INSIGHT

Metal Detectors

Operating Manual

‘Original instructions’

INSIGHT

Operating Manual
(Q875-0200-6.0-ENG)

Software Version 6.5.x.x

Supplied

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Amendments

Loma Systems seek to update manuals to include new features and improvements whenever possible. The revision history is intended to highlight advances from previous issues of this document.

Revision History

Issue	Date	Reason For Issue
1	30th September 2010	Initial release.
2	05th August 2011	Amendments to Administrator, sample test and Key Pad sections. Added Forced Sample test + flowchart and Using Group passwords & Unique User ID's
3	20th October 2011	Amendments to 8 USB memory menu 6.6 Level 3 operation 6.5 Level 2 user 6.4 Level One user 6.2 Insight menus 6 Using the menu System 5 Setting up the Machine
4	9th March 2012	Minor updates to be consistent with strings displayed in software. Update to 8.1.4 USB Memory.
5	19th October 2012	Updates to Operation Charts, inclusion of 'Key' in Sample Test Flowchart and added EC declaration of conformity.
6	8th October 2014	Removed EC declaration of conformity form and replaced with paragraph.

Contents

1. GENERAL

The instructions given in this manual have been written clearly and briefly to enable an easy understanding of the actions necessary to operate this equipment.

In order to ensure trouble-free and reliable service it is strongly recommended that operators of the equipment are provided with this manual in order to familiarise themselves with the controls and procedures.

2. HEALTH AND SAFETY

2.1 Health and Safety at Work etc. Act

The Purchaser shall comply with the instructions and information of this manual and it is strongly advised that all personnel associated with this equipment be made familiar with the information contained herein.

It is essential that the personnel engaged on the installation of the plant be competent and experienced in the work. They should comply with the statutory requirements and regulations, including the provisions of the Health and Safety at Work Act (UK), other EU relevant legalisation, relevant OSHA regulations, and any amendments that may become legal requirements.

Note: For installation of the INSIGHT range of metal detectors refer to the Installation Manual.

3. EC DECLARATION OF CONFORMITY

Provided they are installed, operated, serviced and maintained in accordance with the guidelines contained in this document and the appropriate Installation Manual, the **INSIGHT** range of metal detectors address the fundamental safety and health requirements of the following directives:

- EC Machinery Directive 2006/42/EC
- EC Electromagnetic Compatibility Directive 2004/108/EC
- EU-Directive 1935/2004/EC (Materials for Food Contact)
- EU-Directive 2011/10/EC (Plastic Materials and Articles intended to come into contact with food).

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

4. INTRODUCTION

This is the operating manual for the **INSIGHT** range of metal detectors using a VFD display.

The **INSIGHT** detector uses the latest developments in digital signal processing ensuring complete product integrity. The detector is able to store up to 200 sets of automatic product set up values in memory.

The **INSIGHT** detector is capable of detecting and rejecting ferrous, non-ferrous and non-magnetic stainless steel.

A penetrating electromagnetic field is generated within the detector head, and any metallic contaminant within the detector specification will distort the electromagnetic field and be detected no matter how deeply embedded in the product.
On detection a reject relay is activated, this relay is used to switch the automatic reject device, which rejects the contaminated product.

4.1 Detection Sensitivity

The sensitivity of a metal detector is governed mainly by the size of the aperture through which the product is passed and is particularly dependent upon the minimum dimension of that aperture. Therefore, in order to obtain a high sensitivity on a given product, the aperture size should be kept as small as convenient while allowing sufficient clearance around the product to prevent blockages.

To overcome discrepancies due to the shape of a metal sample, sensitivities are always quoted in terms of diameters of spherical samples. This is referred to as ‘Spherical Sensitivity’.

4.2 Detection Envelope

The **INSIGHT** detector software creates a detection envelope after an automatic setup is performed; it uses this envelope as a means of detecting metallic contaminants. For a signal from a metallic contaminant to operate the detection relay it must produce a vector signal large enough to pass through the periphery of the detection envelope. (See fig 1a and 1b)

You can alter the sensitivity of the detector by changing the sensitivity value.

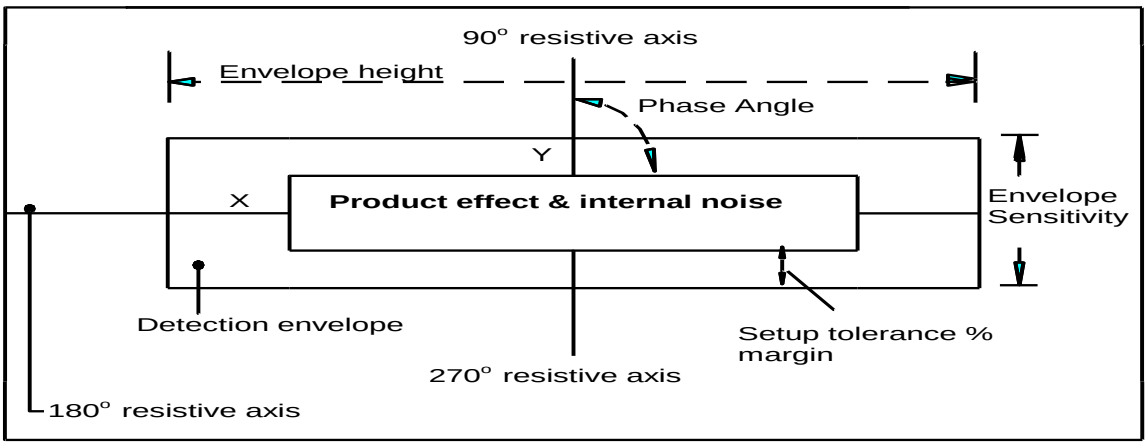


Fig 1a Metal detection envelope.

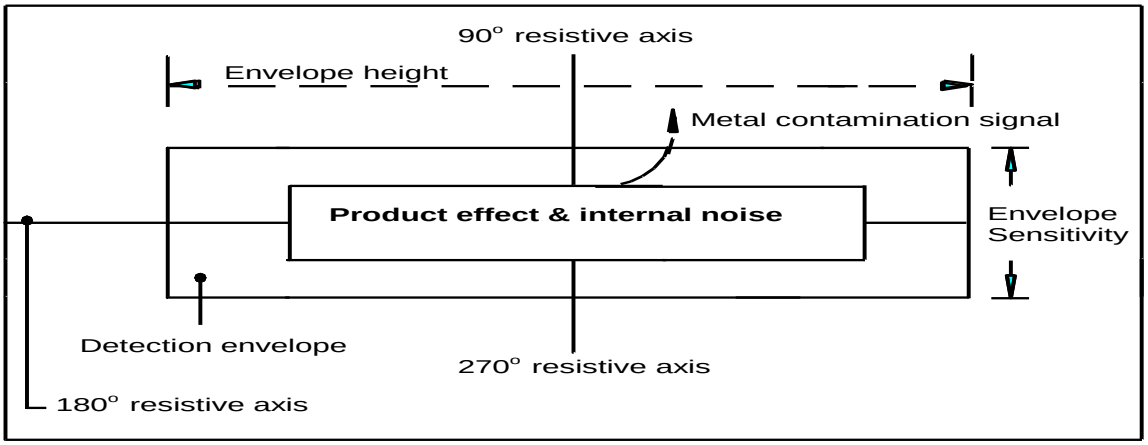


Fig 1b Metal detection envelope with a metal contamination signal shown breaking out of the detection envelope.

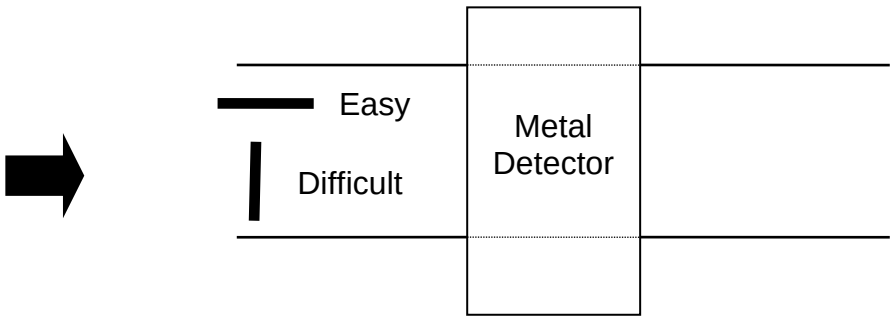
4.3 Orientation Effects

If a wire sample of a particular metal is passed through the aperture, it will be readily detected if the diameter of the wire is equal to or greater than the 'spherical sensitivity' of the metal detector to the same metal.

When the diameter of the wire becomes less than the 'spherical sensitivity' the orientation effects will be noticed. The wire will be detected more easily with its long axis presented one way into the aperture than it will be when presented in another (See figure 1c).

Figure 1c shows that when a piece of non-ferrous or stainless steel wire points in the direction of travel, it is in the most difficult position to detect, and when pointing 90° to the direction of travel, it is in the least difficult position. For ferrous wires, the situation is reversed.

FERROUS



NON FERROUS

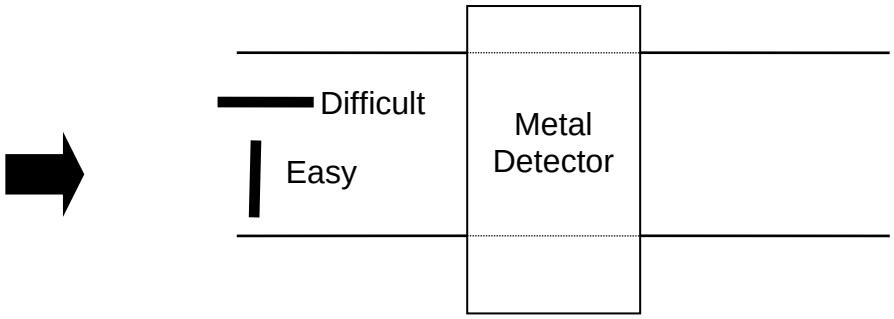


FIG 1c Orientation Effect

4.4 Sensitivity Gradient

Sensitivity is higher around the peripheries of the aperture and somewhat lower through the central axis of the aperture. Quoted sensitivities are always given for the least sensitive area of the aperture, that being along the central axis of the aperture.

