

IQ² Metal Detector User Guide

LOMA SYSTEMS

Perfect Inspection Solutions



IQ² Metal Detector User Guide

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Safety warnings

Listed below are all the safety warnings that are used in this manual. It is strongly recommended that personnel who are, or will be, responsible for either installing, maintaining or operating the equipment described in this manual should read and understand these warnings.

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. **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.
4. **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.
5. **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. It is recommended that ear defenders are worn by personnel who are regularly exposed to the noise.
6. **HEAVY EQUIPMENT**. The equipment described in this manual is extremely heavy and considerable care must be taken when handling it. Sufficient personnel and a suitable fork-lift truck or pallet truck must be used to ensure safe handling.

7. **LIFTING EQUIPMENT**. Use only the correct slings and lifting tackle to move heavy items of equipment described in this manual. Inspect all slings and lifting tackle prior to lifting the equipment 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.

8. **MOVING METAL DETECTORS**. 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 such equipment 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 metal detector.

9. **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.

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

11. **OSHA**. 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. Loma, however, does act in a responsible manner with regard to safe design of equipment and will always work with customers to assist where possible in the remedy of any violations at a reasonable cost to the buyer.

12. **USE OF EQUIPMENT IN WORK AREAS WHERE EXPLOSIVE ATMOSPHERES MAY OCCUR**. CE Directive 94/9/EC – ATEX Directive – July 2003

    (a) **LOCATION OF EQUIPMENT**. This equipment is certified as category 3D for use in zones designated 22 only.

    (b) **INSTALLATION AND MAINTENANCE**. Electrical enclosures should be inspected and maintained on a regular basis to prevent the build up of dust deposits and to ensure the integrity of seals.

    Before undertaking maintenance the equipment must be disconnected from the source of electrical power.

    During installation and maintenance care should betaken to prevent the ingress of dust into any electrical enclosure. Should dust ingress occur then all deposits must be removed before the equipment is put into service.

    Following installation and maintenance and before putting into service all electrical enclosures and cable glands are to be correctly secured to prevent dust ingress.

    Care must be taken during installation and maintenance not to damage door seals and cable entry glands.

    (c) **USE**. To ensure safe operation deposits of dust on any surface should be removed immediately to prevent an increase in the surface temperature of equipment.

13. **HEIGHT ADJUSTMENT**. Care should be taken when adjusting the height of the Pipeline and Pharmaceutical detectors. Lower the height adjustment to its minimum before moving. If appropriate measures are not taken, severe injury to an individual or damage to the detector could result.

14. **LIABILITY**. This machinery contains high voltages of a hazardous and potentially fatal nature. Spectrum Inspection Systems Limited 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.

The following safety warnings relate to specific metal detectors in the IQ² range.

Pipeline detectors including filler specific versions

15. **SECURITY WHEN STAND MOUNTED**. Due to the high centre of gravity, care should be taken when moving a pipeline metal detector on a stand as the applied force and/or obstructions of the wheels may cause the machine to fall over. This could result in death or severe injury to an individual and/or severe damage to the detector.

16. **START UP WITH AUTOMATIC REJECT VALVE**. When a pipeline is switched on, the automatic reject valve changes state from “Reject” mode to “Run” mode. Do not put any part of the body within close proximity of the reject valve outlet when the machine is switched on. This could result in severe injury to an individual.

17. **HEIGHT ADJUSTMENT STAND-MOUNTED VERSIONS**. When adjusting the height of a detector assembly, do not unscrew the locating screw in the height adjustment strut. If it is unscrewed and removed, the body of the detector and the reject valve may spin round on the height adjustment strut, causing the machine to fall over. This could result in death or severe injury to an individual and/or severe damage to the detector.

18. **SECURITY**. The detector is mounted on a gas-filled height-adjustment strut. After adjusting the height of the detector, make sure the adjustment handle is fully tightened. If the handle is not fully tightened, the detector could rise on the strut. This could result in severe injury to an individual and/or severe damage to the detector.

19. **HANDLING A HINGE MOUNTED VERSION ON A PA30 FILLER**. When a pipeline is mounted on a PA30, the detector must be removed from the PA30 before disconnecting the PA30 from the main filler. Failure to do this may result in the PA30 falling over resulting in death or severe injury to an individual and/or severe damage to the PA30.

20. **HANDLING A HINGE MOUNTED VERSION WITHOUT A STAND**. Care should be taken when fitting or removing the detector off the filler hinge. The detector should be lifted by two persons using the handles fitted to the detector. If lifting is attempted by a single person or the handles are not utilised then this could result in death or severe injury to an individual and/or severe damage to the detector.

21. **HANDLING A HINGE MOUNTED VERSION ON A STAND**. Care should be taken when moving a detector as applied force and/or obstructions of the wheels may cause the machine to fall over. Remove all attachments before disconnecting from the filler. Lower the height adjustment to its minimum before moving. Failure to do this may result in the

detector falling over. This could result in death or severe injury to an individual and/or severe damage to the detector.

22. **HANDLING WITH A WATER JACKET FITTED**. When a pipeline is fitted with a water jacketed product pipe, surface temperatures of the product pipe and the water jacket coil may be up to 75°C. Contact with the product pipe or the water jacket coil may result in minor burns or light scalding.

23. **OPERATING WHEN USED FOR HANDLINKING**. When a pipeline is fitted to a filler and used for handlinking, the location of the filler knee control lever is located closer to the detector infeed than the detector outfeed.

24. **DISCONNECTION OF POWER**. 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.

Pharmaceutical versions

25. **ADJUSTMENT**. The detector is mounted on a gas-filled height-adjustment strut. If the height of the detector requires adjusting, make sure the adjustment clamp is fully tightened afterwards. If the clamp is not fully tightened, the detector could rise on the strut. This could result in severe injury to an individual and/or severe damage to the detector.

26. **SECURITY**. The metal detector head and product chute are mounted on an arm such that they can be rotated when the tilt angle adjustment clamp is loosened. When loosening the clamp to adjust the tilt angle, always support the head and product chute. If they are not supported, severe injury could result to an individual.

Freefall versions

27. **REMOVAL OF A DIVERTER**. Care must be taken when removing a diverter reject device. Dropping the unit could result in severe injury to an individual.

28. **START UP WITH A DIVERTER**. When a freefall detector is switched on, the diverter reject device changes state from the “Reject” mode to the “Run” mode. Do not put any part of the body within close proximity of the reject outlets when the machine is switched on. This could result in severe injury to an individual.

Emergency procedures

1. **EMERGENCY SHUTDOWN OF CONVEYORS**. This equipment 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 metal detector to be immediately stopped, press the ‘Stop’ button.
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 indicator lamp and 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 110dB(A) to 125dB(A) at 1 metre.

Quality assurance

By your selection of a Loma 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 system is installed you should contact your local Loma Service Department to have the system commissioned.
2. Regularly check the operation of the metal detector (once an hour is recommended). Keep accurate records of those tests and the metal samples being used, along with the product details.
3. If the detector fails the test, quarantine the product from the last test and re-introduce through the metal detector once the equipment is fit for use.
4. Have the equipment 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 metal detection procedures and have each detector regularly calibrated with a certificate issued.

6. Finally, at least on a yearly basis, have your operators, QA and maintenance personnel trained in the use of the equipment. Details of available training can be obtained from your local Loma Service Department.

About this guide

This guide provides complete instructions for setting up and operating the Loma IQ^2 Metal Detector range. It consists of the following chapters:

About the IQ² Metal Detector range

Provides a general introduction to the IQ^2 Metal Detector range, describing how it operates and its typical applications.

Using the IQ² Metal Detector

Provides general information about using the IQ^2 Metal Detectors, including a simple discussion of the principles of operation.

Setting up a new product

Gives step-by-step instructions for setting up a new product code and calibrating the metal detector for that product.

Displaying and printing reports

Provides information about displaying and printing batch results and contaminant, error and fault reports.

Setting up the IQ² Metal Detector

Explains how to calibrate the metal detector and set up parameters including the tracking limits, time and data, and machine ID.

Using Performance Validation

Describes the benefits of the performance validation procedure and explains how to set up the IQ^2 Metal Detector for PV testing.

Installing the IQ² Metal Detector

Gives general instructions for installing any of the IQ^2 Metal Detector range, together with general rules about positioning for correct operation.

Maintenance
Gives detailed maintenance instructions for the IQ² Metal Detectors.

Appendices
Give information about special purpose options included in the Loma IQ² Metal Detectors.

Conventions

For clarity this guide uses the following typographical conventions:

Style	*Used for*
	Keys that you press on the IQ² Metal Detector control panel.
BOLD	Names of menus and parameters that appear on the metal detector display.
reference	A cross-reference to another part of this guide, or to another guide.

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About the metal detector range

This chapter provides a general overview of the product range, explaining its operation and giving examples of typical applications. It also describes the key features of each of the different models in the range.

Introduction

To cater for the requirements of different types of product the IQ^2 Metal Detector is provided in a range of different configurations. These share the same search head and control unit, but differ in the conveyor used to pass the product through the search head.

The variants are as follows:

- Belt conveyor, with flat or plastic modular belts.
- Pipeline versions.
- Handtmann versions.
- Pharmaceutical versions.
- Freefall versions.

The differences between each of these versions are described in the subsequent sections of this chapter.

Search head and control unit

The search head and control unit have been designed for use with continuous motion conveyor systems, pipeline, pharmaceutical, and freefall metal detectors.

The standard search head and control unit are designed for use in an IP66 environment.

A second search head may be fitted when product is packaged in both non-foil and foil packaging; this is called a Ferrous in Foil metal detector.

As standard, the control unit is secured at the end of the search head. This unit allows the setup and calibration of the system through a menu-driven user interface.

The control unit is compatible with the following communication packages:

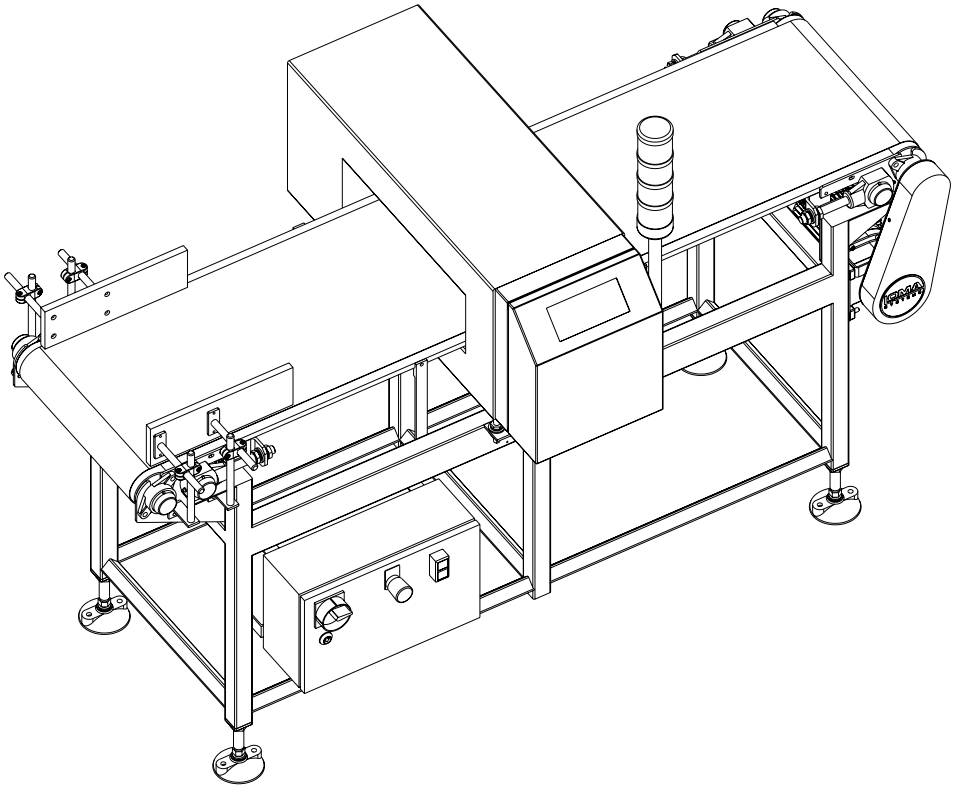
- LomaNet (optional reports/logs and serial link board required).
- LomaLink (optional reports/logs and serial link board required).

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

In addition, the control unit can be connected to a number of visual warning lamps.

Belt conveyor versions

This section describes Loma conveyors that are fitted with flat belts and plastic modular belts. Flat belt conveyors are suitable for use with lighter products; plastic modular belt conveyors are suitable for use with heavier products in a harsher environment.



Flat belts

The flat belt conveyors use a belt constructed from polyurethane belting.

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 belt is 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.

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.

All the belt types are constructed from white polyethylene and can support a maximum weight of 60kg spread along the belt.

Reject mechanisms

Belt conveyors can be supplied with the following types of reject device:

- Stop-On-Detect (SOD)
- Air blast
- Pusher
- Retracting band (available on flat belt and lightweight flush grid belt 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.

Two sizes of reject bins are available with pneumatic reject mechanisms – small and large. The size of the bin is determined by the conveyor length and the product to be rejected. The reject bin is fitted with a hood as standard.

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

After removal of the contaminated product, the conveyor has to be manually restarted.

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

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

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

Other standard equipment

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. 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 handle, ‘Stop’ and ‘Start’ buttons and the emergency ‘Stop’ button.

The isolator is used for isolating the electrical power to the machine. The ‘Start’ pushbutton is used to start movement of the conveyor and the ‘Stop’ pushbutton stops the conveyor.

Emergency stop button (Farnborough manufactured)
Each conveyor is fitted with an emergency ‘Stop’ button. This is mounted on the door of the electrical services box and is coloured red. In the event of an emergency occurring, pressing the button stops the conveyor and exhausts air out of the pneumatic actuator of the reject device where applicable.

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.

Product registration photo-eye

Conveyors that are supplied with a pusher reject are fitted with a product registration photo-eye. 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.

Optional equipment

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

Option	Stop-On-Detect reject	Air blast reject	Pusher reject	Retracting band reject
Audible alarm	S	O	O	O
'Bin Full' photo-eye	–	O	O	O
Indicator beacons	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

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.

Indicator beacons
Four mixable options are available; illuminating when a PVS test is requested or a system fault or contaminated product is detected or as an in Run indicator.

Overhead electrical services
The electrical services box may be mounted overhead instead of at the front of the conveyor as is standard.

Product guides
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
A photo-eye registers the position of products on the conveyor.

PVS indicator lamp
Illuminates when a pre-programmed Performance Validation System test is required. The normal color 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
PECs across the reject collection device confirm that a pack has been rejected.

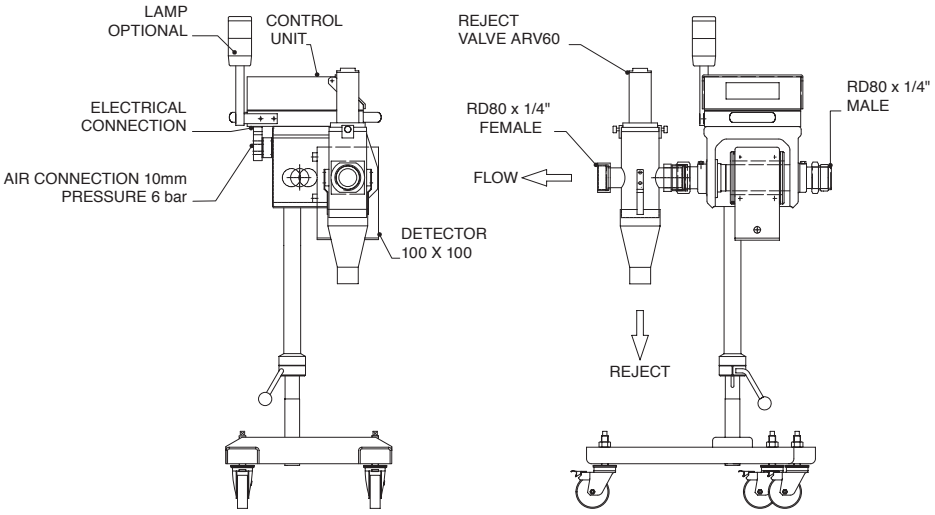
Technical specification (All European belt conveyors)

Dimensions	Each machine is designed to suit a customer's requirements.
Weight	Displayed on identification plate mounted on frame.
Power requirements	
Standard option	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, 1-phase, 50Hz, earth but no neutral
Control voltage	24V ac, 50Hz
Current consumption	350VA
Air supply (Pusher and retracting reject)	
Optimum pressure	5.5 bar (80psi)
Minimum pressure	4.5 bar (65psi)
Maximum pressure	6.0 bar (90psi)
Capacity (litre/second at 100psipsi)	10
Air supply (Air blast reject per nozzle)	
Optimum pressure	6.9 bar (100psi)
Minimum pressure	6.9 bar (100psi)
Maximum pressure	8.0 bar (120psi)
Capacity (litres/second at 100psi)	27
Environment	
Operating temperature	-10°C to 40°C
Relative humidity	80% up to 31˚C (86˚F) reducing to 50% @ 40˚C (104˚F)

Pipeline versions

This section describes Loma Pipeline Metal Detectors, which are designed to be used with pumped products such as meats, liquids, emulsions, slurries and pastes. They can interface with a wide range of meat pumps and clipping machines.

Model shown is a 2.5” on a stand with a reject valve



The Pipeline Metal Detector is of stainless steel construction and consists of a pipeline detector assembly and a control unit. An automatic reject valve can optionally be fitted. The pipeline detector assembly consists of a pipeline body, which contains a removable Acetal product pipe, and a search head.

A water jacket may be fitted, if the detector is to be used for products liable to solidify or smear.

Pipeline detectors may be mounted in either a horizontal or downward flowing section of the pipeline. Upward flowing sections are not suitable as reject timing becomes unpredictable due to the effect of gravity on the contaminant.

Mounting arrangements

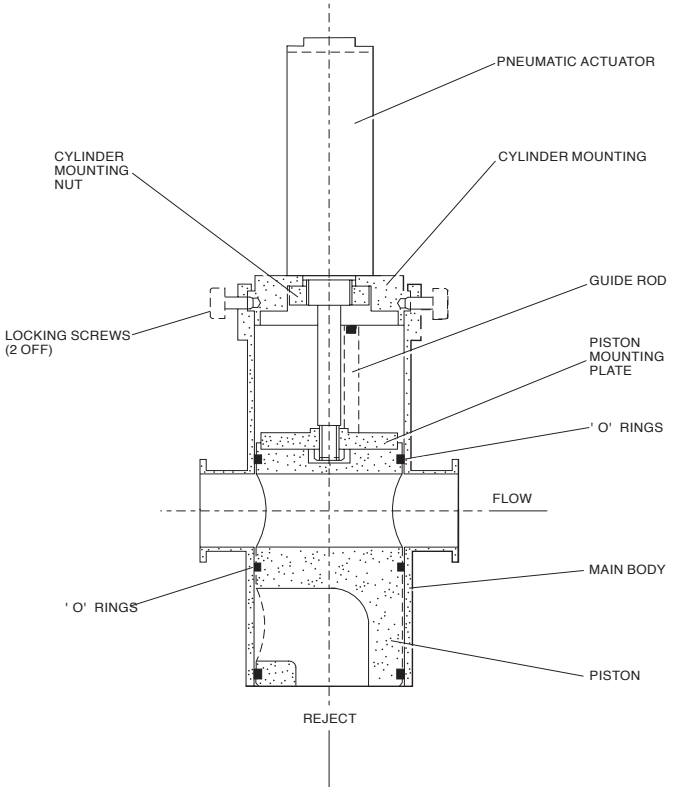
Standard type pipeline detectors are typically stand or L bracket depending upon the application.

Pipeline detectors are constructed from bead blasted stainless steel and come in a number of application dependent aperture sizes. A typical stand mounted version will have a gas-filled strut fitted to the centre pillar, which allows ease of height adjustment. Four independently height adjustable/locking wheels fitted to an open construction H style base allow the detector to be manoeuvred, cleaned, and adjusted for uneven floor heights with ease.

Reject Valves

There are a number of application dependent optional reject valves. Three common types are described below.

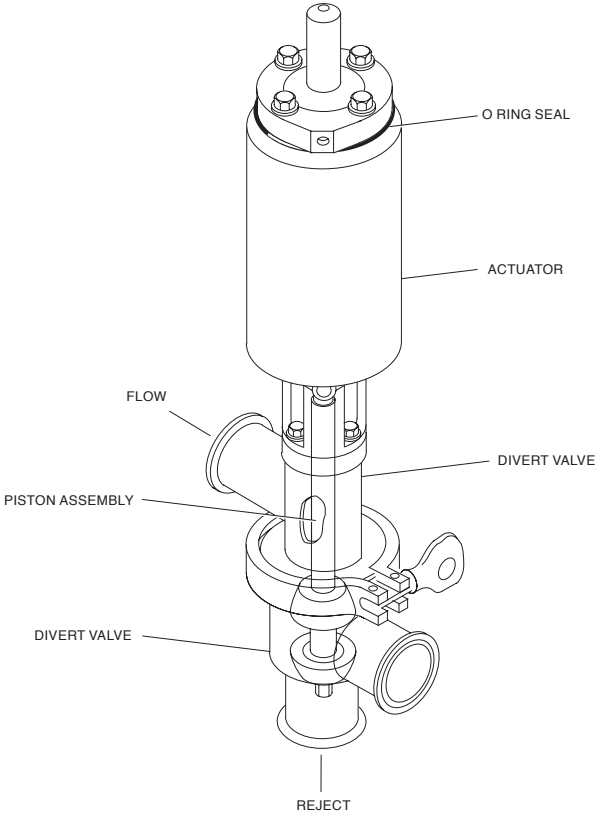
Loma automatic reject valve



The pneumatically operated, straight-through flow diverter device is constructed from 304L stainless steel. The valve comprises a body with a double acting pneumatic actuator. A piston assembly is fitted inside the body. All metallic components are constructed from either 304L stainless steel or aluminium. The piston is constructed from Acetal co-polymer or polysuliphone.

