

- **Good Practice**

This section provides some guidance for maintaining an effective metal detection regime.

- **Establishing a Good Product Learn**

Carrying out a full product learn is an essential first step to ensure that the metal detector performs effectively.

- **Establishing Detector Performance**

Once a product learn has been completed, the next step is to establish the levels of metal detection achievable.

- **Regular In-Line Detector Performance Testing**

Regular testing of the detector's performance, including checking activation of reject devices, provides confirmation and continued confidence in its detection capabilities.

- **Handling Rejected Products**

Effective removal of contaminated products from the production line to ensure that they are not delivered to customers is an essential part of the inspection process.

- **Getting the Results**

The IQ³+ Metal Detector has built in inspection settings to achieve the best detection results for a wide range of product types, including those that create no product effect.

- **Frequency Selection**

Although the detector operates across a range of frequencies, generally a product will have an optimum frequency at which detection is best. This frequency can be manually set but the IQ³+ Metal Detector has the capability built in to automatically search for and select it.

Good Practice

The following guidelines include recommendations for ensuring and maintaining an effective metal detection regime. There are four essential components in using the IQ³+ Metal Detector effectively:

- Establishing a Good Product Learn.
- Establishing Detector Sensitivities.
- Regular In-Line Detector Sensitivity Testing.
- Handling Rejected Products.

These four components are described in detail in this chapter.

Establishing a Good Product Learn

Before inspecting products for inclusion of metal contaminants, you must first carry out a full product learn process. See [Learning Products](#) for further details.

This process consists of passing known good product packs through the detector so that it can establish what effect the product has on the electromagnetic field as it passes through the aperture.

Based on this [product effect](#), the metal detector automatically makes the required settings in the software and establishes a product window or envelope which is saved in memory for use every time the product is selected for inspection.

The product effect is then effectively filtered out from the signal received when being inspected so that signal variations caused by metal contaminants can be easily detected.

Carrying out a full product learn process is therefore a very important first step to ensure that the metal detector performs effectively.

Establishing Detector Performance

Once the metal detector has been set up with the product it is important to establish what size of metal contaminant the detector is capable of finding and if necessary make manual adjustments in the metal detector settings to achieve the required results.

This is achieved by attaching various sizes and types of metal to know good product samples and passing them through the metal detector aperture to establish the level of detection that is achievable.

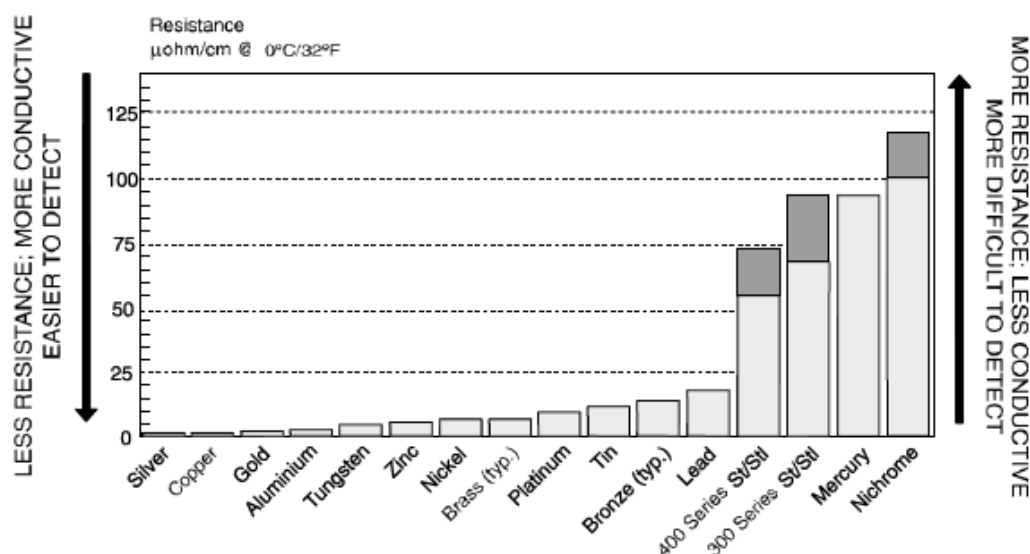
Loma Systems can supply a selection of sizes and types of metal test wands for attaching to product samples for testing purposes. There are three types of wands: ferrous (chrome steel), non-ferrous (brass), and 304 stainless steel. Stainless steel is included because performance is generally poorer than for other non-ferrous contamination due to the relative conductivity of the material. The wands are supplied in a range of sizes depending on the product type being inspected.

In dry running the performance can be measured by placing the test wand at the trailing and leading edges of a representative sample of the product, and then passing the product through the detector. The test wands should be placed at the leading and trailing edges of the product to ensure correct product rejection. This is particularly important in metal detectors with no Product Registration Photo-eye fitted, as the reject time is determined by the position of the contaminant relative to the product.

With conductive products the signal generated by the metal contaminant can be masked by the product itself. It is therefore important to test the product with test wands not only at the leading and trailing edges, but also at the product's centre.

Relative Detectability of Non-Ferrous Metals

The resistance, and hence ease of detection, of different non-ferrous metals varies widely. The more conductive they are, the easier they are to detect, as shown in the graph below.



Performance for stainless steels is invariably poorer than to other non-ferrous contamination. This is largely due to the relative conductivity of the material.

It is also possible to phase out a particular size of non-ferrous contaminant but be able to detect a smaller or larger size. This is because the metal signal matches the product signal and has been compensated out.

It is important to be aware of the effects of contaminant orientation and relative detectability. The test wands used throughout the metal detection industry are spherical, as this eliminates any orientation effects and ensures repeatability. However, in practice this may not always be the case, therefore the user must be mindful of this fact.

Regular In-Line Detector Performance Testing

It is important to maintain regular and accurate in-line performance testing of the metal detector using the same techniques as the initial performance testing. This should include tests to ensure that the reject systems are effective. See [Using Performance Validation](#) for further details.

Regular testing should be conducted using the same techniques as initial performance testing. This should include ensuring that the reject systems are effective, including reject confirmation systems if fitted.

The records generated by this system should be maintained in a safe and easily retrievable place for a time period suited to your particular quality regime. Factors which may be of help in determining a suitable retention period might be:

- The anticipated life of your product within normal consumer usage.
- Any statutory time period within which enforcement authorities may instigate legal proceedings after notification of a complaint.

Handling Rejected Products

A reject collection device, such as a reject bin, will typically be used to prevent contaminating products from being mixed with uncontaminated products. Any rejected product should be kept segregated for later examination. Never let your bin overfill.

It is advisable to examine rejected product with a view to identifying any contamination.

The information gained can be used to implement preventative measures, thus improving further the product. Multiple contaminants may be a clue to machinery break-up. Identification can then pinpoint the source and effective maintenance can then be conducted.

The IQ³+ Metal Detector can also be helpful when examining contaminated products. For example, you can alter the orientation of the product and pass it back through the metal detector to help identify its position. Alternatively, you can subdivide a large product into a number of smaller samples and then use the metal detector to identify which sample contains the contaminant.

Getting the Results

Before using the metal detector with a new product it is important to learn the product, to allow the metal detector to adjust itself to the highest possible sensitivity.

The metal detector will either learn on the signal from the product, or if there is insufficient signal, will use reference learn settings. This reference signal is chosen to maximise the sensitivity of the metal detector, so it is always preferable. However, where a product generates a signal in the detector, referred to as product effect, then the detector must learn this signal instead (otherwise good product will falsely be rejected).

When there is no signal from the product this is because they are non-conductive in nature, usually because they are dry (low water content) such as tea and coffee. Frozen products are also dry in nature because water cannot conduct when it is frozen. During a product learn, the detector will automatically sense if it is possible to run dry (use the reference learn setting), but this can also be forced by selecting DRY YES in the product menu.

Frequency Selection

This metal detector can run at a choice of seventy different operating frequencies so that the optimum frequency can be chosen for any given product. Generally, dry products run at high frequencies, but more conductive and non-uniform products run at low frequencies.

The frequencies are split into 10 bands as shown in the table below. This resolves any issues with cross-talk between two metal detectors working in close proximity. By setting one detector to use the available frequencies in a different band to the other detector they will never be operating on the same frequency.

Band	Frequencies (KHz)						
Band 1	31	71	111	203	300	405	576
Band 2	33	73	115	208	319	416	600
Band 3	35	75	121	211	326	428	625
Band 4	37	77	126	217	333	441	652
Band 5	39	79	131	223	340	454	681
Band 6	41	81	136	231	348	468	714
Band 7	43	83	141	238	357	500	750
Band 8	46	85	146	242	365	517	789
Band 9	48	87	151	250	375	535	833
Band 10	52	89	156	254	384	555	882

Because only the most experienced user will be able to correctly choose the optimum frequency, the product Learn process on the metal detector will automatically select the most suitable frequency. To allow the metal detector to select the best frequency, simply select the Auto-Frequency option in the [Learn Setup](#) screen.

The screenshot shows the 'Learn Setup' screen with a blue header. Below the header, there is a red rectangular box around the 'Auto-Frequency:' label and a checked checkbox. Below this, there are three input fields: 'Frequency:' with a dropdown menu showing '348kHz', 'Min threshold:' with a text box containing '100', and 'Max threshold:' with a text box containing '15000'. At the bottom of the screen, there is a blue bar with a green left arrow icon on the left and a green information icon (i) on the right.

Where several detectors are sited close together, it is essential that they do not run at the same frequency. This is achieved by allocating them separate frequency bands, which will have been set as part of the commissioning process.

Operating Instructions

This chapter provides general information about using the metal detector, including some guidance on setting up the detector to provide the best results.

The following sections provide more information:

- **[Setting Up the Metal Detector](#)**

This section provides guidance for setting up some basic features of the metal detector.

- **[Configuring the Metal Detector](#)**

This section provides for configuring the available options to provide an effective metal detection system.

- **[Adding a New Product](#)**

This section provides guidance for adding a new product into the system for inspection.

- **[Learning Products](#)**

This section provides guidance for setting up the Lean feature and then 'Learning' a product.

- **[Using Performance Validation](#)**

This section provides guidance for setting up the PVS feature and then carrying out a PV test for a product.

Setting Up the Metal Detector

This section provides guidance covering how to set up some basic features of the metal detector.

- **[Setting the Time and Date](#)**

This section describes how to set the time and date to be used by the detector. It is important that this is synchronised with other production equipment to assist with any investigations.

- **[Setting the Language](#)**

This section describes how to set the language to be used by the detector. A wide range of languages are available for selection and the process is very simple.

- **[Setting the Machine ID](#)**

This section describes how to set a unique name / number identifier for the metal detector. This is useful for data analysis purposes when you are using more than one detector as the machine ID is provided at the top of all Logs and Reports.


- **[Setting User Access Level and Password](#)**

User accounts are created at one of four access levels from 1 to 4. Level 1 provides basic operator access whilst level 4 provides access to all of the detector's features and functionality.

Setting the Time and Date

It is important that the correct time and date are set on the machine as they are used to time stamp the data in the contaminant, fault and error logs and are shown on the reports. In addition they determine the interval and synchronisation of automatically initiated PV tests.

To change the time and date, proceed as follows:


1. Tap on the control panel area  in the [System Setup](#) screen. The [System Settings](#) screen is displayed.
2. Tap on the Display icon to show the Display screen.
3. Then tap on the Calendar icon to display the Calendar screen.
4. To change the date, tap on the left or right arrows at the top of the calendar to select the required month. Then tap on the date required.

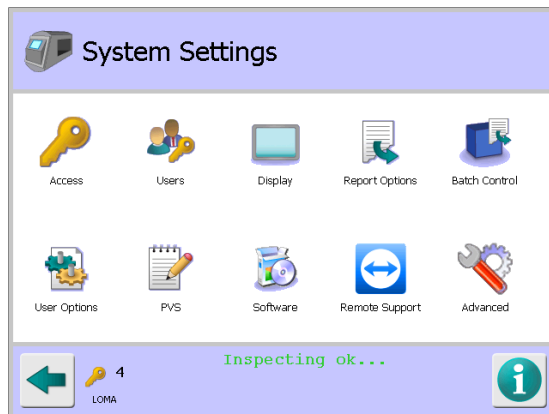
- | | |
|----|---|
| 5. | To change the time, tap on the hours, minutes and seconds value fields in turn and use the up and down arrows to set the required values. |
|----|---|

Also see the [Calendar](#) screen section for further details.

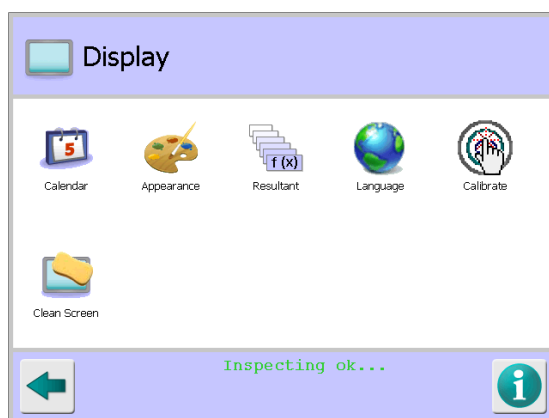
Setting the Language

The following procedure provides an example of changing the system language from English to French.

- | | |
|----|---|
| 1. | <p>Tap on the control panel area  in the System Setup screen. The System Settings screen is displayed.</p> |
|----|---|





- | | |
|----|--|
| 2. | <p>Tap on the Display icon to show the Display screen.</p> |
|----|--|



- | | |
|----|--|
| 3. | <p>Then tap on the Language icon to display the Language Setup screen.</p> |
|----|--|



4.	From this screen you can select the required language by tapping on the appropriate flag icon to select it. We want to select the French language but a French flag is not displayed
5.	<p>Tap on the Edit button in the top right hand corner of the screen. Further options are displayed.</p> <p>Then Tap on the French entry in the Available column to select it.</p> 
6.	<p>Tap on the right arrow button in the centre of the screen to move the French entry across to the Displayed column.</p> 
7.	<p>Tap on the Back button . A French flag will be displayed for selection.</p> 


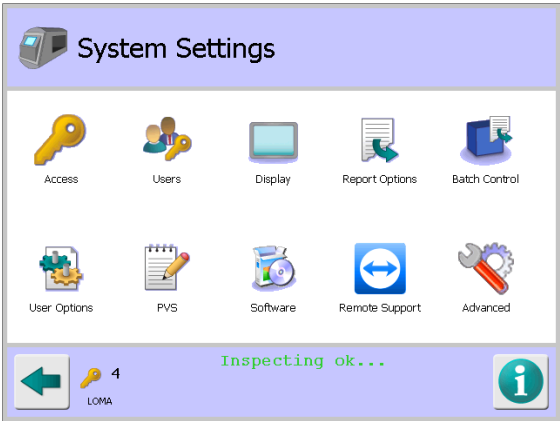
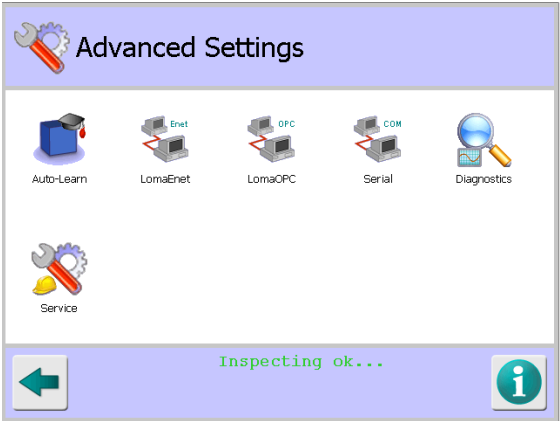
8.	<p>Tap on the flag to select the language and then tap on the Back button . The Save Settings pop-up screen will be displayed. Note that the text is now displayed in French.</p> 
9.	<p>Tap on the green tick 'OK' button to save the language change. The text in all screens will now be displayed in French.</p>


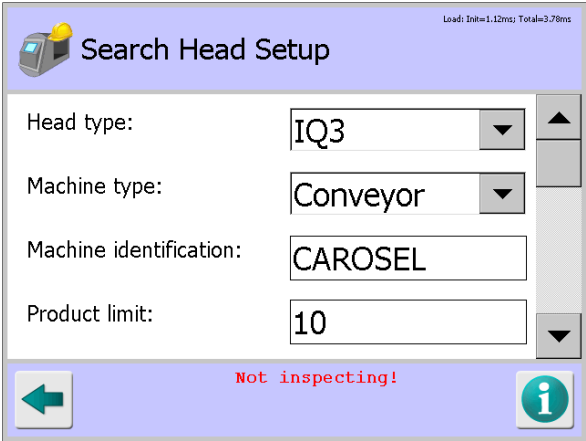

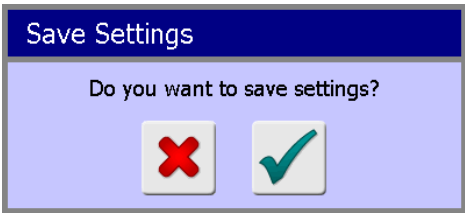
Also see the [Language Setup](#) screen section for further details.