4.5 Product Effect

Some products can produce electrical signals when passed through the metal detector aperture thus making it appear as though there is contamination present. This is because the product is electrically conductive due to various factors such as moisture, salt, metallic oxide content, packaging etc.

If there is product effect seen during the automatic setup of a product, the detector will automatically set an envelope around the product effect signal. This will ensure that the product effect signals are ignored during production thus preventing false detection.

If a product has any effect then the resulting detection envelope will be bigger, this bigger envelope will therefore result in a decrease in sensitivity of the detector.

5. SCOPE OF THIS MANUAL

Below is a summary of the information contained in each section of the manual:

5.1 Setting up the machine

A description of the user interface to the detector (display and keypad) is in this section. Following this is a test to make sure that the basic system is working correctly. This is followed by details of how to set up the system for a particular product, including detection parameters and timer types.

5.2 Using the Menu System

This section provides a complete reference to viewing, editing and accessing product and machine data via the **INSIGHT** menu system.

5.3 Operation Chart

Block diagram of the **INSIGHT** menu system.

5.4 Forced Sample test guide

This section provides detailed sample test instructions.

5.5 Troubleshooting Guide

This section provides a list of common problems that may be encountered and possible solutions.

5.6 Glossary

This section provides a list of terms specific to metal detectors, and their meanings.

6. SETTING UP THE MACHINE

The detector and reject system (if fitted) should now be completely installed. The aim of this section is to describe how to set up the detector for a particular product, including automatic setting of detection parameters and calibration of timers for accurate rejection.

For more detailed explanation of the software, please consult the 'Using The Menu System' section of this manual. If problems are encountered during setup, read the troubleshooting section of the manual.

6.1 Detector Display and Keypad

Switch on the detector, but not the conveyor (if fitted). The display will show the normal running display and should look similar to that shown below.

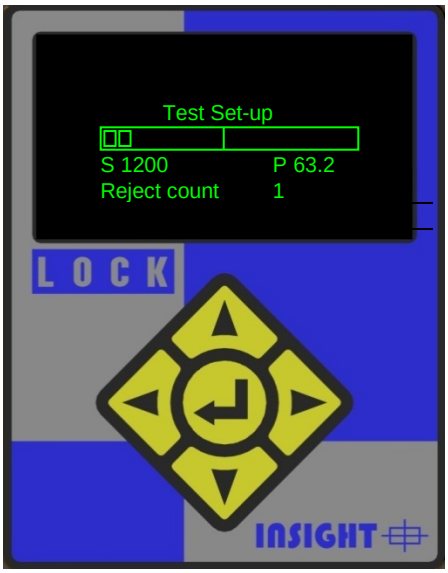


Figure 1: VFD Detector display and keypad

The display has eight lines of 32 characters and after power on or reset, the third line shows the current product name and the fourth line shows a "bar-graph".

The bar-graph can show up to 20 rectangles (bars) and can be used to see how good a product setup is. The bars show the size of signal being detected, the more bars the larger the signal.

Solid bars indicate that metal has been detected. Hollow bars indicate product effect or metal contamination that is not large enough to trigger the metal detector. If many hollow bars are displayed each time a product passes then the detector may be at risk from false triggering. When no signal is detected two bars will be displayed on the bar graph to indicate that the detector is actively looking for metal.

6.2 Initial Test

Every detector is shipped with test samples - small pieces of conveniently packaged metal with which to test the detector. Before the detector is shipped, it is set up to see these samples without false triggering (false triggering is when the detector indicates that it has seen metal when none is present, and is due to electrical noise, vibration, large product effect, etc.). This setup is stored on the detector under the product name "Test setup".

With the detector switched on, check the bar-graph to make sure that the machine is not false triggering. If the detector starts to false trigger, consult the trouble-shooting guide.

Pass the test samples through the aperture. The detector is least sensitive in the centre of the aperture, so the best test is to pass the sample through the centre of the aperture. When passing test samples, make sure that hands, rings, watches etc. are kept away from the aperture. If the detector does not see the test samples consult the trouble-shooting guide (Sec 11).

6.3 Key Pad

The keypad has five keys, labelled: ◄, ►, ▲, ▼, ↵. In this manual the: ◄, ►, ▲, ▼ buttons are referred to as the CURSOR keys and the ↵ button as SELECT.

6.3.1 Using the keyboard

6.3.1.1 Escape Sequence

If at any time it is required to go to the normal running display, the ◄ and ► buttons on the keypad should be pressed simultaneously.

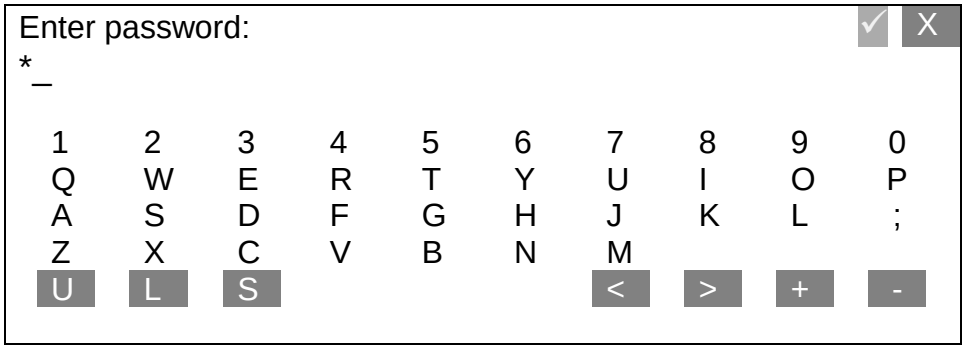
6.3.1.2 Passwords and Names

What follows is a basic introduction to security access and product name creation using the keypad string entry system. A more detailed description can be found in the relevant sections.

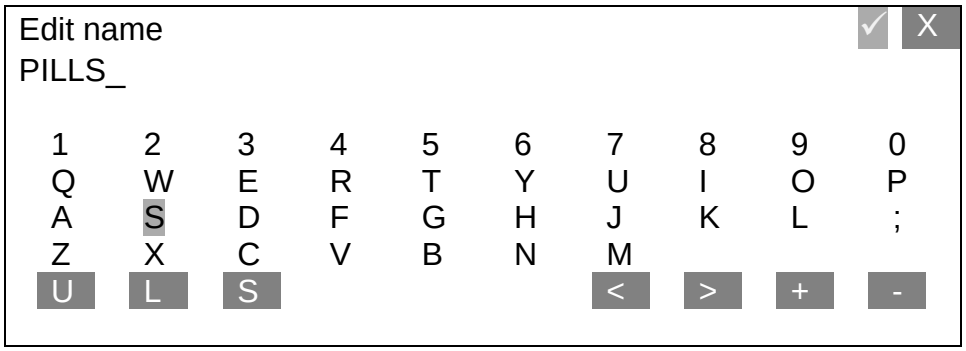
Passwords and Names are entered using the keyboard display: From switch on pressing the SELECT key on the keypad causes the **INSIGHT** menus to be displayed.

Selecting any of the top three items from the menu list will cause the following screen to be displayed.

As will be described later the system requires a password, one of the default passwords for the system is '2', so use the CURSOR keys to select 2 and press SELECT on the keypad. The password is entered by using the CURSOR keys to highlight the ✓ symbol and then press SELECT on the keypad.



On screens where Names are required the display will look like that shown below. For example if a product with the name 'PILLS' is entered, the following display will be seen:



The second line of the display is the Name that is being input. The underline is the EDIT STRING CURSOR. The keypad CURSOR and SELECT are used to add characters to the string at the position of the EDIT STRING CURSOR. The string entered cannot have leading spaces.

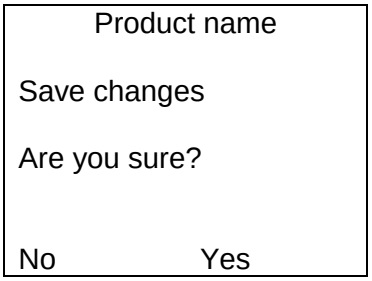
The bottom line of the display contains control functions, which are:

U	Select upper case
L	Select lower case
S	Select special characters
<	Move EDIT STRING CURSOR left
>	Move EDIT STRING CURSOR right
+	Insert space at EDIT STRING CURSOR
-	Delete character at EDIT STRING CURSOR

The maximum number of characters in a Name is 20.
When the edit is complete the Name is entered by moving the CURSOR to the ✓ and pressing SELECT. If the ✓ is selected the 'Save changes' screen is displayed. Selecting the 'X' will discard the entered string.

6.3.1.3 Confirming changes

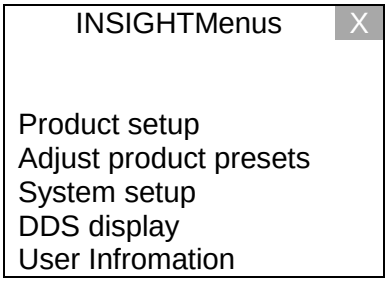
All **INSIGHT** settings are stored in FLASH memory. The FLASH memory is loaded into RAM memory on power on. Any changes to the working configuration will, upon exit from the screen where the changes were made, causes the 'Save changes' screen to be displayed:



If No is selected the changes are discarded and the FLASH memory copied to the RAM memory. If Yes is selected the RAM memory is copied to the FLASH memory permanently saving the new settings.