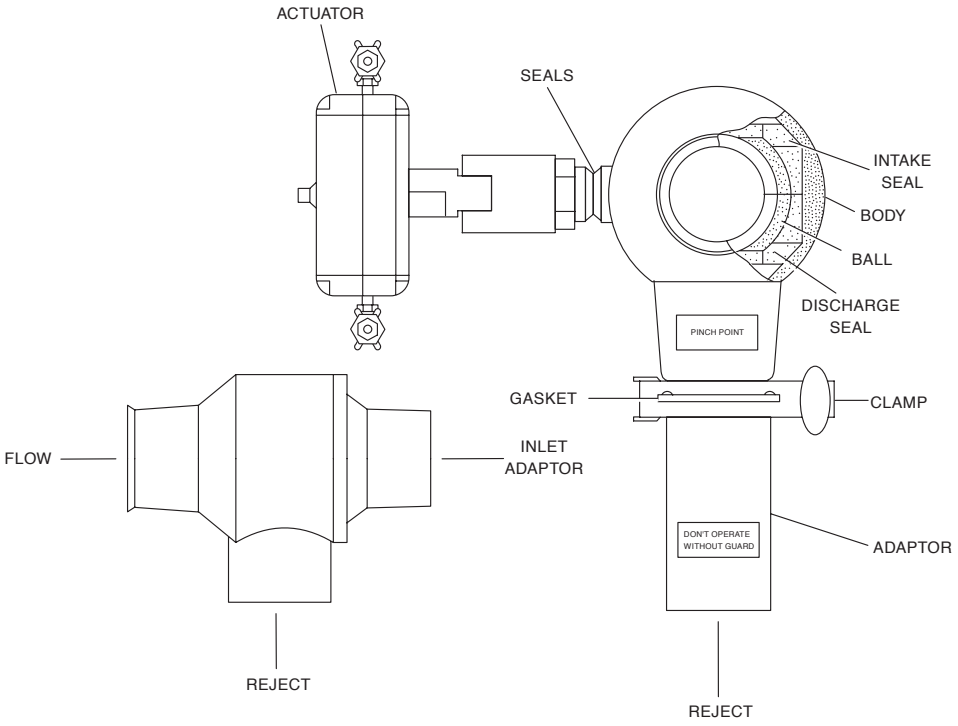
Compressed air to the actuator is supplied via a 5-port pneumatic valve that is mounted on top of the control unit. The compressed air supply must be dry and lubricated at a recommended pressure of 80psi (5.5 bar). Compressed air is supplied to the lower port of the actuator when a contaminated product is detected. This causes the piston to rise and the section of the product containing the contaminant to flow from the reject outlet at the base of the valve.

Ladish Dairy reject valve



Constructed from 316 stainless steel, the valve comprises a divert valve on which a normally closed spring return pneumatic actuator is mounted. A piston assembly is fitted inside the body. All metallic components are constructed from 316 stainless steel. The recommended air supply pressure is 80psi (5.5 bar).

Lee Turbo Charged Ball reject valve



The unit comprises a valve body with integral ‘T’ ball connected to a modified actuator. All metallic components are constructed from 316 stainless steel, with teflon (or Mica filled) seals and Buna-N O rings. The recommended air supply pressure is 100psi (6.9 bar).

Technical specification

Mounting arrangement	Stand or ‘L’ bracket
Stand arrangement	Gas strut height adjustment
Pipeline sizes (inside diameter)	48mm NB (2") 57mm NB (2.5") 73mm NB (3") 98mm NB (4")
Weight range	40 to 100kg.
Power requirements	
Voltage-standard universal input	85V-264V, single phase, 50/60Hz
UL approved control box	120V, 2A, single phase, 60Hz
Current consumption	20VA
Air supply (ARV reject valve)	
Optimum pressure	6.0 bar (90psi)
Minimum pressure	5.0 bar (33psi)
Maximum pressure	8.0 bar (116psi)
Capacity (litre/second at 90psi)	10
Environmental conditions, temperature, humidity, and storage	
Operating temperature	-10°C to 40°C (-14°F to 104°F)
Relative humidity	80% up to 31°C (86°F) reducing to 50% @ 40°C (104°F)
Installation category	Cat II
Pollution degree	Pollution degree 2
Maximum operating altitude	2000m (6561’)
Reject mechanisms	
Types	Straight-through flow diverter, Lee Ball, or Ladish Dairy valves.
Material	Stainless steel 304
Operating mechanism	Pneumatic actuator

Fittings	Available with RD80 x 1/4 DIN11851 3A bevel and Quick Release fittings.
Materials	
Product pipe seals	Acetal/Delrin viton

NOTE: Working product pressures may be limited depending upon the overall line configuration including any automatic reject device if fitted.

Linker versions

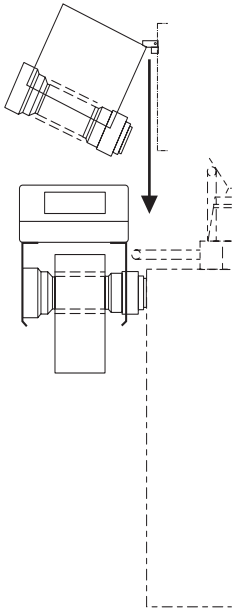
The basic 2.5" pipeline detector can be configured for use with a handlinker application.

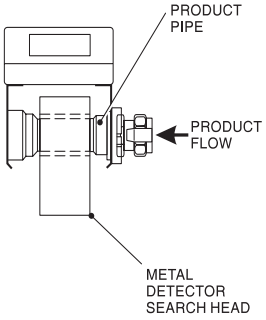
The system has additional hinges and an extension drive shaft fitted to facilitate the use of handlinker equipment. The metal detector locates on the filler output hinge in place of the normal gearbox drive. The product pipe engages the filler output via 1/4 turn RD80 fittings. The gearbox and handlinker equipment is fitted to the replica hinge on the output of the metal detector. The reject system employed is stop on detect.

The same pipeline detector can also be configured for use with AL systems. This system is mounted from the filler hinge and includes the fitting of an input swivel RD80 x 1/4 turn product pipe connector that allows adjustment for uneven heights between the filler and AL Linker.

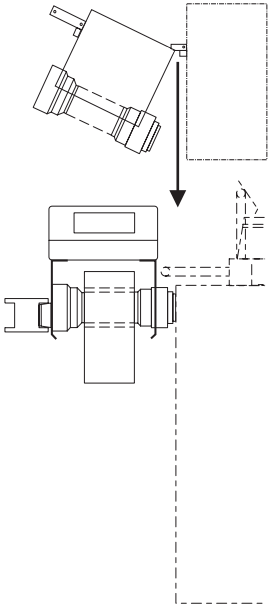
A further configuration called the short hinge allows the use of the 1/4 turn RD80 fittings and an automatic reject valve if required.

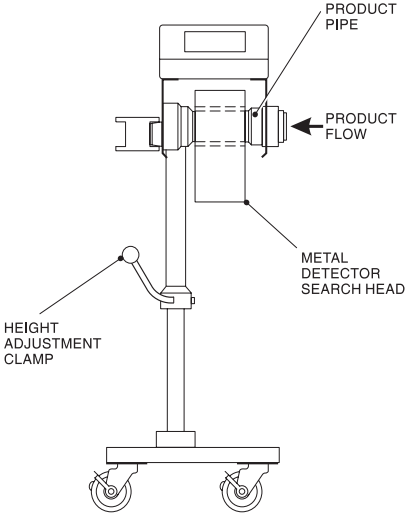
AL Linker version



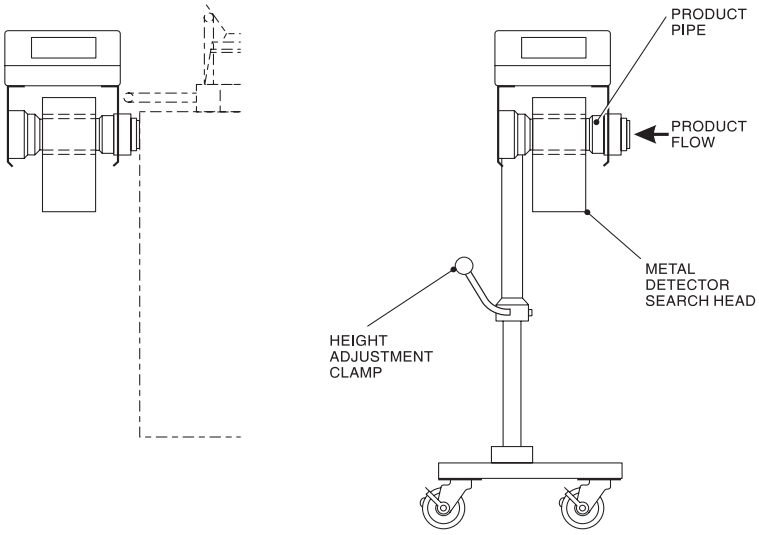


HandLinker version





ShortHinge version



A water jacket may be fitted if the detector is to be used for products liable to smear.

Technical specification

Mounting arrangement	Stand or Hinge
Stand arrangement	Gas strut height adjustment
Pipeline sizes	57mm inside diameter
Weight range	40 to 80kg.
Power Requirements	
Standard universal input	85-264V, single phase, 50/60Hz
UL approved control box	120V, 2A, single phase, 60Hz
Current consumption	20VA
Air supply (ARV reject valve) – short hinge only	
Optimum pressure	6.0 bar (90psi)
Minimum pressure	5.0 bar (73psi)
Maximum pressure	8.0 bar (116psi)

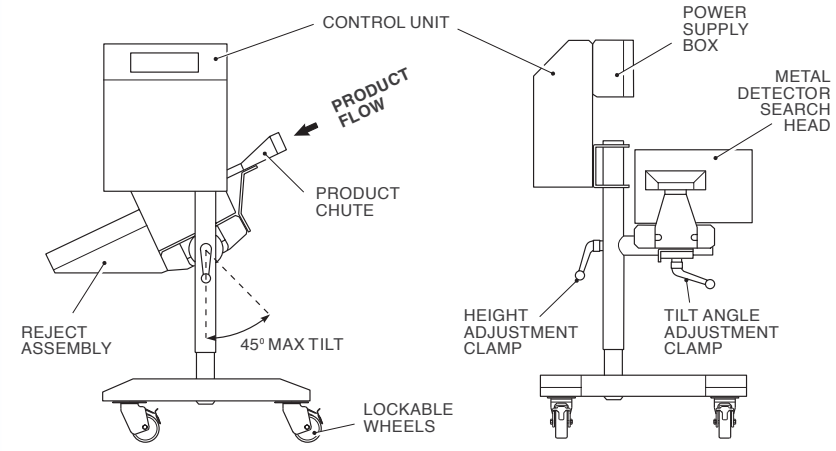
Capacity (litre/second) at 90psi	10
Environmental conditions, temperature, humidity, and storage	
Operating temperature	-10°C to 40°C (-14°F to 104°F)
Relative humidity	80% up to 31˚C (86˚F) reducing to 50% @ 40˚C (104˚F)
Installation category	Cat II
Pollution degree	pollution degree 2
Maximum operating altitude	2000m (6561')
Reject mechanism – short hinge only	
Type	Straight through flow diverter
Material	Stainless steel 304L/Acetal
Operating mechanism	Pneumatic actuator
Fittings	RD80 x 1/4, 1/4 turn Quick Release
Materials	
Product pipe	Acetal/Delrin
Seals	Viton

NOTE: Working product pressures may be limited depending upon the overall line configuration including any automatic reject device if fitted.

Pharmaceutical versions

This section describes the Loma Pharmaceutical Metal Detector, designed to detect ferrous and non-ferrous contaminants in pharmaceutical products such as tablets, pills and capsules.

The metal detector is mounted on an adjustable stand and consists of a search head and a product chute. A reject assembly is fitted at the outfeed side of the head.



On a standard Pharmaceutical Metal Detector, the control unit is mounted on the stand. A power supply box is secured at the back of the control unit.

The product chute is constructed of low friction ABS and is fitted with a polycarbonate cover. The cover is transparent, to allow an operator to monitor the flow of the product through the detector. Two knurled handnuts are used to secure the chute in position.

Mounting arrangements

The stand is constructed from bead blasted stainless steel. A gas-filled strut is fitted in the central pillar, which allows the height of the detector to be easily adjusted. Four lockable wheels are fitted to the stand, allowing the detector to be manoeuvred easily.

The product chute, detector head, and reject assembly can be tilted to a suitable angle by use of a quick release clamp.

Reject assembly

The reject assembly comprises an outlet chute and a reject mechanism. The reject mechanism consists of a stainless steel flap operated by a high-speed electrical solenoid. A polycarbonate cover is fitted over the outlet chute. This must always be fitted in position when the detector is operating to ensure that the pills, tablets or capsules flow down the chute.

When a contaminated product is detected, the solenoid opens the flap, allowing the contaminated product to drop through a slot in the outlet chute and through a reject funnel on the underside of the chute. A circular stub outlet from the reject funnel provides for convenient collection of the rejects. This method of operation provides a clean and precise rejection of the contaminated product. The quick action of the flap keeps waste to a minimum.

Technical specification

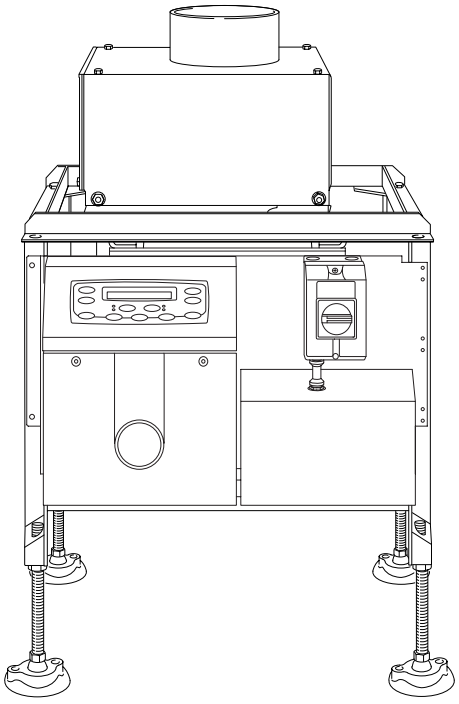
Mounting arrangement	Stand, gas strut height adjustment
Weight	See the identification plate mounted on the frame.
Power requirements	
Standard universal input	85-264V, single phase, 50/60Hz
UL approved control box	120V, 2A,single phase, 60Hz
Current consumption	100VA
Environment	
Operating temperature	-10°C to 40°C (-14°F to 104°F)
Relative humidity	80% up to 31˚C (86˚F) reducing to 50% @ 40˚C (104˚F)
Installation category	Cat II
Pollution degree	Pollution degree 2
Maximum operating altitude	2000m (6561')
Reject mechanism	
Type	Electrical solenoid-operated flap
Flap material	Stainless steel

Freefall versions

This section describes Loma Freefall Metal Detectors, designed to detect ferrous and non-ferrous contaminants in products fed by gravity through some form of hopper and pipework into a packaging system.

Short and long frame models

The following illustration shows the surface mount short and long frame models:



NOTE: The detector fitted depends on the model requirements.

The detector system comes fully assembled, requiring installation into its intended operating position and connection to a single-phase AC supply and an air supply.

The detector and controls are mounted to a robust framework containing a cow bell style reject diverter which diverts the contaminated product flow away from the vertical using preset timings. The timings are set to ensure positive rejection of the contaminant with minimal product wastage.

The unit can be free standing or suspended from overhead fixings depending upon the application.

The unit consists of a search head and controls, with an auxiliary electrical enclosure mounted on a reject diverter system. A circular product pipe is supplied for connection to the existing product pipework via a flexible gaiter. The reject diverter is designed to allow easy access to, and removal of, the cow bell bucket to enable quick and efficient cleaning.

The reject diverter output consists of two rectangular chutes with flanges to allow the connection of suitable pipework for guiding the product into either the following packaging machinery for good product or into a secure reject container for contaminated product.

Short frame model
This model is intended for use in a dry environment with product that exhibits no effect when exposed to the field of the detector and where installation space is limited.

Long frame model
The design of this system is similar to the short frame model. But unlike the short frame unit this model is intended for use in a harsh environment with product that exhibits an effect when exposed to the field of the detector and where installation space is sufficient to take the longer system length.

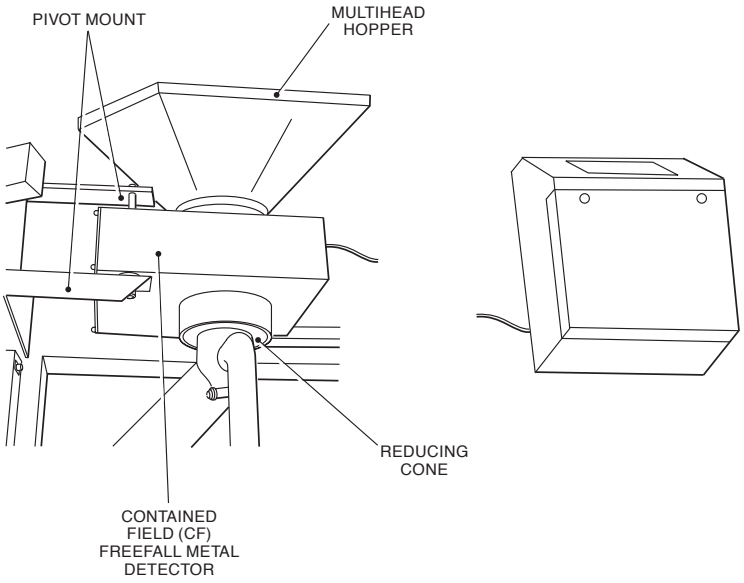
Stand-alone models
Two models are available:

- Slimline contained field (CF) model.
- Catalogue contained field (CF) model.

Slimline contained field model
The Slimline contained field (CF) metal detector is less sensitive to fixed and moving metal that is in close proximity to the aperture. It is suitable for use in situations where space and the available metal-free area is limited, eg above bagmakers.

The standard aperture of a CF metal detector is circular, with fixed metal collar top and bottom. The overall depth depends on the size of the aperture.

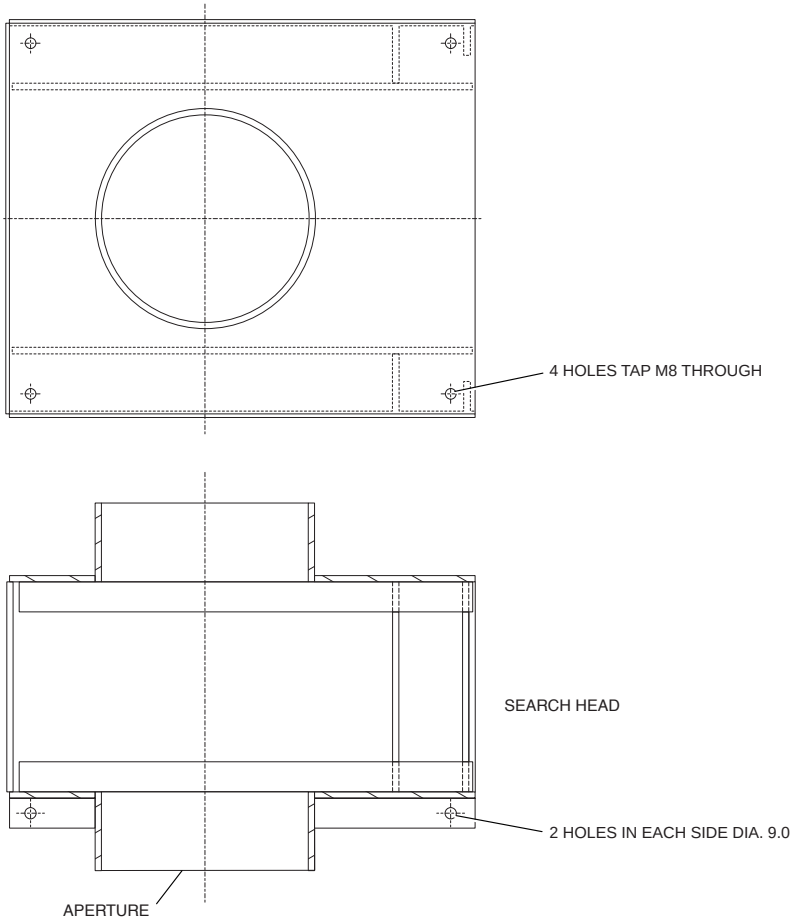
The following illustration shows a typical slimline model:



Catalogue contained field model

Like the slimline version, the detector is of a contained field design to minimize the metal free area requirement. The design is slightly larger than its slimline equivalent and is intended to perform in the same applications but where a larger installation space is available.

The following illustration shows a typical catalogue model:



Mounting arrangements

Like all metal detectors, a Freefall Metal Detector performs better when it is free from vibration. It is preferable for it to be rigidly mounted, as this prevents the detector from moving with respect to its environment. This reduces the moving metal effect.

Freefall metal detectors may be mounted on anti-vibration mounts, on a Tufnol plate, or by a pivoting arrangement.

Anti-vibration mounts are recommended for use only where the level of vibration is significant and there is no metal in the metal-free area. Mounting on a Tufnol plate is often more appropriate. This provides a rigid fixing and is non-conductive. Pivot mounting simplifies the changeover of product and also cleaning of the detector. A pivot-mounted (slimline only) detector must be supported at the end opposite the pivot to prevent vibration.

Technical specification

Mounting arrangement (Stand alone model)	Pivot, fixed or anti-vibration mount
Mounting arrangement (Short & Long frame models)	Floor standing or ceiling hung
Reject mechanism (depending upon model)	Cow bell diverter reject or voltage free contacts
Power requirements	
Universal input (Stand alone model)	85-264V, single phase, 50/60Hz
UL approved control box	120V, 2A, single phase, 60Hz
Short & Long frame models	220, 230 or 240V, single phase, 50/60Hz
UL approved control box	120V, 2A, single phase, 60Hz
Current consumption	<50VA
Environment	
Operating temperature	-10°C to +40°C (-14°F to +104°F)
Relative humidity	80% up to 31°C (86°F) reducing to 50% @ 40°C (104°F)
Installation category	Cat II
Pollution degree	Pollution degree 2
Maximum operating altitude	2000m (6561')
Air supply (Short & Long frame models)	
Optimum supply pressure	4.0 bar (60psi)
Minimum air pressure	3.5 bar (50psi)
Maximum air pressure	4.5 bar (65psi)
Capacity (litre/second @ 4.5 bar (65psi)	10

Voltage free reject contact rating (Stand alone model)	5A @ 250V ac or 3A @ 30V dc resistive load 2A @ 250V ac or 2A @ 30V dc inductive load



Using the metal detector

This chapter provides general information about using the metal detector, including a simple discussion of the principles of operation to explain how it works.

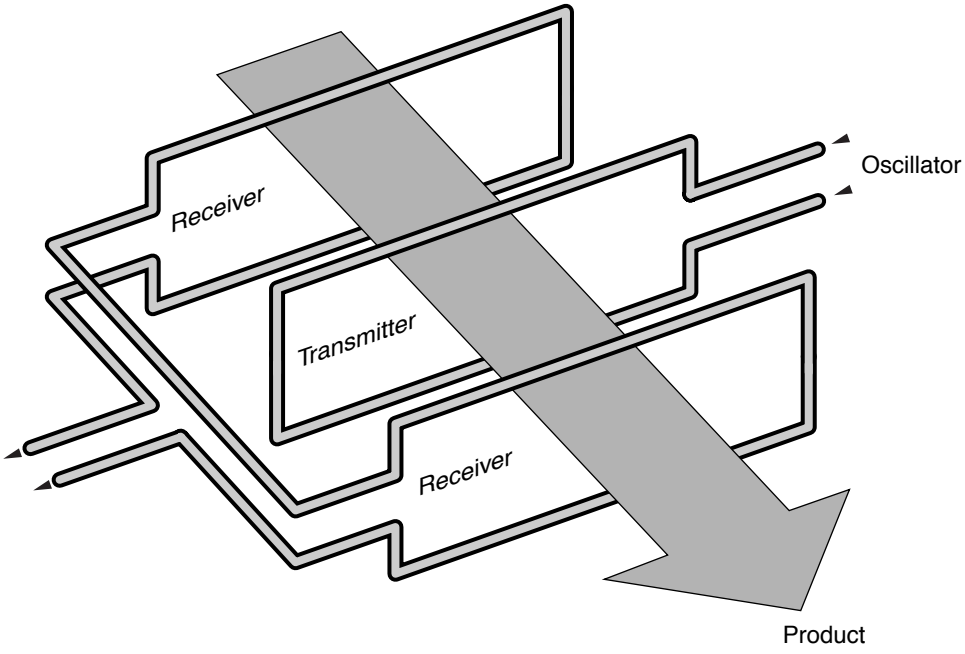
It also describes the general procedures for entering a keycode, moving between the menus, adjusting parameters, and adjusting the sensitivity.