Setting the Machine ID

The Machine ID is printed out on any Reports or Logs and can be edited to a convenient name to allow them to be easily associated to a machine.

To add or edit a Machine ID, proceed as follows:


1.	<p>Tap on the control panel area  in the System Setup screen. The System Settings screen is displayed.</p> 
2.	<p>Tap on the Advanced icon to display the Advanced Settings screen.</p> 

3.	<p>Then tap on the Service icon to display the Service screen.</p> 
4.	<p>Tap on the Head Setup icon to display the Search Head Setup screen.</p> <p>Note that the detector will stop inspecting whilst you are in any Service screen, as indicated by the red message Not Inspecting! displayed at the bottom of the screen.</p> 
5.	<p>Tap in the Machine identification field to display a pop-up keyboard and enter a suitable name for the Machine ID.</p>
6.	<p>Tap on the Back button ... The Save Settings pop-up screen will be displayed.</p> 
7.	<p>Tap on the green tick 'OK' button to save the change.</p>

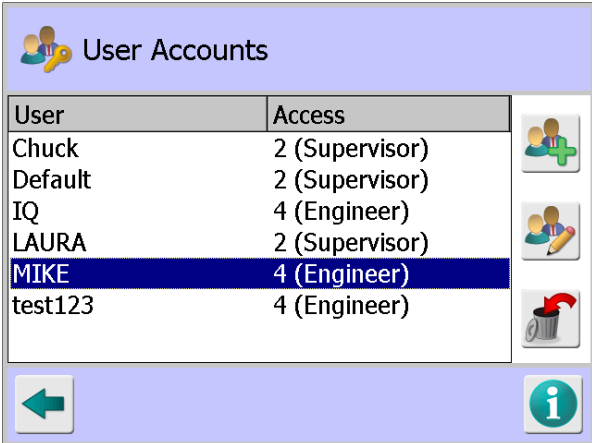
Setting User Access Levels and Passwords

User accounts are used to manage access to the features and functionality available in the metal detector. Four access levels are available which are described in the [User Access](#) section.

To set a user access level and password, proceed as follows:

1. Tap on the control panel area  in the [System Setup](#) screen. The [System Settings](#) screen is displayed.


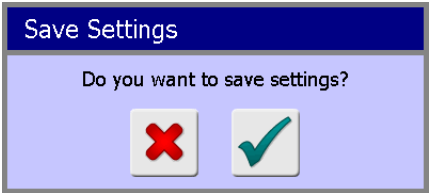

2. Tap on the Users icon to display the [User Accounts Setup](#) screen.



User	Access
Chuck	2 (Supervisor)
Default	2 (Supervisor)
IQ	4 (Engineer)
LAURA	2 (Supervisor)
MIKE	4 (Engineer)
test123	4 (Engineer)

In this screen you can add new users, edit users details or delete users using the three buttons provided on the right hand side of the screen. Tapping in a field displays a pop-up keyboard or numeric keypad screen for entering data.
3. To add a new user, tap on the Add User button on the right hand side of the page. The [User Account Details](#) screen is displayed



4.	In this screen you can now set the new users User ID, access level and password. Once you have added all of the details, tap on the green tick 'OK' button to save the changes.
5.	<p>Tap on the Back button . The Save Settings pop-up screen will be displayed.</p>  <p>The image shows a 'Save Settings' pop-up screen with a dark blue header. Below the header, the text 'Do you want to save settings?' is displayed. At the bottom, there are two buttons: a red 'X' button on the left and a green checkmark button on the right.</p>
6.	Tap on the green tick 'OK' button to save the changes and finish adding the new user account.

Configuring the Metal Detector

Wherever possible, configuration of the metal detector will be carried out by Loma Systems before the machine is dispatched, or by a Loma Service Engineer during a commissioning visit. Primarily, the commissioning visit is required as part of the installation process so that the engineer can optimise machine performance in its actual working environment and for the products that are to be inspected.

There are circumstances, however, where it may be necessary for the end user to carry out some or all of the configuration and commissioning procedures. Typically, this would occur when Loma Systems do not have enough information about the end application, such as the belt speed or reject details, to fully configure the machine.

Options and parameters available for configuring the metal detector are listed and described below.

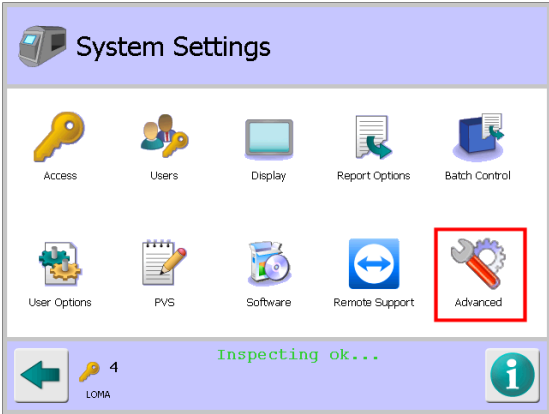
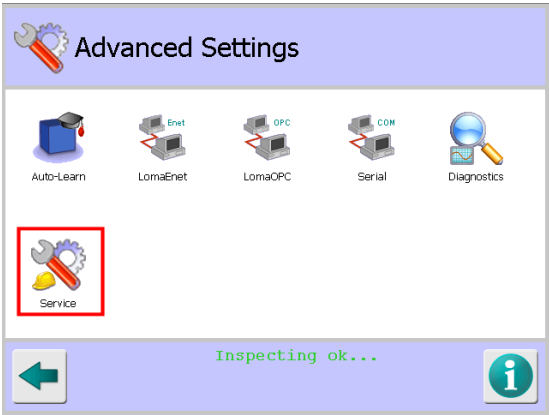

- [Setting Up the Search Head](#)
- [Setting Up the Conveyor](#)
- [Setting Up the Service Options](#)
- [Setting Up the Monitoring Services](#)
- [Setting the VF Balance](#)
- [Setting the VF Drive](#)
- [Setting Up the User Options](#)
- [Setting Up Serial Links](#)
- [Performing a Ferrite Tune](#)
- [Setting Up Product Signal Tracking](#)
- [Setting Up the Reject Options](#)

Setting Up the Search Head


Setting up of the detector search head is carried out in the [Search Head Setup](#) screen which when selected takes the detector out of run mode so that it is not inspecting products.

The options and parameters within this screen contain basic set up data that the detector requires before it is able to correctly function. Important data entries must be completed correctly before exit of this screen is allowed. If data is missing then a message advising of the missing data is displayed.

To set up the search head, proceed as follows:


1. In the [System Settings](#) screen tap on the Advanced icon to display the [Advanced Settings](#) screen.
 
2. Tap on the Service icon to display the Service screen..
 
3. Then tap on the Head Setup icon to display the Search Head Setup screen.
 

4. You can now select the required options and enter the appropriate parameter values to set up the search head. See the [Search Head Setup](#) screen section for further details.

5. Once you have finished entering the required details, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.


Setting Up the Conveyor

The conveyor options are configured through the [Conveyor Setup](#) screen which provides access to parameters controlling the conveyor.

If the screen is accessed by tapping on the Conveyor area  of the mimic in the System Setup screen, the settings will be read-only so that the user can review, but not alter, any settings.

To set up the Conveyor, proceed as follows:

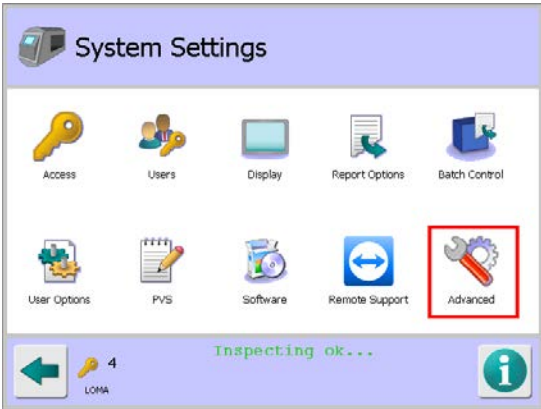
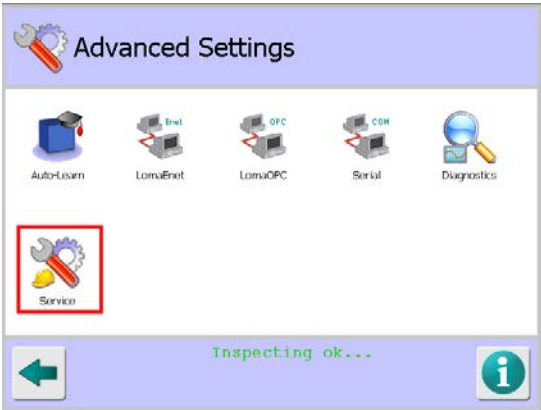
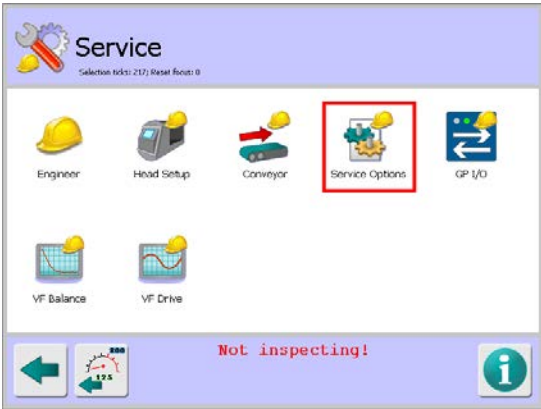
1. In the [System Settings](#) screen, tap on the Advanced icon to display the Advanced Settings screen.

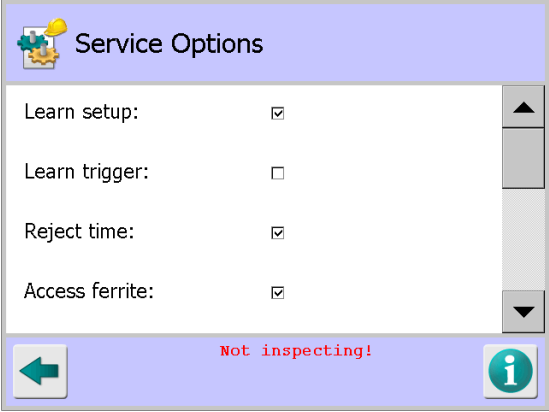

2. In the Advanced Settings screen, tap on the Service icon to display the Service screen.
3. Then tap on the Conveyor icon to display the Conveyor Setup screen.
4. You can now select the required options and enter the appropriate parameter values to set up the conveyor. See the [Conveyor Setup](#) screen section for further details
5. Once you have finished entering the required details, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.

Setting Up the Service Options

Service Options are set up in the Service Options screen through which certain user options and facilities may be turned on and off, as appropriate to your machine application.

To set the service options, proceed as follows:

1.	<p>In the System Settings screen, Tap on the Advanced icon to display the Advanced Settings screen.</p> 
2.	<p>Then tap on the Service icon to display the Service screen.</p> 
3.	<p>Tap on the Service Options icon to display the Service Options screen.</p> <p>Note that the detector will stop inspecting whilst you are in any Service screen, as indicated by the red message Not Inspecting! displayed at the bottom of the screen.</p> 
4.	<p>You can now select the required options and enter the appropriate parameter values to set up the service options. See the Service Options screen section for further details.</p>

	
5.	Once you have entered the required details, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.

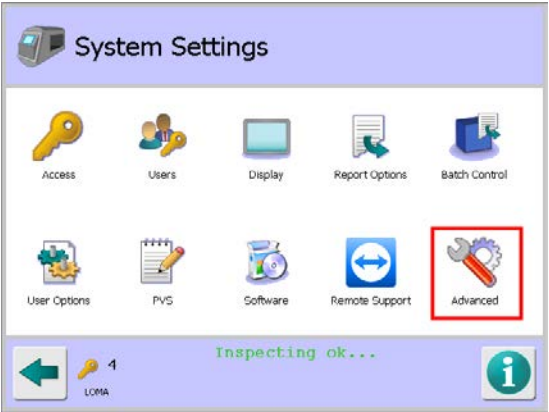
Setting Up the Monitoring Services

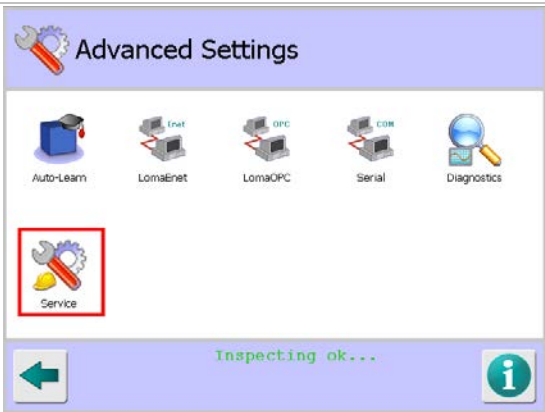
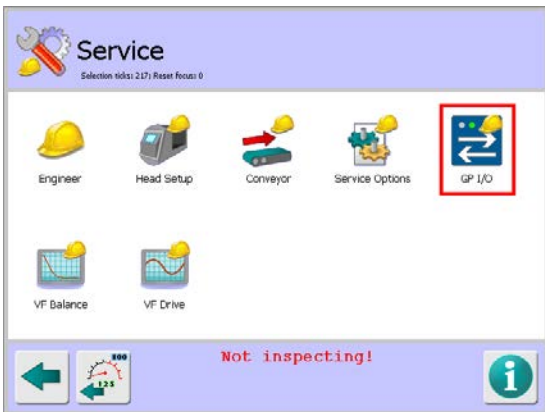
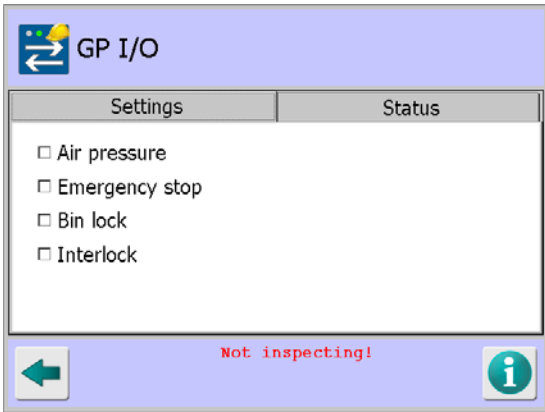

The metal detector provides monitoring of the status for a number of selectable machine features, where fitted, through the GP I/O screen.



Note that GP I/O needs to be set to Enabled in the [Search Head Setup](#) screen for it to be available for use.

To set up the monitoring services, proceed as follows:
screen. Then proceed as follows:

1.	<p>In the System Settings screen, tap on the Advanced icon to display the Advanced Settings screen.</p> 
2.	Then tap on the Service icon to display the Service screen.

	
3.	<p>Tap on the GP I/O icon to display the GP I/O screen.</p> <p>Note that the detector will stop inspecting whilst you are in any Service screen, as indicated by the red message Not Inspecting! displayed at the bottom of the screen.</p> 
4.	<p>You can now select the required options. See the GP I/O screen section for further details.</p> 
6.	<p>Once you have selected the options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.</p>

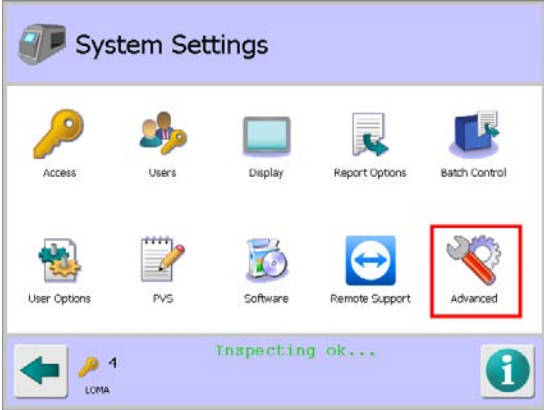
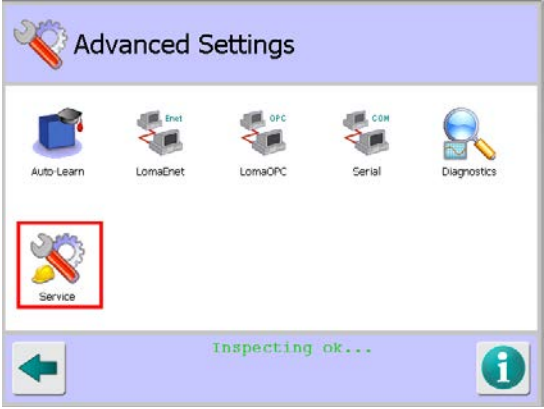
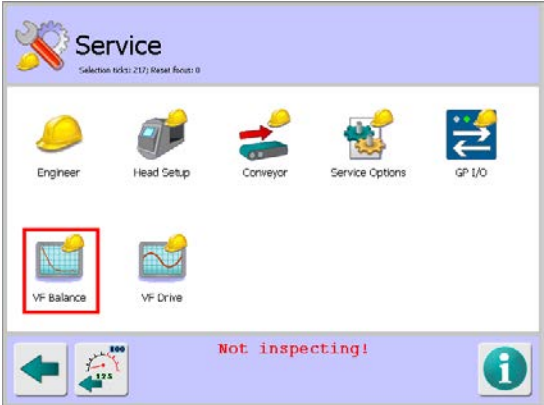
Setting the VF Balance

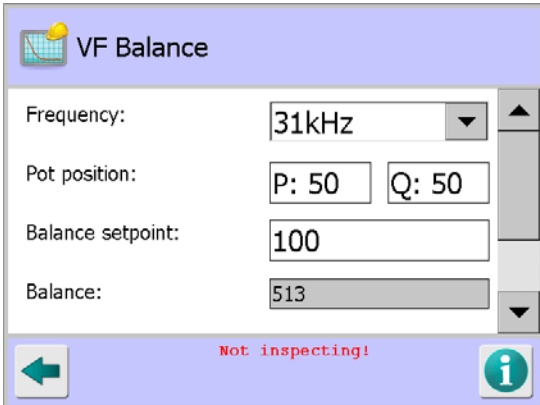

Setting the balance on the raw P and Q channels for all available operating frequencies to maximise sensitivity of the detector is carried out in the VF Balance screen. This is completed during the machine manufacturing process so should not need adjustment under normal operating conditions.