6.4 Main Menu (Quick Start)

Pressing SELECT on the keyboard when the normal running display is on view gives the following display:

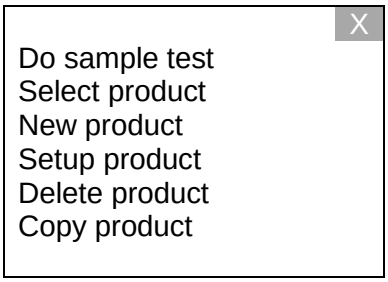


6.4.1 Product setup

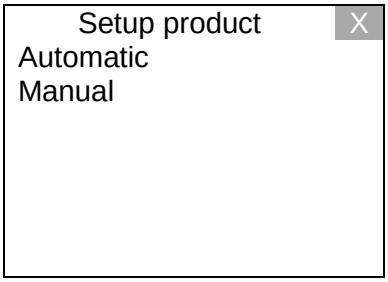
The aim of this subsection is to get the metal detector to learn the characteristics of a particular product. In order to do this, some product samples will be required. The description of how to use the software is kept deliberately brief in this subsection, for more detail see the 'Using The Menu System' section of this manual.

Use the CURSOR keys to select 'Select product', and press SELECT on the keypad, you will then be asked to enter a password. The factory default setting for this is '2', so use the CURSOR keys to select '2' and press SELECT on the keypad. The password is entered by using the CURSOR keys. Then navigate to the ✓ and press SELECT on the keypad.

The display should then show:

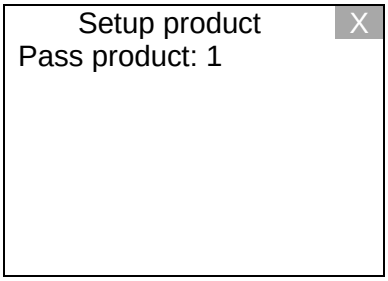


Use the CURSOR keys to select New Product, and press SELECT on the keypad. The display will then show a flashing cursor in the position of the new product to be entered. To enter a new product use the SELECT and CURSOR keys to enter the Product name. Once the product name has been entered the display should show:



Note: It is not recommended to do a manual setup; this is primarily used for testing by service technicians.

Use the CURSOR keys to select Automatic, and press SELECT on the keypad.
The display should show:



The product to be setup needs to be passed through the machine until the setup is complete.

Every time the 'Pass product' count is incremented the product should be passed through the aperture until the setup is finished, otherwise the detector will be unable to learn the product's signal correctly.

Note: While passing the product make sure that no metal goes near the aperture, particularly watches, rings etc.

Keep passing product until the display shows something similar to the following:

INSIGHT Single Frequency

Product name	X
Sensitivity	00100
Phase	30.0
Height	32000
Height checking	No
Gain	High

INSIGHT Multi Frequency

Product name	X
Sensitivity	00100
Phase	30.0
Height	32000
Height checking	No
Gain	High
Frequency	High

Pressing SELECT will display the 'Save changes' screen, selecting 'Yes' will save the new products signal data to FLASH Memory and then return to the normal running display showing the product name and bar graph.

The detector is now setup to ignore the signal from the product, but still see metal. Pass the product through the aperture and make sure that the detector does not trigger. If it doesn't, move on to the next subsection: 'Reject timers'. If the detector does trigger on the product read the notes below.

6.4.2 Notes on automatic setup

The detector will usually be able to set itself up automatically, however the following points should be borne in mind. Products can have different effects depending on their temperature, moisture content and packaging. Orientation of product can also cause an affect known as the 'product effect, e.g. if a setup is done with products passed lengthways, a product passed widthways may be rejected.

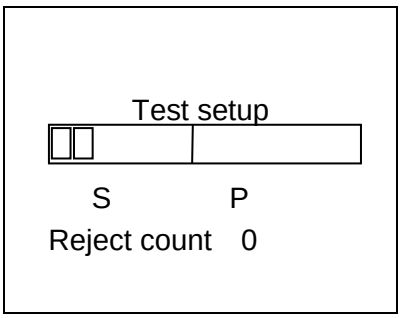
If the product varies a lot, or the environment is electrically noisy, then the sensitivity of the detector may need to be reduced. In order to do this, read about the 'product detection envelope', in section 7.2.1.3'Product settings'. To alter these settings see section 7.5.2.5.2. 'Detection Settings'

7. USING THE MENU SYSTEM

This section of the manual describes how to access the machine and product settings using the menu system. It is intended mainly for reference and is not meant to describe how to set up a machine or product, or why certain options are required.

7.1 Power up / Normal Running Display

When the unit is switched on the display is similar to the following. This is called the normal running display.



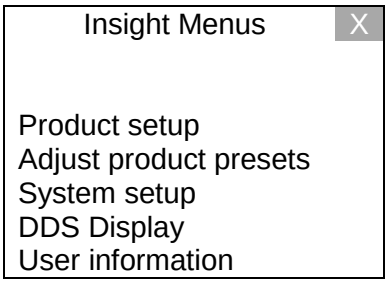
The string, "Test setup", is the name of the currently selected product. The name of the product could be anything that has been input into the system using the 'New product' menu item in the 'Product setup' menu.

The bar-graph can be used to see how good a product setup is, the bars show the size of signal being detected, the more bars the larger the signal. Solid bars indicate that metal has been detected.

The next line shows the size and phase of the last reject, and if enabled, the Product count.

7.2 Insight Menus

From the normal running display, when SELECT is pressed, the following screen will be displayed:



These menu items are used to set up or obtain diagnostic information from the system.

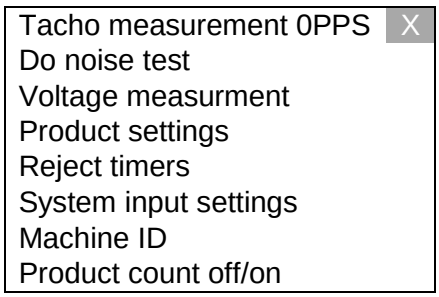
The CURSOR and SELECT keys can be used to select a menu item in the list or the X which will cause the system to exit the current menu and return to the normal running display.

7.2.1 User Information

The CURSOR and SELECT keys can be used to select the 'User information' menu item. Selecting this will provide information about the systems setting. A password is not required and none of the information can be modified with the exception of the 'Product count' menu item.

If 'Product count off' is selected it will change to 'Product count on'. The value set here determines whether the product count is seen on the normal running display.

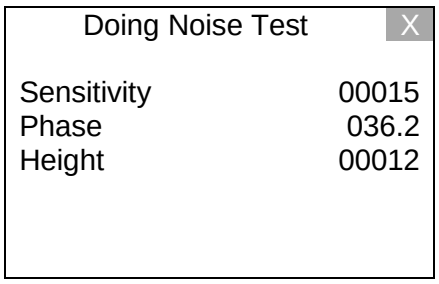
The display shows the following when the 'User information' menu item is selected:



Note: The 'Tacho measurement' menu item can be hidden / displayed (See section 7.6.3.3.1)

7.2.1.1 Do noise test

The following is displayed when 'Do noise test' menu item is selected:



The Noise test is repeated every 5 seconds and the measured values displayed. To return to the 'User information' menu press SELECT.

7.2.1.2 Voltage measurement

The following is displayed when Voltage Measurement is selected:

	Volts X
Balance Voltage	0.038
Drive Voltage	40.0
X Channel	0.1
Y Channel	0.0

7.2.1.3 Product settings

The detection parameters are displayed if Product Settings is selected:

INSIGHT Single Frequency

Test setup	X
Sensitivity	00100
Phase	0.0
Height	32000
Height checking	No
Gain	High

INSIGHT Multi Frequency

Test setup	X
Sensitivity	00100
Phase	0.0
Height	32000
Height checking	No
Gain	High
Frequency	High

In the diagram below S = sensitivity where width is used as the sensitivity setting, h = height and θ = phase used for detection.

Note: Sensitivity and height refer to characteristics of the electrical signal produced from the product, and have nothing to do with its physical dimensions.

If height-checking is disabled, i.e. then height is not being used for detection and the product detection envelope will open-ended.

The other figure displayed is the gain (G) and there are two gain settings with code version V6.xx, i.e. High and Low.

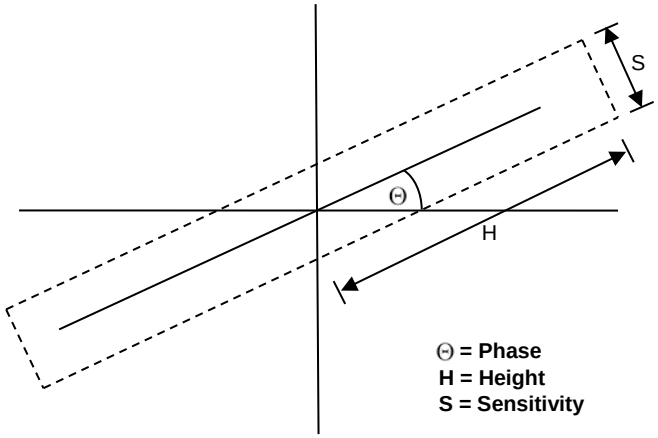


Figure 4: Product detection envelope

7.2.1.4 Reject timers

The following is displayed when the menu item Reject timers is selected:

	X
Syschek time	1.00S
Photocell time	00.50S
Detection window	00.50S
Delay time	01.50S
Reject time	00.50S

A description of the reject timers and their adjustment is dealt with in section (See 7.5.2.5.3).

7.2.1.5 Configure system inputs

Selecting the Configure system inputs menu item will display the following:

02/01/2010 14:47	X
Input	Enabled
Tacho input	0
Photocell input	0
Reject check input	0
Product check input	0
Auxiliary input 1	0
Auxiliary input 2	0

(See 7.6.3.3) for a description of the system input settings and their adjustments.