Principles of operation

Before using the metal detector it is helpful to understand its principle of operation, as this will help you understand the measurements it makes and the basis it uses for detecting a metal contaminant in a foodstuff.

Although several different types of metal detector are produced, to suit different types of foodstuff, they all operate in essentially the same way.

The product passes through a tube around which are three coils, as shown in the following diagram:



The central coil is referred to as the transmitter coil, and this transmits a radio-frequency signal similar to the frequencies used in AM broadcasting. Spaced equally on each side of the transmitter coil are two receiver coils, which act as aerials to pick up the radio signal. The metal detector measures the difference in voltage between these coils, and this is referred to as the signal.

When there is nothing between the coils the voltage in each receiver coil will be identical, because they are an equal distance from the transmitter coil, and the signal is zero.

Any conductive object moving between the coils will interact with the magnetic field to produce a voltage difference between each of the receiver coils. Although any object will produce a slight difference, metal objects produce a significantly larger difference, allowing them to be detected in non-metal objects such as foodstuffs. The metal detector can thus distinguish between an uncontaminated product, and one containing metal contanimation.

Getting the best results

Before using the metal detector with a new product it is important to calibrate it with the product, to allow the metal detector to adjust itself to the highest possible sensitivity.

The metal detector can use three alternative modes of operation: Dry, Resistive, or Reactive. During calibration it automatically selects the operating mode that will give the best results for a particular product.

Dry mode

Dry mode is used for products with low moisture content such as tea and coffee. Frozen foods can also use dry mode, because water does not conduct when it is frozen.

Dry mode gives the best sensitivity, and in dry mode the metal detector can typically detect a one millimeter ferrous or non-ferrous metal contaminant in a typical 100 millimeter aperture size.

Resistive mode

Resistive mode is used for products with a slight moisture content, such as flour or cocoa, or are iron fortified, such as cereal.

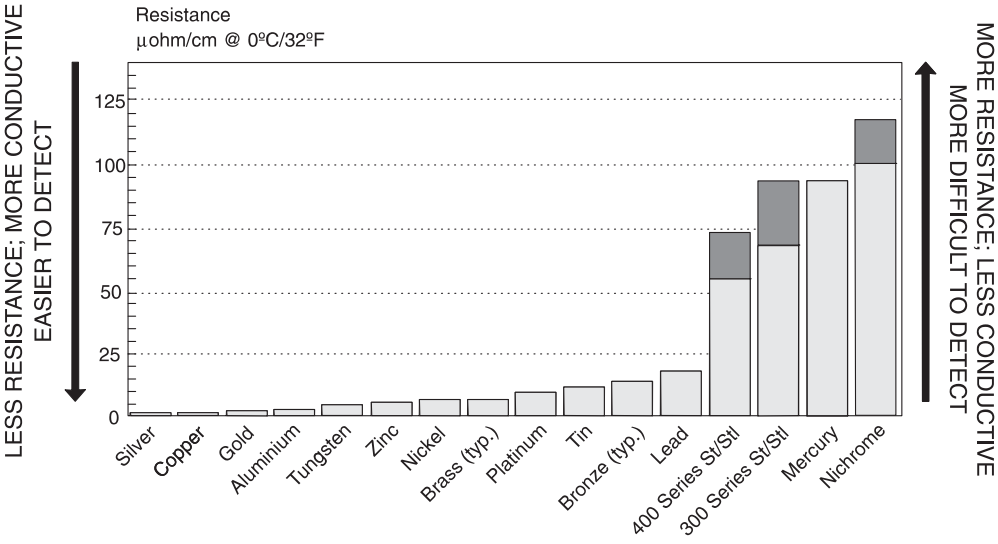
Reactive mode

Reactive mode is used for products with a considerable moisture content, which are therefore conductive causing the product to give a large effect when it passes through the metal detector.

In reactive mode the metal detector takes advantage of the difference between the resistive and the reactive signal to distinguish between the effect of the product, and the effect of a product with a metal contaminant. Because the product can mask the signal generated by the metal contaminant, the sensitivity is generally slightly lower than in dry or resistive mode.

Relative detectability of non-ferrous metals

The resistance, and hence ease of detection, of different non-ferrous metals varier widely. The more conductive they are, the easier they are to detect, as shown in the following graph:



Sensitivity to stainless steels is invariably poorer than to other non-ferrous contamination. This is largely due to the relative conductivity of the material as shown above.

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.

Good practice

The following procedures are recommended for ensuring and maintaining an effective metal inspection regime. There are three essential components in using the IQ^2 Metal Detector effectively:

- Establishing detector sensitivities
- Regular in-line detector sensitivity testing
- Effective handling of rejected products.

Establishing detector sensitivities

Once the metal detector has been calibrated with the product it is important to establish what size of metal contaminant the detector is capable of finding.

In dry or resistive mode ferrous and non-ferrous sensitivities are approximately equal. In reactive mode non-ferrous sensitivity will be poorer than ferrous sensitivity.

The metal detectors are normally supplied with a selection of metal test wands. There are three types of wands: ferrous (chrome steel), non-ferrous (brass), and stainless steel. Stainless steel is included because sensitivity is generally poorer than to other non-ferrous contamination due to the relative conductivity of the material. The wands are supplied in a range of sizes depending on the particular instrument you are using.

In dry or resistive mode the sensitivity 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 a height so they pass as near as possible to the centre of the aperture. Test wands are placed at the leading and trailing edges of the product to ensure correct product rejection. This is particularly important in metal detectors with no photo-eye system, as the reject time is determined by the position of the contaminant relative to the product.

In reactive operation 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.

Regular in-line detector sensitivity testing

It is important to maintain regular and accurate in-line sensitivity testing of the metal detector using the same techniques as the initial sensitivity testing. This should include tests to ensure that the reject systems are effective.

Regular testing should be conducted using the same techniques as initial sensitivity testing. This should include ensuring 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 in which enforcement authorities have to institute 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 quality. Multiple contaminants may be a clue to machinery break-up, identification can pinpoint the source, and effective maintenance can then be conducted.

The IQ^2 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 the product into a number of smaller samples and then use the metal detector to identify which sample contains the contaminant.

ISO9000

Advice is given below on probable areas of concern.

Certificates of calibration

This type of calibration is confined to the checking of the electronics of the metal detector against original specification, effecting 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 that piece of equipment. Loma recommend this calibration should be done at least yearly.

Product calibration

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

Metal test wands

It is recommended that all sensitivity checking is conducted using test wands which use metal spheres certified and traceable to national and international standards. Loma can supply upon request certificates of conformity for test wands supplied either with new equipment or as spare parts.

Work instructions, training and record keeping

It is recommended that in-line sensitivity 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.

Entering a keycode

The metal detector can be set up to restrict access using a keycode.

When the key panel is locked pressing any key apart from ▲ or ▼ will prompt for the keycode.

To enter a keycode

- Press ↵ to display the keycode prompt.



- Press ▲ or ▼ to adjust the number to the appropriate keycode and press ↵.

Selecting a product

The IQ² Metal Detector can be precalibrated for up to 100 different products.

To select the product code

- Press G.

  The display will show the name and number of the currently selected product.



- Press ▲ or ▼ to move up or down the list of products until the one you want is displayed, and press ↵ to select it.

  The display shows **Changing to** followed by the name and number of the product, and then returns to the normal display.



The displays

During normal operation you can step between the following displays using ▲ or ▼.

Threshold/signal display



Shows the signal, together with the threshold above which packs will be rejected. The signal is updated continuously as the signal changes.

Bargraph display



The bargraph display shows the signal in bargraph form, with the threshold point represented by a fixed vertical bar approximately three-quarters away along the display. When the signal reaches the threshold the bargraph display shows **METAL**:



Reject count



Displays the reject count for the current batch of products.

Currently selected product



Displays the number and name of the currently selected product.

Control panel

Operator keys

The following table explains the function of the control panels keys:

Key	*Description*
	**Cancel key** – Cancels the current operation.
	**Lock key** – Locks the keyboard.
	**Arrow keys** – Allow you to step between menu options or change the value of the current menu option.
	**Sensitivity keys** – Allow you to decrease or increase the sensitivity.
	**Change key** – Allows you to change the currently selected product.
	**Setup key** – Allows you to set up a new product.
	**Calibrate key** – Allows you to calibrate a product.
	**Results key** – Allows you to display the results for the products being checked.
	**Enter key** – Selects a menu or confirms an enter value.

Indicators

Symbol	*Description*
	Indicates that the metal detector is searching for metal.
	Indicates that the metal detector is performing a calibration cycle.
	Indicates that a system fault has been logged.
	Indicates that a run error has been logged.

Adjusting the sensitivity/threshold

The threshold determines the signal above which packs will be rejected. For example, with no product passing through the metal detector the signal might be between 0 and 10, and with uncontaminated product the signal might be between 50 and 200. In this case you could set the threshold to 300 to cause all packs giving a signal of 300 or greater to be rejected.

To adjust the threshold from the threshold/signal display

- Press ENTER.

  The arrow indicates that you can adjust the sensitivity.



- Press ▲ or ▼ to increase or decrease the threshold value.
- Press ↵ to confirm the current threshold value or C to cancel without changing the threshold.

To adjust the sensitivity from the bargraph display

- Press ◄ or ► to decrease or increase the sensitivity.

  As you decrease or increase the sensitivity a - or + symbol will flash at the right-hand end of the display.



Note that decreasing the sensitivity is equivalent to increasing the threshold.

Using the menus

The options for setting up, calibrating, and checking the operation of the metal detector are accessed from the four menus which you can select using the G, #, ▼, or Σ keys.

To select a menu

- Press G, #, ▼, or Σ.

To move between the menu options

- Press ▲ or ▼.

To edit a menu option

A * indicates a menu option with a value you can edit.



- Press ↵ to edit the value.

  An arrow points to the value being edited:



- Press ▲ or ▼ to edit the value.

  If the value is a number pressing ▲ or ▼ will increase or decrease the value respectively.
  If the value has alternatives such as **Yes** and **No**, pressing ▲ and ▼ will cycle between the alternatives.



- Press ↵ to confirm the value you have entered or C to cancel it and return to the previous setting.



To edit a text field

- Press ↵ to edit the text.

  The previous text will be displayed; blanks will be displayed if there was no previous text.



- Press ▲ and ▼ to step between the following characters: Underline, Space, 0 to 9, and A to Z.



- Press ↵ to select the next character position.

  When you have entered the name keep pressing ↵ until all characters have been entered.





Setting up a new product

This chapter explains how to create a new product code and calibrate the metal detector for that product.

It also contains the Quick Setup Guide. A tear-out laminated copy of which can also be found at the back of this user guide.

Setting up a product

The metal detector must be calibrated for each of the different types of product it will be used with. Each time you use the metal detector you must specify which product you are testing to ensure it is running with the correct calibration.

To set up a new product

- Press #.

  If the keyboard is locked the display will prompt you for a keycode; see *Entering a keycode*, page 34.

Product setup will then be displayed:



- Press ↵ to select the **Product setup** menu and display the first option:



- Press ↵ to edit the product number.
- Press ▲ or ▼ to select the number for the new product and press ↵ to confirm it.

The product number can be from 1 to 100.

- Press ▼ to display the **Name** of the option.



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To set up a new product *(Continued)*

- Press ↵ to edit the name.
- Enter a name of up to 10 characters and press ↵ to confirm it.

  For information about editing the name see *To edit a text field*, page 39.



- Press ▼ to display the **Frequency selection** menu.

  The **Frequency** option will be displayed if **Dual frequency** is set to **YES** in the user options menu.
- Press ↵ and then select either **HIGH** or **LOW** to set the head frequency that is required.

  High is the default frequency.



- Press ▼ to display the **Dry product** menu.
- Press ↵ to display the **Dry product** menu option.

  Leave this option set to **No** if you want the metal detector to monitor the product and automatically choose the appropriate calibration. You can change this option to **Yes** using ▼ and pressing ↵ to confirm to force the machine to use a dry calibration if you are confident that the product does not contain any moisture.

  NOTE: This option will not be displayed when the frequency selection is set at **LOW**.



To set up a new product *(Continued)*

- Press ▼ to display the **Flow length** option.

  This option allows you to enter the length of the pack to flow allowing for any skew.



- Press ▼ to display the **Rej delay** option.

  This determines the delay, in seconds, between the detector head, or photo-eye if fitted, and the operation of the reject device.



- Press ▼ to display the **Rej dwell** option.

  This determines the time for which the reject device operates.



- Press ▼ to move to the next entry.

  This display will be shown if **PV test** is set to **YES** in the **User Options** menu.

- Press ↵ to select the **PV test setup** menu.

  This contains five system dependent entries and four product dependent entries. To use the PV test all the entries must be completed. For more information see *Setting up PV testing*, page 75.



To set up a new product *(Continued)*

- Press ▼ to move to the next entry.

  The display will show **Full calibrate?** or **Reverse calibrate?** if the **Detection** option is set to **REVERSE** in the **Product setup** menu. For information about reverse calibration see *Appendix A – Reverse Calibration*, page 138.



At this point you should have some representative product ready to calibrate and several samples should be used.

- Press ↵ to start the calibration cycle and keep passing the product until the calibration cycle is complete.



The display will prompt you as necessary.

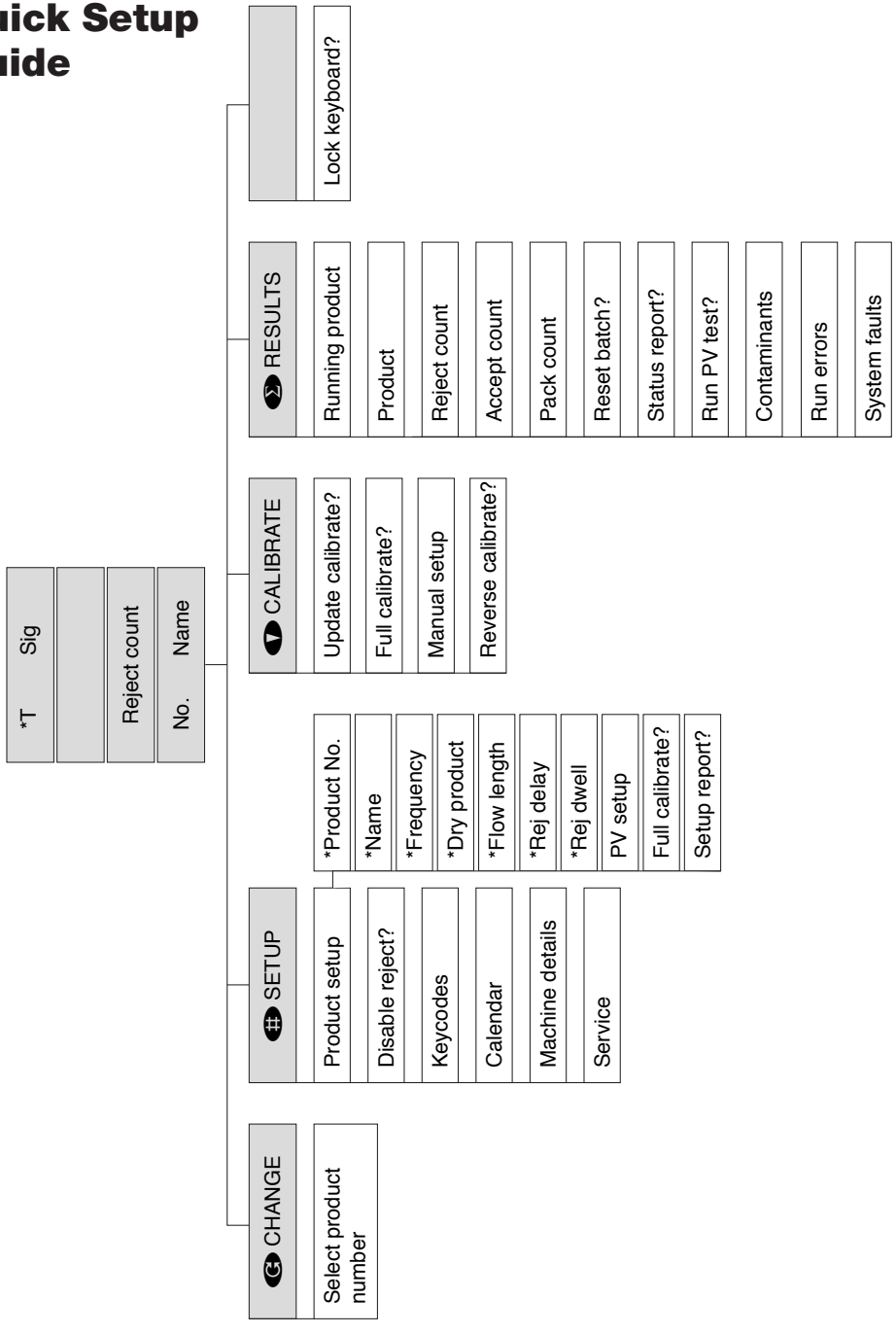


When the calibration is complete the unit will display **Calibrate complete** and then return to the normal display.



Repeat the above set-up procedure with each of the products you wish to calibrate up to 100 in total.

Quick Setup Guide



To adjust the sensitivity

- If necessary use C to move to the top level of the menus.
- Select either the bargraph or threshold/signal display.
- Press ◄ or ► to adjust the sensitivity in the bargraph display.
- Press ↵.
- Press ▲ or ▼ to adjust the threshold value in the threshold/signal display.
- Press ↵ to save the new value.

Higher thresholds give lower sensitivity and lower ones higher sensitivity.

To change a product

- Press G.
- Press ▲ or ▼ to scroll through the product selection to the desired product.
- When the correct product is displayed, press ↵ to confirm your selection.

To recalibrate a product

- Press ▼ and then ↵ to start the process.

Keep passing product until the display indicates that the calibration cycle is complete.

To set up a new product

- Press #.
- Press ↵ twice.
- Use ▲ or ▼ to select the desired product number.
- Press ↵ to save the product number.

Scroll through the **Product Setup** list and adjust the values as necessary. The **Frequency** option will only appear if **Dual frequency** is set to **YES** in the **User options** menu. The **Flow length** option will only appear if a photo-eye is connected to the system, in which case the length to flow of the product should be entered.

The **PV test setup** will only appear if the Performance Validation System is enabled, in which case entries should be made in the menu to program the system.

At the bottom of the list, when **Full calibrate** is displayed, press ↵ and pass product until the display indicates that the calibration cycle is complete.

To move around the menus

- To select a menu, press G (Change), # (Setup), ▼ (Calibrate), or Σ (Results).
- To move between the options, use ▲ or ▼.
- Press ↵ to move across the map to the right.
- Press C to move across the map to the left.
- To adjust a parameter shown on the display, press ↵ to change the ✱ to a < or >, and then adjust the setting using ▲ or ▼.
- Press ↵ to save a new setting.

May be obtained separately as part number 811261 issue level J 1/12/2003



Displaying and printing reports

This chapter gives information displaying the batch results, and the contaminant, error, and fault reports, using the options on the **Results** menu.

It will also describe how to produce printed reports, using the settings on the **Reports Option** submenu of the **Setup** menu.

To print reports the metal detector must be fitted with the optional report/logs package and serial link board.

Displaying batch results

The metal detector maintains the following statistics for the current product:

Statistic	*Description*
Product	The product name
Reject count	The number of products rejected
Accept count	The number of products accepted Note that this will only be displayed when a photo-eye is used for product registration.
Total count	The total number of packs that have passed through the metal detector; ie the sum of reject and accept counts.

To display the batch results

- Press Σ.

  The currently running product is displayed:



- Press ▼ to step through and display the batch statistics for the current running products since the batch was last reset.

To reset the batch

- Press Σ, and press ▼ until the display shows **Reset batch?**



- Press ↵ to reset the current batch statistics.

  If batch reports are set to **Yes** on the **Report Options** menu the accumulated statistics will be printed or transmitted to the serial link.

The batch is reset automatically whenever the product is changed or when a batch report is generated.

Producing reports

The metal detector can produce a range of reports about product statistics, machine calibration information, and machine status information. These can either be printed to a printer attached to a unit or transmitted down the serial link to a PC or Network.

The reports are as follows:

Report	*Description*
Error	Contains all the details from the Run Error log.
Fault	Contains all the details from the System fault log.
Setup	Contains the product Setup details from the **Product setup** and **Manual setup** menus.
Contaminants	Contains all the details from the Contaminant log.
Calibration	Contains all the data relevant to the calibration of the current product. This report is printed automatically after a calibration cycle.
Status	Contains the accumulated batch statistics since the start of the current batch.
PV test	Contains all the data relevant to PV test operation.
Batch	This report contains all the batch statistics such as the number of rejects for the current batch. This report is produced automatically on a batch-reset command, a change of product, completion of the batch interval, or when the unit is taken out of run. The batch interval can either be specified by time, or if a photo-eye is fitted by number of packs.

A sample report is shown below:

```
      ---------------------------------------
      :      LOMA IQ METAL DETECTOR       :
      ---------------------------------------

                  BATCH REPORT

Time : 15-37-02  Date : WED 20 SEP 1995

Machine Identification :       LINE 12
Product number :               2
Product Identification :       CHOCOLATES
Number of packs passed :       10
Number of good packs :         9
Number of bad packs :1
Minimum Signal :               648
Maximum Signal :               27727
Average Signal :               3423

      ---------------------------------------
```

To produce any reports, **Usage** must be set to **REPORTS** in link menu, **Link 1**. This is displayed by pressing #, and selecting the **Serial Link** submenu in the **Service** menu. The service password is 76.

A complete information package is given in the optional *IQ² Service Manual*, part no. 814119. Basic link setup information is given in *Appendix B – Commissioning Guide*, page 140.

To specify which report to produce

- Press # to display the **Product setup** menu.



To specify which report to produce *(Continued)*

- Press ▼ until the **Report options** menu is displayed and press ↵ to select it.

  If this option does not appear on the **Setup** menu check that you have turned on the link in the **Serial Link** submenu of the **Service** menu.



The **Form feed** option is displayed.

Set this to **YES** to print a form feed at the end of each report or **NO** to print the reports without breaks.



- Press ▼ to display the **All reports** option.

  Set **All reports** to **YES** to enable all the reports. Alternatively, setting the option to **NO** displays a menu option for each report allowing you to individually specify which report to print.



To specify the batch statistics

If **All reports** has been set to **YES** or **Batch reports** has been set to **YES** in the **Report Options** menu (**Setup** menu), three additional menu options allow you to setup the batch statistics.



To specify the batch statistics *(Continued)*

- Press ▼ to display the **Batch units** option.



- Select **TIME** for the batch interval to be specified by time, or **PACK** for the batch interval to be specified by the number of packs.

  If you specify the batch units as time:

The Batch interval can only be specified in terms of the number of packs if a photo-eye is fitted; otherwise this menu option is not displayed.

- Press ▼ to specify the batch start. To ignore the start time set batch start to 00.00.