However, if any of the electronics are replaced it is recommended that the setup is repeated. This is normally done using the AutoBalance feature which automatically makes any P and Q channel balance adjustments necessary for each of the available frequencies.

Manual adjustment is also possible and this is carried out by Loma Service Engineers when required.

To set up the VF balance, proceed as follows:

1.	<p>In the System Settings screen, tap on the Advanced icon to display the Advanced Settings screen.</p> 
2.	<p>Then tap on the Service icon to display the Service screen.</p> 
3.	<p>Tap on the VF Balance icon to display the VF Balance screen.</p> <p>Note that the detector will stop inspecting whilst you are in any Service screen, as indicated by the red message Not Inspecting! displayed at the bottom of the screen.</p> 

4. You can now select the required options and enter the appropriate parameter values to set up the VF Balance. See the [VF Balance](#) screen section for further details.

5. Once you have entered details and selected the required options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.

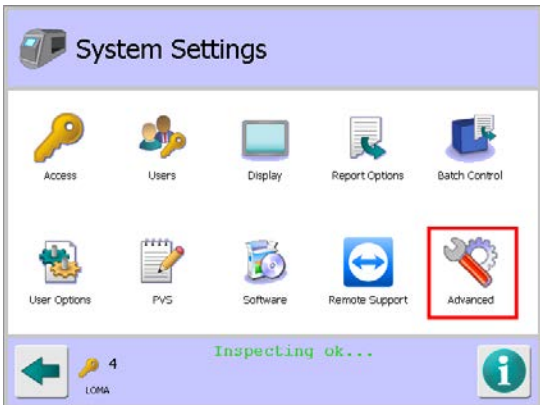
Setting the VF Drive

The transmitter drive for all available operating frequencies is set up in the VF Drive screen to maximise sensitivity of the detector. This is carried out during the manufacturing process so should not need adjustment under normal operating conditions.


However, if any of the electronics are replaced it is recommended that the setup is repeated. This is normally done using the AutoBalance feature which automatically makes any P and Q channel balance adjustments necessary for each of the available frequencies.

Manual adjustment is also possible and this is carried out by Loma Service Engineers when required.

To set up the VF drive, proceed as follows:

1. In the [System Settings](#) screen, tap on the Advanced icon to display the [Advanced Settings](#) screen is displayed.


2. Then tap on the Service icon to display the [Service](#) screen.

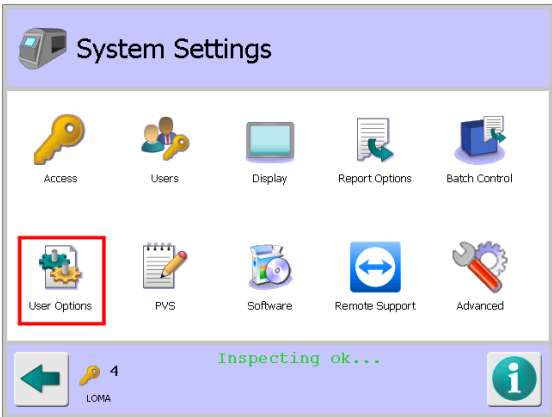
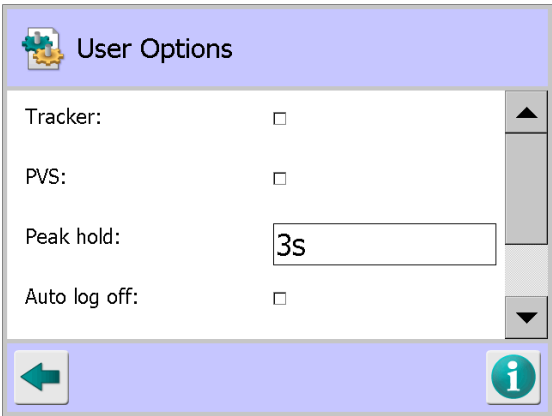

3.	<p>Tap on the VF Drive icon to display the VF Drive screen.</p>
4.	<p>Note that the detector will stop inspecting whilst you are in any Service screen, as indicated by the red message Not Inspecting! displayed at the bottom of the screen.</p>
5.	<p>You can now select the required options and enter the appropriate parameter values to set up the VF drive. See the VF Drive screen section for further details.</p>
6.	<p>Once you have entered details and selected the required options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.</p>

Setting Up the User Options

User Options are set up in the User Options screen which enables/disables many of the detector functions using a tick box system. If a function is unavailable because perhaps a setting in another

menu requires enabling, the tick box is greyed out. If an option remains un-ticked (disabled) then any further menus that are associated with it will remain hidden to the user.

To set up the user options, proceed as follows:

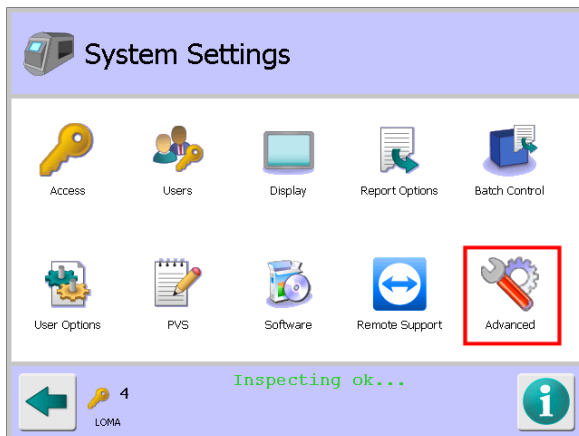
1. In the [System Settings](#) screen, tap on the User Options icon to display the [User Options](#) screen

2. Select the required options and enter the appropriate parameter values in the screen. See the [User Options](#) screen section for further details.

3. Once you have entered details and selected the required options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.

Setting Up Serial Links

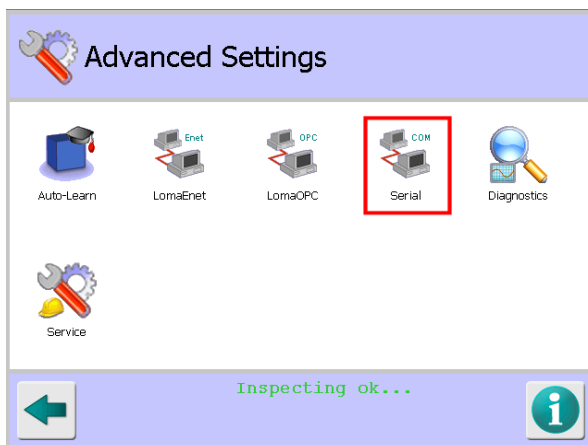
Serial links are set up through the Serial Comms Setup screen which provides choices for the type of data to be transmitted and/or received and how the data is communicated. To enable communications over a serial link to function, the detector must have as a minimum the additional serial link board with cabling. Report options will require the further addition of an Ethernet module.

To set up a serial link, proceed as follows:

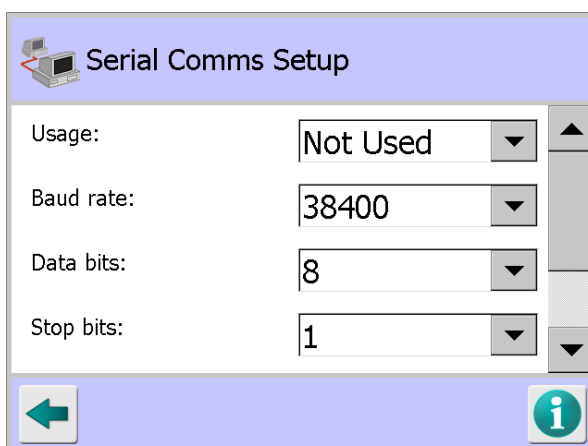
1. In the [System Setup](#) screen, tap on the Advanced icon to display the [Advanced Settings](#) screen.




2. Then tap on the Serial icon to display the [Serial Comms Setup](#) screen.



3. Select the options and enter the appropriate parameter values in the screen. See the [Serial Comms Setup](#) screen section for further details.



3. Once you have entered details and selected the required options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.

Performing a Ferrite Tune

A “Ferrite” product is set up during manufacture of the detector head to provide a baseline configuration for inspecting “Dry” products which exhibit no product effect during inspection.

A part of this process a “Ferrite Wand”, similar to a Test Wand but much larger and containing a sample of pure iron, is used to carry out a Full Learn process. This is called a Ferrite Tune. The “Ferrite Wand” used then becomes specific to the detector head and is provided with the head to enable future Ferrite Tunes to be carried out.

To avoid it being lost, the “Ferrite Wand” is stored inside of the detector head control panel, fixed to the back wall of the panel. You can remove it by twisting the wand which disengages the plastic retaining latch. The wand can then be removed from the control panel and the panel refitted before carrying out the Ferrite Tune.



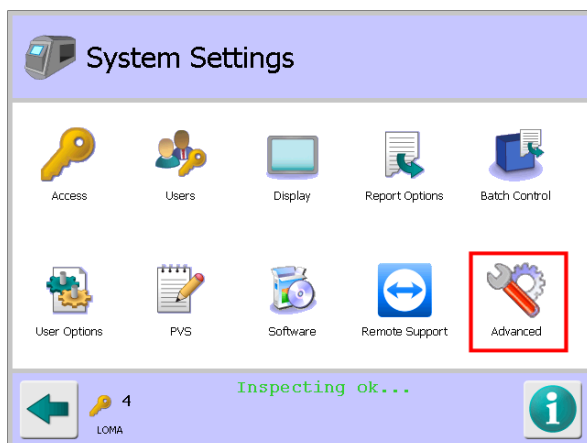
When refitting the head control panel cover, ensure that the fixing screws have been tightened to 4Nm torque to maintain the integrity of the IP69K rating for the head; preventing ingress of water or condensation.

When you are adding a new product to the system for inspection, you can select the “Dry” product type option in the [Product Settings](#) screen. Then following a successful [Full Learn](#) process, the “Ferrite” settings will be used for inspecting the new product.

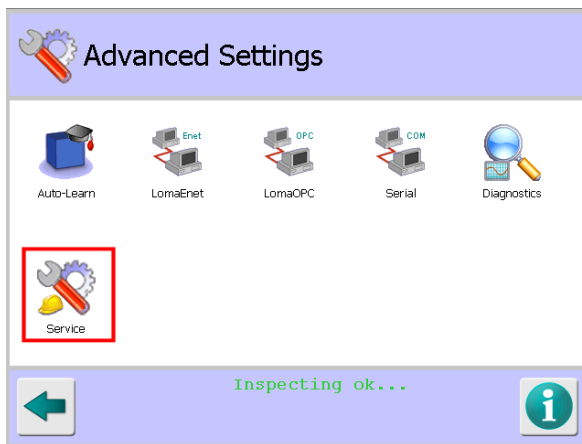
To avoid accidental changes being made to the Ferrite product it is always hidden from display in the [Select Product to Setup](#) screen following a Ferrite Tune. To display the Ferrite product for selection you will need to go to the [Service Options](#) screen.

To perform a ferrite tune, proceed as follows:

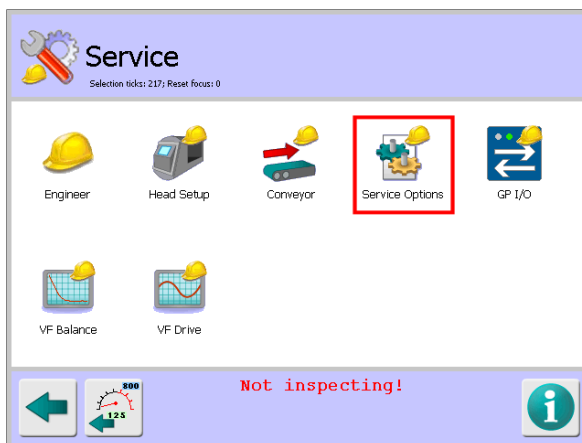
1. In the [System Settings](#) screen, tap on the Advanced icon to display the [Advanced Settings](#) screen.



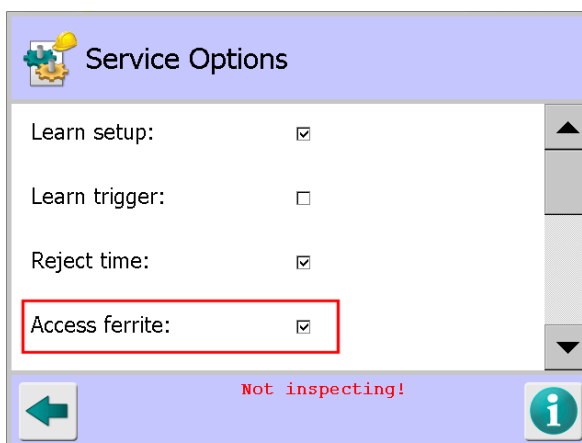
2. Then tap on the Service icon to display the [Service](#) screen.




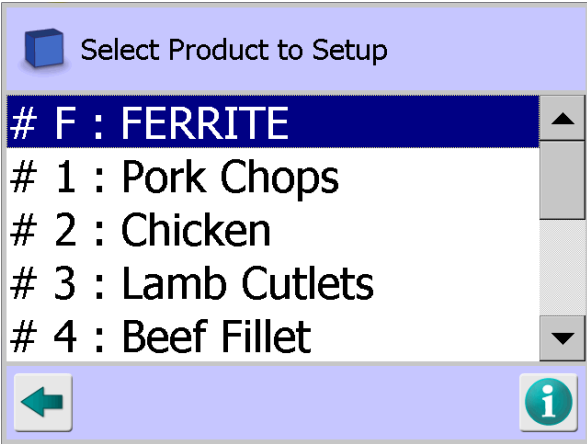
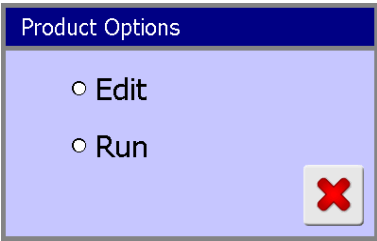


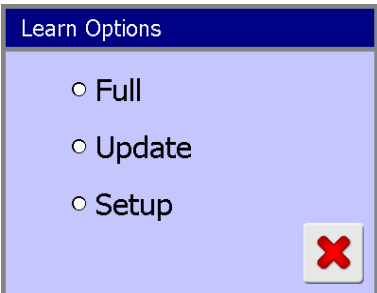
3. Tap on the Service Options icon to display the [Service Options](#) screen.




4. Then select the Access ferrite option.



5. Navigate back to the [System Setup](#) screen using the Back button  at the bottom of the screen.

6. Then tap on the product area  to display a list of products in the [Select Product to Setup](#) screen and tap on the FERRITE product.
- 
7. The Product Options screen is displayed. Select the Run option.
- 
8. The Main Run screen is displayed with the FERRITE product selected to run.
- 
9. Tap on the Learn icon  to display the [Learn Options](#) screen and select the Full option.
- 

10.	Perform a Full Learn whilst moving the end of the ferrite wand with the sample in and out of the search head; taking care not to put your hand in or get any watches/rings near the search head.
	<i>On systems fitted with a Product Registration Photo-eye, block the photo-eye to register that packs are present.</i>
11.	Once a successful Learn has been completed, navigate to the Service Options screen and disable the Access ferrite option. You have now completed the Ferrite Tune process.

Setting Up Product Signal Tracking

This feature allows the detector to automatically adjust the working threshold between two pre-set limits to enable the sensitivity of the detector to be optimised in situations where the product signal drifts up and down with the change in product effect.

For instance, for a frozen product the product effect is very small when the product has just come out of the freezer allowing a low working threshold level to be used giving a high sensitivity to metal contaminants. However, if the line stops for any reason then the product could thaw slightly, or if the product were not fully frozen, a significant product signal increase would result. In this event the working threshold will have to be raised to allow the product to be passed, without false rejection. Raising the working threshold to allow softer product to pass without false rejection will reduce the sensitivity to metal contamination, i.e. larger pieces of metal will now be detected. If the product becomes hard frozen whilst the raised working threshold is still set the sensitivity to metal contamination will remain reduced because the working threshold is higher than it now needs to be.