7.2.1.6 Machine ID

Selecting Machine ID: Will display the installed Digital Board and I/O Board revision numbers. These numbers help Lock Inspection / Loma Systems identify the hardware and software configuration of the system. The detection parameters are also displayed:

INSIGHT Single Frequency

Machine ID	X
DB Version	6.3.2.0
IOB Version	1.5.1.11
Frequency	1000000

INSIGHT Multi Frequency

Machine ID	X
DB Version	6.3.2.0
IOB Version	1.5.1.11
Frequency	
High	875000
Medium	286000
Low	100000

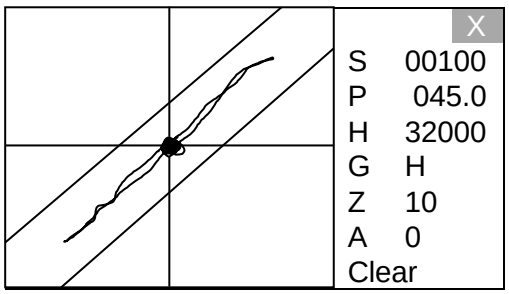
7.2.1.7 Product Count

The menu item 'product count' when selected toggles between 'On' and 'Off'. This causes the product count to be displayed or not-displayed on the normal running display.

Note: For product count to work a suitable Opto device must be fitted. Please refer to the INSIGHT Installation Manual.

7.2.2 DDS Display

The DDS display is a graphical representation of the detection envelope. The display looks like:



Where:

S	Sensitivity	–	Cannot be adjusted at this level.
P	Phase	–	Cannot be adjusted at this level.
H	Height	–	Cannot be adjusted at this level.
G	Gain	–	Cannot be adjusted at this level.
Z	Zoom	–	Can be adjusted using SELECT and CURSOR keys.
A	Aspect Zoom	–	This rotates the displayed envelope to the phase angle and adjusts the X and Y scales independently such that they fit on the display. This is particularly useful for display large product signals.
Clear		–	Clears the displayed product signal

7.3 Using Group Passwords or Unique User ID‘s

Before moving on to describe the ‘Product setup’, ‘Adjust product presets’ or the ‘System setup’ menu items, the Security Access screen will be explained as this screen will be displayed if any of the above are selected.

INSIGHT has two modes of security access they are Group Password and Unique User ID.

There is an option at Level 4, in either mode, to switch between the two access modes. In the case of Unique User mode, up to 100 separate users can be assigned, each having their own ID, password and level. In the case of Group Password mode, up to 4 levels of priority can be assigned.

The level of the password or user ID entered determines the features that can be accessed:
e.g.

- Level 1: For changing product’ and performing sample test.
- Level 2: Level 1 + edit product, create product, delete product, edit password.
- Level 3: Level 2 + Vibration setup, configure system inputs, frequency control, edit Input, set clock and sample test reminder.
- Level 4: Level 3 + Set language, Initialise, Guard setup and user control.

The security code will remain active for a set time after the last key press if not entered by selecting the✓.

At all times a valid user ID or Password must be entered. A valid password or user ID is one that is not a duplicate, has been registered in the password or user list and conforms to a valid string i.e. has no leading spaces.

7.3.1 Group Password Mode

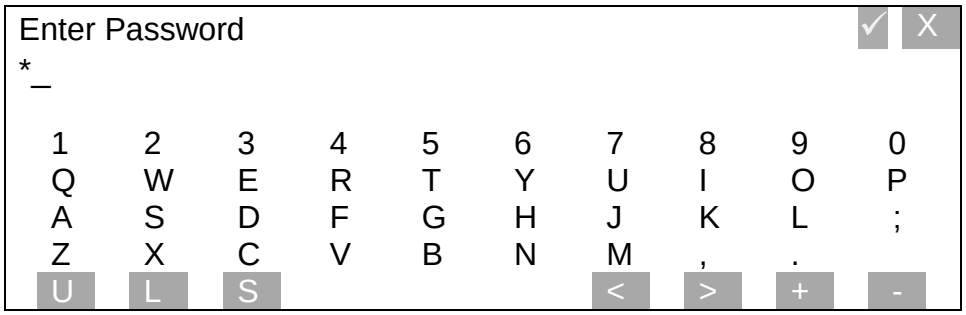
The default setting is for **INSIGHT** to have four passwords, in increasing order of security, these are: Level 1, Level 2, Level 3 and Level 4. When the unit is supplied they are set to a default code but this can be altered to any alphanumeric password up to 20 characters in length by the user at level 4. Level 4 users have full administrator privileges.

The default passwords are:

- Level 1: 1
- Level 2: 2
- Level 3: 3
- Level 4: 4

On pressing SELECT after using the CURSOR keys to select either; ‘Product setup’, ‘Adjust product presets’ or the ‘System setup’ menu items from the **INSIGHT** Menus display.

The following screen is shown:



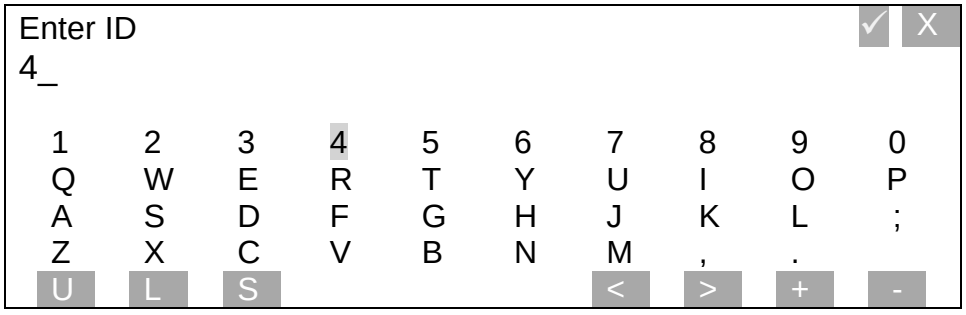
A valid password must now be entered to gain access to the selected menu.

7.3.2 Using Unique User ID‘s

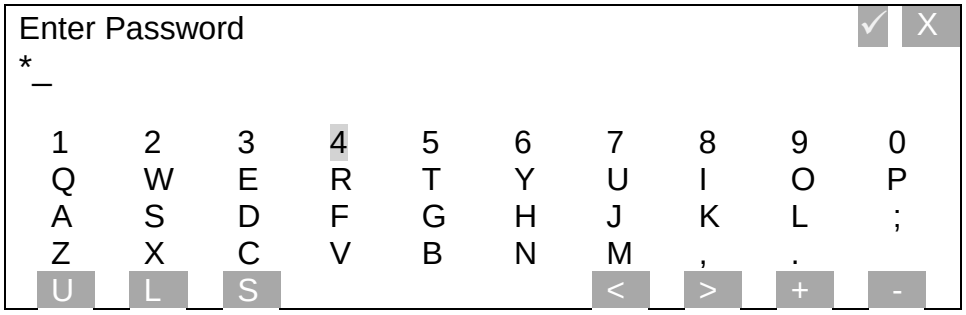
The default setting is for **INSIGHT** to have four ‘User ID’s’, with corresponding passwords in increasing order of security. When the unit is supplied they are set to a default code but this can be altered to any alphanumeric ID and password up to 20 characters in length by the user at level 4. Level 4 users have full administrator privileges.

The default ID’s and Passwords are:

User ID of 4 whose level is 4 has a password of 4.
User ID of 3 whose level is 3 has a password of 3.
User ID of 2 whose level is 2 has a password of 2.
User ID of 1 whose level is 1 has a password of 1.



Followed by:



A valid user ID and password must now be entered to gain access to the selected menu.

7.3.3 Editing Security Access Information

7.3.3.1 Managing Group Passwords

Group passwords may be enable, disabled or changed. Users can only change the level at which they are logged on at and below.

e.g.

A level 2 user may change their own password and that of a level 1 user however not a level 3 user.

They may also disable their own level and the levels below them. However, if users disable the password at their own level this will allow anyone to log on to the system without a password and gain access to all features up to and including the level at which the passwords were disabled.

e.g.

A level 3 user disables level 3 and below passwords. All features except those features requiring level 4 privileges are now accessible by anyone. Those features requiring level 4 access will be accessible by selecting the 'More' menu item that will now be displayed to allow such access.

7.3.3.2 Managing Unique Users

Unique Users may be added, deleted or have their ID's and passwords changed.

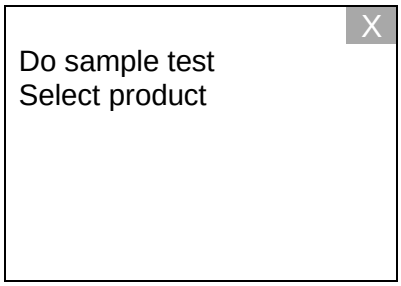
Only a user with Administrator privileges at level 4 can manage users. This is done by accessing the user list (See 7.7.3.1.4) and is not available to lower level users.

An administrator may Add, Delete or Edit any user. However, an administrator may only change his or her own password and ID and may not change their level or be deleted.

7.4 Level 1 Operation

7.4.1 Product setup

When Product setup is selected the menu looks like:

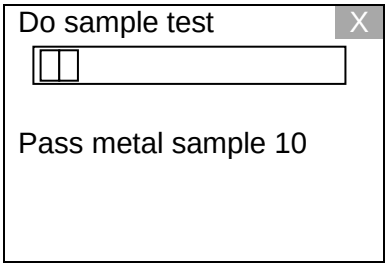


Use CURSOR keys to select an option and then the SELECT key to select it.

7.4.1.1 Do Sample Test

This option allows a test of the metal detection sensitivity to be done. Firstly a request for the User ID or password is displayed on the screen. Which depends on the current security access mode.(See 7.3) This is a string of up to 20 alphanumeric characters. A report is generated each time a sample test is run. The user ID or Password entered is used to identify who performed the test. The reports can be accessed using the 'Optix' tool.

After entering the User ID or Password the following is displayed:

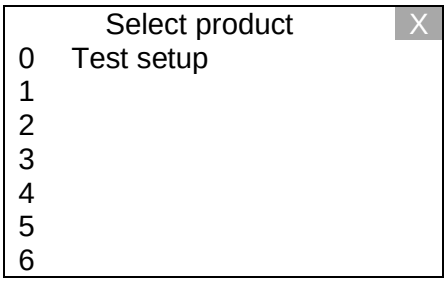


After SELECT is pressed the User has 10 seconds to pass a metal sample. If metal has been detected then "TEST PASSED" is displayed and waits for the SELECT key to be pressed before returning to the normal running display.