This option allows you to synchronize the start of each batch to a particular time of day. For example, if hourly batch statistics are required starting from 6.30 pm set the batch length to one hour and the batch start to 18.30.

- Press ▼ to display the **Batch length** option and specify the batch length in hours.



If batch units are set to **PACK**:

- Press ▼ to display the **Batch packs** option.



This can be set to a number between 0 and 9999 to specify the batch pack interval.

Displaying the contaminants, run errors, and system faults logs

The IQ² Metal Detector maintains the following logs containing information about the product being tested:

Contaminants log

This contains details of the date and time of any contamination, as well as the product signal recorded for the contaminated product.

Errors log

Keeps a log of all errors generated by the system.

Faults log

Maintains a list of all system faults.

Each log can store up to 20 records. When the log is full the oldest entries will be overwritten with new entries unless the **Reports** option is being used, in which case a copy of the log will automatically be printed or transferred down the serial link ensuring that no information is lost.

To display the appropriate log

- Press Σ to display the currently running product.

- Press ▼ until **Contaminants**, **Run errors**, or **System Faults** menus are displayed and press ↵ to select it.

  After selecting the appropriate log you can either view the log entries, clear the log, or print a report of the log.



To view the log entries

- Press ▼ until the appropriate **View** option is displayed:



- Press ↵ to select it.

  If there are no entries in the log the message **Log empty** will be displayed.



Otherwise the number of entries in the log will be displayed, followed immediately by the most recent entry.

- Press ▼ to step through the log entries.



Each log entry is displayed on three lines, which you can step between by pressing ▼. The information for each entry is as follows:

Entry	*Example*
Error name	
Time and Error code	
Day and Date	

To print a copy of the log

- Select the log you want to print from the **Results** menu.
- Press ▼ to display the appropriate **Report** option.



- Press ↵ to select it.

  The display will show **Report sent**.



To clear the log

- Select the log you want to clear from the **Results** menu.
- Press ▼ to display the appropriate **Clear** option.



- Press ↵ to select it.

  The display will show **Errors cleared.**





Setting up the metal detector

This chapter explains how to calibrate the metal detector and set up the parameters affecting the operation of the machine.

Real-time clock and PV test are only available with the optional reports/logs package.

Calibrating the metal detector

The metal detector provides three alternative calibration procedures:

Update calibration fine-tunes the compensation value to minimize the signal, while still checking for metal in the product. Use an update calibration to update the signal when the production line is running, if false rejects are occurring because the signal has drifted.

Full and **Reverse calibration** completely recalibrates the detector, and to do this normal metal detection must be turned off. Use full calibration in all other circumstances or when an update fails to produce the required result.

Any calibration procedure must use true samples of the product to be run.

To recalibrate a product

- Press ▼.

  The display shows **Update?**



- Press ↵ to start the **Update**.

  A countdown timer will then be displayed while the update calibration takes place.



Finally the display shows **Calibrate complete**.



To perform a full calibration

- Press ▼, and then press ▼.

  The display shows **Full calibrate?**



To perform a full calibration *(Continued)*

- Press ↵ to start the Full calibration.

  The name and number of the product being calibrated are displayed.



Followed by **Pass product**.



It then counts down as the calibration takes place.



It then displays the type of operation selected **Auto dry tune**.



Finally it displays **Calibrate complete**.



The following table lists the messages that may appear during calibration:

Message	*Explanation*
+Use ferrite+	This only applies to 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 head power cannot be reduced any further to stop the head overloading. Possible reasons for this could be that: the calibration pack has a large metal contaminant in it, causing the head to overload; a product not specified for operation of the machine is being used, such that it is too conductive for the machine configuration; the product packaging is highly conductive. If in doubt, call your nearest Loma Service Centre.

Message	*Explanation*
+Working dry+	The product has so little moisture content that it produces no product signal, and therefore the detector has chosen to set the compensation to minimize the effects of vibration (ie 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 **Manual Setup** menu). This would typically be because the calibrate pack is contaminated or is too conductive for the maximum threshold setting. Check that the calibrate pack(s) is representative of production packs (eg. for frozen product, the calibrate pack must be frozen). If in doubt, call your nearest Loma Service Centre.
+Power reducing+	The unit is reducing the head power to account for the product effect of the product.
+Head locked+	The unit is using the head power value from **Manual setup** menu, rather than determining it itself, as the head power has been locked in that menu.
+Mode locked+	The unit is using the working mode from the **Manual setup** menu rather than determining it itself, as the working mode has been locked in that menu.
+Dry product+	The product has little product signal, and therefore the wrong mode of working may have been locked.
+Calibrate complete+	Full calibration was successful.

Setting up the calibration parameters manually

Calibration parameters

The following table gives a summary of the calibration parameters you can edit in manual setup mode.

Parameter	*Description*
Working mode	Dry, Reacts or Resists to specify the working mode.
Working	Allows the working mode to be locked so it cannot be altered during calibration.
Min threshold	The minimum acceptable threshold after calibration.
Max threshold	The maximum acceptable threshold after calibration.
Threshold	Allows the threshold to be adjusted.
Compensation	Allows the compensation value to be adjusted.
Head power	Can be adjusted between Max, 7 to 1, or Min to adjust the head power.
Head	Allows the head power to be locked so it will not be adjusted automatically during calibration.

The menus are only accessible if **Manual Setup** has been set to **YES** in the **User option** menus.

These are explained in greater detail in the following sections:

To perform a manual setup

- Press ▼, and then press ▼ twice until the display shows **Manual setup**.



- Press ↵ to select **Manual setup**.

The options on the **Manual Setup** menu are normally set up by a Loma Service engineer and should not normally be adjusted.

Setting the working mode

The metal detector operates in one of three alternative modes to give the best results with different types of product.

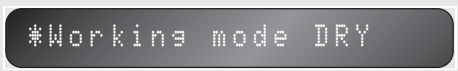
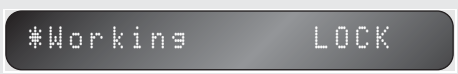
DRY mode is used for products with no product effect.

RESIST mode is used for products that exhibit some product effect, such as cocoa, iron fortified cereals, flour, etc, or that contain some moisture.

REACT mode is used for products that are conductive; ie with a significant water content such as cheese or meat, or products wrapped in metalised film.

For more information refer to *Principles of operation*, page 28.

Normally this setting is automatically set during calibration, but you can set it manually and optionally lock it so that it does not get altered during subsequent calibration.

To set the working mode	
• Select the **Manual setup** menu as described above.	
• Press ▼ to display the **Working mode** option, and press ↵ to edit it. • Press ▲ or ▼ to step between the three options **DRY**, **RESIST**, and **REACT**.	
• Press ▼ to display the **Working** option and press ↵ to edit it.	
• Press ▲ or ▼ to switch between **LOCK** and **UNLOCK**.	*This allows you to lock the working mode setting so it is not automatically set during a calibration procedure.*

Setting the trigger thresholds

The calibration procedure automatically determines the best threshold setting based on the samples pack used for calibration. Manual setup allows you to specify the minimum and maximum values for the threshold, as a safeguard that the calibration has been performed correctly.

Additionally you can specify a trigger threshold, which is used on pipeline systems to ensure that a calibration procedure is not started without product being present in the pipeline.

To set the minimum and maximum threshold	
• Select the **Manual setup** menu as described above. • Press ▼ until the display shows **Min threshold** and press ↵ to edit it.	
• Press ▲ or ▼ to increase or decrease the minimum threshold and press ↵ to confirm it.	*The minimum threshold is the lowest threshold that can be adopted after a calibration cycle, and should be set about 15% to 50% higher than the maximum signal levels produced by non-contaminated products.*
• Press ▼ to display the maximum threshold and press ↵ to edit it.	
• Press ▲ or ▼ to increase or decrease the maximum threshold and press ↵ to confirm it.	*The maximum threshold sets an upper limit on the acceptable threshold as a safeguard against contaminated product being used during calibration.*

To set the trigger threshold

- Press ▼ to display the current trigger threshold and press ↵ to edit it.

  This option will only appear if the **Calib trigger** option has been set to **On** in the **User Options** menu.



- Press ▲ or ▼ to increase or decrease the trigger threshold, and press ↵ to confirm it.

Adjusting the threshold and compensation

These values are normally automatically set up during calibration and should not normally require adjustment.

While either value is being adjusted the **Calibrate** indicator will be illuminated.

NOTE: Any manual settings will be lost the next time a calibration is performed.

To adjust the threshold

- Press ▼ until the **Threshold** option is displayed and press ↵ to select it.

  The display shows the **threshold and signal** and allows you to edit the threshold.



To adjust the threshold *(Continued)*

- Press ↵ to edit the threshold.
- Press ▲ and ▼ keys to increase or decrease the threshold respectively and press ↵ to confirm it.



The threshold can be adjusted between 0 and 65535, in steps of 5, and defaults to 1000.

To adjust the compensation

- Press ▼ until the display shows **Compensation** and press ↵ to select it.

  The display then shows the current compensation and signal level values.



- Press ↵ to edit the compensation value.
- Press ▲ or ▼ to increase or decrease the compensation respectively and press ↵ to confirm it.



Adjusting the head power

The head power is set automatically during full calibration and should not normally need adjustment. However, you have the option of adjusting the head power manually, and locking the adjustment so that it will not be changed during calibration.

To adjust the head power	
• Select the **Manual setup** menu.	
• Press ▼ until the current head power setting is displayed:	
• Press ↵ to edit it, press ▲ or ▼ to increase or decrease the head power respectively, and press ↵ to confirm it.	*The head power can be adjusted to the values Min (least sensitive), 1, 2, 3, 4, 5, 6, 7, or Max (most sensitive).*
To lock the head power	
• Press ▼ to display **Head**.	
• Press ↵ to edit it, press ▲ or ▼ to switch between **LOCKED** and **UNLOCKED**, and press ↵ to confirm it.	*Locking the headpower prevents it from being set automatically during a subsequent calibration.*

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 printed reports. In addition, they determine the interval and synchronization of automatically initiated PV tests.

To set the time and date

- Press **Setup** to display the **Product Setup** menu.
- Press ▼ until the **Calendar** option is displayed:



- Press ↵ to select it.
- Press ▲ and ▼ to step between the following options: **Year**, **Month**, **Day**, **Date**, **Hours**, and **Minutes**.



- Press ↵ to edit any of the options.
- Press ▲ and ▼ to adjust the option, and then press ↵ to confirm it.

  Pressing C exits from the menu without making any changes.

Setting the machine ID

The **Machine details** menu provides information about the software fitted to the metal detector and the machine ID. The machine ID is printed out on any reports and can be edited to any convenient number, such as the identifier used in the factory.

To set the machine ID

- Press # and press ▼ to display the **Machine details** menu.
- Press ↵ to select it.



- Edit the machine ID in the usual way see *To edit a text field*, page 39.



Defining keycodes

Keycodes can be use to restrict operation of the metal detector to authorized users. Codes can be specified individually for the following areas of access:

- The sizing and changing keycodes
- Changing product
- Running a PV test.

To restrict access

- Press #, press ▼ until the **Keycodes** menu is displayed, and press ↵ to select it:



The **Keyboard lock** option is displayed:



To lock the keyboard

- Press .

  The following prompt is displayed:



- Press  to lock the keyboard.

  Keyboard locked will be displayed:

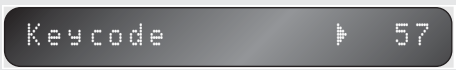
  Access will now be restricted to entering the numbers specified in the keycode change and PV test options.



To gain access

- Press , or select one of the other options to which access is needed.

  You will be prompted to enter the appropriate keycode:



- Press  and  to set the keycode and press  to confirm it.

  You will then have access to the options specified by that keycode.

For security the keyboard must be re-locked manually, by pressing  followed by .



Using Performance Validation

This chapter explains the benefits of the Performance Validation procedure, and explains how to set up the metal detector for PV testing, with information about each of the parameters that need to be specified.

Introduction

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. 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 prompt the operator to perform quality assurance checks on a regular basis, and it then prompts the operator through a sequence of tests using standard test samples. At the end of the Performance Validation test the results are transmitted to a PC or printer to produce a printed copy of the report.

A typical PV Test report is shown below:

```
      ---------------------------------------
      :      LOMA IQ² METAL DETECTOR       :
      ---------------------------------------

                  PV TEST REPORT

Time: 10-22-00 Date:           MON 09 JUL 1995
Machine Identification:        MH23843
Product Number:      1         Name: CHOCOLATES
Prompt: 10-15-00               On:  MON 09 JUL 1995
Operator Identication:         ABC
Test Samples Ferrous:          5 x 1.00mm
Test Samples Non Ferrous:      5 x 1.00mm
Test Samples Stainless St:     5 x 1.00mm
Threshold Detection: 1000      False: 2000
PV Test prompt:                06:00

             **PV TEST SUCCESSFUL**

      ---------------------------------------
```

Setting up PV testing

To use PV testing the **PV Test** option must be set to **YES** in the **User Options** menu. An additional **PV test setup** option will then appear when defining a new product:



- Press ↵ to select it.

A series of options then allow you to specify how the performance validation test operates, and these are described in the following sections.

NOTE: PV test setup is not available with Reverse mode detection.

To set the performance validation interval	
• Select the **PV test setup** menu as described above. The timing option will be displayed:	
• Press ↵ to edit it. • Press ▲ or ▼ to select between the options **OFF**, **INTERVAL**, or **BATCH**, and press ↵ to confirm it.	***BATCH*** *is only available if* ***Batch reports*** *has been set to* ***YES*** *in the* ***Report options*** *menu.*
If you have selected **INTERVAL**: • Press ▼ to display the **Interval** option and press ↵ to edit it.	
• Press ▲ and ▼ to increase or decrease the interval in hours and minutes and press ↵ to confirm it.	*The maximum time is 24 hours and the minimum time is the* ***Test window*** *value plus one minute. For example, to perform a PV test every six hours set* ***Interval*** *to 6.00.*

To set the performance validation interval *(Continued)*

- Press ▼ to display the **Synch** option and press ↵ to edit it.



- Press ▲ or ▼ to increase or decrease the synch time respectively and press ↵ to confirm it.

*Set **Synch** to 00.00 for unsynchronized testing. For example, if the Interval is set to six hours each PV test will be initiated six hours after the completion of the previous one.*

*Set **Synch** to the time of day for synchronized timing. For example, if **Interval** is set to six hours and **Synch** is set to 14.30, a PV test will be initiated at 2.30pm and then subsequently every six hours, irrespective of how long the PV test takes to complete.*

- Press ▼ to display the **Test window** option and press ↵ to edit it.

  This specifies the time in minutes within in which the PV test must be completed. If not completed within the specified time a **PV test timeout** error is reported.



The following options in the **PV test setup** menu allow you to specify the types of test that should be performed during performance validation.

The test wands you specify for performance validation should have been determined using sensitivity tests with the product after calibration.

To specify the characteristics of the PV test	
• Press ▼ until the **No of passes** option is displayed and press ↵ to edit it.	
• Press ▲ or ▼ to specify the number of passes of each specified test wand that must be detected to constitute a successful PV test and press ↵ to confirm it.	*The number can be set between 1 and 8. This should be set to a multiple of two so that test wands can be placed at the leading and trailing edges of the product.*
• Press ▼ to display the **Fe size** option and press ↵ to edit it.	
• Enter the size of ferrous test wand which should be prompted for when a PV test is initiated.	*The size can be 0.01 to 10.00 millimeters. Setting the size to 0.00 will disable the prompt during testing.*
Likewise, set the **NFe** (non-ferrous) and **ST** (stainless steel) sizes on the subsequent two menus.	 

To specify the false threshold

- Press ▼ to display the **False thresh** option and press ↵ to edit it.



This is used to identify metal test samples or other metal objects that give a greater signal value than those specified for testing. If the signal exceeds the set false threshold value the message **False contaminant** will be displayed and the pass count will not be incremented.

It can be set to any value between 0 and 99990, and can be adjusted in steps of ten units. It defaults to twice the normal threshold value.

Running a performance validation test

If timing has been set to **INTERVAL** or **BATCH** in the **PV Test Setup** menu a Performance Validation test will automatically be initiated during normal product testing. A PV test is automatically initiated in the following situations:

- If timing has been set to **Interval** in the **PV Test Setup** menu and the specified time interval has lapsed.
- If the **Batch**, **Interval**, **Time,** or **Size** has been exceeded, depending on how the batch reporting has been setup.
- If a batch is manually reset.
- If the product is recalibrated.
- If a batch is terminated or a new batch is started as a result of changing the current product.

When this happens the normal operating display will show:



- Press ↵ to proceed with the PV test.

Alternatively, a Performance Validation test can be run at any time from the **Results** menu using the following procedure.

To run a performance validation test

- Press Σ to display the **Results** menu.
- Press ▼ arrow until the **Run PV test** option is displayed.
- Press ↵ to confirm that you want to run the PV test.



The following **Operator** prompt will be displayed:

- Press ↵ to edit the prompt and then enter the operator ID in the usual way; see *To edit a text field*, page 39.



The test will then prompt the operator for the size of the first type of test wand specified in the **PV test setup** menu:



It will then perform the first pass of PV testing.

If no test sample sizes have been programmed then the display will show **+ No Samples+** and a report will be produced immediately.



To cancel a performance validation test

- Press C.

  If the PV test was run manually no error is caused, but if the PV test was initiated automatically a non-action error is recorded and a report is generated.

At the end of the PV test the display will revert to the previous display.



Installing the metal detector

This chapter describes how to install the metal detector range. It first gives general information, applicable to all versions, followed by specific installation instructions for each version.

General information

The following information applies to all versions of the metal detector.

For a description of each version of the metal detector range see the chapter *About the metal detector range*, page 1.

Warnings

The following safety warnings apply to the procedures for all versions:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES

2. LETHAL HAZARD – COMPRESSED AIR SUPPLIES

3. WORKING ON EQUIPMENT

4. REJECT DEVICES

6. HEAVY EQUIPMENT

7. LIFTING EQUIPMENT

8. MOVING METAL DETECTORS

9. CONTAMINANTS

For details see *Safety warnings*, page iii.

The following emergency procedures apply to these procedures:

2. DEALING WITH FIRE.

For details see *Emergency procedures*, page viii.

Space required for installation and maintenance

It is important that sufficient free space is left at the front and back of a metal detector to enable commissioning and 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.

Lifting and moving a metal detector

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

When a metal detector which is 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.

Do not attempt to lift or move a metal detector by a reject cover. Reject covers are made of plastic and are easily damaged.

Using a crane

- Position the straps on any unit so it will not tilt when lifted. Attach the straps to the crane.
- Lift the unit and carefully move it to the required location.
- Lower the unit and remove the straps.
- Never put straps through any aperture.

Using a fork lift truck

- Position any unit on the forks so it does not tilt. Raise the lift sufficiently to lift the unit clear of the ground and any obstacles.
- Carefully move the unit to the required location.
- Lower the forks and withdraw them from the unit.

Removing packing materials

- Remove and discard all packing and protective materials.

EMC considerations

All Loma equipment is designed to operate under factory conditions, and has been tested to recognised international standards for Electromagnetic Compatibility (EMC). It is still necessary, however, to ensure that the equipment is not subjected to excessive electrical noise via its supply or airborne sources.

Electrical supply considerations

The unit 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 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.

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 (eg 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.

Further information is contained in your Service Manual.

These guidelines are based on the PPMA EMC Code of Practice, which should be referred to if in doubt about any aspect of making external electrical connections to the detector.

Radio frequency interference

A metal detector is, essentially, a Radio Frequency (RF) receiver. As such it is sensitive to RF noise in the general vicinity of the detector location. While 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 can 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'.

Control box replaceable fuses

All detector control boxes irrespective of detector type are fitted with three replaceable fuses: F1 (T2A) Loma part number 517033 located in the incoming ac supply circuit, F2 and F3 (T5A) Loma part number 517026 located in the reject relay circuits. All the fuses can be found beneath the power supply safety mesh cover.

F1: If the fuse blows on start up then it may be replaced. However should the fuse blow a second time then further replacement is not recommended; help should be sought from your local Service Centre.

F2 and F3: It is recommended to check the circuitry connected to the reject relay to ascertain the reason for the fuse blowing before replacement.

Before attempting to replace any fuses the following precautions must be observed:

ISOLATE all power to the detector system before commencing work on the power supply unit.

WARNING: For continued protection against the risk of fire replace only with the same type and rating of fuse.

Access to the fuses can be gained as follows:

- Using the 5mm allen key supplied with your equipment, unscrew the two front hinged door screws on the control box and open the door.
- Undo and remove the four M3 pillars securing the PSU safety mesh screen cover and carefully remove.

The cover is connected via a ground wire to the control box; there is no requirement to remove this connection. The wire is of sufficient length to allow the placing of the cover in the bottom of the hinge door.

All three fuses are situated in the bottom left-hand corners of the main control board. Once replaced assembly is the reverse of the above.

Installing a serial link

The main control electronics board must have the optional Report/Logs package and 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.

Refer to your optional Service Manual for wiring installation guidelines and link position information for all available links.

European belt conveyor versions

This section describes how to install Loma flat belt and plastic modular belt conveyors that are ready fitted with Loma metal detector search heads. After connection of the appropriate services, a conveyor is ready for immediate use.

Warnings

The following additional safety warnings apply to these procedures:

10.TRAPPED FINGERS.

For details see *Safety warnings*, page iii.

The following emergency procedures apply to these procedures:

11.EMERGENCY SHUTDOWN OF CONVEYORS.

For details see *Emergency procedures*, page viii.

Preparing to install a conveyor version

All conveyor metal detectors are dispatched from Loma Engineering in the following state:

- Feet (if fitted) are screwed fully in.
- 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). Feet may have been fitted for transit purposes or 20mm bolts may be used to secure the conveyor to the pallet.
- Delicate items are covered in protective wrapping material.

Removing bolts and fitting wheels

- Conveyors for customers in Europe may have been secured to the pallet by 20mm 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 outrigged legs of the conveyor.

Adjusting/levelling the conveyor

- Adjust the infeed and outfeed heights as necessary by means of either the adjustable feet or adjustable wheels. Make sure 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 the head, resulting in spurious triggering.

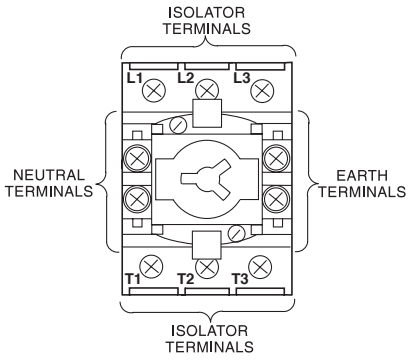
- When the height is correct, lock the wheels (if fitted).
- If the conveyor is fitted with feet, you are recommended to apply silicone sealant around the feet and floor.

Connecting electrical supplies

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.

- Switch the isolator to the 'Off' position then unlock and open the door.

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



- Remove the plastic terminal cover from the starter isolator.
- Cable entry is via the brass gland provided on the bottom rear face of the electrical services box.

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

- 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.
- Split the cable inside the box and cut the wires to suitable lengths. The wires for the phases, neutral, and earth are connected to terminals on the isolator switch.