Tracking works by recording the product signal for each pack. From the values read the working threshold continuously trends upwards or downwards between an upper and a lower limit.

The rate and amount by which the working threshold changes, together with limits between which it operates, are controlled by user entered parameters.

It must be understood that this type of system may allow metal contamination that would otherwise be detected when the product is fully frozen, to be accepted if product softening has forced the working threshold to rise.

Operating Conditions

The Tracking limits parameters are only available if the Tracker option has been enabled in the [User Options](#) screen. For this option to be available, a Product Registration Photo-eye must be fitted and enabled in the [Conveyor Setup](#) screen.

Tracking is product relative and the function can be turned on or off individually for each of the available 100 product memories.

Tracker initialisation will occur whenever:

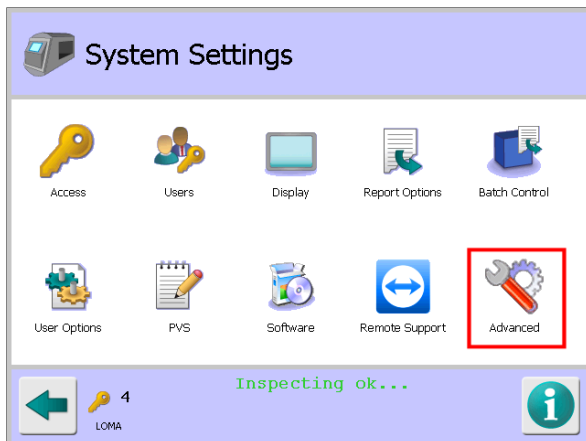
- The detector is powered on.
- The running product is changed.
- The Tracking limits parameters are changed in the User Options screen.

Upon completion of a product Learn process the derived working threshold will be used unless the product signal initiates a change.

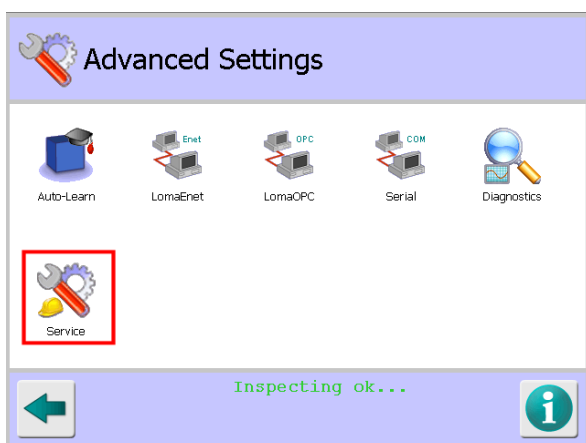
Enabling the Tracker Feature

To enable the tracker feature, proceed as follows:

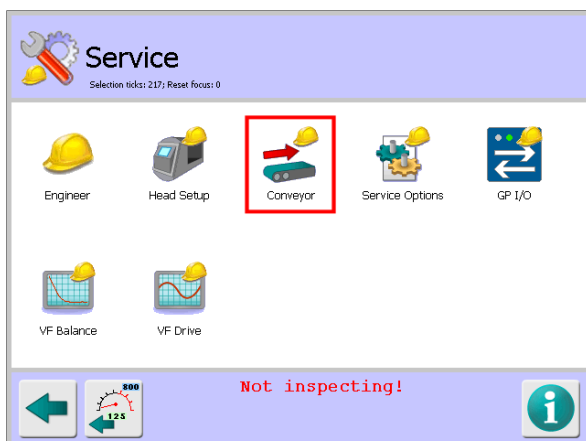
1. In the [System Settings](#) screen, tap on the Advanced icon to display the [Advanced Settings](#) screen.

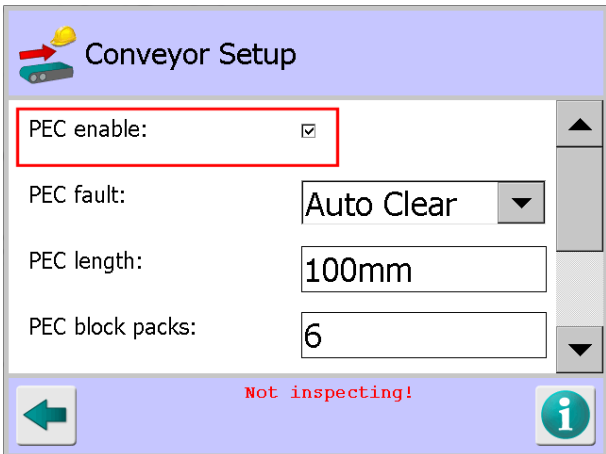


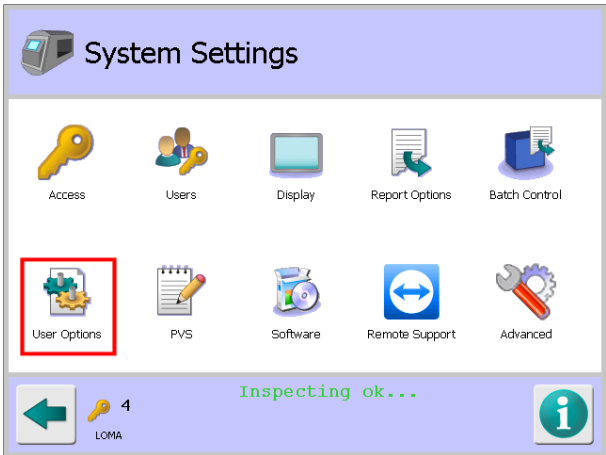
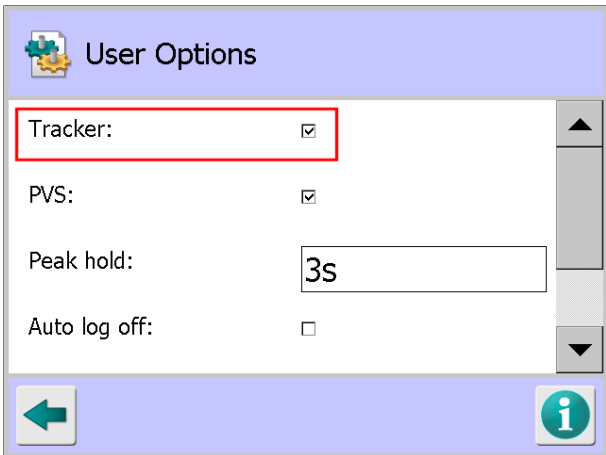



2. Tap on the Service icon to display the [Service](#) screen.



3. Then tap on the Conveyor icon to display the [Conveyor Setup](#) screen.

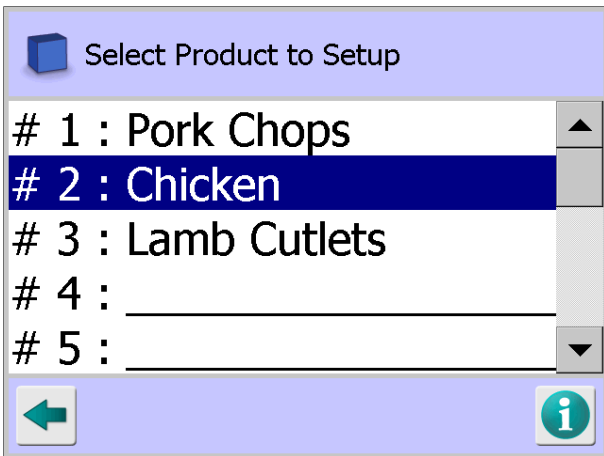

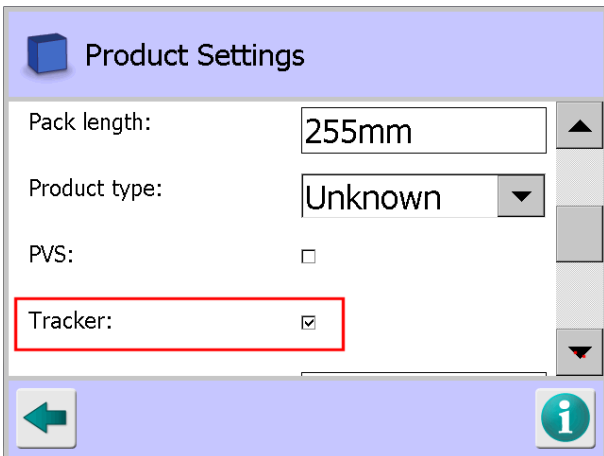



4.	<p>Tap on the PEC enable option check box to select it.</p> 
5.	<p>Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen. The Service Screen is displayed.</p>
6.	<p>Use the back button  to navigate back to the System Settings screen and then tap on the User Options icon to display the User Options Screen.</p> 
7.	<p>Tap on the Tracker option check box to enable it.</p> 

8.	<p>Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen. The Tracker feature is now enabled and can be selected for use with any product</p>
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Enabling and Configuring Tracker for a Product

To enable the tracker feature for a product, proceed as follows:


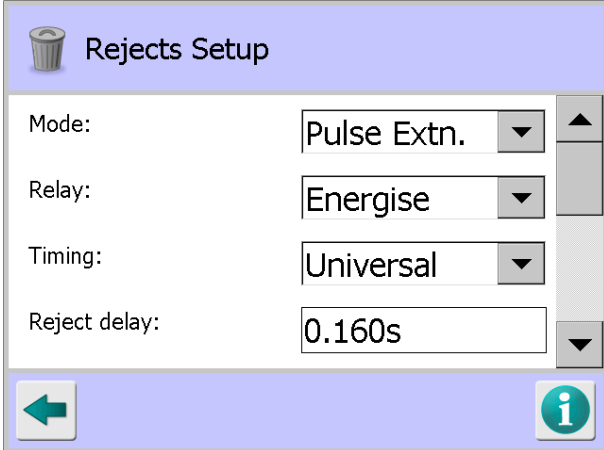

1.	<p>Navigate to the Select Product to Setup screen. Use the scroll bar on the right of the screen to navigate to the required product. Then tap on the row to display the Product Options screen.</p> 
2.	<p>Tap on the Edit option to display the Product Settings screen.</p> 
3.	<p>Then tap on the Tracker option to enable it for the product. The Tracker limits parameters will then be added at the bottom of the screen.</p> 
4.	<p>Select the appropriate parameter values in the screen and save the changes. See the Product Settings screen section for further details.</p>

5.	Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen. The Tracker feature is now enabled for the selected product.
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Setting Up the Reject Options

Reject options for the reject devices fitted are configured in the [Rejects Setup](#) screen.

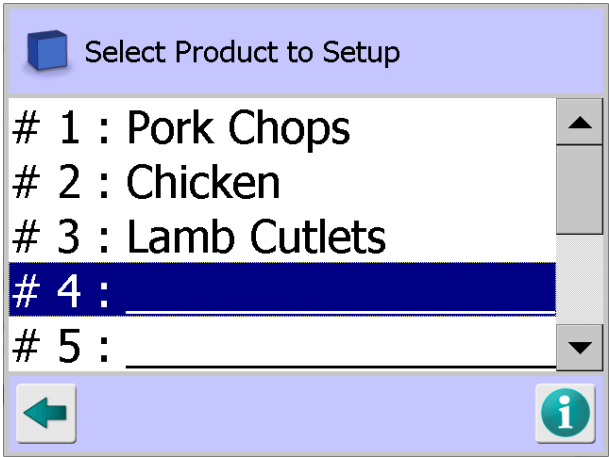
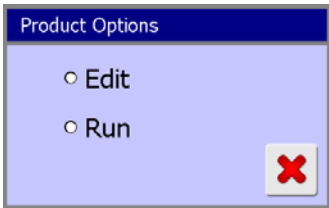
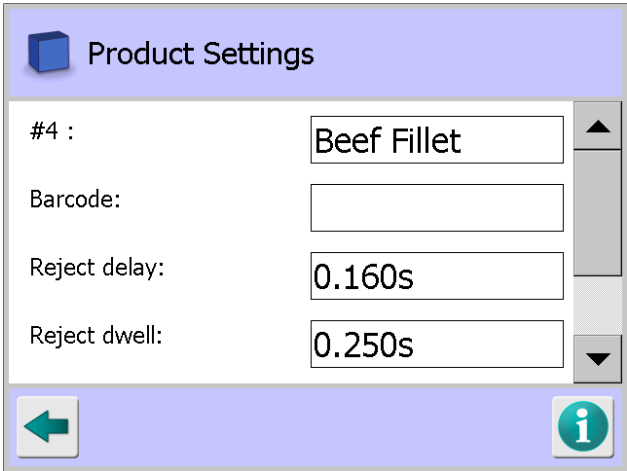

To set up the rejects options, proceed as follows:

1.	<p>To display the screen, tap on the Reject area  in the System Setup screen. The Rejects Setup Screen is displayed.</p> 
2.	Select the required options and enter the appropriate parameter values in the screen. See the Rejects Setup screen section for further details.
3.	Once you have entered details and selected the required options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen.

Adding a New Product

This section explains how to add a new product, following which a [Full Learn](#) should be carried out to capture and save the metal detector settings for inspecting the product.

To add a new product, proceed as follows:

1. Navigate to the [Select Product to Setup](#) screen. Use the scroll bar on the right of the screen to navigate to the next empty row in the list. Then tap on the row to display the [Product Options](#) screen.
 
2. Select the Edit option to display the [Product Settings](#) screen.
 
3. Select the required options and enter the appropriate parameter values in the screen. See the [Product Settings](#) screen section for further details.
 
5. Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen.

You should now carry out a [Full Learn](#) process to capture the settings for inspecting the product.

Learning Products

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 three 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 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

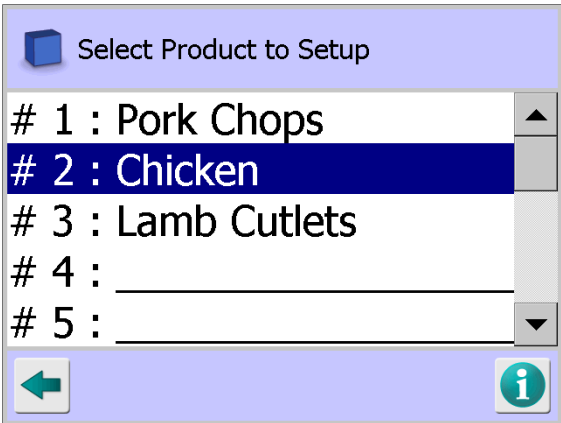


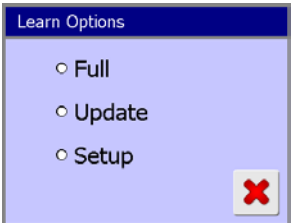
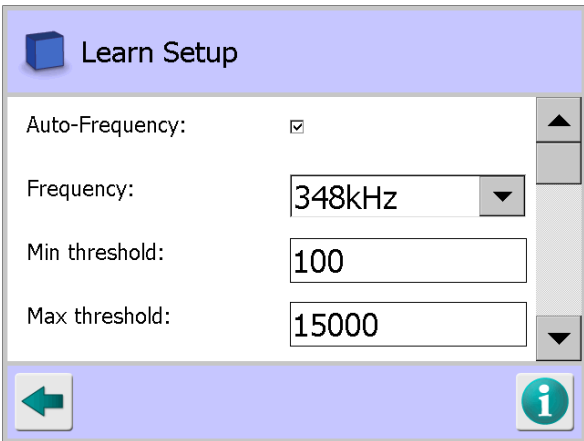
This process is only available if you have previously carried out a Full Learn process for the product. It fine-tunes the phase value to minimize the signal, while still checking for metal in the product. Use an Update Learn to update the signal when the production line is running if false rejects are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




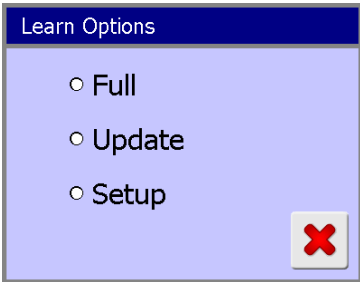
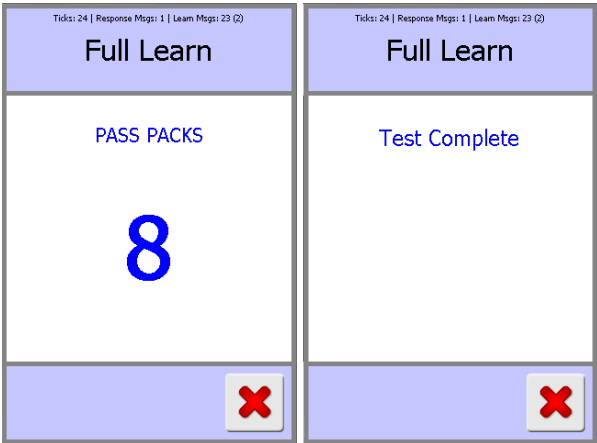
■ Reverse Learn

This process is only available if the Reverse detection option has been enabled in the [Service Options](#) screen. It is used in situations where for example a product must contain a contaminant, perhaps a toy car or whistle, and the metal detector is being used to reject products that do not contain one.