If the detector fails to detect metal in this time "TEST FAILED" is displayed and waits for the SELECT key to be pressed before returning to the normal running display

7.4.1.2 Select product

This menu item allows product setups to be chosen. The display looks like that shown below:



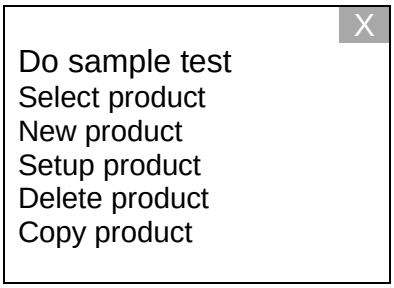
There are 200 slots, (0 to 199), for products. Use the CURSOR keys to navigate up and down and then the SELECT key to select a product. Confirm selection by selecting 'Yes' on the 'Save changes' display. The 'are sure' display only appears if a product has been changed.

Note: the above display shows only one product and that is the 'Test setup' product shipped with the system. The user has to enter a user defined product to this list using 'New product' (See 7.5.1.2)

7.5 Level 2 Operation

7.5.1 Product setup

When Product setup is selected the menu looks like:



Use CURSOR keys to navigate to an option and then the SELECT key to select it.

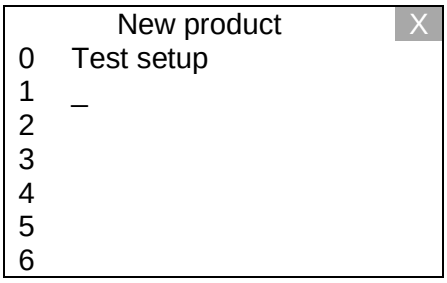
7.5.1.1 Select product

This is the same as level 1 operation – (See 7.4.1.2)

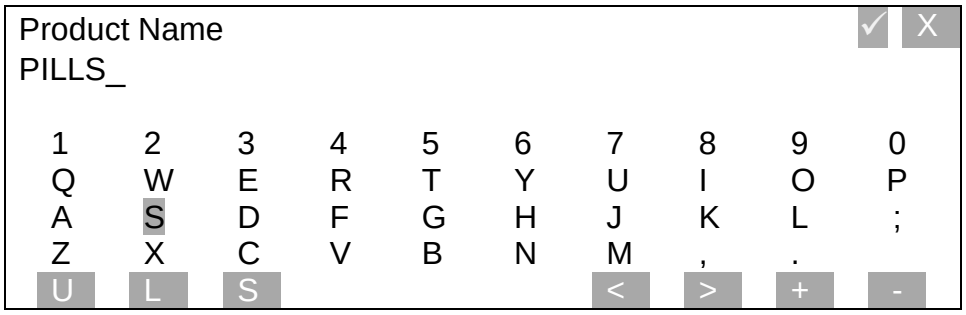
7.5.1.2 New Product

This menu item allows new product setups to be created. On selecting this menu item the cursor is positioned on the first available slot. The CURSOR keys can be used to select an alternative slot if required.

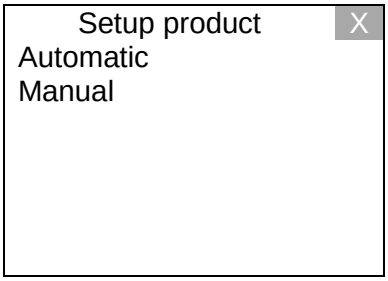
When 'New product' is selected the menu looks like:



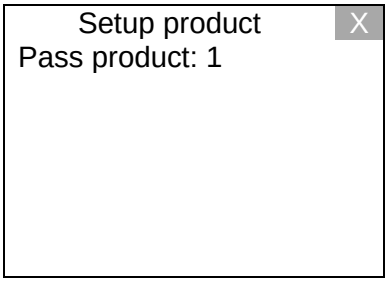
Pressing select will display the alpha numeric display so that the new product name can be entered.



Navigating to the X and pressing the SELECT will discard the entry. Selecting ✓ and pressing the SELECT will display the following:



Use the CURSOR keys to select Automatic, and then press SELECT on the keypad. The display will then show:



The product will need to be passed every time the pass product count is incremented until the setup is finished, otherwise the detector will be unable to learn the product's signal correctly.

Note: While passing the product make sure that no metal goes near the aperture, particularly watches, rings etc.

Keep passing product until the display shows something similar to the following:

INSIGHT Single Frequency

Product name	X
Sensitivity	00100
Phase	30.0
Height	32000
Height checking	No
Gain	High

INSIGHT Multi Frequency

Product name	X
Sensitivity	00100
Phase	30.0
Height	32000
Height checking	No
Gain	High
Frequency	High

Note: It is not recommended to do a manual setup; this is primarily used for testing by service technician.

If Manual is selected, the next menu is Advanced Adjustment (see 7.5.2.5).

7.5.1.3 Setup Product

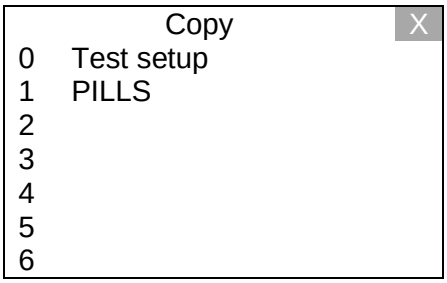
This menu allows Automatic or Manual setup to be re-run on an existing product.

7.5.1.4 Delete Product

This menu enables an existing product to be deleted.

7.5.1.5 Copy Product

This menu allows a copy to be made of an existing product. The display looks like:



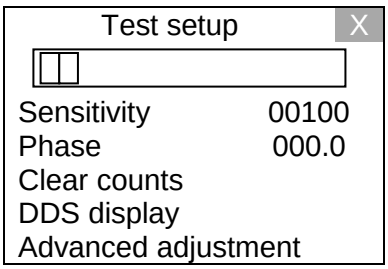
Use the CURSOR keys to select the product to be copied and press SELECT on the keypad. The top line changes to 'Paste'. The CURSOR keys are then used to select a slot and when SELECT is pressed the copy is pasted into that slot.

Pressing SELECT again take you to the 'Save changes' screen. Once saved or not the display returns to the Product setup menu.

7.5.2 Adjust product presets

These menus are only available to Level 2, 3 and 4 users only.

The Adjust product presets menu looks like:



7.5.2.1 Sensitivity

Select Sensitivity and press SELECT. The cursor moves to the Sensitivity field enabling the sensitivity to be adjusted. Use the bar-graph to see how close to false triggering the detector is.

7.5.2.2 Phase

The Phase can be adjusted in a similar manner to the Sensitivity,

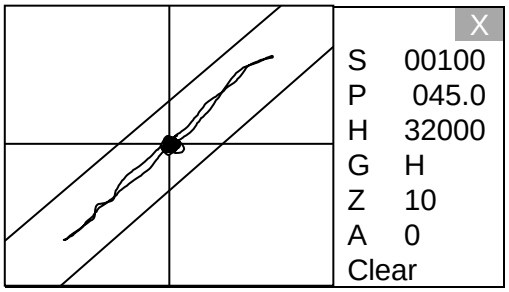
7.5.2.3 Clear Counts

Use this option to clear the reject and product counts to zero.

Note: That product counting is only reliable for a product that completely breaks the photocell light beam once.

7.5.2.4 DDS display

The DDS display is a graphical representation of the detection envelope. The display looks like:



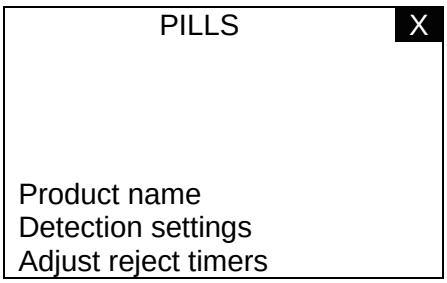
Where:

S Sensitivity – Can be adjusted using SELECT and CURSOR keys.
P Phase – Can be adjusted using SELECT and CURSOR keys.
H Height – Can be adjusted using SELECT and CURSOR keys.
G Gain – Can be adjusted using SELECT and CURSOR keys.
Z Zoom – Can be adjusted using SELECT and CURSOR keys.
A Aspect Zoom – this rotates the displayed envelope to the phase angle and adjusts the X and Y scales independently such that they fit on the display. This is particularly useful for display large product signals.
Clear Clears the displayed product signal

To change these values use the Cursor keys to navigate to the required item and then press select. The cursor will then be in the editable field where left / right keys will navigate to the required digit and the up/down keys will either increment of decrement the digit. Pressing SELECT will save the new value and return the cursor to the non-editable field.

7.5.2.5 Advanced Adjustment

The Adjustment menu looks like:



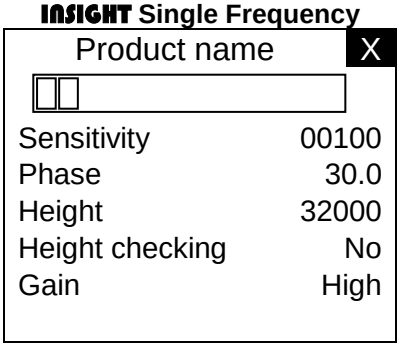
7.5.2.5.1 Product Name

The current name will be displayed and can be amended. See ‘Using the keyboard’ (6.3.1).