- Make the connections to the isolator switch as follows:

3-phase earth and neutral	
Core	***Terminal***
3-phases	L1, L2 & L3
Neutral	N
Earth	E
3-phase earth and neutral	
Core	***Terminal***
3-phases	L1, L2 & L3
Neutral	Not used
Earth	E
3-phase earth and neutral	
Core	***Terminal***
3-phases	L1
Neutral	N
Earth	E

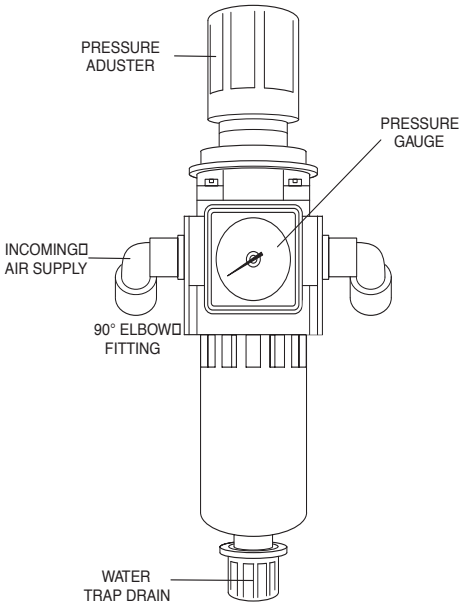
- Check that all connections are secure and correct then securely refit the plastic terminal cover onto the isolator.
- Close and lock the door.

Connecting the air supply (pneumatically operated reject only)

The minimum air pressure must not fall below 65psi (4.5 bar) when the reject operates.

With the exception of a conveyor that is fitted with an air-blast reject, the air supply is connected to a regulator that is fitted to the front of the conveyor, set to 80psi (5.5 bar). For air blast units the air supply should be 100psi (6.9 bar).

The following illustration shows a typical regulator unit:



With the exception of conveyors fitted with either an air-blast reject system or Stop-On-Detect reject, a low-pressure air switch is fitted electrically in series with the starter motor coil. This goes open-circuit if the air pressure drops below 40psi (2.8 bar).

The air supply is connected using 10mm O/D tubing to the 90° elbow. The elbow will be located on the side of the air regulator unit or the air blast solenoid depending upon the reject type fitted.

Checking guards

- Check that all guards are securely fastened in place. On some conveyors that are made to special order, electrical interlocks may be fitted.
- Check that the infeed and outfeed of the conveyor are clear of obstructions.

Powering up the conveyor

- At the electrical services box, switch on the main isolator.
- Switch on the Control Unit.
- Switch on the compressed air supply to the conveyor.

- At the electrical services box, press the ‘Start’ button. Check that the conveyor starts and the belt runs in the correct direction.

If it is running correctly:

- Where a low air pressure switch is fitted, disconnect the air and check that the motor stops. No low air pressure switch is fitted to a Stop-on-detect system.

If it is not running in the correct direction (3-phase systems only):

- At the electrical services box, press the ‘Stop’ button. Switch off the control unit.
- At the electrical services box, switch off the main isolator to isolate the electrical supply to the conveyor.
- Isolate the pneumatic supply to the conveyor, if appropriate.
- Unlock and open the door of the electrical services box.
- At the isolator switch, reverse the connections of any two phases.
- Close and lock the door of the electrical services box.
- Repeat the above procedures.

Checking belt tracking (PV belt systems 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 *Routine maintenance*, page 132.

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*, page 135.

If the reject Delay and Dwell times need to be adjusted, these are set up via the user interface from the control panel. Refer to *Setting up a product*, page 42.

Air Blast reject

Since this type of reject has no throttle controls, adjustment is via the reject delay and dwell times or by changing the height or angle of the air blast nozzle(s).

Pipeline versions

This section describes how to install a Loma stand-mounted pipeline metal detector. After connection of the appropriate services, the detector is ready for immediate use.

Warnings

The following additional safety warnings apply to these procedures:

15.SECURITY WHEN STAND MOUNTED

16.START UP WITH AUTOMATIC REJECT VALVE

17.HEIGHT ADJUSTMENT STAND-MOUNTED VERSIONS

18.SECURITY

For details see *Safety warnings*, page iii.

Preparing to install a detector

All stand-mounted pipeline metal detectors are dispatched from Loma in the following state:

- Wheels are locked.
- Spanners required for installing and maintaining the detector are supplied.
- The reject valve is packed separately in bubble-wrapping.

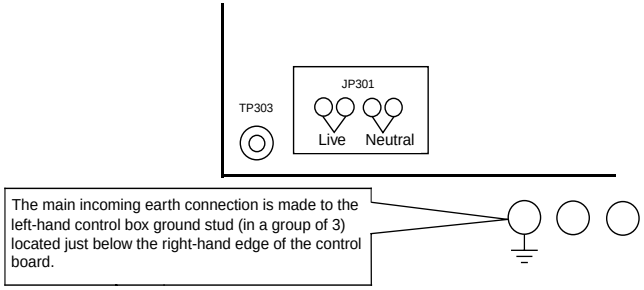
Connecting the detector

- Connect the automatic reject valve to the body of the detector.
- Slacken the height adjustment handle, taking care that the detector does not rise too quickly on the gas-filled strut. Carefully adjust the height of the unit so that the input and output ports are aligned with the existing pipe system and the weight of the detector is fully supported on the wheels. Fully tighten the adjustment handle.
- Wheels are levelled with the floor and locked.
- Connect the unit to the existing pipe system.

Connecting electrical supplies

Pipeline detectors require a single-phase electrical supply. Electrical connections are made to a connector block inside the control box.

The following illustration shows the connection arrangements at the connector block:



- Power cabling must be rated at no less than 5A current carrying capability and be routed into the control box by a suitable watertight gland. The power input gland hole is on the extreme left of the control box when facing the controls.
- Power cabling for a UL approved model is 20-16AWG fed from a locally positioned switch or circuit breaker that is within easy reach of the operator. The breaker must be labelled as the disconnecting device for the equipment. Cable tightening torque 5.5in/lbs routing into the control box as in the above diagram

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

- Open the control box door and remove the safety cover angled terminal access plate only from the power supply cover. Place it in the bottom of the control box door.
- Split the cable inside the box and cut the wires to suitable lengths.
- On pipeline detectors the power plug is also the disconnection device.
- The power supply cable should not exceed 3m.
- If armoured cable is used the armour wires must be connected to protective earth (PE).
- Do not position the detector so that it is difficult to remove the power plug.

Disconnecting the Power

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.

- Refer to the previous illustration for connector block wiring details. Make the connections to the connector block as follows:

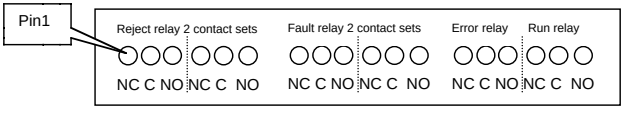
AC wiring colours will vary according to territory.			
North America	Black	=	HOT
UL approved models	White	=	NEUTRAL
120V	Green/Yellow	=	EARTH
All Others	Brown	=	LIVE
200/240V	Blue	=	NEUTRAL
	Green/Yellow	=	EARTH

Relay contact information

If your metal detector is supplied with a reject device or any peripherals they will already be connected.

However if you are connecting your own reject device refer to the voltage free relay connection information given below. It is suggested that the reject device wiring is connected in series with a set of fault relay contacts to enable the reject to be operated in the event of a system fault being generated, ensuring failsafe reject operation for a fault condition. Contact switching information is given in *About the metal detector range*, page 1.

Connections are made depending upon your requirement. Contacts shown are for relays when de-energized (failsafe):



- Check that all connections are secure and correct then securely refit the terminal access plate to the power supply cover.
- Close and secure the control box door.

Connecting the air supply (pneumatically-operated reject valve only)

An air supply at a pressure of between 6.0 and 8.0 bar (90-116psi) is required when the detector is fitted with an pneumatically-operated automatic reject valve. The minimum air pressure should not fall below 75psi (5.2 bar) when the reject valve operates. The air supply must be dry and lubricated.

- If a pneumatically-operated reject valve is fitted, connect the compressed air supply to the input port of the 5-port valve via a 10mm O/D air tube. This valve is located at the rear underside of the control box.

Checking the detector

- Check that all couplings are securely tightened and that the unit is not hanging from the pipeline, or pressing upwards in such a way as to distort the assembly.
- Check that the four wheels are securely located on the floor and locked.

Powering up the detector

- Switch on the supply to the search head control unit.
- Switch on the air supply to the detector.
- Set up the unit as described in *Setting up the metal detector*, page 59.

Handtmann versions

This section describes how to install a Loma Handtmann metal detector. The detector is mounted from the hinge block located on the filler outfeed adjacent to the filler product pipe.

Warnings

The following additional safety warnings apply to these procedures:

19. HANDLING A HINGE MOUNTED VERSION ON A PA30 FILLER

20. HANDLING A HINGE MOUNTED VERSION WITHOUT A STAND

21. HANDLING A HINGE MOUNTED VERSION ON A STAND

22. HANDLING WITH A WATER JACKET FITTED

23. OPERATING WHEN USED FOR HANDLINKING

24.DISCONNECTION OF POWER

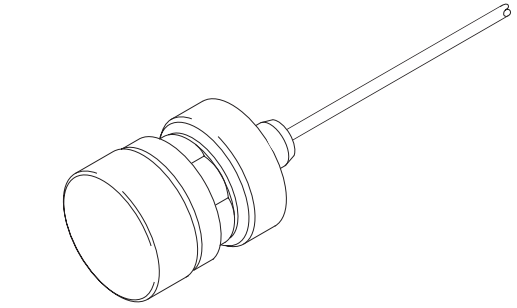
For details see *Safety warnings*, page iii.

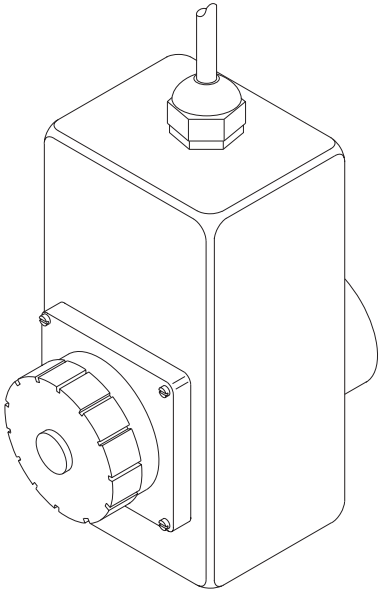
Handlinking applications

This requires the removal of the hand linking gearbox assembly from the filler hinge and re-fitting it to the replica hinge block on the outfeed of the metal detector assembly. Power and reject connections are made as follows:

If the metal detector does not have a fitted power cable, power is connected as described in *Connecting electrical supplies*, page 93.

The reject system used with this model is Stop-on-Detect, a pair of voltage free relay contacts are wired into either a single connector as shown in the following illustration which locates into the Utensil Socket on the rear of the filler:





AL applications

This requires the uncoupling of the AL machine from the filler hinge block and re-coupling it to the replica hinge block on the outfeed of the metal detector assembly.

If the metal detector does not have a fitted power cable, power is connected as described in *Connecting electrical supplies*, page 93.

The VF200 and 300 models reject system used with this model is Stop-On-Detect, a pair of voltage free relay contacts are wired into a dual connector as shown in the previous illustration. This will require the removal of the AL connection cable from the utensil socket on the rear of the filler, the metal detector dual connector is located in that socket and the AL re-connected to the back of the dual connector.

For VF600 models the connector maybe a single or dual type depending upon the application requirements. Generally the single connector is connected into the second of the pair of utensil sockets located on the rear of the filler.

Short Hinge applications

The detector is located on the filler output hinge connection will be via 1/4 turn RD80 fittings. This unit can have an automatic reject device fitted in which case it will have an additional stand mount. It may also precede a clipping machine.

If the metal detector does not have a fitted power cable, power is connected as described in *Connecting electrical supplies*, page 93.

If a pneumatically-operated reject valve is fitted, then the unit will require a compressed air supply for the valve of between 6.0 and 8.0 bar (90-116psi). The minimum air pressure should not fall below 75psi (5.2 bar) when the valve operates. The air supply must be dry and lubricated. Connection is made to the input port of the 5-port valve via a 10mm O/D air tube.

Checking the detector

- Check that all couplings are securely tightened and that the unit is not fitted in such a way as to distort the assembly.
- Check all electrical and pneumatic connections as applicable are secure and connected correctly.
- If a stand is fitted check that all four wheels are securely located on the floor and are locked.

Pharmaceutical versions

This section describes how to install a Loma pharmaceutical metal detector. The detector is supplied complete with its own stand and reject mechanism. After connection of the appropriate services, the detector is ready for immediate use.

Warnings

The following additional safety warnings apply to these procedures:

25. ADJUSTMENT

26. SECURITY

For details see *Safety warnings*, page iii.

Preparing to install a detector

The pharmaceutical metal detector is dispatched from Loma with the wheels locked.

Connecting the detector

- Adjust the height of the detector by slackening the height clamp and sliding the head up or down the stand tube. The stand is supplied with an internal gas strut, aiding adjustment by giving the detector an effective zero mass. Re-tighten the height clamp.
- Tilt the metal detector by slackening the tilt clamp slightly and carefully tilting the head to the required angle. The reject mechanism must always be on the lower side. Re-tighten the tilt clamp.
- The height may now need further adjustment.
- Lock all four wheels by means of the integral brakes.

Connecting electrical supplies

Pharmaceutical metal detectors are supplied with fitted mains plugs. No wiring is required.

Checking the detector

- Check that all guards are in place and are secure and that the infeed and outfeed of the system are clear of obstructions.

Powering up the detector

- Switch on the supply and the search head control unit.
- Set up the unit and verify the operation of the metal detector as described in *Setting up the metal detector*, page 59.

Freefall versions (stand-alone)

Loma supply two versions of stand-alone freefall metal detector search heads:

- Catalogue contained field (CF) model.
- Slimline contained field (CF) model.

For reasons identical to those for the mounting of heads on conveyors, certain guidelines must be followed to achieve optimum sensitivity.

Warnings

The following additional safety warnings apply to these procedures:

27. REMOVAL OF A DIVERTER

28. START UP WITH A DIVERTER.

For details see *Safety warnings*, page iii.

Search head mounting methods

Freefall metal detectors may be mounted on anti-vibration mounts, on a Tufnol plate, or by a pivoting arrangement, depending on the model supplied.

Whichever method is used to mount the head, the head must be insulated from any surrounding metalwork. It should be grounded only by means of the 12-core screened cable which connects the head to the control box.

Detector mounting advice

- If mounted on anti-vibration mounts fitted to a non-metallic plate, secured to a suitable welded construction framework, capable of supporting the weight of the unit, use the four fixing holes located in the four extreme corners of the detector case aperture face.
- If mounted via 2 x 5mm thick closed cell sponge strips running along the edge of the case in its longest dimension and a non-metallic plate secured to a suitable welded construction framework, capable of supporting the weight of the unit, use the four fixing holes located in the four extreme corners of the detector case aperture face.

Catalogue units only

- If mounted using the four holes located in the extension flange on the bottom of the detector case ensure that the framework to which it is secured is capable of supporting the weight of the unit.

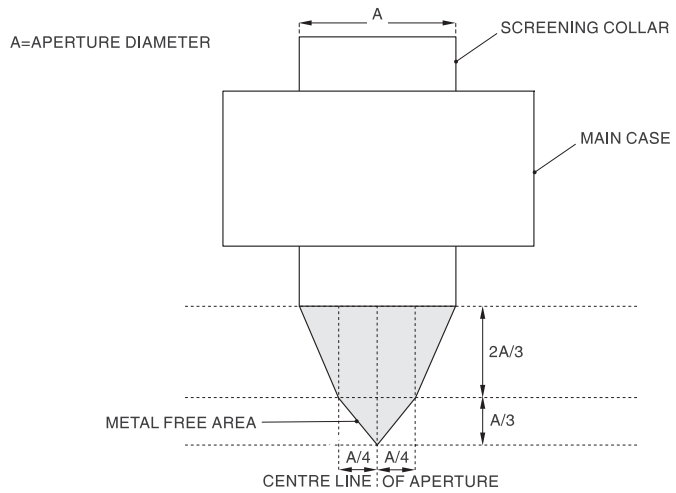
Slimline units only

- If mounted using a pivot pin, ensure that the pivot pin is insulated from the detector case and is capable of supporting the weight of the unit.

Search head metal-free area

As with heads mounted on conveyors there is both a metal-free area for moving and fixed metal.

Metal free area for contained field models



- The metal-free area shown is for moving metal.
- Provide a 150mm metal-free area around the end plate gasket.
- The metal-free area is symmetrical about each side of the detector.

The metal-free area may be reduced, but at the possible expense of sensitivity.

Routing the cable between the search head and the control box

The 12-core screened cable supplied must be used to join the search head to the control box.

NOTE: Do not route the cable with any electrically noisy wiring, such as mains supplies.

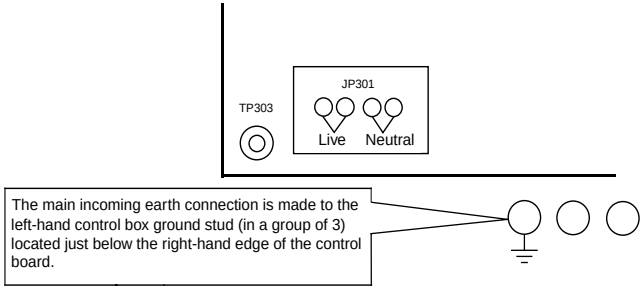
Static precautions for dry powder products

For products likely to generate static it is essential that the product pipe which runs through the aperture is fitted with an antistatic screen. Please consult your Loma Service Centre for details.

Connecting electrical supplies

The standard Loma stand-mounted freefall metal detector requires a single-phase electrical supply. Electrical connections are made to a connector block inside the control box

The following illustration shows the connection arrangements at the connector block:



- Power cabling must be rated at no less than 5A current carrying capability and be routed into the control box by a suitable watertight gland. The power input gland hole is on the extreme left of the control box when facing the controls.
- Power cabling for a UL approved model is 20-16AWG fed from a locally positioned switch or circuit breaker that is within easy reach of the operator. The breaker must be labelled as the disconnecting device for the equipment. Cable tightening torque is 5.5in/lbs routing into the control box as in the above diagram

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

- Open the control box door and remove the safety cover angled terminal access plate only from the power supply cover. Place it in the bottom of the control box door.

- Split the cable inside the box and cut the wires to suitable lengths.
- Refer to the previous illustration for connector block wiring details. Make the connections to the connector block as follows:

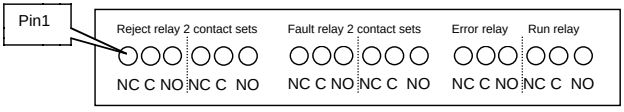
AC wiring colours will vary according to territory.			
North America	Black	=	HOT
UL approved models	White	=	NEUTRAL
120V	Green/Yellow	=	EARTH
All Others	Brown	=	LIVE
200/240V	Blue	=	NEUTRAL
	Green/Yellow	=	EARTH

Relay contact information

If your metal detector is supplied with a reject device or any peripherals they will already be connected.

However if you are connecting your own reject device refer to the voltage free relay connection information given below. It is suggested that the reject device wiring is connected in series with a set of fault relay contacts to enable the reject to be operated in the event of a system fault being generated, ensuring failsafe reject operation for a fault condition. Contact switching information is given in *About the metal detector range*, page 1.

Connections are made depending upon your requirement. Contacts shown are for relays when de-energized (failsafe).



- Check that all connections are secure and correct then securely refit the terminal access plate to the power supply cover.
- Close and secure the control box door.

Short and long frame versions with diverter reject

These systems have a choice of mounting methods: surface standing on height adjustable feet or suspended from an overhead framework. General footprint drawings follow.

The installation space required is dependent upon the detector aperture size. The space required can be determined from the measurement between the top of the infeed product pipe to the surface upon which it is to stand.

An allowance of 10mm should be added to allow space between the end of the feed pipework and the start of the detector product pipe. The surface upon which the system stands must be capable of adequately supporting its weight, and any additional pipework, which may be fitted to the reject device. The weight of the system is on its serial number plate, located on the system framework.

The system requires adequate clearance around its circumference to allow easy, access for operation and cleaning. A minimum clearance of 1 metre (39.4") is suggested.

Coupling of the product feed pipework to the system pipework is via a plastic flexible gaiter secured to the pipe with reusable ties; direct contact between the pipes must be avoided. Output pipework is connected directly to the rectangular flanges at both the good and reject ports on the bottom of the reject device.

Short frame systems (all aperture sizes and mounting options)

For optimum performance, the distance between the top surface of the search head and the point at which the product begins to freefall should not exceed 500mm (19.7").

Long frame systems (all mounting options but varies according to aperture size)

For optimum performance, the distance between the top surface of the search head and the point at which the product begins to freefall should be as shown in the table below:

Aperture size	*Distance to the top surface of the detector*
125mm	1000mm (39.4")
175mm	1450mm (57")
250mm	2100mm (82.7")

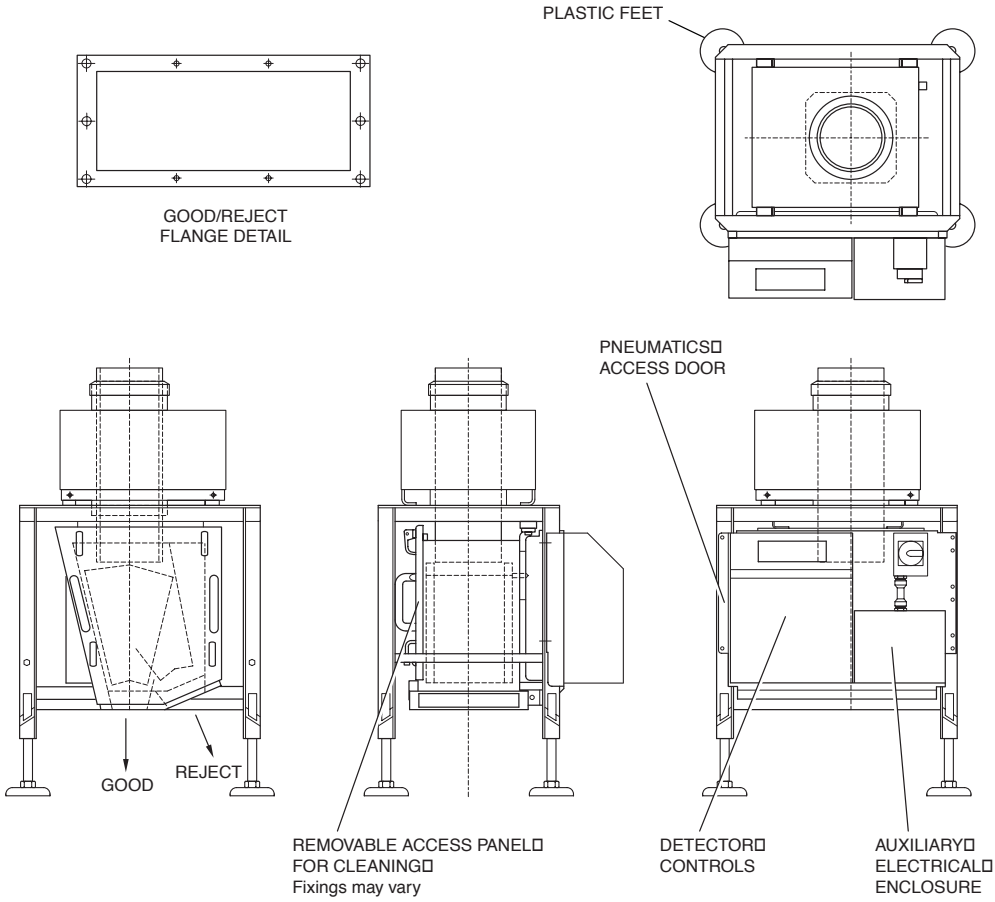
When installing a short frame system attention must be paid to the metal free area requirements as set out in the *Search head metal-free area*, page 100.