Learning a Product

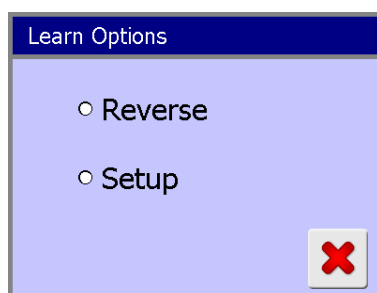
To Learn a product, proceed as follows:

1.	<p>From the Select Product to Setup screen, tap in the list on the product that you wish to Learn. The Product Options pop-up screen is displayed.</p> 
2.	<p>Tap on the Run option to select it to load the product parameters. Once the parameters have been loaded the Main Run screen is displayed.</p> 
3.	<p>Tap on the Learn icon  in the Main Run Screen to display the Learn Options Pop-Up screen.</p> 
4.	<p>Tap on the Setup option to select it and display the Learn Setup screen and adjust the settings to be applied during the Learn process.</p> 

5.	See the Learn Setup screen section for detail of the options and parameters available in the screen.
6.	Once you have entered the required details, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes.
7.	Use the Back button  to navigate back to the Main Run screen. Then tap on the Learn icon  to display the Learn Options Pop-Up screen.
8.	<p>At this point 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.</p>  <p>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.</p> <p>The Update Learn process will only recalculate the Compensation and Phase angle values for the product.</p> <p>Tap on either the Full or Update option to start the Learn process. The display will prompt you to pass sample product packs as necessary.</p>
10.	<p>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.</p> 
11.	Once the Full Learn is complete, the Main Run screen will be displayed ready for inspecting the selected product.

Reverse Learn

This menu option replaces the Full Learn option. It will only appear when the Reverse detection option is enabled in the [Service Options](#) screen and the Detection option is set to Reverse in the product Settings screen.



Select the Reverse option in the [Learn Options](#) screen to initiate a Reverse Learn process for the currently selected product.

Sample products used for the Reverse Learn process must be representative of the product to be tested. Either a single product can be repeatedly passed through the search head, or a set of at least eight identical items may be used; assuming that the Short Learn cycle option has been selected in the [Auto-Learn Settings](#) screen.

Using Performance Validation

This section describes the benefits of the Performance Validation System and explains 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.

One approach is to make regular sensitivity checks and keep handwritten records of the results.

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.

See the [Logs and Reports](#) section for further details.

Performance Validation System

PV tests can be used to ensure regular in line testing of metal sensitivities occur. Records of PVS activity can either be captured using the report option together with for example a LomaEnet system, or by use of the PVS Log whose data can be downloaded to a USB stick in the form of a ".csv" file that can be opened using Windows Excel. Either option can replace the need for manual records.

The requirement for a PV test can be prompted for by the detector on a regular basis or manually initiated. When detector prompted the user has a timed window in which to successfully complete the requirements of the test. This time window is user definable. Optional visible or audible remote/ local warning of the test prompting may or can be fitted.

To set up PV testing, the PVS option must first be enabled in the User Options screen so that the PVS Setup screen can be selected from the System Settings screen. The PVS Setup screen is used to set when PV test are to be carried out and what type of testing is to be done. These settings are then applicable for all products that have the PVS option enabled.

For each product the PVS option can be enabled through the Product Settings screen and the test sample types and sizes to be used selected.

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. All the settings are explained within the screen help associated with their location.

If the user has password protected the detector keyboard; a separate password can be assigned for the test that allows access to only the functions needed to complete the test. This ensures the detector set up integrity is preserved.

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.

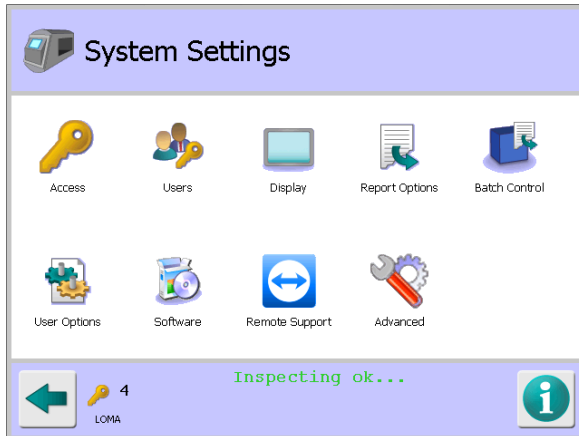
During the running of a test the signal levels generated can be viewed to enable fault diagnosis in the event of the correct test pieces not being detected.

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.

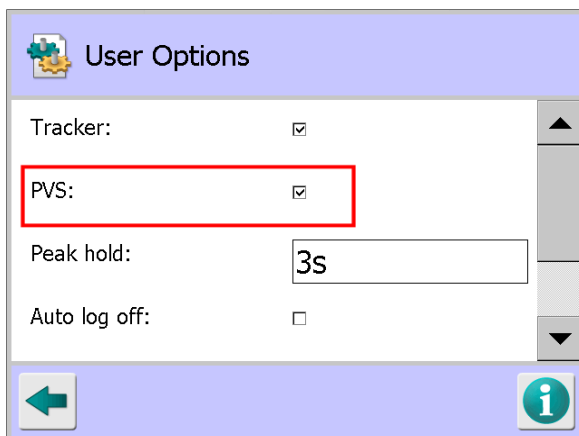
Enabling the PVS Feature


To start using PV testing, proceed as follows:

1. In the [System Settings](#) screen, tap on the User Options icon to display the [User Options](#) screen.

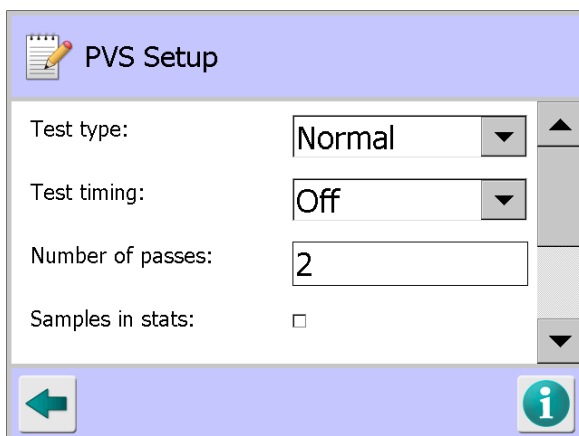



2. Then tap on the PVS option check box to enable the option.



3. Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen.

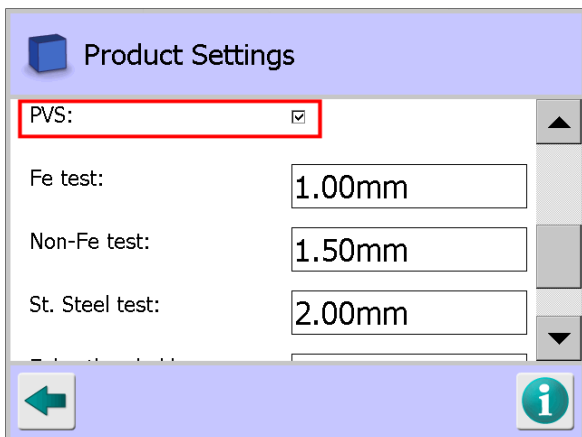

4. In the System Settings screen a PVS icon is now displayed. Tap on the icon to display the PVS Setup screen.



6.	You can now enter or select the appropriate test parameters which are listed and described in the PVS Setup screen section.
7.	Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen. The Tracker feature is now enabled and can be selected for use with any product

Enabling PV Testing for a Product

To enable PV testing for a product, proceed as follows:

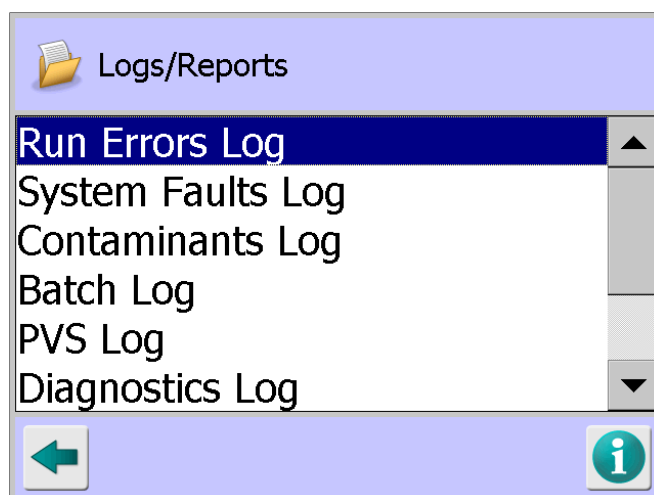
1.	<p>Navigate to the Product Settings screen for the required product and tap on the PVS option check box to enable the option. A number of other parameters will then be displayed.</p> 
2.	You can now enter values for the PVS test parameters which are listed and described in the Product Settings screen section.
3.	Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen. The Tracker feature is now enabled for the selected product

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Logs and Reports

This chapter provides information about the available logs and reports that are generated from information automatically collected by the IQ³+ Metal Detector.

Tapping on the folder area  in the [System Setup](#) screen displays the Logs/Reports screen which provides a list of available logs and reports for selection.



The logs and reports included for selection and how they can be saved and displayed depends on whether they have been enabled in the [Report Options](#) screen, the serial communications configuration and if the LomaEnet Capture application has been set up.

The following sections provide more information:

- [Run Errors Log](#)

This section describes how to produce the log and an explanation of some example problems that may be included in the log.

- [System Faults Log](#)

This section describes how to produce the log and an explanation of some example problems that may be included in the log.

- [Contaminants Log](#)

This section describes how to produce the log which is useful for analysing reject activity and timings.

- [Batch Log](#)

This section describes how to produce the log which is useful for analysing batch data and also how to configure the system to select the details to be included in the log.

- [PVS Log](#)

This section describes how to produce the log which provides details of the detector in-line sensitivity testing carried out.

- [Diagnostics Log](#)

This section describes how to produce the log and an explanation of some example problems that may be included in the log.

- [Setup Report](#)

This section describes how to produce the report, which can be automatically created and sent when changing product or can be manually requested from the Setup Report screen.

■ [Learn Report](#)

This section describes how to produce the report, which can be automatically created and sent each time the product Learn function is completed or it can be manually requested from the Setup Report screen.

■ [Status Report](#)

This section describes how to produce the report, which provides product run data for the currently running product at the time it is sent.

■ [Access Log](#)

This section describes how to produce the log and an explanation of some example problems that may be included in the log.

■ [Configuration Report](#)

This section describes how to produce the report, which contains a complete record of the detector setup.

■ [Release Notes](#)

This section describes how to view the release notes that are applicable for the installed software versions.

■ [Log and Report Output Options](#)

This section provides details for each of the available methods for outputting a log or report

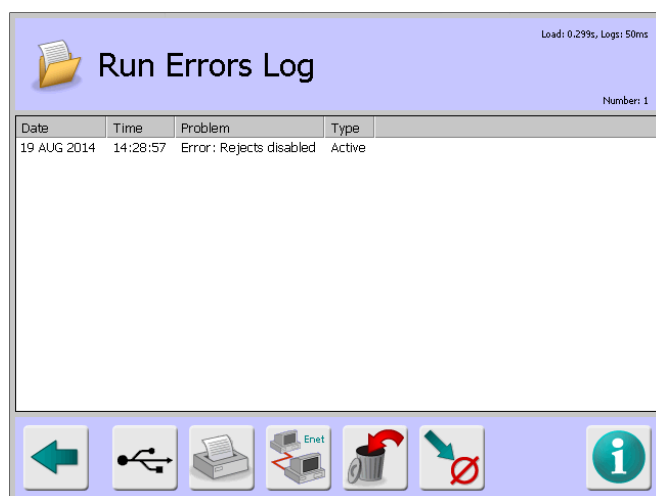
Run Errors Log

Purpose

Run errors are classified as non serious but may require an operator's attention. When generated the attention relay operates and subsequently any remote device connected to it.

This report is useful for monitoring the types of errors being generated that interrupt production and looking for potential trends so that improvements may be made to reduce production down time.

Selecting the Run Errors Log option in the [Logs/Reports](#) screen displays the Run Errors Log screen.



Screen Contents

The screen displays a list of errors under the following column headings:

- **Date** – Displays the date that the error occurred.
- **Time** – Displays the time that the error occurred.
- **Problem** – Displays a brief description of the reason why the error has been generated. See Example problems below.
- **Type** – This column displays the current status of the error:
 - **Active** – The error is current and has not been cleared.
 - **Event** – The error has been cleared.
 - **Passive** – The error has been listed for advice only

The log can hold up to 20 error records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

Example Problems

Some example run errors problems that may be displayed and suggested remedial actions are listed below.

- **Problem:** PV test prompt - an automatic programmed PV test prompt has occurred.
 - **Action:** Complete a PV Test.
- **Problem:** PEC blocked - the product registration photo-eye has remained blocked for greater than several (the default is 6) consecutive pack lengths.
 - **Actions:**

Check the PEC for blockage. Often caused by product backup on the line.

Check the PEC is working correctly.

Check the pack flow length entry is adequate, ensuring an allowance is made for pack skew.

Ensure correct belt speed is entered.
- **Problem:** Neg delay exten(sion) - reject dwell time setting problem. Variable speed systems only.
 - **Action:** Check the reject delay and dwell time settings.
- **Problem:** Speed too fast - belt speed is greater than the upper limit for filter resistors, coil gap and belt speed combination. Variable speed systems only.
 - **Action:** Decrease belt speed.
- **Problem:** Speed too slow - belt speed is less than the lower limit for filter resistors, coil gap and belt speed combination. Variable speed systems only.
 - **Action:** Increase belt speed.
- **Problem:** Rejects too close - the reject system is still counting out the dwell for a reject when the next pack to be rejected needs to be rejected.
 - **Actions:**

Reduce the reject dwell time.

The pack length for product registration photo-eye operation may be too short. Increase entered length.

Improve the pack pitch.

If the reject is a retracting band or lift/drop flap, change the reject mode to pulse extension.

- **Problem:** Reject disabled - the reject relay has been manually disabled.
 - **Action:** Enable the reject relay using the Reject enable command.
- **Problem:** Calib-in-run abort - a signal that has exceeded the currently set value for maximum threshold in the learn setup menu has been exceeded during a learn cycle.
 - **Action:** Product used for learn is probably contaminated. Select an alternative product for learning.
- **Problem:** Drive overload - (IQ3 detectors only) this is a warning message advising that the drive current for the selected operating frequency has increased and is approaching the upper limit. If the upper limit is exceeded, this will cause the transmitter to operate in 100kHz safe mode. If safe mode is entered, then the detector operation will be affected and may cause false rejects or poor metal sensitivity.
 - **Action:** Go to the VF drive menu and select the same frequency that was running when the error occurred. It may be that the drive ON time has been manually increased. Decrease the value of the ON time entry incrementally, until the displayed drive current (in the same menu) is in the region of 230 - 250mA. Note that detectors with large apertures will have drive currents below the normal 230 - 250mA range if operating at frequencies above 650kHz. If the message persists or the user is in doubt then contact your local Loma Service Centre for assistance.

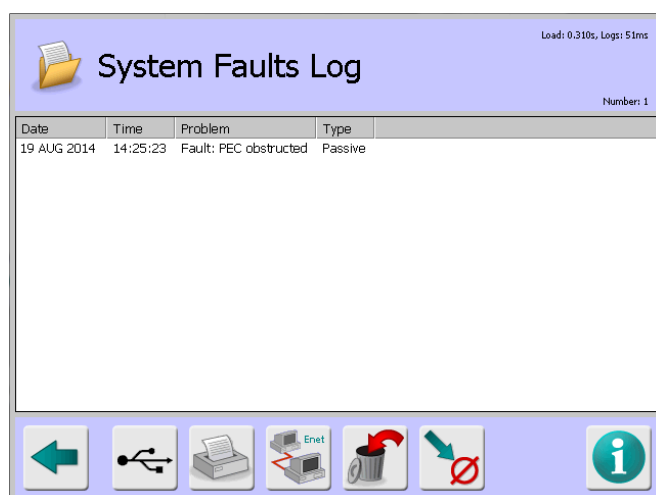
System Faults Log

Purpose

System faults are classified as serious and require immediate action. When a fault is generated the fault relay operates, permanently operating the reject device and/or stopping the conveyor transport.

This log is useful for monitoring the types of faults being generated that interrupt production and looking for potential trends so that improvements may be made to reduce production down time.

Selecting the System Faults Log option in the [Logs/Reports](#) screen displays the System Faults Log screen.



Date	Time	Problem	Type
19 AUG 2014	14:25:23	Fault: PEC obstructed	Passive

Screen Contents

The screen displays a list of system faults under the following column headings:

- **Date** – Displays the date that the error occurred.

- **Time** – Displays the time that the error occurred.
- **Problem** – Displays a brief description of the reason why the error has been generated. See Example problems below.
- **Type** – This column displays the current status of the error:
 - **Active** – The error is current and has not been cleared.
 - **Event** – The error has been cleared.
 - **Passive** – The error has been listed for advice only

The log can hold up to 20 system fault records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

Example Problems

Some example system faults problems that may be displayed and suggested remedial actions are listed below.