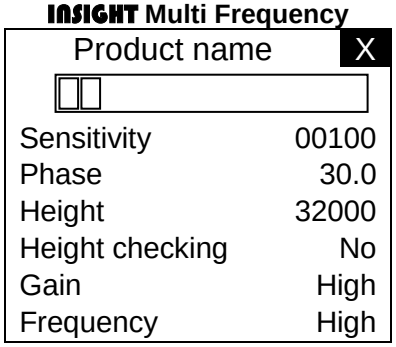
7.5.2.5.2 Detection settings

The Adjustment menu looks like:

INSIGHT Single Frequency



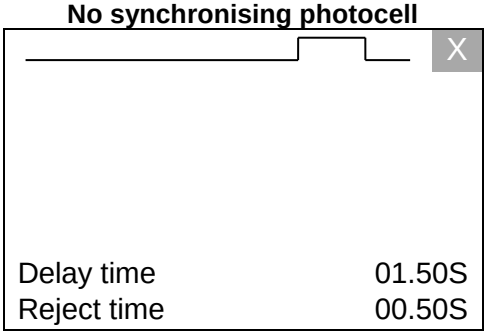
INSIGHT Multi Frequency



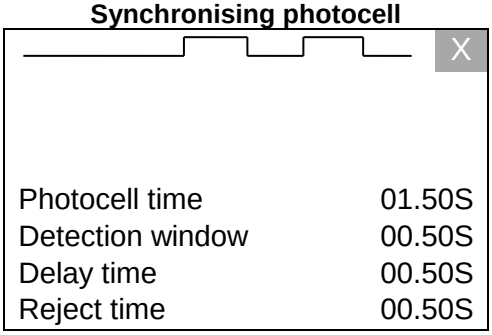
7.5.2.5.3 Adjust Reject Timers

The Adjust reject timers menu looks like:

No synchronising photocell



Synchronising photocell



Note: The reject timer configuration for a pharmaceutical, waferthin, vertical fall and pipeline system are correctly configured in the factory and should not be amended.

Every product has a timer associated with it. This timer is responsible for deciding when the reject mechanism should be activated after metal contamination has been detected by the software.

When a new product is created the timer values for the previous product are copied into the new product. If the new product is a different size to the previous one, it may be necessary to adjust some of the timer values. The values can be changed in the 'Adjust reject timer' option in the 'Using The Menu System' section of this manual. Please read this before proceeding.

There are two parts to this:

1) Timer configuration: The first is to tell the detector what sort of system is connected to it, i.e. whether it is variable speed and whether there is a product gating photocell or not. To tell the detector about the system connected to it, enable the relevant timer inputs and adjust their polarities according to the instructions in the subsection entitled 'Configure system inputs' in the 'Using The Menu System' section of this manual. This should already be set up if the conveyor and reject mechanism has been supplied by Lock Inspection / Loma Systems.

2) Timer values: The second step is to set the correct timer values to reject the correct product as follows:

There are two basic situations with regard to setting timer values: either there is a synchronising photocell, or there isn't. Other variations will be discussed later.

7.5.2.5.3.1 No Synchronising Photocell

(Applicable for Pharmaceutical, waferthin, vertical fall and pipeline systems)

Only two parameters are used in this situation: delay time and reject time.

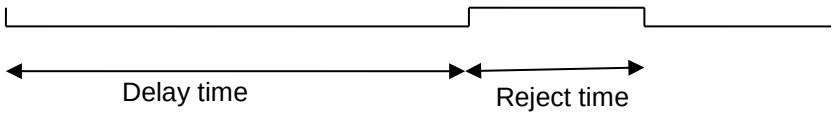


Figure 2: No Synchronising Photocell

When the detector detects metal it generates a trigger pulse. This starts a delay timer. When the delay timer expires the reject relay is activated. When a trigger occurs a second graphic is drawn that shows the reject pulse.

To set up the timers pass a product with a metal sample attached and adjust the delay time such that the product is rejected. The reject time can then be adjusted to operate the reject mechanism for the desired time.

For an immediate reject, set the delay time to 0.00.

7.5.2.5.3.2 Synchronising Photocell

(Applicable for conveyorised systems only)

This system uses a photocell to make sure that the contaminated product is in the correct position with respect to the reject mechanism. Four parameters are used in this situation: delay and reject time as before, plus a photocell delay time and a detection window time.

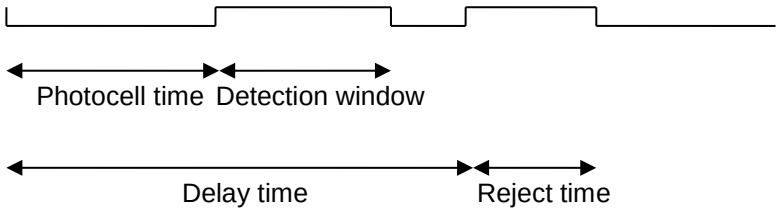
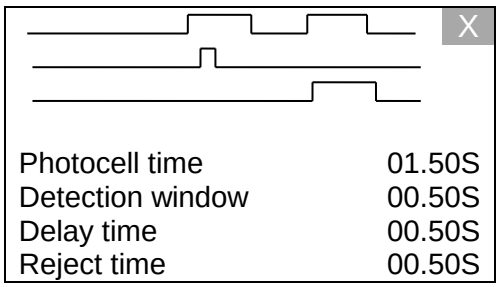


Figure 3 : Synchronising Photocell

To set up the timers pass a product with a metal sample attached to the leading edge. When the product is detected by the photocell a further 2 graphics are displayed:



The first graphic shows when metal is being detected and the second when the reject mechanism is being activated. Note that if the metal is not detected within the detection envelope the reject mechanism will not be activated.
Adjust the photocell time so that the metal detected signal just fits into the start of the detection envelope.

Then attach the sample to the back edge of the product and adjust the detection window so that the metal detected signal just fits into the detection window.
Finally adjust the delay and reject times so that the product is rejected correctly.

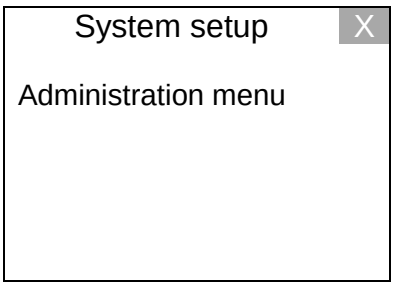
7.5.2.5.3.3 Variable Speed Conveyors

For variable speed conveyors, the timers work in exactly the same way, except that the delay time, and where applicable the photocell delay time, are measured in tacho pulses, i.e. these values are based on distance travelled rather than time elapsed. There is also an option in the Configure System inputs menu to have the reject time in pulses.

The photocell pulses delay should be set with the belt running at the slowest speed and the detection window pulses with the belt at the highest speed. The delay pulses should be tried at both the minimum and maximum speeds and the optimum setting determined.

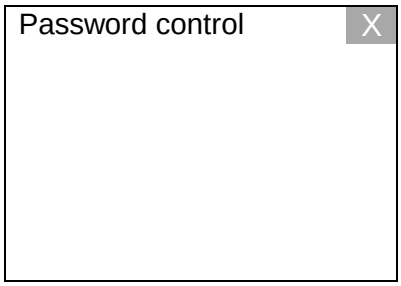
7.5.3 System setup

When System setup is selected the menu looks like:

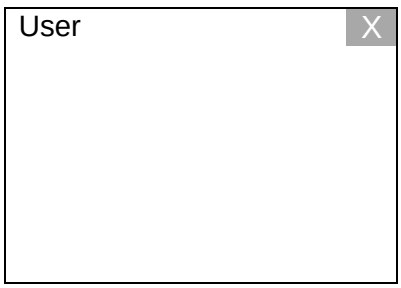


7.5.3.1 Administration Menu

When the Administration Menu is selected and User Control = 0 (See 7.7.3.1.1) the display looks like:

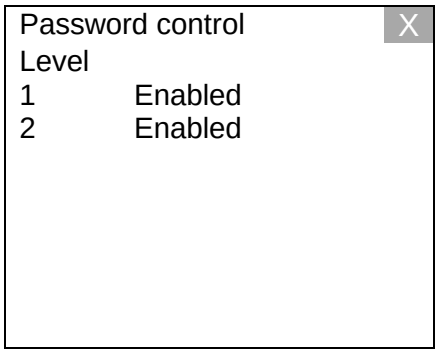


If User control = 1 the display looks like:



7.5.3.1.1 Password Control

When Password Control is selected the display looks like:



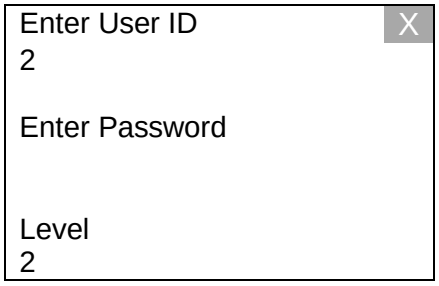
The UP/DOWN CURSOR keys can be used to select the available entries. Press SELECT to amend the password. The user will be asked to confirm the password.

Note: Passwords are written directly into FLASH memory and do not use the 'Save changes' option.

The LEFT/RIGHT CURSOR keys can be used to enable or disable passwords. When passwords are disabled a 'More' menu item appears on some menus. This enables a password to be entered for menus that require higher level access.

7.5.3.1.2 User

When User is selected the display looks like:



The UP/DOWN CURSOR keys can be used to select Enter Password only. The User ID and Level may only be changed by a user with administrator privileges (i.e. a level 4 user) Select menu item and press SELECT to change. The user will be asked to confirm the password.

Note: Passwords are written directly into FLASH memory and do not use the 'Save changes' option. User passwords cannot be duplicated and must not have leading spaces.