Metal free area long frame systems

- There shall be no fixed metal closer to the detector aperture than 1.5 times the aperture size as measured from the centre line of the detector case depth.
- There should be no moving metal closer to the detector aperture than 3.0 times the aperture size as measured from the centre line of the detector case depth.
- The metal-free area is symmetrical about each side of the detector.
- The metal-free area may be reduced, but at the possible expense of sensitivity.

Aperture size	*Fixed metal*	*Moving metal*
125mm	188mm	375mm
175mm	263mm	525mm
250mm	375mm	750mm

Surface standing

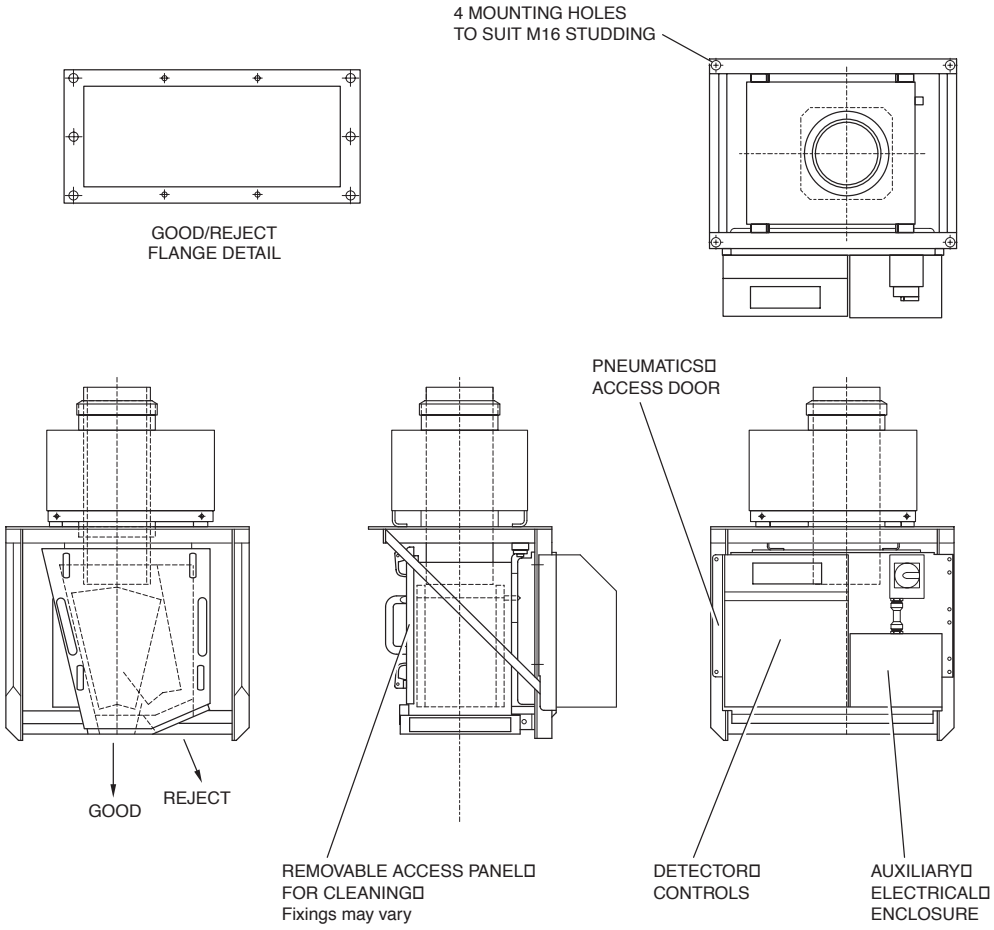


Installation Footprint Floor Mount

The system has ±75mm (3") of height adjustment via its screw legs. It is advisable to keep the amount of extended leg as short as possible.

The height adjustable legs are fitted with feet, each with one or two 10mm (3/8") clearance holes. The system must be secured to the surface upon which it stands to prevent movement during reject operation. Failure to do this will put undue pressure on the pipework to which it is connected. This may be detrimental to the overall operation and mechanical safety of the system.

Suspension mount



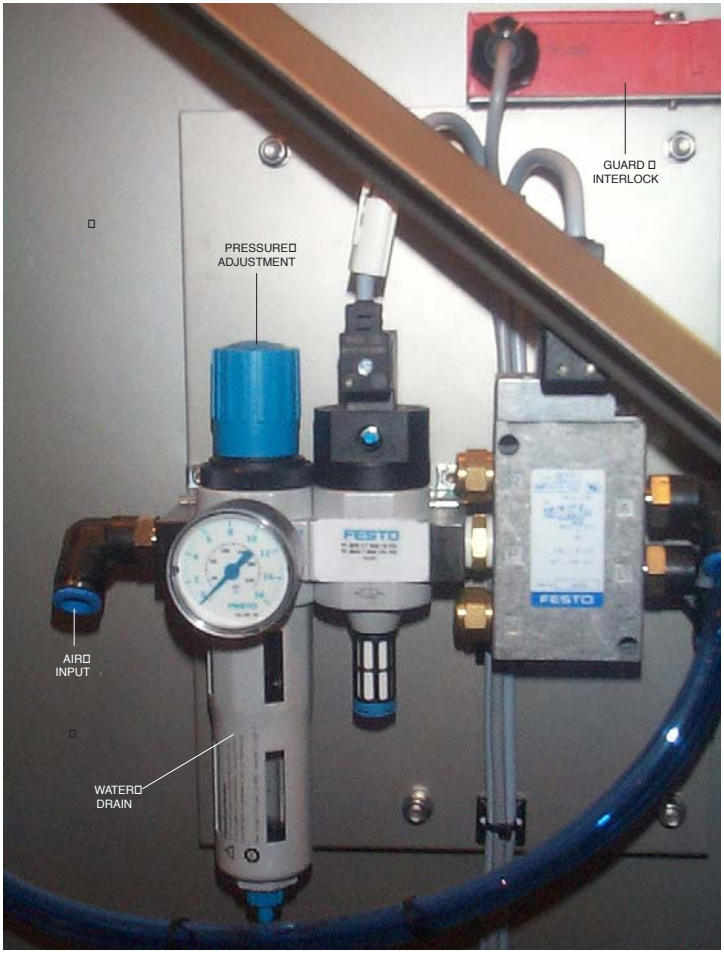
Installation Footprint Suspension Mount

The system should be hung rigidly using 16mm studding insulated from the main framework; it must be level across the corners.

Connecting the air supply

NOTE: An air supply at a pressure of between 3.5 bar (52psi) and 4.5 bar (66psi) is required to operated the reject device. The air supply must be dry and lubricated.

- Connect the compressed air supply to the input side of the air regulator unit via 10mm outside diameter pipe. This unit is located on the right-hand side of the system framework when facing the detector controls. The air pressure is set at 4.0 bar (60psi) using the control situated on the top of the water trap bottle.



Connecting the electrical supply

The system requires a single-phase ac supply with earth and neutral as indicated by the voltage label on the enclosure.

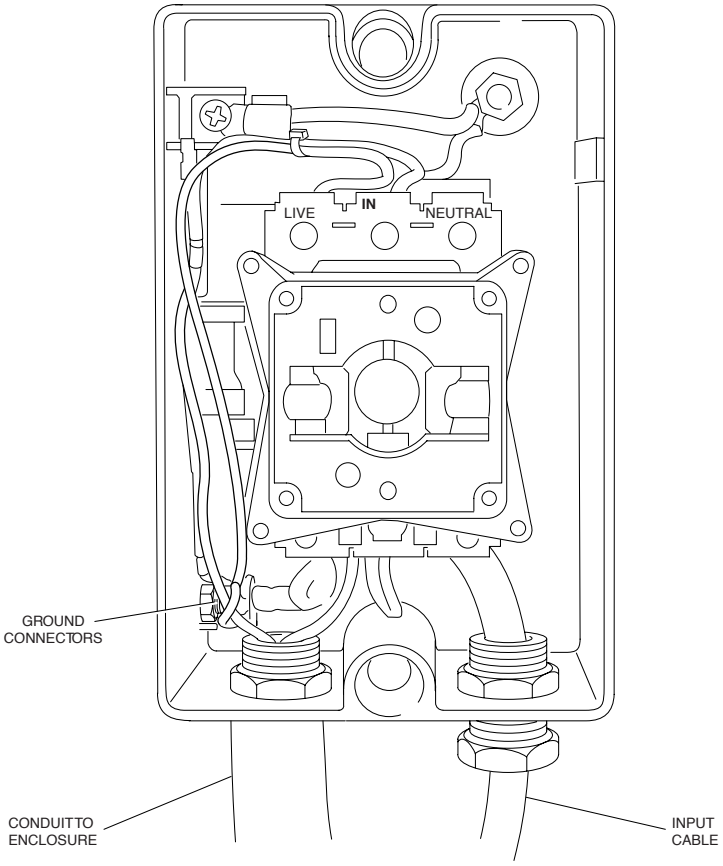
The supply is connected via the main isolator located on the right-hand side of the control box when facing the detector controls.

When routing the main supply source to your system ensure the cable routing does not pass through nor run parallel to any electrically noisy enclosures or cables. Do not mix main supply cables with signal cables.

Power cabling must be rated at no less than 5A current carrying capacity and must be either 3-core cable fed through a flexible conduit or 3-core armoured cable.

- Power cabling for a UL approved model is 20-16AWG fed from a locally positioned switch or circuit breaker that is within easy reach of the operator. The breaker must be labelled as the disconnecting device for the equipment. Cable tightening torque is 5.5in/lbs routing into the control box as in the above diagram.
- Insert the cable through a suitable gland.
- Split the cable inside the box and cut the wires to suitable lengths.

- Make the connections to the connector block as follows:



AC wiring colours will vary according to territory.					
North America	Black	=	HOT	to	L1
UL approved models	White	=	NEUTRAL	to	N
120V	Green/Yellow	=	EARTH	to	Brass terminal
All Others	Brown	=	LIVE	to	L1
200/240V	Blue	=	NEUTRAL	to	N
	Green/Yellow	=	EARTH	to	Brass terminal

IQ² search head only installation

This section describes how to install a Loma metal detector search head to either an existing conveyor or to a conveyor being built by a customer.

Electrical supply considerations

All Loma equipment is designed to operate under factory conditions, and has been tested to recognised international standards for mains-borne interference. It is still necessary, however, to ensure that the equipment is nor subjected to excessive electrical noise via its supply. The following simple steps should be followed to ensure this:

The unit should have its own dedicated supply, unless the line supply is known to be clean.

Any dedicated supply line should run in its own conduit/trunking away from other noisy supplies.

Any signal I/O which is connected to the auxiliary connections should be in screened cable, grounded at the point of entry to the detector control box, and kept free from sources of electrical noise (eg mains supplies for large electrical machines).

Before starting to install a head

Before starting to install a head on a conveyor, installation personnel are strongly recommended to read *Mounting heads on conveyors*, page 112, to thoroughly familiarise themselves with the installation requirements.

Connecting electrical supplies

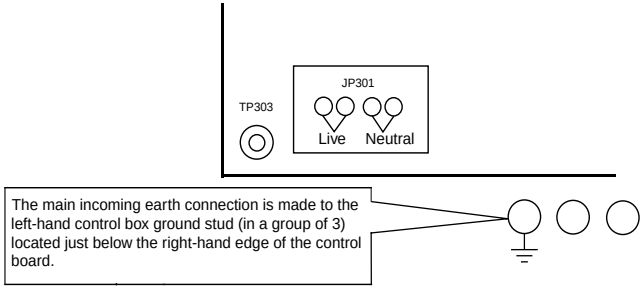
In the case of a metal detector search head supplied as a Head, electrical connections are made to a connector block inside the control box.

Use a clean supply source preferably with a dedicated breaker for both the main supply and reject power. It is important that the system has a good ground.

When routing the main supply source to your system ensure the cable routing does not pass through nor run parallel to any electrically noisy enclosures or cables. Do not mix main supply cables with signal cables.

Use a suitable suppressor to suppress the reject supply coil. This must be fitted as close as possible to the coil.

The following illustration shows the connection arrangements at the connector block:



- Power cabling must be rated at no less than 5A current carrying capability and be routed into the control box by a suitable watertight gland. The power input gland hole is on the extreme left of the control box when facing the controls.
- Power cabling for a UL approved model is 20-16AWG fed from a locally positioned switch or circuit breaker that is within easy reach of the operator. The breaker must be labelled as the disconnecting device for the equipment. Cable tightening torque is 5.5in/lbs routing into the control box as in the above diagram.

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

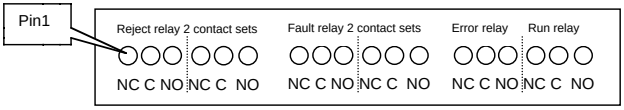
- Open the control box door and remove the safety cover angled terminal access plate only from the power supply cover. Place it in the bottom of the control box door.
- Split the cable inside the box and cut the wires to suitable lengths.
- The previous illustration provides connector block wiring details. Make the connections to the connector block as follows:

AC wiring colours will vary according to territory.			
North America	Black	=	HOT
UL approved models	White	=	NEUTRAL
120V	Green/Yellow	=	EARTH
All Others	Brown	=	LIVE
200/240v	Blue	=	NEUTRAL
	Green/Yellow	=	EARTH

Relay contact information

When connecting your own reject device refer to the voltage free relay connection information given below. It is suggested that the reject device wiring is connected in series with a set of fault relay contacts to enable the reject to be operated in the event of a system fault being generated, ensuring failsafe reject operation for a fault condition. Contact switching information is given in *About the metal detector range*, page 1.

Connections are made depending upon your requirement. Contacts shown are for relays when de-energized (failsafe):



- Check that all connections are secure and correct, then securely refit the terminal access plate to the power supply cover.
- Close and secure the control box door.
- Please refer to *Appendix F* for details for connecting reject confirmation, bin full and product registration photo-eyes.

Mounting heads on conveyors

Loma has been manufacturing metal detector systems for many years now, and our current conveyor design incorporates this wealth of experience. There are a number of points to watch 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, if nuisance triggering necessitating operation at reduced sensitivity settings is to be avoided.

- The conveyor must be of substantial and welded – not bolted – construction.
- There shall be no fixed metal closer to the centre of the detector aperture than 1.5 times the smaller of the two aperture dimensions; see *Further information*, page 118.
- There should be no moving metal closer to the centre of the head aperture than three times the smaller of the two aperture dimensions.
- The head should be mounted on the conveyor using the mounting kit supplied.
- The conveyor belt should be of plastic construction with an angled heat sealed or vulcanised joint. Straight joints using even non-metallic clips must not be used. Rollers should be PVC coated steel or of high grade stainless steel construction.

- The belt must be supported through the aperture by a non-metallic skid plate such as Tufnol which must be strong enough not to bow under the product weight.
- Electrical Interference. The reject relay usually switches inductive loads such as motor starter contactors, solenoid valves etc. Suppressors must be fitted to these devices.

Most problems with intermittent or nuisance triggering are due to insufficient appreciation of the basic problems involved. The following sections explain the reasoning.

Conveyor construction

Where the product to be screened is dry or frozen, the detector can be run in dry or resistive mode, where it is inherently resistant to vibration or shock. However, where the product is wet and/or salty (eg fresh meats, meat products, cheese, pickles, mortar etc.) the unit has to be run in reactive mode to compensate for product effect. In consequence the detector head's resistance to vibration is much reduced. The conveyor must therefore be designed with this criterion in mind.

It must be capable of supporting the detector head (larger ones can weigh hundreds of kilograms), together with the product, at all times without flexing or sagging at any point and with the minimum of inherent vibration.

The metal detector is a radio frequency electromagnetic device which sets up a high frequency field through the aperture. The stainless 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 head. However, because there has to be an aperture through which the product to be monitored can pass, some of this field radiates to the outside and, by induction, causes small electrical currents (eddy currents) to flow in nearby metallic structures which form closed electrical circuits or loops.

Such closed loops are inherently part of the framework of the conveyor upon which the head is mounted and consist of side supports, stringers, cross braces, rollers and roller shafts, etc. Provided that the eddy current paths have a constant electrical resistance, the metal detector can 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 – bolts can loosen slightly due to vibration and mating surfaces can corrode or get painted over – all of which will affect the resistance of the joint and can cause false triggering.

With rollers it is virtually impossible to provide a constant resistance path, mainly because the bearings are usually lubricated by grease which is non-conductive. The balls act as the contacts and in consequence the contact resistance varies as they move through the grease. Here the alternative approach of permanently open circuiting the loop must be taken 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 circuited or short circuited provided it can be guaranteed 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 the conveyor, since large eddy current loops can be formed by service conduits such as electricity and air. Only bring down one electrical conduit since it has to be bonded to the conveyor frame for safety electrical earthing purposes. For the same reason, the metal detector conveyor should not be bolted directly to any infeed or outfeed conveyors.

Ensure that the air service pipe, if metallic, is insulated where it touches the head 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 in on flexible nylon tube.

To prove the point you may like to try a simple experiment. Take a piece of wire and form it into a loop a little smaller than the aperture. Do not at this stage short 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 off. If the ends of the loop are intermittently close and open circuited, it will be found that the detector will trigger at the instant of open or close circuiting the loop even when it is at some distance from the aperture.

Fixed metal

Since the detector is efficiently screened, large masses of metal near the top, bottom or sides will not effect its performance. However metal nearer to the aperture than 1.5 times the smaller of the two aperture dimensions can be a major cause of poor performance, requiring the detector to be run at a reduced sensitivity. The general guidelines which can be followed for metal free area for all head sizes are illustrated in *Further information*, page 118.

Metallic infeed and outfeed decking brought to the limit of the fixed metal area must be supported and fastened down firmly along the edge closest to the aperture, otherwise it becomes moving metal and must be sited further away, see below. This movement need only be very small and cases have been known where the decking was ‘singing’ as the conveyor belt passed over, causing spurious detections. Any guide rails mounted near or

into the aperture must also be non metallic. Use Darvic or some similar material and keep the mounting posts out of the metal free area.

Moving metal

Moving metal must be sited at least three times the smaller of the two aperture dimensions from the centre of the head, as illustrated in *Further information*, page 118. Moving metal includes rollers whether idler, drive or end rollers. This requirement determines the minimum length of the conveyor, eg for a 300mm smaller dimension aperture, assuming the head is sited in the middle, the minimum conveyor length has to be 1.8m to ensure that the end rollers are out of the moving metal free area.If rollers cause false triggering when rotating, try insulating one end to open circuit a possible eddy current loop. Other moving metal could include supply cables or conduits draped across or to one side of the conveyor and not rigidly fixed.

Vibration

It is important that the head is not subjected to excessive vibration. Thus the conveyor on which the head is mounted must be substantial and well supported to keep the head stable. Electrical services to the head must be taken up in a flexible not rigid conduit.

NOTE: Do not use the head or control box as a convenient point to anchor any conduit or pipe work whatever, whether it be rigid or flexible.

NOTE: Do not use the head as a walkway across the conveyor or as a convenient writing desk or repository for odds and ends.

Belting

The conveyor belt should be of a plastic or polyurethane type with an angled belt join, preferably at 60˚, but no more than 75˚, and be vulcanised or heat sealed. A 90˚ lap, clipped or sewn joint is not acceptable as product can get picked up in the joint and the detector will have to be run at reduced sensitivity to avoid false triggering.

Some belts, particularly slatted types, use oxide pigments as a colouring material. These are metallic in origin and can cause false triggering, particularly at the belt joint where the oxides are concentrated. These should be avoided.

Care must be taken when fitting a belt that all metallic swarf and filings have been cleared away and that all rollers are coated, preferably with PVC, to prevent rust formation. Rust on the rollers or swarf will be picked up onto the underside of the belt and will cause false triggering.

Care must be taken to ensure that the belt tracks easily and does not track off touching the aperture sides. Apart from cutting a groove into the aperture wall, vibrations will be transmitted causing false triggering. It should be noted that most slatted belting use metallic pins to join the slats. These must be replaced by non-metallic pins.

Skid plate

It is imperative that the belt does not touch the bottom or sides of the aperture. The belt must be supported through the aperture by a non-metallic skid plate such as Tufnol, Darvic, Phenolic (dry applications) or Delrin (wet applications). This must extend beyond the metal free area and be firmly fixed to the conveyor frame to be level with the infeed and outfeed decking. It must be strong enough not to bow under the product weight as it passes through the aperture. There must be at least 10mm clearance between the bottom and sides of the skid plate and the bottom and sides of the aperture.

Care must be taken to prevent anything touching the aperture top or bottom or sides including product passing through, skid plate, guide rails, etc. Care must be taken in conveyor system design to prevent product build-up at the sides and under the skid plate which eventually will cause false triggering.

Electrical interference

The detector head has been designed with a high immunity to mains borne interference. If trouble is experienced, the offending devices should be located and suppressed at source where it is much easier to control. The detector may have to be run at reduced sensitivity if this is not possible. We must also highlight the possible problem of other metal detectors that may be in the vicinity. These could cause interference if operating on the same frequency. We advise a distance of not less than 27x the smallest aperture dimension (ie height or width) between the detectors.

All inductive devices, such as reject solenoid valve coils, motor starter contactors and similar devices, should be suppressed by fitting suitable suppressors across the inductive load as close as possible to the coil. Other devices such as thyristor control gear should be suppressed in the best possible manner. Airborne interference is more difficult to deal with as it is being picked up by the search coil acting as an aerial. Common sources are radio

paging aerials and loops, RF heaters, welders of all types and even airport radar. The only cure is to re-orientate either detector head or the source of interference so that the aperture is not looking directly at it.

Post-installation problems

Commissioning procedures are covered comprehensively in Service Bulletin MD20. Copies are available on request.

Spurious triggering

Moving metal anywhere within the metal free area up to a distance of twice the smaller of the aperture dimensions away from the head can be detected.