- **Problem:** 5V out of spec - the 5V rail is less than 4.75V.
 - **Action:** Contact your local Loma service centre for assistance.
- **Problem:** +12V out of spec - the +12V rail is less than 11.40V.
 - **Action:** – Contact your local Loma service centre for assistance.
- **Problem** – Verdict too late - a pack has arrived at the reject point before the detector has sent a reject decision.
 - **Actions:**
 1. Increase the reject delay time.
 2. If a product registration photo-eye is installed, reduce the pack length.
- **Problem:** Verdict mismatch - the system has more reject verdicts than packs passed.
 - **Action:** Power machine off and on.
- **Problem:** Rej confirm fail - the reject system has attempted to reject a pack but could not confirm that the pack entered the reject bin and was removed from the line, within the specified time. When this fault occurs, the conveyor should be cleared before the transport can be restarted.
 - **Action:**

If the pack has been correctly rejected:

 1. Check the reject confirmation sensor is working.
 2. Check the reject confirmation timing parameters are correct.

If the pack has not been correctly rejected, the transport system will have stopped:

 1. Collect and remove from the line all product/s both in the aperture and after the detector. If there is any possibility that the contaminated product may have left the detector transport system, then any possible contaminated product beyond the detector transport will need to be cleared as well. It is advised that any removed product be properly identified and securely segregated from good product.
 2. Recheck the setup parameters and the function of the reject and confirm systems before restarting the line.

- **Problem:** Rej con wind fail - reject confirm window failure. The reject confirmation system has detected two packs in one reject confirm window.
 - **Actions:**
 1. Check for the possibility of a single pack double triggering the reject confirmation photo-eye.
 2. If two packs were supposed to be rejected than reduce the Reject confirmation window time.
 3. Reduce the reject dwell time.
- **Problem:** Confirm sensor fault - the reject confirm sensor has been blocked for greater than the Reject confirmation timeout.
 - **Actions:**
 1. Check the sensor for blockage.
 2. Check the sensor is working correctly.
- **Problem:** Bin full - the reject bin full sensor has been blocked for longer than 5 seconds and the transport system has stopped. The bin will need to be emptied before the transport can be restarted.
 - **Action:**

If the bin is full:

 1. Remove, identify and segregate the product. Once the sensor is unblocked the fault will automatically clear.

If the bin is not full:

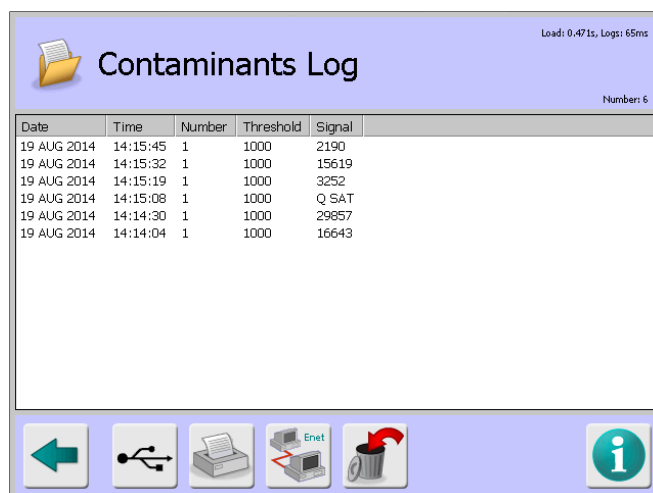
 1. Check the Bin full sensor is working correctly.
- **Problem:** Link corrupted - data corruption has occurred between the detector and LomaLink PC or other controlling device. The operation of the detector is unaffected.
 - **Action:**
 1. Check cabling and link connectors from remote device.
 2. Check LomaLink PC or other controlling device for reported errors.
- **Problem:** Link failure - a break in communication between the detector and LomaLink PC/other controlling device. The operation of the detector is unaffected.
 - **Action:**
 1. Check cabling and link connectors from remote device.
 2. Check connections between the detector and LomaLink PC or other controlling device for loose or broken wiring/connectors.
- **Problem:** PV test timeout - an automated prompt for the PV test has either not been actioned or completed within the window time set. The transport system may have stopped.
 - **Action:** Clear system fault (restart the transport if stopped) and perform a [PV test](#).
- **Problem:** PEC obstructed - the product registration photo-eye has remained blocked for greater than 6 consecutive pack lengths. This fault is only generated if the PEC fault is enabled.

- **Actions:**
 1. Check the PEC for blockage.
 2. Check the PEC is working correctly.
 3. Check pack flow length entry is adequate, ensuring an allowance is made for pack skew.
 4. Ensure the correct belt speed is entered.
- **Problem:** Wrong flash c/sum - the software has compared the flash checksum currently stored in its memory with the checksum for recently installed software. This occurs if a software update has been done and a hardware cold start was not performed after installation.
 - **Action:**
 1. Perform an update checksum from the tick button found in the [Search Head Setup](#) screen.
 2. Perform a hardware cold start by moving link JP6 across pins 1-2 from 2-3 on the Control Board, then power on/off. This will wipe all system and product setup data from the detector. Therefore a complete setup of the detector will be required. This should only be done in the event of extreme difficulties. Return the link to its original position before entering any data.
- **Problem:** Drive too low - (IQ3 only) the transmitter drive current is not set.
 - **Action:** From the [VF Drive](#) screen perform the auto configure operation. This will automatically reset all the drives for each of the detector operating frequencies. This will take several minutes to complete. This action will not affect any other detector settings.

Contaminants Log

Purpose

The Contaminants Log contains a complete record of reject activity which is useful for monitoring and analysing the occurrences and levels of contamination for specific products.



Date	Time	Number	Threshold	Signal
19 AUG 2014	14:15:45	1	1000	2190
19 AUG 2014	14:15:32	1	1000	15619
19 AUG 2014	14:15:19	1	1000	3252
19 AUG 2014	14:15:08	1	1000	Q SAT
19 AUG 2014	14:14:30	1	1000	29857
19 AUG 2014	14:14:04	1	1000	16643

Select the Contaminants Log option in the [Logs/Reports](#) screen to display the Contaminants Log screen.

Screen Contents

The screen displays a list of inspection records where contaminants were detected under the following column headings:

- **Date** – Displays the date that the error occurred.
- **Time** – Displays the time that the error occurred.
- **Number** – Displays the product number.
- **Threshold** – Displays the threshold value set for the product inspected.
- **Signal** – Displays the actual signal value received

The log can hold up to 20 records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

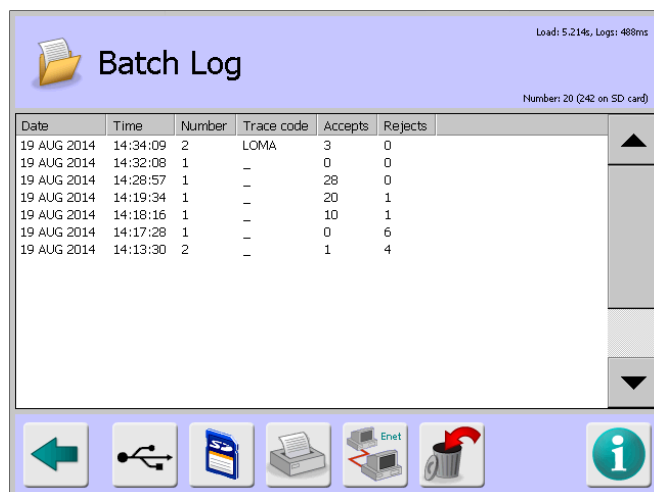
Batch Log

Purpose

The Batch Log contains a record of completed batch information. Batches can be compiled on a time basis or a count basis where the Production Registration PEC is fitted.

This log is useful for monitoring and analysing batch reject rates per product so that improvements may be made to reduce production costs.

Select the Batch Log option in the [Logs/Reports](#) screen to display the Batch Log screen.



Date	Time	Number	Trace code	Accepts	Rejects
19 AUG 2014	14:34:09	2	LOMA	3	0
19 AUG 2014	14:32:08	1	—	0	0
19 AUG 2014	14:28:57	1	—	28	0
19 AUG 2014	14:19:34	1	—	20	1
19 AUG 2014	14:18:16	1	—	10	1
19 AUG 2014	14:17:28	1	—	0	6
19 AUG 2014	14:13:30	2	—	1	4

Screen Contents

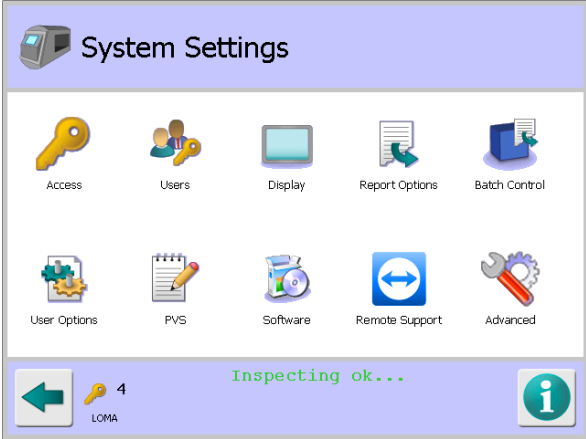
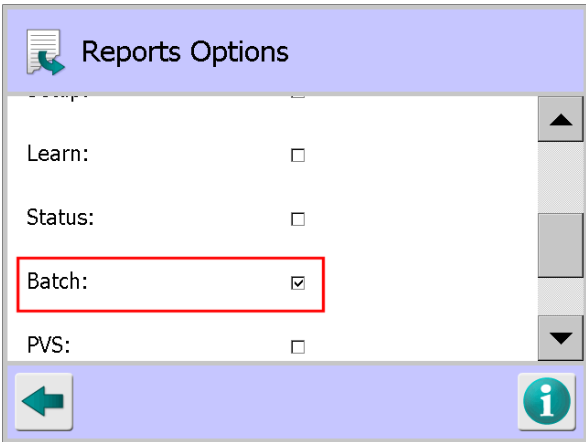

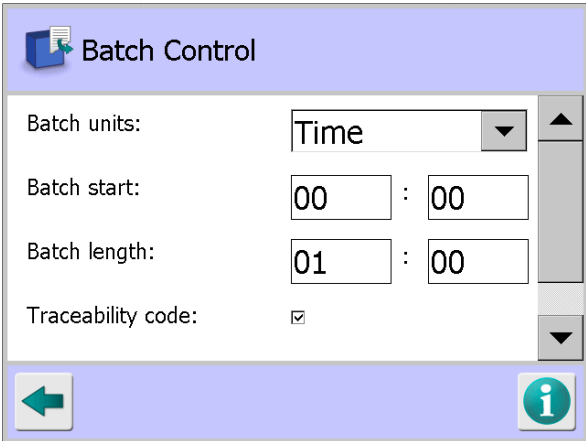
The screen displays a list of system faults under the following column headings:

- **Date** – Displays the report date.
- **Time** – Displays the report time.
- **Trace Code** – Displays the Traceability code assigned to the batch, available if this option has been enabled in the Batch Control screen.
- **Accepts** – Displays the number of accepted products inspected, available if the Product Registration PEC is fitted to the conveyor.
- **Rejects** – Displays the number of rejected products.

The log can hold up to 20 system fault records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.


Configuring a Batch Log

To configure a batch log, proceed as follows:

1. Navigate to the [System Settings](#) screen. Then tap on the Report Options icon to display the [Report Options](#) screen

2. Use the scroll bar to navigate to and select Batch option.

3. Tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen.
4. Tap on the Batch Control icon in the System Settings screen to display the Batch Control screen.


Enter the batch details in the fields provided as described in the table below.

Parameters	Description
Batch units	This field will only appear if a product registration photo-eye is in use. Select the units (Packs or Time) which determine a batch.
Batch packs	This field will only appear if Batch units are set to Packs. Enter the number of packs which make up a batch.
Batch start	This field will only appear if Batch units are set to Time (or if the Batch units selection field is not available). Set the time at which the batch is to start.
Batch length	This field only appears if Batch units are set to Time (or if the Batch units selection field is not available). Set the length of time that makes up a batch.
Traceability code	If this option is enabled, a unique 15-character trace code will be added to every batch report. Whenever a new batch is started, the operator will be prompted for a new trace code.
Code	A trace code of up to 15 alphanumeric characters can be manually entered via a pop-up keyboard which is displayed when the field is selected. A code can also be entered or edited directly on the Main Run screen.

Once you have entered or selected all of the required parameter values and options, tap on the Back button  to display the Save Settings pop-up screen. Then tap on the green tick 'OK' button to save the changes and close the screen.

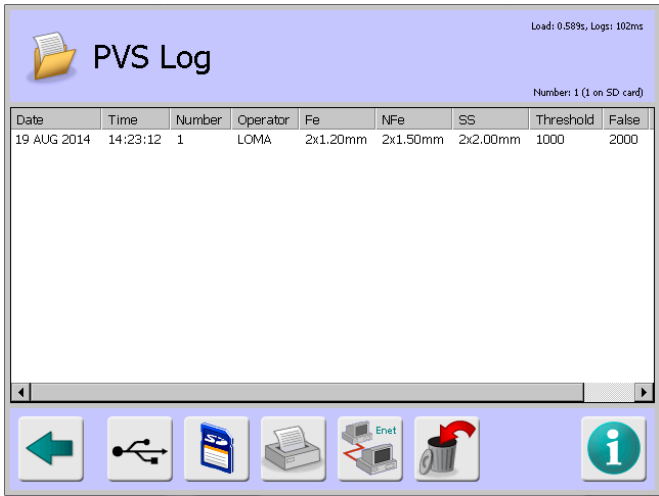
PVS Log

Purpose

The Performance Validation System (PVS) Log contains a record of completed in-line sensitivity testing activity.

Before you can use the PVS feature it must first be enabled in the User Options screen. Then tap on the PVS icon in the System Settings screen to display the PVS Setup screen and make the required selections. See [Using Performance Validation](#) for further details.

Select the PVS Log option in the [Logs/Reports](#) screen to display the PVS Log screen.



Date	Time	Number	Operator	Fe	NFe	SS	Threshold	False
19 AUG 2014	14:23:12	1	LOMA	2x1.20mm	2x1.50mm	2x2.00mm	1000	2000

Screen Contents

The screen displays a list of PVS testing information under the following column headings:

- **Date** – Displays the PVS test date.
- **Time** – Displays the PVS test time.
- **Number** – Displays the product number.
- **Operator** – Displays the entered identity of the test operator.
- **Fe** – Displays the number of passes and the Ferrous test piece used.
- **NFe** – Displays the number of passes and the Non-Ferrous test piece used.
- **SS** – Displays the number of passes and the Stainless Steel test piece used.
- **Threshold** – Displays the working threshold limit for the product tested.
- **False** – Displays the false threshold used for the test.
- **Results** – Displays values of Success, Not actioned or No samples depending on the test outcome.



If a test piece is not programmed for use then it will not appear on the log or on the separate PVS report.

The log can hold up to 20 system fault records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

Diagnostics Log

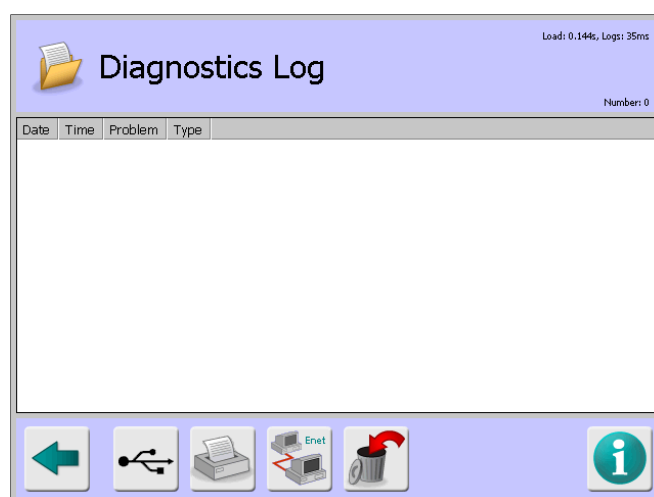
Purpose

Whilst the metal detector is operational, some self-monitoring of the electronics is carried out and when an issue with one of the monitored functions is detected then an appropriate diagnostic message is generated and captured in the Diagnostics Log to aid rectification.

It should be noted that a number of the messages associated with the IQ³+ metal detector are only logged once the Diagnostics Log itself is displayed.

Generally a message is generated because there is an internal failure within the electronics that has affected the correct operation of the detector and should be dealt with promptly.

It is therefore advised that you contact your local Loma Service Centre for assistance in the event any of the messages listed in the Example Messages section below are recorded.



The Diagnostics Log contains a list of all diagnostic messages generated. Select the Diagnostics Log option in the [Logs/Reports](#) screen to display the Diagnostics Log screen.

Screen Contents

The screen displays a list of system faults under the following column headings:

- **Date** – Displays the date that the message was generated.
- **Time** – Displays the time that the message was generated.
- **Problem** – Displays a brief description of the reason why the message has been generated. See Example Messages below.
- **Type** – This column displays the current status of the messenger:
 - **Active** – The message is current and has not been cleared.
 - **Event** – The message has been cleared.
 - **Passive** – The message has been listed for advice only

The log can hold up to 20 messages. If this number is exceeded and the log has not been sent as a report, then the oldest message is deleted to provide space for a new message.