7.6 Level 3 Operation

7.6.1 Product setup

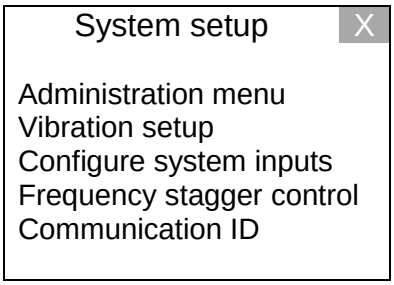
This is the same as level 2 operation (See 7.5.1)

7.6.2 Adjust product presets

This is the same as level 2 operation (See 7.5.2)

7.6.3 System setup

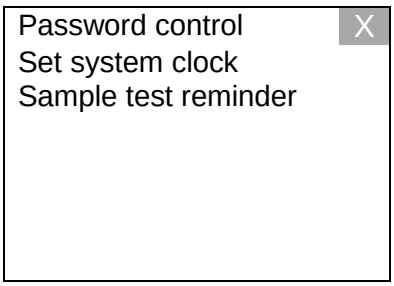
When System is the selected the display looks like:



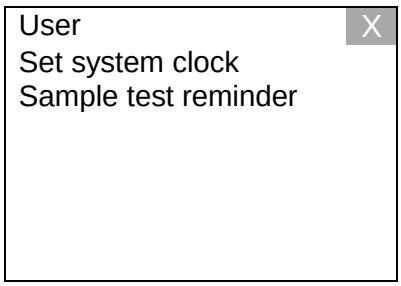
Use CURSOR keys to select an option and then the SELECT key to select it.

7.6.3.1 Administration Menu

When Administration Menu is selected and User Control = 0 (See 7.7.3.1.1) the display looks like:

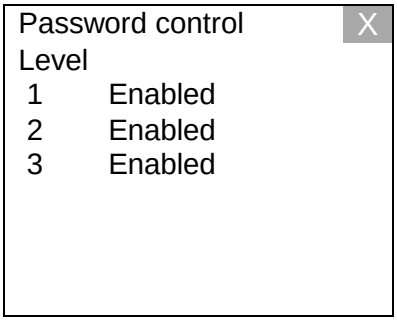


If User control = 1 the display looks like:



7.6.3.1.1 Password Control

When Password control is selected the display looks like:



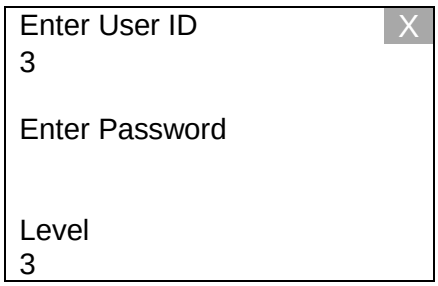
The UP/DOWN CURSOR keys can be used to select the available entries. Select menu item and press SELECT to change. The user will be asked to confirm the password.

Note: Passwords are written directly into FLASH memory and do not use the 'Save changes' option.

The LEFT/RIGHT CURSOR keys can be used to enable or disable passwords. When passwords are disabled a 'More' menu item appears on some menus. This enables a password to be entered for menus that require higher level access.

7.6.3.1.2 User

When User is selected the display looks like:

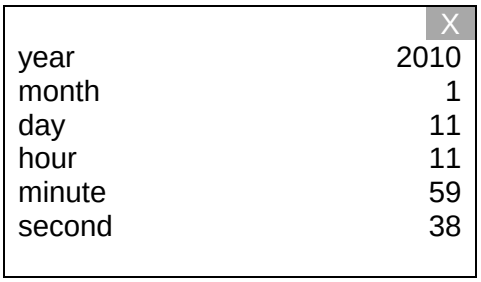


The UP/DOWN CURSOR keys can be used to select Enter Password only. The User ID and Level may only be changed by a user with administrator privileges (i.e. a level 4 user) Select menu item and press SELECT to change. The user will be asked to confirm the password.

Note: Passwords are written directly into FLASH memory and do not use the 'Save changes' option. User passwords cannot be duplicated and must not have leading spaces.

7.6.3.1.3 Set System Clock

When Set System Clock is selected the menu looks like:

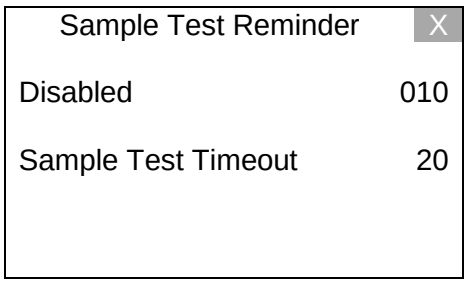


Use the CURSOR keys to navigate to individual digits and then the CURSOR UP/DOWN to amend it. The time is entered when SELECT is pressed.

7.6.3.1.4 Sample Test Reminder

This allows a timer to be set which will set an alarm after a duration of time set by the user and force a sample test to be execute.

When Sample Test Reminder is selected the menu looks like:



Use the CURSOR keys to navigate to disabled or individual digits and then the CURSOR UP/DOWN to amend the item.

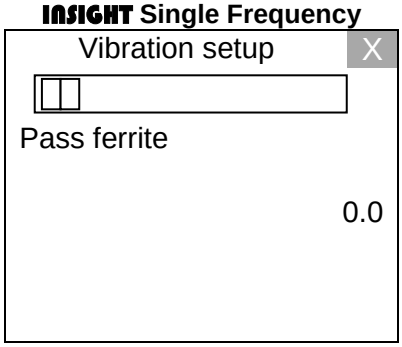
If the timer is enabled the time delay before the alarm is entered in the range of 5-1000 minutes. After the time has expired the warning relay is activated. After a further time of the Sample Test Timeout the fault relay is activated and the display changes to indicate that the sample test is overdue.

This optional feature is detailed in the ‘Sample Test’ section of this manual.

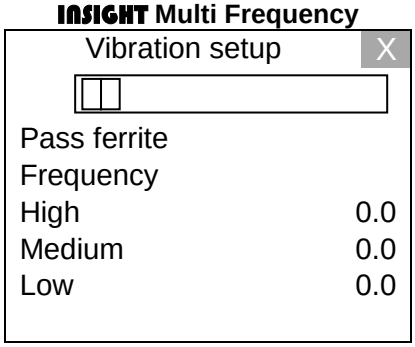
7.6.3.2 Vibration setup

When the **INSIGHT** metal detector leaves the factory, the Test setup phase angle is set to same angle as vibration and calibrated to 0 degrees. This option enables adjustment of this angle, which may be required if some of the metal detector components have to be repaired. When this option is set the following is displayed:

INSIGHT Single Frequency



INSIGHT Multi Frequency

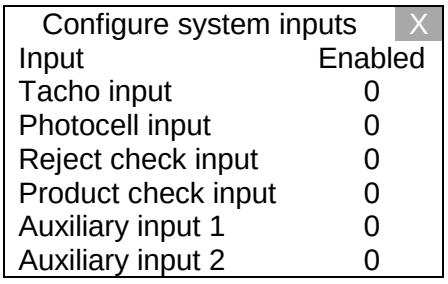


If the machine is an **INSIGHT** Multi Frequency each frequency must be selected in turn. A ferrite rod must be passed through the detector's aperture. Keep passing the ferrite rod until the 'Pass ferrite' message changes to 'Vibration setup complete'. If the ferrite rod is too large then the message 'Signal too large' will be displayed and the process repeated.

Note: Before conducting a vibration setup please consult Lock Inspection / Loma Systems.

7.6.3.3 Configure system inputs

A display similar to the following is seen when Configure system inputs is selected:



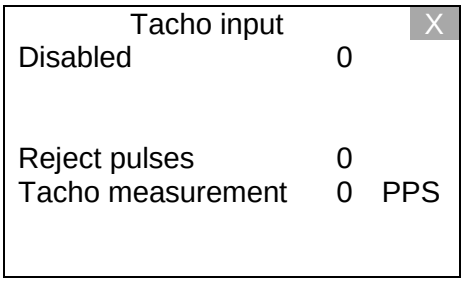
This option controls the 6 inputs on available in the I/O unit

- Tacho (for variable speed conveyors)
- Gating photocell (used to detect position of product on the belt)
- Reject systemchek (to check that reject mechanism operated)
- Product systemchek (to check that rejected product entered the bin)
- Auxiliary input 1 (e.g. bin full, air failure etc.)
- Auxiliary input 2 (e.g. bin full, air failure etc.)

A '0' indicate that the input is disabled, and '1' indicates enabled inputs.

7.6.3.3.1 Tacho input

The Tacho Input menu looks like:



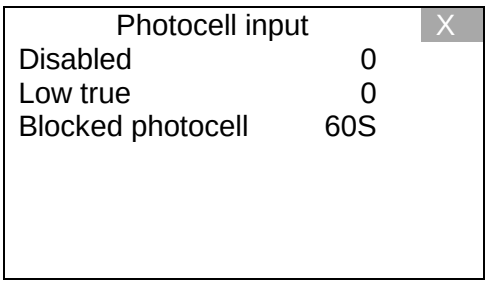
The input is enabled and disabled by using the CURSOR keys to select Disabled and pressing SELECT on the keypad.

The reject timer can optionally be set up to be timed in seconds or a number of Tacho pulses. To select pulses use the CURSOR keys to select Reject pulses and press SELECT on the keypad.

The bottom line is a test facility to show the pulse rate (pulses per second) of the Tacho input.

7.6.3.3.2 Photocell input

The Photocell Input menu looks like:



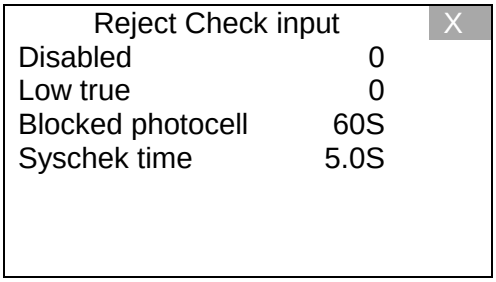
The input is enabled and disabled by using the CURSOR keys to select Disabled and pressing SELECT on the keypad.

Active High true or Low true should be chosen such that the usual value of the input (as shown by the 0 or 1) is low (0), and when the photocell is blocked the input should go high (1).

If the input is active true for more than the Blocked photocell time a ‘Blocked photocell’ fault occurs. The blocked photocell time is adjustable. The timer applies to all inputs.