Examples of moving metal include:

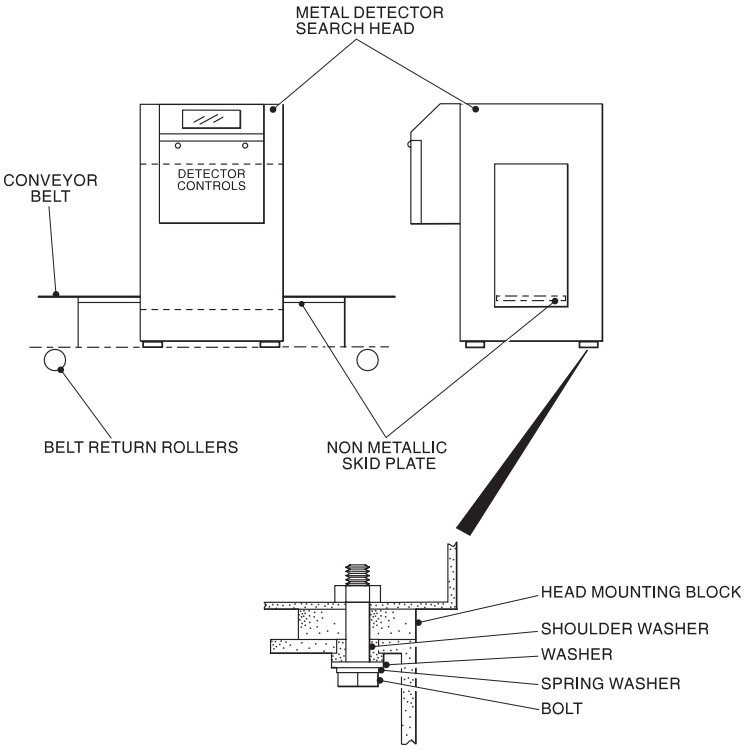
- Operator rings or watches
- Belt contamination even by small particles of rust
- Metallic belt clips even if plastic coated
- Metallic guide rails particularly into the metal free area
- Loose infeed decking
- A conveyor bolted together rather than welded
- Metallic inks or labels
- Metallic frames to infeed or outfeed guards
- Low grade or reclaimed cardboard packing materials which often contain metallised paper or foil
- Washers or swarf under the skid plate.

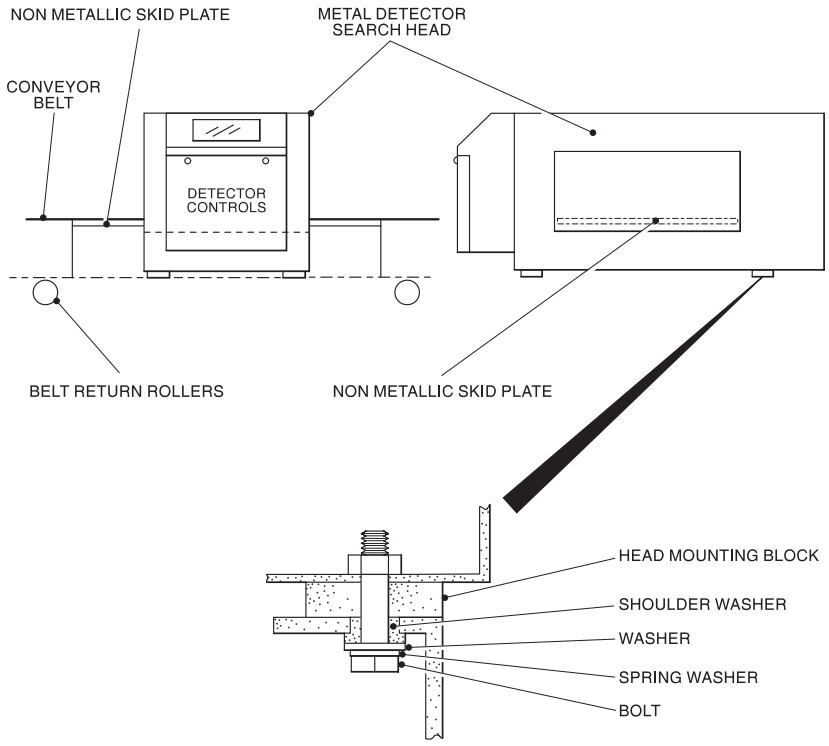
Other causes, include:

- Excessive vibration, particularly when run in reactive mode
- Eddy current loops
- Aperture pressure
- Electrical Interference and EMC considerations.

Further information

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





Further information and advice can always be obtained from the Service Department.



Maintenance

This chapter describes the maintenance procedures for the metal detector range.

Inspection and cleaning procedures

These procedures relate to all the metal detectors in the IQ^2 range unless otherwise specified.

Invalidation of Warranty

Your warranty may be invalidated if you do not follow the maintenance schedule set out within this user manual.

This warranty statement is in addition to the terms of sale.

Warnings

The following safety warnings apply to these procedures:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES.

2. LETHAL HAZARD - COMPRESSED AIR SUPPLIES.

3. WORKING ON EQUIPMENT.

4. REJECT DEVICES.

For details, see *Safety warnings*, page iii.

See also the safety warnings relating to specific metal detectors in the *Preface*.

Cleaning information

The table following gives information on suitable cleaning regimes:

System	*Hose wash*	*Light hand wash or Dry wipe*
Conveyor systems	Yes	Yes
Handtmann and pipeline systems	Yes	Yes
Long frame freefall systems	No	Yes
Search heads with a white aperture finish	Yes	Yes
Pharmaceutical systems	No	Yes
Short frame freefall systems	No	Yes
Stand-alone freefall systems	No	Yes

Do not hose wash UL approved controls; use only a light hand wash and wipe dry procedure.

Cleaning regime

A typical cleaning regime consists of the 5 stages.

- Pre-rinse
- Detergent rise
- Rinse
- Disinfectant rinse
- Final rinse

Cleaning solutions

Detergents are typically alkaline solutions with a PH value of 5 to 6. Disinfectants typically contain Chorine 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 in accordance with the individual system paragraphs will reduce/eliminate micro-biological 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.

If a hose wash is to be used the maximum safe wash down conditions are as follows:

- Water jet nozzle is < 12.5mm (1/2") diameter.
- Water delivery rate is <105 litres/minute (23 gallons/minute).
- The distance of the nozzle from the equipment is 2.5 - 3.0 meters (8.0 - 10 feet).
- Never direct water into bearings.

Cleaning

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*, page 133.
- Check the security of all conveyor-guarding systems.
- Reconnect power and air systems.
- When 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*, page 135.
- For plastic modular belt conveyors check for belt damage. For replacing individual sections see *Plastic modular belt conveyor versions – belt section replacement*, page 134.
- Check the correct operation of the reject system. Advice can be found in *Good practice*, page 31.
- For systems with reject confirm and bin full check their correct operation. Bin full will operate if the sensor is blocked for > 5 seconds.

Pipelines including filler specific versions

- Pipeline systems should be cleaned daily or after each production run.
- Isolate the electrical and pneumatic supplies to the system.
- Disconnect pipeline system including any automatic reject system from the line
- If the system employs and extension linker drive assembly inspect the drive teeth for any sign of damage.
- Remove any automatic reject system from the outfeed of the pipeline. If the system is fitted with one of the listed reject valves in this manual, clean the valve according to the type *Specific cleaning procedures*, page 125.
- Remove and clean the product pipe and couplings; see *Cleaning the product pipe and couplings*, page 127.
- Pipeline systems may be cleaned using hose down or steam cleaning.
- Rinse and wash through with a disinfectant.
- Rinse and dry thoroughly all washed areas.
- Reconnect power and air systems.
- Check that the reject mechanism or automatic reject valve operates correctly.

Pharmaceutical versions

- Isolate the electrical supplies to the system.
- Pharmaceutical versions are not suitable for hose down or steam cleaning.
- Check wheels are locked.
- Check security of and damage to any fixtures and fittings, including the height adjustment clamp.
- Remove and clean the product chutes and covers clean as described in *Pharmaceutical versions*, page 130.
- Refit parts reconnect power and check correct operation of reject and confirm systems.

Freefall versions

For details on cleaning refer to *Cleaning the freefall head*, page 131 and *Cleaning a diverter reject*, page 132.

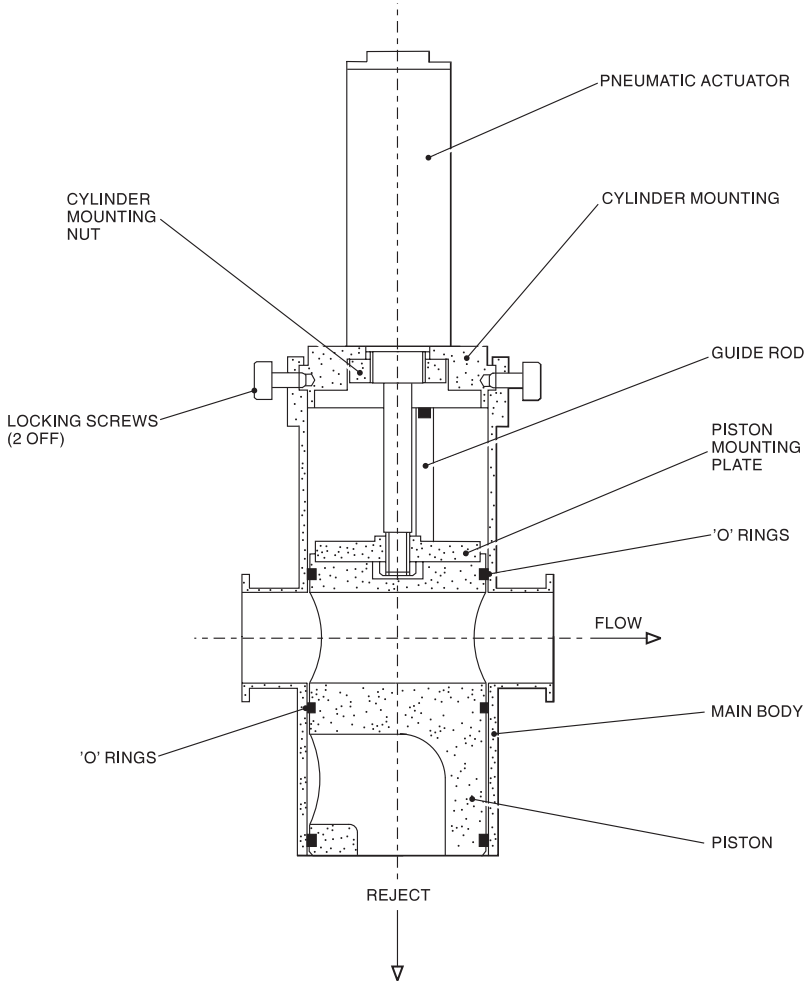
- Isolate the electrical and compressed air supplies if fitted.
- Check the security of all fixtures and fittings.
- Restore the electrical and compressed air supplies as required.
- Check the operation of the reject system.
- Freefall versions are not suitable for hose down or steam cleaning.

Specific cleaning procedures

NOTE: After any of the following procedures thoroughly dry all the washed components to remove any detergents, to avoid product contamination.

Cleaning the automatic reject valve (Loma ARV)

- Isolate the electrical and compressed air power supplies to the metal detector.
- Unscrew the two knurled locking screws.
- Turn the two release handles in a counter-clockwise direction to release the piston assembly. Lift the piston assembly out of the valve body.
- Thoroughly clean the piston using a mild detergent solution.
- Check that the fitted ‘O’-rings are in good condition; replace if any sign of damage.
- Lift the piston assembly by the two release handles and lower it into the valve body. Ensure that the direction of flow is correct.



- Turn the handles in a clockwise direction to secure the piston assembly in the body.
- Tighten the two locking screws.
- Restore the electrical and compressed air power supplies to the metal detector.

NOTE: Do not inject water directly into Linker drive gears.

Cleaning the product pipe and couplings

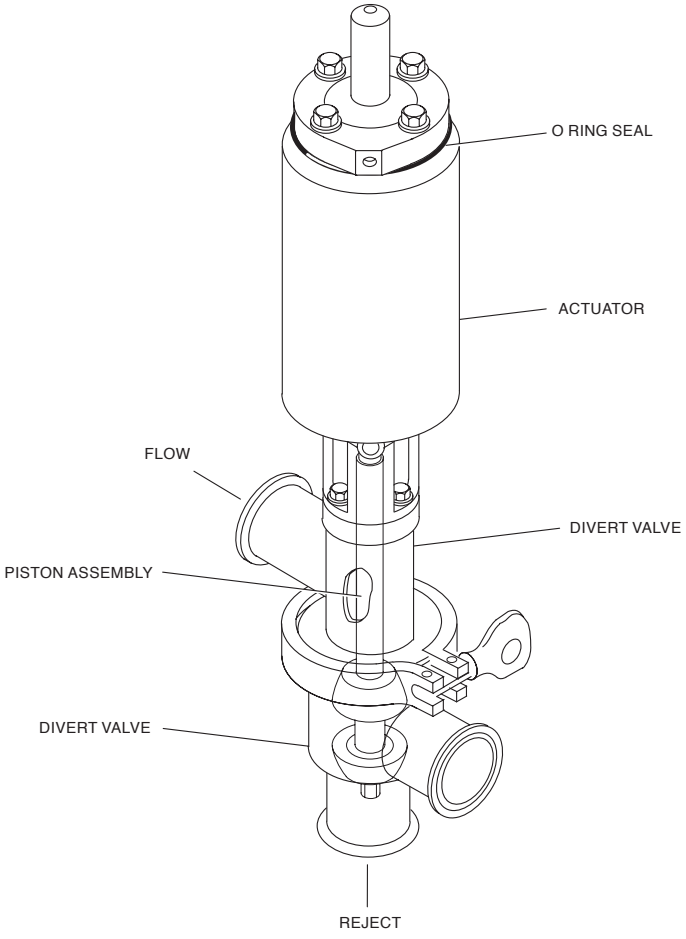
Pipeline versions

- If the product pipe is fitted with a water jacket isolate the water supply and disconnect the water pipes.
- For 2", 3" and 4" models undo the product pipe from the fixed fitting using the spanner provided.
- Withdraw the product pipe and floating fitting from the bracket.
- Once removed the floating fitting may be unscrewed from the product pipe.
- For 2.5" models, loosen the outlet nut then remove inlet nut with the 110mm end of the pipe spanner provided.
- Move the pipe assembly 3mm towards the outfeed to disengage spigot from the inlet flange.
- Rotate pipe to position inlet tube fitting to clear corner of head aperture. Then pull the complete assembly clear from the outlet end.
- Unscrew the inlet fitting using the spigot spanner provided using the 70mm end of the pipe spanner to hold the pipe.
- Unscrew the outlet nut; pull the outlet fitting from the pipe.
- Thoroughly clean the product pipe and couplings using a mild detergent solution.
- Wash with a disinfectant followed by a thorough rinse.
- Check the condition and replace if required any ‘O’ ring seals.
- Assembly is the reverse of disassembly. Food grade silicon grease may be applied to ‘O’ rings and pipe threads to aid assembly

Cleaning the Ladish Dairy reject valve (CIP compatible)

Pipeline versions

- Isolate the electrical and compressed air power supplies to the metal detector.
- Unscrew the clamp and remove the lower valve body from the upper valve body.
- Unscrew the piston from the actuator and thoroughly clean the piston and valve using a mild detergent solution.
- Inspect the fitted seals and seats for signs of excessive wear. Replace as necessary.



- Check that the fitted ‘O’-rings and the split bushing are in good condition. Replace as necessary.
- Screw the piston onto the actuator.
- Replace the lower valve body and clamp the upper and lower valve bodies together.

Replacing the actuator bushing/packing

Pipeline versions

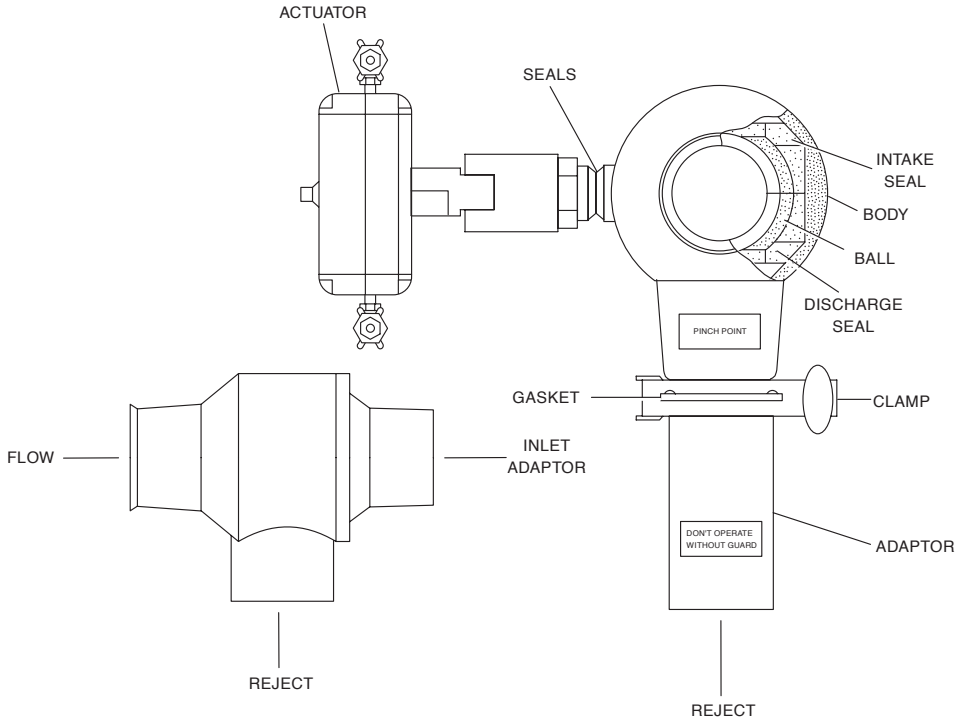
- Remove the end cap from the actuator by unscrewing the four screws, separate the clear stem protector from the end cap and replace the end cap.

- Apply 60psi air to the end cap, which will force the packing and bushing out. Remove the air supply once this occurs.
- Replace the packing (with the ‘v’ side facing the actuator) and the bushing, taking care not to damage or roll the lip of the packing.
- Replace the end cap and four screws.
- Carry out this procedure to the other end of the actuator.
- Restore the electrical and compressed air power supplies.

Cleaning the Lee Turbo Ball reject valve

Pipeline versions

- Isolate the electrical and compressed air power supplies to the metal detector.
- Unscrew the three wing nuts and remove the inlet adapter from the valve body.
- Unscrew the four screws which attach the actuator bracket to the valve body and remove the actuator adapter and coupler.
- Unscrew the valve stem from the “T” ball and thoroughly clean the ball using a mild detergent solution.
- Inspect the fitted seals for signs of excessive wear. Replace as necessary.



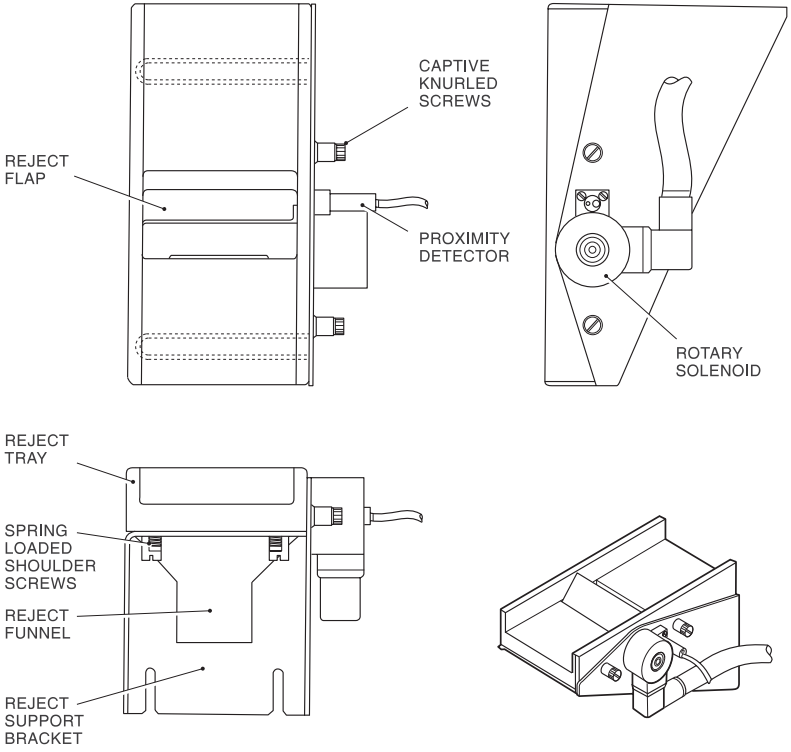
- Check that the fitted ‘O’-ring is in good condition. Replace as necessary.
- Insert the “T” ball and seals into the valve body, and replace the valve stem, actuator coupling and adapter.
- Replace the actuator bracket and tighten the four screws.
- Replace the inlet adapter and tighten the three wing nuts.

Cleaning the reject mechanism

Pharmaceutical versions

- Isolate the electrical supply to the detector.
- Loosen the two knurled knobs that are located at the underside of the product chute and carefully withdraw the chute from the detector head. Gently tighten the knurled knobs, to avoid loss, while cleaning.
- Remove the polycarbonate cover from the reject tray.

POLYCARBONATE COVER REMOVED FOR CLARITY



- Unscrew fully both captive knurled screws that are attached to the reject support bracket. This releases the tray and flap. Hold the reject flap and pull the reject tray approximately 25mm away from the rotary solenoid. Disengage the reject flap from the shaft and remove it. Pull the tray away from the solenoid until it is released.
- Wash the product chute, polycarbonate cover, reject tray and reject flap in a mild detergent solution. Rinse and dry thoroughly.
- Either dust or lightly brush the remainder of the reject assembly to remove any loose particles. Do not use any cleaning fluids.
- Ensure that all components are clean and dry before re-assembly.
- Reach under the reject support bracket and push vertically the two spring-loaded shoulder screws that are furthest away from the solenoid. This allows the reject tray to slide onto the dovetail clamps. Push the tray towards the solenoid shaft until the shaft appears flush with the hole on the inside of the tray.
- Hold the reject flap at an angle of approximately 45° to the horizontal and locate the headed pin held captive in the tray with the circlip. Now carefully push the tray approximately 1.5mm towards the solenoid to engage the solenoid shaft and flap. Push the tray fully home and release the flap. Re-tighten the two knurled captive screws to secure the tray.
- Refit the polycarbonate cover on the reject tray.
- Loosen the two knurled knobs on the product chute and refit the chute in the original position in the detector head. Tighten the two knurled knobs to secure the chute.
- Switch on the electrical supply to the metal detector.
- Check the reject operation and confirmation system.

NOTE: Do not operate the metal detector unless the infeed chute and the polycarbonate cover are fitted in position.

Cleaning the freefall head

Stand-alone versions

- Isolate the electrical supply to the metal detector.
- Wipe down the metal detector with mild detergent.
- Restore the electrical supply to the metal detector.

Cleaning a diverter reject

- Isolate the electrical and air supplies to the metal detector.
- Release the swell latches or hand wheels (fixings may vary) on the removable access cover and carefully remove. The door is attached to the main frame by a ground lead and therefore cannot be completely removed.
- Remove the diverter bucket from its two location pins.
- Inspect the good and reject product chutes; clean as necessary. If the system is fitted with a Test Ball collection system clean any residual product from the fitted mesh pieces.
- Using a mild detergent clean both the bucket and the inside of the housing thoroughly, ensuring all residual product is removed.
- Thoroughly dry all washed components before re-assembly.
- Re-assemble the bucket, ensuring both pivot pins are correctly located in the drive arm.
- Replace the access cover ensuring the diverter pivot pin is correctly located into the access cover bearing housing. Secure all the swell latches.
- Restore the electrical and compressed air supplies to the metal detector.
- Check the operation of the system by placing the test sample balls into the access door located in the product pipe above the detector.