Example Messages

General Messages

- Watchdog reset - the control board software has failed to restart the hardware watchdog timer circuits. The hardware watchdog timer circuit has timed out and reset the microprocessor.
- OS call failure - there is an operating software related issue.

LomaLink messages:

- LomaLink is a two-way communications protocol that allows some remote control of the detector functions. If your detector is using LomaLink the following Diagnostic error messages may occur. Reference should be made to the LomaLink manual (part number 811153) for further information.
- Remote link lost - the detector was under the control of a remote device when a remote control timeout occurred.
- Invalid msg type - the detector has received an invalid message.
- Unkn dataset req - the detector has received a request for an unknown data set.
- Unkn dataset - the detector has received a change message for an unknown data set.
- Unkn command no - the detector has received a command message indicating an unknown command.

Not Monitored

The following messages are not monitored and therefore only generated when the Diagnostics Log screen is displayed. If the detector has already failed to function correctly, displaying the log may help in diagnosis should the initial issue be the result of one of the monitored functions.

- +3.3V out of spec - the 3.3V rail on the transmitter board has been measured at either above 3.6V or below 3.0V.
- +1.8V out of spec - the 1.8V rail on the transmitter board has been measured at either above 2.0V or below 1.6V.
- Drive in safe mode - the maximum drive current of 300mA for the operating frequency in use has been exceeded therefore the detector has reverted to the 100kHz low drive current safe mode operation.

- Drive shutdown - the maximum drive current of 300mA for the operating frequency in use has been exceeded and even when reverting to safe mode operation the drive current is still above the limit, the drive then shuts down.
- FET overheated - the temperature of the transmitter drive components are operating at too high a temperature.
- Drive fuse failed - the current for the DC power used by the transmitter board has exceeded the fuse rating.

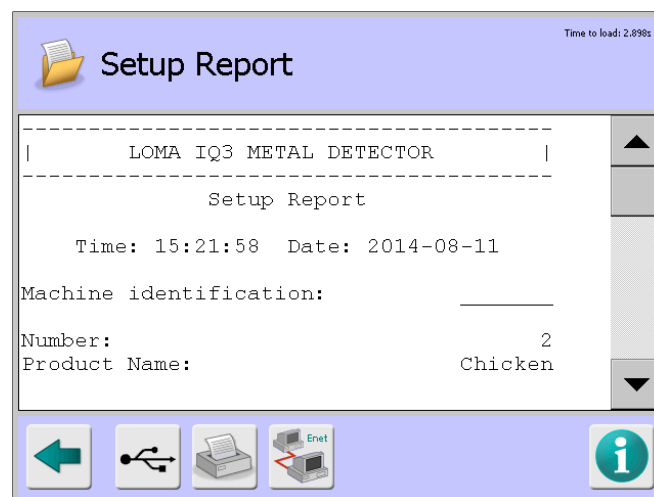
Setup Report

Purpose

The Setup Report is automatically created and sent when changing product or can be manually requested from the Setup Report screen.

When automatically sent, the report is for the product being changed to. When manually requested it is for the current running product. The report contains product and learn setup data.

Select the Setup Report option in the [Logs/Reports](#) screen to display the Setup Report screen.



Screen Contents

The report contains information in several sections as described below.

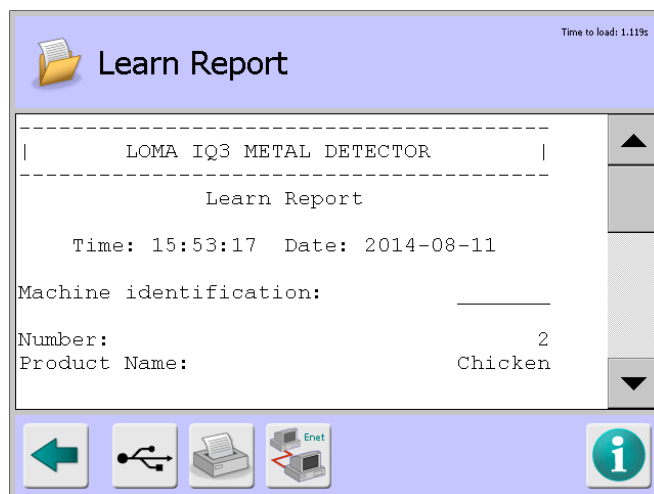
- **Setup Report** - This section contains the following general information:
 - **Time** – Displays the time that the report was generated.
 - **Date** – Displays the date that the report was generated.
 - **Machine Identification** – Displays the machine ID.
 - **Number** – Displays the product number.
 - **Product Name** – Displays the product name.
- **Product Settings** – This section includes a list of the parameters available in the [Product Settings](#) screen and their associated values and selections.
- **Learn Setup** – This section includes a list of the parameters available in the [Learn Setup](#) screen and their associated values and selections.

Learn Report

Purpose

The Learn Report is automatically created and sent each time the product Learn function is completed or it can be manually requested from the Setup Report screen. The report contains product and learn setup data. See the [Learning a Product](#) for further details.

Select the Learn Report option in the [Logs/Reports](#) screen to display the Learn Report screen.



Screen Contents

The report contains information in several sections as described below.

- **Learn Report** - This section contains the following general information:
 - **Time** – Displays the time that the report was generated.
 - **Date** – Displays the date that the report was generated.
 - **Machine Identification** – Displays the machine ID.
 - **Number** – Displays the product number.
 - **Product Name** – Displays the product name.
- **Learn Setup** – This section includes a list of the parameters available in the [Learn Setup](#) screen and their associated values and selections

Status Report

Purpose

The Status Report contains accumulated product run data for the currently running product at the time it is sent. It contains similar information to the batch Report. Sending a Status Report does not reset the batch values. Select the Status Report option in the [Logs/Reports](#) screen to display the Status Report screen

Status Report

Time to load: 0.471s

LOMA IQ3 METAL DETECTOR

Status Report

Time: 07:39:11 Date: 12 AUG 2014

Machine identification: _____
 Number: _____ 2
 Product Name: _____ Chicken
 Batch start: _____ 06:51:00

Screen Contents

The report contains information in several sections as described below.

- **Status Report** - This section contains the following general information:
 - **Time** – Displays the time that the report was generated.
 - **Date** – Displays the date that the report was generated.
 - **Machine Identification** – Displays the machine ID.
 - **Number** – Displays the product number.
 - **Product Name** – Displays the product name.
 - **Batch start** – Displays the batch start time.
 - **Batch finish** – Displays the batch finish time.
 - **Number of bad packs** – Displays the number of packs rejected

Access Log

Purpose

The Access Log provides a record of all user actions on the metal detector which is a useful feature when carrying out investigations to resolve problems. The log cannot be deleted or manually edited.

Select the Access Log option in the [Logs/Reports](#) screen to display the Access Log screen.

Access Log

Load: 1.856s, Logs: 1608ms

Number: 566

Date	Time	User	Action	Data
11/08/2014	14:51:59	LOMA	Settings	User Options:PVS_ENABLE;0->1
11/08/2014	14:50:30	LOMA	Product	Batch Reset
11/08/2014	14:50:30	LOMA	Service	Enabled
11/08/2014	11:11:31	LOMA	Settings	Batch Control:TRACE_CODE;_->1234
11/08/2014	11:11:30	LOMA	Settings-IQ+	Batch Control:Traceability code: Yes
11/08/2014	11:10:48	LOMA	Settings	Report Options:PVS_REPORTS;0->1
11/08/2014	11:10:48	LOMA	Settings	Report Options:STATUS_REPORTS;...
11/08/2014	11:10:47	LOMA	Settings	Report Options:LEARN_REPORTS;0->...
11/08/2014	11:10:47	LOMA	Settings	Report Options:PRODUCT_REPORTS;...
11/08/2014	11:10:47	LOMA	Settings	Report Options:CONTAM_REPORTS;...
11/08/2014	11:10:47	LOMA	Settings	Report Options:FAULT_REPORTS;0->...
11/08/2014	11:10:47	LOMA	Settings	Report Options:ERROR_REPORTS;0->...
11/08/2014	11:10:47	LOMA	Settings	Report Options:ALL_REPORTS;0->1
11/08/2014	11:10:38	LOMA	Settings	Report Options:PVS_REPORTS;1->0
11/08/2014	11:10:38	LOMA	Settings	Report Options:STATUS_REPORTS;...
11/08/2014	11:10:38	LOMA	Settings	Report Options:LEARN_REPORTS;1->...

Screen Contents

The screen displays a list of PVS testing information under the following column headings:

- **Date** – Displays the date that the action was taken.
- **Time** – Displays the time that the action was taken.
- **User** – Displays the name of the user account which initiated the action.
- **Action** – Displays the type of action taken. See Example Actions below for further details.
- **Data** – Displays additional relevant information for the action taken.

The log can hold up to 1000 records. If this number is exceeded and the log has not been sent as a report, then the oldest record is deleted to provide space for a new record.

Example Actions

- **Create** – A new user account has been created. The Data field shows the name of the new user account and their access level.
- **Delete** – An existing user account has been deleted. The Data field shows the name of the deleted user account and their access level.
- **Edit** – An existing user account has been edited. The Data field shows whether the access level was edited, the password was changed or both.
- **Log off** – A user has logged off.
- **Auto Log Off** – The currently logged in user has been logged off automatically. This occurs after an extended period of inactivity.
- **Log on** – A new user has logged on or an existing user has changed their access level. The Data field shows the access level given to the user.
- **Settings** – One or more settings has been modified. The Data field shows the value that has changed.

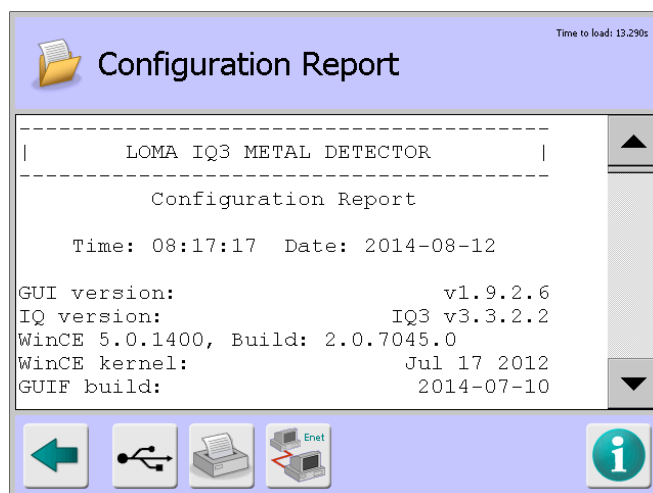
Additional actions are also recorded, such as unlocking the reject bin or exiting the software. Please contact your local Loma Service Centre if any action is not clear.

Configuration Report

Purpose

The Configuration Report contains a complete record of the detector setup. Saving this report to a USB stick is useful for backing up the setup information and for sending to Loma to support an investigation.

Select the Configuration Report option in the [Logs/Reports](#) screen to display the Configuration Report screen.



Screen Contents

The report contains information in several sections as described below.

- **Configuration** - This section contains the following general information:
 - **GUI version** – Displays the version of the GUI software installed.
 - **IQ version** – Displays the version of the IQ software installed.
 - **WinCE and Build** – Displays the version and build details for the installed WinCE operating system software.
 - **WinCE kernel** – Displays the version date of the installed WinCE operating system software kernel component.
 - **GUIF build** – Displays the build date for the installed GUIF software.
 - **Ethernet adaptor** – Displays details of the ethernet adaptor type installed.
 - **MAC address** – Displays the Media Access Control (MAC) address for the Ethernet adaptor.
 - **Machine identification** – Displays the machine identification entered for the metal detector.
- **Search Head Setup** – This section includes a list of the parameters available in the [Search Head Setup](#) screen and their associated values and selections.
- **Conveyor Setup** – This section includes a list of the parameters available in the [Conveyor Setup](#) screen and their associated values and selections.
- **Service Options** – This section includes a list of the parameters available in the [Service Options](#) screen and their associated values and selections.
- **GP I/O** – This section includes a list of the parameters available in the [GP I/O](#) screen and their associated values and selections.
- **VF Drive** – This section includes a list of the parameters available in the [VF Drive](#) screen and their associated values and selections.
- **VF Balance** – This section includes a list of the parameters available in the [VF Balance](#) screen and their associated values and selections.
- **Analysis** – This section includes a list of the parameters available in the [PQ Analysis](#) screen and their associated values and selections.
- **Auto-Learn Settings** – This section includes a list of the parameters available in the [Auto-Learn Settings](#) screen and their associated values and selections.

- **LomaEnet** – This section includes a list of the parameters available in the [LomaEnet Capture](#) screen and their associated values and selections.
- **LomaOPC** – This section includes a list of the parameters available in the [LomaOPC Server](#) screen and their associated values and selections.
- **Serial Comms Setup** – This section includes a list of the parameters available in the [Serial Comms Setup](#) screen and their associated values and selections.
- **User Accounts** – This section includes a list of the parameters available in the [User Accounts](#) screen and their associated values and selections.
- **Appearance Settings** – This section includes a list of the parameters available in the [Appearance Settings](#) screen and their associated values and selections.
- **Resultant** – This section includes a list of the parameters available in the [Resultant](#) screen and their associated values and selections.
- **Report Options** – This section includes a list of the parameters available in the [Report Options](#) screen and their associated values and selections.
- **Batch Control** – This section includes a list of the parameters available in the [Batch Control](#) screen and their associated values and selections.
- **User Options** – This section includes a list of the parameters available in the [User Options](#) screen and their associated values and selections.
- **PVS Setup** – This section includes a list of the parameters available in the [PVS Setup](#) screen and their associated values and selections.
- **Rejects Setup** – This section includes a list of the parameters available in the [Rejects Setup](#) screen and their associated values and selections.



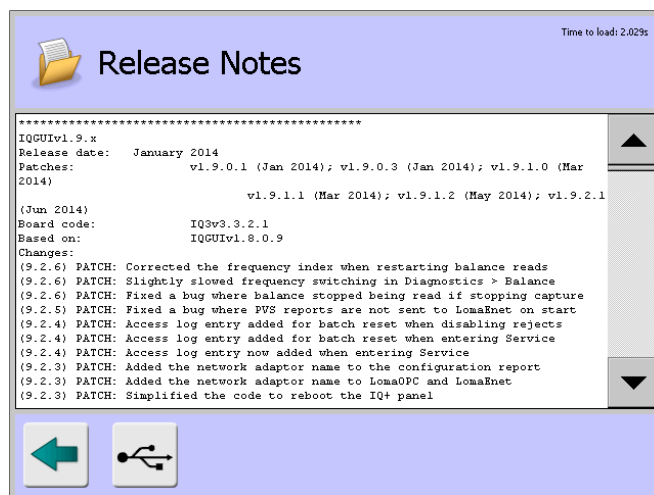
Some sections, such as Batch Control, will only be included in the report if the feature has been enabled.

Release Notes

Purpose

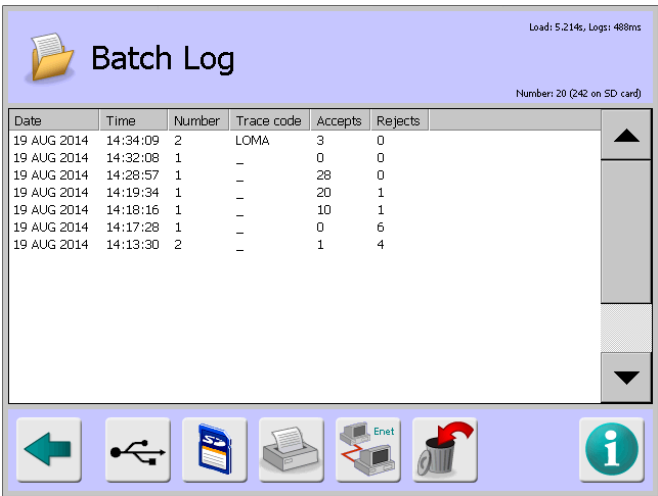
Release Notes contains a copy of the release notes applicable for the installed software versions. It provides details of all changes and patches included in the installed software and are intended for use by Loma service engineers.

Select the Release Notes option in the [Logs/Reports](#) screen to display the Release Notes screen





Log and Report Output Options

When each log or report screen is displayed a number of options for outputting the report are available.



A number of icons are displayed at the bottom of the screen as shown in the example Batch Log screen above, providing options for outputting the Log or Report details format by tapping on them. These are described in the table below.

 The icons displayed will vary depending on the Log or Report type selected.