Routine maintenance

These procedures relate to all the metal detectors in the IQ^2 range, unless otherwise specified.

Warnings

The following safety warnings apply to these procedures:

1. LETHAL HAZARD – ELECTRICAL SUPPLIES.

2. LETHAL HAZARD – COMPRESSED AIR SUPPLIES.

3. WORKING ON EQUIPMENT.

4. REJECT DEVICES.

9. CONTAMINANTS.

See also the safety warnings relating to specific metal detectors in the *Preface*.

For details, see *Safety warnings*, page iii.

Greasing

Drive end and idle roller shafts on conveyor systems are fitted with bearings that require greasing at regular intervals.

Freefall diverter reject devices are fitted with bearings that require greasing at regular intervals.

Bearings should be greased four times per year, unless the environment or cleaning regime dictates greasing more frequently. BP Energrease LS2 or an equivalent grease is recommended.

Conveyor systems

- Isolate the electrical and compressed air supplies.
- Some designs may require the removal of fitted covers or guards to gain access to the bearings.
- Using a grease gun, apply grease to each nipple in turn. Take care not to apply too much grease. Grease should not issue from the bearing.
- Re-connect the electrical and compressed air supplies.
- Ensure all removed covers/guards are replaced.

Freefall systems a with diverter reject

- Isolate the electrical and compressed air supplies.
- Release and open the hinged door upon which the control box is mounted; an allen key is required to remove the fastenings.
- Using a grease gun, apply grease to each nipple in turn. Take care not to apply too much grease. Grease should not issue from the bearing.
- Close and fasten the door. Re-connect the electrical and compressed air supplies.
- Ensure all removed covers/guards are replaced.

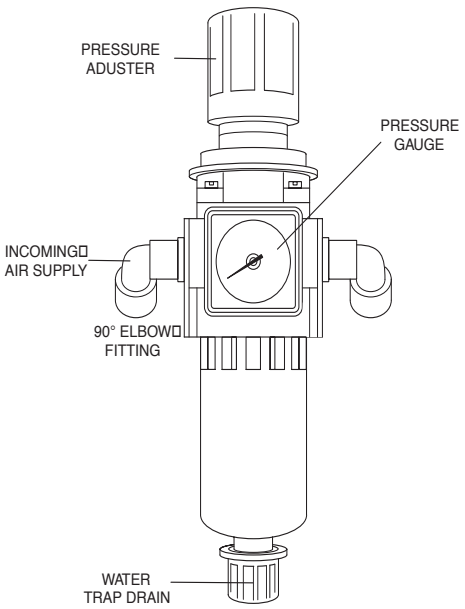
Air regulator unit maintenance

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 anticlockwise 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.

A typical regulator unit is shown for information:



The correct setting of the air pressure can be found in the individual system specifications in *About the metal detector range*, page 1.

Conveyor belt maintenance

Plastic modular belt conveyor versions – 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.

NOTE: 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 left. 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 mechanisms

Pusher and retracting band rejects

At the reject solenoid valve, adjust the two throttle screws, in conjunction with the reject delay and dwell times, 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. There is no air regulator supplied with the air blast reject. However, the air supply pressure should be approximately 100psi (6.9 bar).



Appendices

Appendix A – Reverse Calibration

This menu option replaces the **Full calibrate** menu. It will only appear when the product selected is set to **Detection REVERSE**.

When the detector is operating in **Reverse**, the selected product must be calibrated using the **Reverse calibrate** function to achieve optimum performance. Products used for calibration 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 Autocal is set to **SHORT**).

Once this command has been initiated the Reverse calibration cycle takes place, commencing with the instruction **Pass good product**. During this cycle the product containing the metal object is passed through the search head until the optimum head power is selected.

When this has been selected, the message **Head Power x set** will be displayed, where **x** is the head power that has been selected. This will be followed by the message **Pass fail product**.

It may be necessary at this stage to change the orientation of the metal object and repeat the first stage of the calibration sequence to ensure that the lowest head power setting is chosen ie the maximum signal is obtained from the product.

The calibration sequence can then be continued by passing products which do not contain metal, to obtain the correct working mode, compensation and threshold values.

If the calibration cycle is started by invoking the **Rev calibrate** command in the **Product setup** menu, then the product number calibrated will be the one specified in that menu. The current running product will otherwise be calibrated.

Press ↵ to initiate a Reverse calibration cycle for the currently selected product number.

+Head overload+	The head power cannot be reduced any further to stop the head overloading. Possible reasons for this could be that the calibration pack has a large metal content, causing the head to overload; a product not specified for operation of the machine is being used, such that it is too conductive for the machine configuration; 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 signal, and therefore the detector has chosen to set the compensation to minimise the effects of vibration (ie 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 **Manual Setup** menu). This would typically be because the calibrate pack is contaminated or is too conductive for the maximum threshold setting. Check that the correct calibrate pack(s) is representative of production packs. If in doubt, call your nearest Loma Service Centre.
+Power reducing+	The unit is reducing the head power to account for the metal content of the product.
+Head locked+	The unit is using the Head Power value from **Manual setup** menu, rather than determining it itself, as the head power has been locked in that menu.
+Mode locked+	The unit is using the working mode from the **Manual setup** menu rather than determining it itself, as the working mode has been locked in that menu.
+Dry product+	The product has little product signal, and therefore the wrong mode of working may have been locked.
+Calibrate complete+	Reverse calibration was successful.

Whilst the Reverse calibration cycle takes place, the metal detector will not attempt to check for any metal contamination (the Run Detect LED will go out).

If **Reject out of** run has been selected in the **User options** menu and a photo-eye is fitted, all packs will be rejected during the calibrate cycle.

Appendix B – Commissioning Guide

Each time the detector is switched on the software version fitted on the detector's control board will be displayed for approximately 0.5 seconds. If this is the first time the detector is switched on it needs to be configured for the end application. Wherever possible this will be carried out by Loma before the unit is dispatched, or by a Loma Service Engineer during a commissioning visit. Primarily, this information is required to optimise machine performance for the application, and to enable certain features.

There are circumstances, however, where it may be necessary for the end user to carry out the commissioning procedure for the control unit himself. Typically, this would occur when Loma do not have enough information about the end application, such as the belt speed or reject details, to fully configure the machine. There are, in addition, other instances such as performing a software update, moving the detector to a different application, replacing a control card, etc. The unit can easily be set up from scratch as required. Alternatively, if only small changes are required to the configuration of the machine, then the menu entries within the **Service** menu can be adjusted individually.

Configuring the metal detector

Record the configuration details for the machine on the map menu. We suggest that you fill this in when you configure the system, so that if you ever need to repeat the exercise all the information will be ready to hand.

To enter the **Configuration** menu:

- Press .
- Press  until the display shows **Service** and press .
- Press  until the password shows **76** and press .

The display shows **User options**.

- Press the  until the display shows **Configuration** and press .

The display shows **+Not detecting+**.

The correct parameters must now be entered into the configuration menu. For information about using the menus see *Using the menus*, page 38.

The parameters and available options are summarised in the following table:

Parameter	*Options*
Language	ENGLISH (default entry), FRANÇAIS, NEDERL, DEUTSCH, ESPAÑOL, ITALIAN, PORTUGES, KATAKANA.
Type	CONVEYOR, FREEFALL, PIPELINE or PHARM.
Units	METRIC or IMPERIAL.
Photo-eye	Select **YES** if a photo-eye has been wired to the control board.
PEC fault	Select **YES** if a blocked or disconnected photo eye is to cause a System fault to be generated, or **NO** if a Run error is to be generated.
Coil gap	Enter the coil gap as shown on the machine details plate (inside control box) or from the table in your Service Manual.
PEC length	This entry will appear, if a value must be entered. The PEC length is the distance from the centre line of the photo-eye to the leading face of the detector plus the Rx distance (again shown on the machine details plate).
Filter resist	This entry will appear if speed mode is set to **FRUN**. Enter the filter resistor value as fitted on the main control board.
Speed mode	Select **FIXED**, unless your system is vari-speed or free running. For variable speed system select **VBLE**, and for free-running **FRUN**.
DSP	This entry will appear if speed mode is set to **FRUN**. Enter **YES** for a catalogue Freefall unit, otherwise **NO**.
Belt speed	This entry will appear if speed mode is set to **FIXED**. Enter the belt speed.
CTB constant	This entry will appear if speed mode is set to **VBLE**. Enter the **CTB** constant.
Log speed prob	This entry will appear if speed mode is set to **VBLE**. Enter **YES** to log speed too fast or too slow Run errors. Limits are determined by coil gap and filter resistance.
Tolerance	Select the required level of tolerance to be adopted during auto-calibration. The higher the setting the more sensitive the detector, but the more prone it will be to false rejects if the product effect varies (phase dispersion). We recommend **LOW** for most applications.
Autocal	Select the desired auto-calibration period: **Short**, **Long** or **Extra Long**. Short is recommended for most applications, provided that at least eight packs can be passed during a calibration cycle.

NOTE: PEC is the abbreviation for Photo-electric cell (photo eye). PEC fault is only available from software version IQ2V1.6.0.

The following table summarises the available tolerance settings:

Menu position	*% of calibrated threshold added*
MIN	15%
LOW	25%
MED	50%
HI	75%
MAX	100%

The Auto-calibration periods are summarised in the following table:

	Photo-eye	*No photo-eye*
Short	8 packs	20 seconds
Long	20 packs	1 minute
Extra long	n/a	2 minutes

- Press C to exit the **Configuration** menu.

Setting up user options

The detector must now be set up for the desired user options. Until you are completely familiar with the operation of the detector, it is recommended that all the options are left at their default values.

- Press ▲ until the display shows **User options**.
- Press ↵ to move into the **User options** menu, and then set up your options are desired.

The available options are summarised in the following table:

Options	*Description*
Tracker	This option will only appear if phot-eye operation has been selected in the **Configuration** menu. Turn this **ON** or **OFF** as required.
Reject time	Leave this at the default option of **ON** to enable access to the reject timing information in the **Product setup** menu. Only set this to **OFF** once the reject time has been correctly set, and you wish to deny line operators access to it.
Manual setup	Turn this **ON** or **OFF** as required.
Aux relay	Turn this to **ERROR** or **RUN** as required.
Access ferrite	This entry must be set to **YES**, in order that a ferrite tune can be performed.
Rej out of run	Turn this **ON** or **OFF** as required.
Cal trigger	Turn this **ON** or **OFF** as required.
Dual frequency	Set to **YES** to enable dual frequency operation, if it is a Dual frequency detector.
Aux relay	Select operation as I**N RUN**, **REJECT** or **DUAL** as required. **NOTE: IN RUN** is the default option unless the detector is dual frequency. **DUAL** option will only appear when Dual frequency is set to **YES**. When running Dual frequency no other setting can be selected.
*PV test	Set to **YES** to enable the Performance Validation system.
*Fault on PV	Set to **YES** to cause the fault relay to operate if a Performance Validation system test is not actioned or completed in the time allowed.
*Reverse mode	Set to **YES** to cause the detector to reject when there is no metal present in the product. **NO** is normal operation. The menu entry will only appear if photo-eye in the **Configuration** menu is set to **YES**.

- Press **C** to exit from the **User options** menu.

To set up the reject options

Refer to *Appendix E – Reject options*, page 151.

- Press **C** to exit the **Reject options** menu.

To set up serial links

If you are using any of the serial links, then you will need to set up the serial links as follows:

Serial link menu configuration

Link 1 may be set to one of the following options. Press ↵ to select the usage list then press it again and use ▼ to select one of the uses below:

USAGE	**NOT USED** is the default setting.
LOMALINK	For use with LomaLink control protocol.
or	For use with LomaView management systems.
REPORTS	For use with LomaNet or a single printer.

- Press ↵ to accept.

When LOMALINK or REPORTS is selected further menu entries within the link allow the protocol to be set.

- Press ▼ to step down the menu below:

Baud rate	150, 300, 600, 1200, 2400, 4800, 9600
Data bits	7 or 8
Stop bits	1, 1.5 OR 2
Parity	ODD, EVEN or NO
Flow Ctrl	NONE, CTS-RTS or XON-XOFF

- Pressing ↵ in any menu position changes the "*" to a ">". Use ▲ or ▼ to select entry required then press ↵ again to accept.
- Pressing C will exit the menu without making any changes.

NOTE: Please refer to *Displaying and printing reports*, page 49, if using the report option, or appropriate LomaView, LomaNet or LomaLink information.

The machine will now be looking for metal in your product, although the sensitivity will not be fully optimised as the detector has not yet been calibrated for the product. Before any products can be calibrated, it will be necessary to perform a ferrite tune in order to minimise the effects of vibration when running products with no product effect.

To perform a ferrite tune

- Ensure that **Access ferrite** in the **User options** menu is set to **YES**.
- Press G and press ▼ until **Ferrite F** is displayed.
- Press ↵
- Perform a Full Calibration whilst moving the end of the ferrite wand with the sample in and out of the search head.
- Take care not to put your hand in or get any watches/rings near the search head.
- On systems fitted with a photo-eye block the photo-eye to register that packs are present. To do this press ▼, followed by the ▼ and then ↵.
- Return to the **User options** menu and disable the access to **Access ferrite**.

The control unit is now fully commissioned for your application.

NOTE: For dual frequency systems ferrite calibration is done at the **HIGH** frequency setting of the detector.

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 on head only sales the following information should be observed when using vari-speed.

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.

CTB Constant

This parameter is the number of pulses per metre/foot of belt travel. For systems fitted with a photo-eye it can be set between 1 and 999 pulses per metre/foot, whereas for non photo-eye systems it can be set between 1000/coil_gap and 999 pulses per metre/foot. The shaft encoder for the system should be chosen so that it gives sufficient resolution for

accurate rejection, but not so much that the CTB rate will exceed a frequency of 100Hz at the maximum belt speed. An absolute minimum of 4 pulses must occur over the coil gap distance. The coil gap distance can be found on the machine details plate (inside control box).

Vari-speed errors

Because the detector can only work within a pre-determined speed range it is possible for belt speed to move outside the limit of reliable operation of the machine. In these cases, speed logging problems can be turned on in the **Configuration** menu which will generate either **Speed too slow** or **Speed too fast** run errors.

Appendix C – Product signal tracking menu

This facility 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 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.

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** menu is only available if **Tracker** has been set to **ON** in the **User options** menu. For this option to be available, a photo-eye must be fitted for product registration purposes.

Tracking is product relative, ie the function can be turned on or off for each of the 100 product memories each memory can contain unique settings.

Tracker initialisation will occur whenever:

- The detector is powered on.
- The running product is changed.
- The **Tracking limits** parameters are changed.

Upon completion of the product calibration routine the derived working threshold will be used unless the product signal initiates a change.

The following table describes the options on the **Tracking** menu:

Menu	***Description***	***Advice***
*Tracking	Turns the tracker option on or off.	Can be set on a per product basis.
*Min limit	Lowest tracking limit.	Commences at the calibrated working threshold. The value cannot be set less than the calibrated working threshold but may be increased up to the value of the Max limit.
*Max limit	Highest tracking limit.	Commences at twice the calibrated working threshold. The value cannot be set less than the calibrated working threshold but may be increased up to the value of your choice. However 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.
*Max limit	Maximum limit value lock/unlock.	Once the highest tracking limit value has been entered the value can be locked to prevent a change should a re-calibration occur.
*Adjustment	Factor by which the threshold changes.	The factor range is 0 - 9 where 9 is the largest. The default value is 1.
*Number of packs	Number of packs included in the tracker calculations.	The rolling pack number included within the tracker calculations. The range is 1 -100 where 100 is the finest control. The default value is 10.

Appendix D – Service menu

The entries within this menu allow certain user options and facilities to be turned on and off, as appropriate to your machine application. These options are detailed in the following table:

Options	*Description*
Tracker	Allows the user to select the tracker option for each of the products as required. See *Appendix C – Product signal tracking menu*, page 147.
Manual setup	Allows the user to make manual adjustments to the calibration of the unit via the **Manual setup** menu.
Auxiliary relay (Aux relay)	The relay marked Attention on the power relay PCB has two different functions: select **Run**, in order that the relay is energised whenever the detector is in run, ie it is looking for metal; select **ERROR**, in order that the relay is energised when a run error occurs.
Access Ferrite	Allows the user to gain access to product F, either via the **Change Product** or **Product setup** menus. See *Appendix B – Commissioning Guide*, page 140.
Reject out of run	Turn this to **ON** if no product is to be allowed down the line without being checked for metal. This makes it impossible to disable the reject mechanism via the disable reject menu and in addition, provided a photo-eye is fitted to the system, that product will be rejected during a full calibration cycle.
Cal trigger	Turn this facility on if product calibration is to be initiated after the signal level exceeds a preset value (set by **Trigger thrsh** in the **Manual setup** menu). Only appears if no photo-eye is used or if **FRUN** (free run) speed mode is selected in the **Configuration** menu.
Dual frequency	Set to **YES** to enable dual frequency operation, when using a dual frequency detector.
Auxiliary relay	The relay marked **RUN** on the microprocessor control PCB has three different functions: • Select I**N RUN**, in order that the relay is energised whenever the detector is in run, ie it is looking for metal; • Select **REJECT**, in order that the relay is energised when a reject occurs (in addition to the **REJECT** relay). • Select **DUAL** when set to Dual frequency mode, to switch from high to low frequency (only appears when **Dual frequency** is set to **YES**).

PV test	Select **YES** to enable the Performance Validation System (PVS) or (PV testing). A number of additional menu positions will appear, which require data input to set-up for PV testing to operate. Select **NO** to disable PV testing.
Fault on PV	Select **YES** to enable fault relay operation when a system fault is generated by failure to complete a prompted for PV test. When the conveyor belt motor controls are wired through this relay the conveyor will stop. Select **NO** to disable the system fault relay operation only.
Reverse mode	Only appears if photo-eye is set to **YES** in the **Configuration** menu, ISC is set to **OFF**, Tracker is set to **OFF**, Cal trigger is set to **OFF** and PV test is set to **NO**. Select **YES** to enable the metal detector **Reverse Mode** option. This will then cause an extra menu position to appear in the **Product setup** menu, which enables the metal detector to be set to operate either in **NORMAL** or **REVERSE** mode for the product selected.

Wherever possible, Loma will have set the entries within this menu to those required by your application before the dispatch of your system, or during a commissioning visit by a Loma engineer if applicable.

Appendix E – Reject options

The entries contained within this menu allow selection of the type of reject timing and certain reject options as described below.

Mode

Selects the reject configuration from the following options:

Pulse (only available if a photo-eye is fitted)
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
The same as pulse mode, 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)
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.

NOTE: No Reject dwell entry will appear in the **Product setup** menu for this mode of operation.

Dwell extension (not available if a photo-eye is fitted)
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. No Reject delay entry will appear in the **Product setup** menu.

Reject till accept (only available if a photo-eye is fitted)
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.

Reject relay

Can be set to be either normally energised or normally de-energised (the normal state is the not rejecting state). For failsafe applications the relay state should be normally energised, shown as **ENERG** on the display, so that if the power fails to the system the relay will drop out causing rejection of non-inspected product.

Reject timing

Can be selected to be either product relative or universal. Product relative means that each of the products can have different dwell/delay times, whereas universal means that they will all be the same.

NOTE: If universal timing is selected, then when the reject timings are adjusted for one product, then all the others will automatically be updated to the same values.

Reject confirm

Set to **YES** if reject confirmation facility is fitted to your system, and you wish a system fault to be generated on a confirmation failure.

If reject confirmation is set to **ON**, then the entries confirm delay if a photo-eye is fitted and a confirm window will appear in the menu list. These entries allow a time window to be set up in which a reject confirmation signal must be received when a contaminated pack is rejected.

For example, if the confirmation signal should occur within 50 to 150ms of the reject device being activated, set the confirm delay to 50ms and the confirm window to 100ms.

Bin full

Select this if a bin full facility has been fitted to your system, and you wish a system fault to be generated if the reject bin becomes full.

For failsafe operation, the fault relay should be wired into the conveyor drive or reject circuitry to ensure that no contaminated product can pass in the event of a reject or bin full failure.

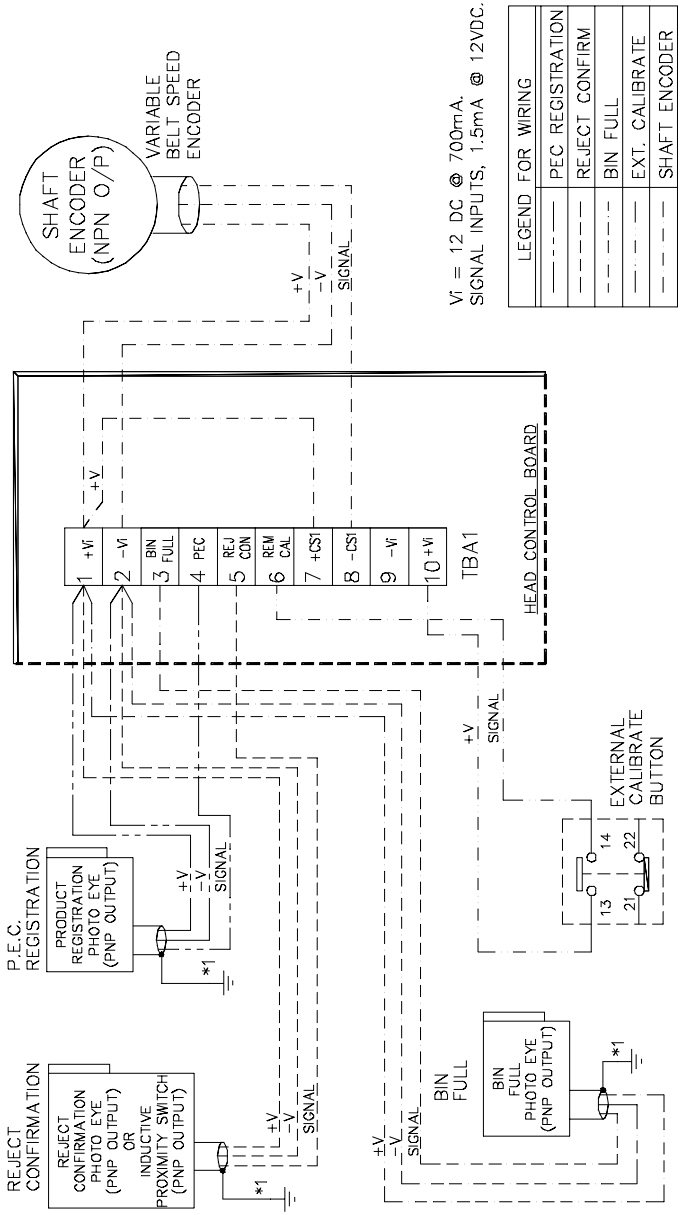
Dwell unit (only available if vari-speed operation is selected)

This option will only appear if vari-speed operation has been selected. Select either time or distance depending upon the sort of reject device that has been fitted to the system.

Wherever possible the necessary settings will be selected before the unit is dispatched by Loma.

Specific hardware requirements are needed for some of the options to be operational, such as bin full detection. The reject dwell and/or delay times are set in the **Product setup** menu.

Appendix F – Wiring diagram for external sensors



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