	This is known as the “Back“ button, and tapping it will take you back one screen to the Logs/Reports screen.
	<p>This icon is displayed if a USB stick has been inserted into the USB connection provided on the side of the search head.</p> <p>Tapping on the icon downloads the log or report to the USB stick as a ".csv" file that can be opened in Microsoft Excel. The log is not cleared by this action. If there are reports saved on the SD card, these will be transferred to the USB stick and deleted from the SD card.</p> <p>The folder hierarchy recorded on the USB stick is as follows:</p> <p>For Logs:</p> <p>LomaIQ3/<MACHINE_ID>/Logs/LogName/<files> stored under date/time filenames.</p> <p>For Reports:</p> <p>LomaIQ3/<MACHINE_ID>/Reports/ReportName/<files> stored under date/time filenames.</p> <p>Further files as they are downloaded are added to the existing folder. The log can hold up to 20 records. If the log exceeds 20, then the oldest is deleted and replaced.</p> <p>The log consists of the following information:</p> <ul style="list-style-type: none">- Date: Report date.- Time: Report time.- Number: Product number.- Trace Code: Traceability code assigned to the batch (if enabled in the Batch Control menu).

	<ul style="list-style-type: none"> - Accepts: Number of accepted products (if PEC enabled in the Conveyor menu). - Rejects: Number of rejected products. <p>Note: An accept count is only present if a product registration photo-eye is fitted.</p>
	<p>This icon is displayed if an SD Card is fitted on the display board in the search head.</p> <p>Up to 500 reports can be saved to the SD card. If this number is exceeded, then the oldest report is deleted. Therefore it is advised to observe a strict download regime to avoid loss of data.</p> <p>Tapping on the icon displays the Batch Log (on SD card) screen which provides a list of reports generated in chronological order. Tapping on a report then displays it on the screen.</p> 
	<p>This icon is displayed after tapping on the SD Card icon.</p> <p>Tapping on the icon changes the screen back to the Batch Log screen and the icon changes back to the SD Card icon.</p>
	<p>This icon is displayed if the Reports option has been selected in the Usage field when setting up the serial connection in the Serial Comms Setup screen.</p> <p>Tapping on the icon automatically downloads the report to the connected device.</p>
	<p>This icon is displayed if the LomaEnet Capture application has been installed onto a dedicated networked server and a communication connection configured in the LomaEnet Capture screen.</p> <p>Some reports such as the batch and PVS reports, can be set up to be sent to the server automatically.</p> <p>Tapping on the icon will manually send the latest report to the server.</p>
	<p>Tapping on this icon will delete all reports. An Are you sure message is displayed to help avoid accidental deletion. Individual reports cannot be deleted.</p>

Report Languages

Reports are generated in the currently selected operating language and saved to the SD memory card. If another operating language is subsequently selected, new reports are generated in that language and saved to the SD card.

Reports generated in the previously selected language can still be viewed but will obviously be in the previous language.

Maintenance

This chapter describes the maintenance procedures for the IQ³+ Metal Detector.



Your warranty may be invalidated if you do not follow the maintenance schedule set out within this user guide. This warranty statement is in addition to the terms of sale.

The following sections provide more information:

- **Maintenance Warnings**

A list of applicable [safety warnings](#) to be observed when maintaining the metal detector head is provided.

- **Cleaning**

This section provides guidance for cleaning the metal detector.

- **Air Regulator Unit Maintenance**

This section provides some guidance covering maintaining the compressed air regulator.

- **Conveyor Belt Maintenance**

This section provides some guidance covering maintaining the conveyor belt.

- **Adjusting the Reject Devices**

This section provides some guidance covering adjustment of the reject devices.

- **Software Upgrades**

This section provides some guidance for upgrading the metal detector software.

Maintenance Warnings

The following safety warnings apply when carrying out maintenance operations on an IQ³+ Metal Detector:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES
2. LETHAL HAZARD – COMPRESSED AIR SUPPLIES
3. NON-IONIZING RADIATION
4. WORKING ON EQUIPMENT
5. REJECT DEVICES

For details see the [Safety Warnings](#) section.

Cleaning

Cleaning regime

A typical cleaning regime consists of the 5 stages.

- Pre-rinse
- Detergent rinse
- Rinse
- Disinfectant rinse

■ Final rinse



Never immerse the Pneumatic Actuator as internal corrosion and permanent damage will result.

Cleaning solutions

Detergents are typically alkaline solutions. Disinfectants typically contain Chlorine or Ammonia. Every 3-4 weeks it is typical to revert to acid based cleaning solution to remove any build up of lime scale on stainless steel parts.

For specific cleaning applications please refer to the supplier of the cleaning solutions. Always observe safety data sheet provided by the manufacturer of the cleaning solutions.

If chlorine based cleaning solutions are used on grade 304/304L stainless steel there is a risk of corrosion appearing within a short time. A higher specification 'marine grade' 316 stainless offers more resistance to corrosion by virtue of its molybdenum content.

Cleaning will reduce/eliminate microbiological contamination to an acceptable level. Prior to a production run a swab test should be carried out to ensure that the required level of hygiene is maintained for food production.

Both the Standard and Harsh versions of the metal detector have been designed and tested to meet IP69K water pressure between 1160 - 1450 psi @ between 3.69 - 4.2 gallons per minute @ 80 centigrade.

Water is sprayed @ a distance between 3.9 - 5.9 inches @ angles of 0, 30, 60 & 90 degrees for 30 seconds @ each angle. Nema equivalent is PW12 which is slightly less rigorous.



Prior to starting cleaning procedures ensure that the head control panel cover fixing screws have been tightened to 4Nm torque to maintain the integrity of the IP69K rating for the head; preventing ingress of water or condensation.

Belt conveyor versions

- Isolate the electrical and pneumatic supplies to the conveyor.
- If your conveyor system uses a harsh construction search head (white plastic liner) then hose down or steam cleaning can be used in place of washing with mild detergents.
- If fitted remove the reject container. Empty and wash with mild detergent.
- Brush any loose debris off the exposed conveyor surfaces and belt scraper if fitted.
- Wash conveyor, detector aperture, rollers, skid plate and underside of belt using mild detergent.
- Rinse and dry thoroughly all washed areas.
- Inspect the conveyor belt for signs of damage.
- Where an air regulator unit is fitted check the water build up in the trap and drain off as described in Air Regulator Unit Maintenance.
- Check the security of all conveyor-guarding systems.
- Reconnect power and air systems.
- Where interlocked guarding is fitted check the conveyor stops when the guards are opened.
- For PU belted conveyors check the belt tension and belt tracking. Belt tensioning and tracking is described in Setting the Belt Tension and Tracking.
- For plastic modular belt conveyors check for belt damage. For replacing individual sections see Plastic Modular Belt Conveyor Versions – Belt Section Replacement.

- Check the correct operation of the reject system. Advice can be found in the Good Practice section.
- For systems with reject confirm and bin full check their correct operation. Bin full will operate if the sensor is blocked for > 5 seconds.

Air Regulator Unit Maintenance

With the exception of systems fitted with Air Blast or Stop-On-Detect or electrically driven rejects the compressed air supply pressure to the fitted reject device is fed through an air regulator unit. The particular model of regulator may vary according to the specification of the system. Each type will have a pressure adjustment control air input and output fittings a pressure gauge and water trap.

Adjustment of the air pressure is normally carried out by pulling up the adjustment knob to release the lock and by turning the control clock or anti-clockwise the pressure can be adjusted.

Removal of water from the water trap bottle is carried out by operation of a rotating knob or by pressing a button. Either way the control will be located at the bottom of the water trap bottle. Water should be removed regularly.

The correct setting of the air pressure can be found in the individual system specifications in the [Technical Specifications](#) chapter.

Conveyor Belt Maintenance

Plastic Modular Belt Section Replacement

- If product guides are fitted to the conveyor, unscrew the retaining screws and remove the guides.
- Clamp the belt either side of one of the plastic hinge pins that are used to join the sections of the belt together that require changing.



If you do not clamp the belt it will roll off the loose sprockets when you remove the pin.

- Carefully slide out the plastic hinge pins and remove the section of belt to be replaced.
- Carefully interlock the new section of the belt. Make sure the belt is located on the drive sprocket and correctly engage with the other 'floating' sprockets.
- Carefully slide the plastic hinge rods through the interlocked sections of belt.
- If product guides were removed from the conveyor, refit them in position and tighten the securing screws.

Setting the Belt Tension and Tracking

If the belt slips or moves during normal operation, check the rollers are clean and free from debris and greasy elements then follow the steps below.

Adjusting the hexagonal lock nuts on the studs of the four hanger bearings at the ends of the conveyor facilitates belt tracking and tension adjustment for this type of conveyor. Do not over-tension the belt as this may cause premature wear to the bearings.

- Main belt tensioning is controlled by the hanger bearings at the drive end of the conveyor. This is factory set and must not be adjusted on site.

Tracking and minor tension adjustment is controlled by the hanger bearings at the idle end of the conveyor. Increasing the tension on the right-hand side of the belt will cause the belt to move to the left. A decrease in tension on the right will cause the belt to move to the right. Adjust until the belt track is central.

Adjusting the Drive Chain Tension

The conveyor belt drive chain is tensioned by undoing the four bolts holding the motor and moving the motor until the correct tension of 5mm maximum free play at the central point between the pulleys is achieved.

Adjusting the Reject Devices

Pusher and Retracting Band Rejects

At the reject solenoid valve, adjust the two throttle screws, in conjunction with the reject delay and dwell times set in the [Rejects Setup](#) screen, until the required reject timing and speed of operation are obtained. Both the reject timing and the speed of operation are affected by the air pressure supplied to the conveyor.

Air Blast Reject

Since this type of reject has no throttles, the only variables that can be adjusted are the reject delay and dwell times set in the [Rejects Setup](#) screen. There is no air regulator supplied as standard with the air blast reject. However, the air supply pressure should be approximately 100psi (6.9 bar).

Software Upgrades

This section provides details for upgrading the IQ³+ Metal Detector software.

Pre-requisites for upgrading are a copy of the latest software and help files, and a USB memory stick which is used to import the latest software, overwriting the existing software installed on the machine.

The following files are required and are available from Loma systems:

- **IQ3_vX.X.X.Xs.hex** – This file contains the operating software for the metal detector. The s in the file name signifies that it can be installed on systems that only have 2 x 2 MB (4 MB) flash ROMs fitted in positions U1 and U2 on the Control Board.
- **IQ3_vX.X.X.X.hex** – This file contains the operating software for the metal detector. It can be installed on systems that have an 8 MB flash ROM fitted in position U5 on the Control Board.
- **IQ3_Plus_vX.X.X.X._zip** - This file contains the GUI software required to operate the touch screen.
- **Matching HEX and GUI codes.txt** – This file can be opened in Notepad and provides additional information covering software versions, including a cross reference table between the Hex Code file versions and their matching GUI Code files to ensure that compatible versions of each file are installed.
- **Help_vX.X.X.X.zip** – This zipped folder contains a number of language sub-folders which each contain translated help text files. The set of files used by the software depends on the language selected in the [Language Setup](#) screen when setting up the metal detector.



The Xs used in the file names above have been used to substitute the version numbers. So for example the current GUI software version is IQ3_Plus_v1.9.2.10._zip at the time of writing this document.

1. Obtain a copy of the applicable upgrade files for your system from Loma Systems.
2. Insert a USB memory stick into your PC and copy the following files onto it:

IQ3_vX.X.X.Xs.hex

IQ3_vX.X.X.X.hex
3. Create a new folder on the USB memory stick called **IQ3_Plus_vX.X.X.X** using the version numbers on the source file.

-
4. Rename the IQ3_Plus_vX.X.X.X._zip file extension from ._zip to just .zip by removing the underscore. Then use WinZip or native Windows functionality to extract all files into the folder you have just created on the USB memory stick.
 5. Create a new folder on the USB memory stick called Help.
 6. Then use WinZip or native Windows functionality to extract all folders and files into the Help folder you have just created on the USB memory stick.
 7. Eject and unplug the USB memory stick from your PC and plug it into the USB connector socket on the side of the control panel on the head of your metal detector.
 8. Exit the Loma software on the metal detector using one of the following methods:

Method 1: CTRL-TAB and End Task in the Main Run Screen.

Method 2: Enter LOMA access level and press ESC from the Main Run screen.

Method 3: Tap on the Software icon in the System Settings screen to display the Software screen. Then scroll down to the bottom of the screen and tap on the Exit IQ+ software button.

9. Load the Explore task on the IQ+ panel using one of the following methods:

Method 1: Plug in a USB keyboard and press Windows+E.

Method 2: Double-click My Device on the desktop.

10. Navigate to the \FFSDISK\IQ3_GUI folder, then select and delete all the files and folders in the folder.
11. Navigate to the Hard Disk folder, which is the USB memory stick, then select and copy all of the files and folders.
12. Navigate to the \FFSDISK\IQ3_GUI folder and paste in the files and folders copied from the USB memory stick.
13. Reboot the IQ+ panel or alternatively navigate to the \FFSDISK\IQ3_GUI folder and double-tap on the IQ3_GUI.exe to run program. After a few minutes the main Run Screen will be displayed.
14. Check that the software has been updated by tapping on the Software icon in the System Settings screen to display the Software screen.

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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:** Option which uses a PEC to indicate when a reject bin is full and needs 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.

G

- GUI:** The controls used to set up and operate the metal detector.

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 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

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.

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Index

A

About this Guide 2
Access Log 223
Adding a New Product 200
Adjusting - Levelling the Conveyor 44
Adjusting the Reject Devices 232
Air Blast 56
Air Pressure Switch 57
Air Regulator Unit Maintenance 231
Appearance Settings 99
Auto-Learn Settings 115

B

Balance 126
Batch Control 106
Batch Log 216
Batch Reset 80

C

Calendar 99
Calibrate 104
Checking Belt Tracking 48
Checking Guards 48
Clean Screen 105
Cleaning 229
Clearance Requirements 44
Coil Current 125
Configuration Report 224
Connecting the Air Supply 44
Connecting the Detector Head Electrical Supplies 38
Connecting the Electrical Supplies 46
Contaminants Log 215
Conveyor Belt Maintenance 231
Conveyor Belts 53
Conveyor Setup 142, 160
Copyright and Acknowledgements 5

D

Detector Head Mounting Positions 32
Detector Performance 10
Diagnostics Log 219

Document Change Control 4

Document Key 4

E

EC Declaration of Conformity 18
Electrical Services Box 57
Emergency Procedures 23
Enabling and Configuring Tracker for a Product 198
Enabling the Tracker Feature 196
End of Life Treatment 23
End User Licence Agreement 25
Engineer - Loma Service 138
EnviroScan 128
Establishing a Good Product Learn 169
Establishing Detector Performance 170

F

Frequency Selection 172
Full Learn 82

G

General Navigation 67
Getting the Results 171
Good Practice 169
GP I-O 147
Guards 57

H

Handling Rejected Products 171
Help Manual 168
How a Metal Detector Works 8

I

Installing a Serial Link 48
Intended Use of the Machine 22

L

Language Setup 103
Learn Feature 15
Learn Report 222
Learn Setup 84
Learning a Product 202
Log and Report Output Options 227
Logging In and Out 63

- LomaEnet Capture 118
- LomaOPC Server 120
- M**
- Maintenance Warnings 229
- Metal Detector Search Heads 52
- Metal Free Zone 10
- Mounting a Detector Head onto a Conveyor 34
- Moving the Detector Head 30
- Moving the Machine 43
- N**
- Noise Levels 23
- O**
- Optional Equipment 58
- Organisation 3
- P**
- Patents 25
- Performance Validation System 205
- Performing a Ferrite Tune 192
- Plough 56
- Powered Decliner 56
- PQ Analysis 124
- Product 132
- Product Effect and Phasing 8
- Product Settings 76, 156
- Pusher 56
- PVS Log 218
- PVS Setup 109
- Q**
- Quality Assurance 24
- R**
- Receiving and Unpacking 43
- Regular In-Line Detector Performance Testing 171
- Reject Bins 57
- Reject Devices 55
- Rejects Setup 163
- Release Notes 226
- Remote Support 113
- Remote User Interface 48
- Report Options 105
- Responsibilities and Disclaimer 21
- Resultant 102
- Retracting Band 56
- Reverse Learn 204
- Run Errors Log 210
- S**
- Safety Awareness 18
- Safety Guards 21
- Safety Labels 20
- Safety Measures 22
- Safety Warnings 19
- Search Head Setup 139
- Select Product to Run 73
- Serial Comms Setup 121
- Service 137
- Service Options 145
- Setting the Language 175
- Setting the Machine ID 177
- Setting the Time and Date 174
- Setting the VF Balance 186
- Setting the VF Drive 188
- Setting Up Reject Mechanisms 48
- Setting Up Serial Links 190
- Setting Up the Conveyor 182
- Setting Up the Monitoring Services 185
- Setting Up the Reject Options 199
- Setting Up the Search Head 181
- Setting Up the Service Options 183
- Setting Up the User Options 189
- Setting User Access Levels and Passwords 179
- Setup Report 221
- Shapes and Orientation of Metal 12
- Signal Only 56
- Site Considerations 48
- Software 113
- Software Upgrades 232
- Starting and Stopping 65
- Status Report 222
- Stop On Detect 55

System Faults Log 87, 212

T

Technical Specifications 27

Testing Metal Detector Performance 13

The Loma Group of Companies 6

Threshold 81

Tracker Feature 10

Types of Metal 12

U

Update Learn 83

User Access 62

User Account Details 97

User Accounts 91

User Interface 61

User Options 108

V

VF Balance 150

VF Drive 152

W

Warnings 30, 42