7.6.3.3.3 Reject check input

The Reject Check Input menu looks like:



The input is enabled and disabled by using the CURSOR keys to select Disabled and pressing SELECT on the keypad.

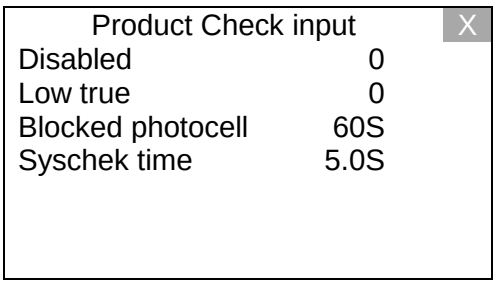
Active High true or Low true should be chosen such that the usual value of the input (as shown by the 0 or 1) is low (0), and when the photocell is blocked the input should go high (1).

If the input is active true for more than the Blocked photocell time a ‘Blocked photocell’ fault occurs. The blocked photocell time is adjustable. The timer applies to all inputs.
Syschek time allows the systemchek time to be changed. This is only relevant when one or both systemcheks are enabled in either Reject check or Product check Inputs.

When the reject relay is activated two timers are started, one for the product systemchek and one for the reject systemchek. If a signal from the relevant systemchek photocell is not received within the "Syschek time" then the fault relay is activated, and will remain activated until the detector is reset.

7.6.3.3.4 Product Check input

The Product Check Input menu looks like:



The input is enabled and disabled by using the CURSOR keys to select Disabled and pressing SELECT on the keypad.

Active High true or Low true should be chosen such that the usual value of the input (as shown by the 0 or 1) is low (0), and when the photocell is blocked the input should go high (1).

If the input is active true for more than the Blocked photocell time a ‘Blocked photocell’ fault occurs. The blocked photocell time is adjustable. The timer applies to all inputs.

7.6.3.3.5 Auxiliary input 1 & 2

The two auxiliary inputs can be used in a variety of applications, for example as an air failure detector or bin full sensor. The auxiliary active time is the length of time for which the auxiliary input needs to be high (active) continuously before the software drives the output relay. For a "bin full" sensor the active time might be a couple of seconds.

The Auxiliary Inputs menus look like:

Auxiliary input	X
Disabled	0
Low true	0
Blocked photocell	60S
BIN FULL	
No relay	
Auxiliary active time	0.00S
User defined message	

The input is enabled and disabled by using the CURSOR keys to select Disabled and pressing SELECT on the keypad.

Active High true or Low true should be chosen such that the usual value of the input (as shown by the 0 or 1) is low (0), and when the photocell is blocked the input should go high (1).

If the input is active true for more than the Blocked photocell time a ‘Blocked photocell’ fault occurs. The blocked photocell time is adjustable. The timer applies to all inputs.
The different messages available are selected by pressing SELECT on the fifth line.

When the input is activated there are 4 possibilities:

1) No relay activated
2) Reject relay activated
3) Warning relay activated
4) Fault relay activated

These options are obtained by pressing SELECT on the sixth line.

7.6.3.3.6 Frequency stagger control

This menu allows the detection frequency to be staggered. This may be necessary to prevent interference from equipment in the vicinity that is operating at a similar frequency.

The menu looks like:

INSIGHT Single Frequency

	Stagger	Frequency
High	+0	1000000

DDS Display

INSIGHT Multi Frequency

	Stagger	Frequency
High	+0	875000
Medium	+0	286000
Low	+0	100000

DDS Display

Use the CURSOR keys to select High, Medium or Low and press SELECT to access the stagger field. The stagger is then adjusted by using the UP/DOWN CURSOR keys.

7.6.3.4 Communications ID

The Line ID option on the menu allows the detector ID to be changed. This is used to address the detector in multi-drop RS485 network applications (e.g. 'Datachek' data management software).

7.7 Level 4 Operation

7.7.1 Product setup

This is the same as level 2 operation (See 7.5.1)

7.7.2 Adjust product presets

This is the same as level 2 operation (See 7.5.2)

7.7.3 System setup

When System setup is the selected the display looks like:

System setup

Administration menu
Vibration setup
Configure system inputs
Frequency stagger control
Communication ID

Use CURSOR keys to select an option and then the SELECT key.

7.7.3.1 Administration Menu

7.7.3.1.1 User control

This controls the security access mode in use. When ‘User control’ is set to 0, the Group password mode is selected. In this mode there are four passwords slots available, one for each level of user.

When ‘User control’ is set to 1, the Unique User ID mode is selected. In this mode there are 100 Unique User ID slots available each with their own User ID, password and level of operation.

When Administration Menu is selected and User Control = 0 the display looks like:

Password control	X
Set system clock	
Sample test reminder	
Set Language	
Initialise memory and restore	
Guard setup	1
User Control	0

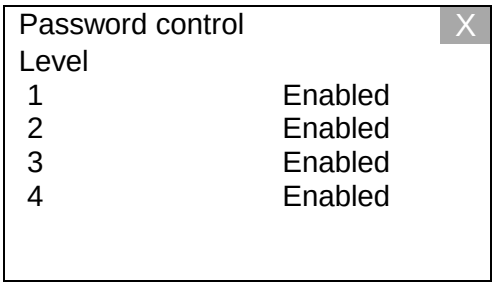
If User control = 1 the display looks like:

User	X
Set system clock	
Sample test reminder	
Set Language	
Initialise memory and restore	
Guard setup	1
User Control	1
User List	

7.7.3.1.2 Password control:

When Administration Menu is selected and User Control = 0 and the Password control menu is selected the display looks like:

Level 4



The UP/DOWN CURSOR keys can be used to select the available levels. Press SELECT to amend the password. The user will be asked to confirm the password after a valid entry has been made.

Note passwords are written directly into FLASH memory and do not use the 'Save changes' option.

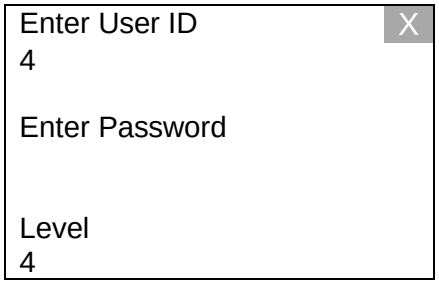
The LEFT/RIGHT CURSOR keys can be used to turn passwords off. When passwords are turned off a More button appears on some menus. This enables a password to be entered for menus that require a higher level.

Users may only change their own level password and that of lower level users.

Passwords cannot be duplicated. **INSIGHT** will not accept a new password if it is already in use.

7.7.3.1.3 User

When Administration Menu is selected and User Control = 1 and the User menu is selected the display looks like:



The UP/DOWN CURSOR keys can be used to select Enter User ID, Enter Password or X only. Select menu item and press SELECT to change.

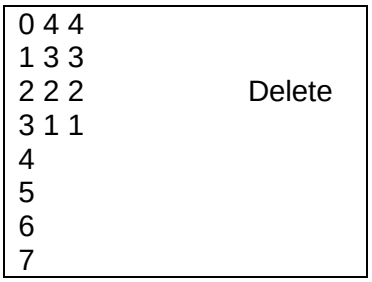
Note: User IDs and passwords are written directly into FLASH memory and do not use the 'Save changes' option.

User IDs cannot be duplicated. **INSIGHT** will not accept a new User ID if it is already in use. The Administrators can adjust the level of any user except their own.

7.7.3.1.4 User List

This menu enables the Administrator to manage up to 100 users on **INSIGHT**.

When the **INSIGHT** is delivered from the factory this menu will be similar to:



The first column shows the 'slot number' used to hold the User's ID, Password and Level.

The second column shows the Level of the user and the third column is a text string of the User's ID. The user ID can be up to 20 characters in length. Note that the password is not shown.

The display above shows that the **INSIGHT** is delivered with 4 users.
i.e.
Slot 0 shows a User ID of 4 whose level is 4.
Slot 1 shows a User ID of 3 whose level is 3.
Slot 2 shows a User ID of 2 whose level is 2.
Slot 3 shows a User ID of 1 whose level is 1.

(Note the default passwords are 1, 2, 3 and 4 respectively)

The CURSOR UP/DOWN keys are used to select a user slot and the User menu (See 7.7.3.1.3) is entered when SELECT is pressed.

Only a user with Administrator privileges at level 4 can manage users so the user list is not available to lower level users.

An administrator may Add, Delete or Edit any user. However an administrator may only change his or her own password and may not change level or be deleted.

If an empty slot is selected, a new user is created. The administrator is asked to input the User ID and the User menu is displayed. It is not possible to exit the User menu until a valid password has been set.

If the CURSOR RIGHT key is used on the User list menu the Delete button is accessed and if SELECT is pressed that User is deleted, however, the 'Save changes' screen will be displayed before this action completes.

7.7.3.1.5 Set System Clock

This is the same as Level 3 (See 7.6.3.1.3)

7.7.3.1.6 Sample Test Reminder

This is the same as Level 3 (See 7.6.3.1.4)

7.7.3.1.7 Set Language

This option allows the Administrator to change the language. The language files are loaded using the Lock Optix application.

7.7.3.1.8 Initialise and Restore

This option enables the Administrator to initialise all the settings in the **INSIGHT**. The settings are returned to the values when 'Guard setup' was last set. (See next section). All product settings (except Test setup) are erased. All passwords are erased and returned to the default factory settings.

7.7.3.1.9 Guard setup

Guard setup is enabled when the detector leaves the factory, however this may be overridden by an Administrator. This is done to protect the machines system and 'Test setup' settings. When Guard is enabled i.e. Guard = '1' the machines system and 'Test setup' settings are copied to the backup area of flash so that the machine can be recovered using the 'Initialise memory and restore' feature if required. Also when Guard is enabled the 'Test setup' can not be permanently changed.

7.7.3.2 Vibration setup

This is the same as Level 3 (See 7.6.3.2)

7.7.3.3 Configure system inputs

This is the same as Level 3 (See 7.6.3.3)

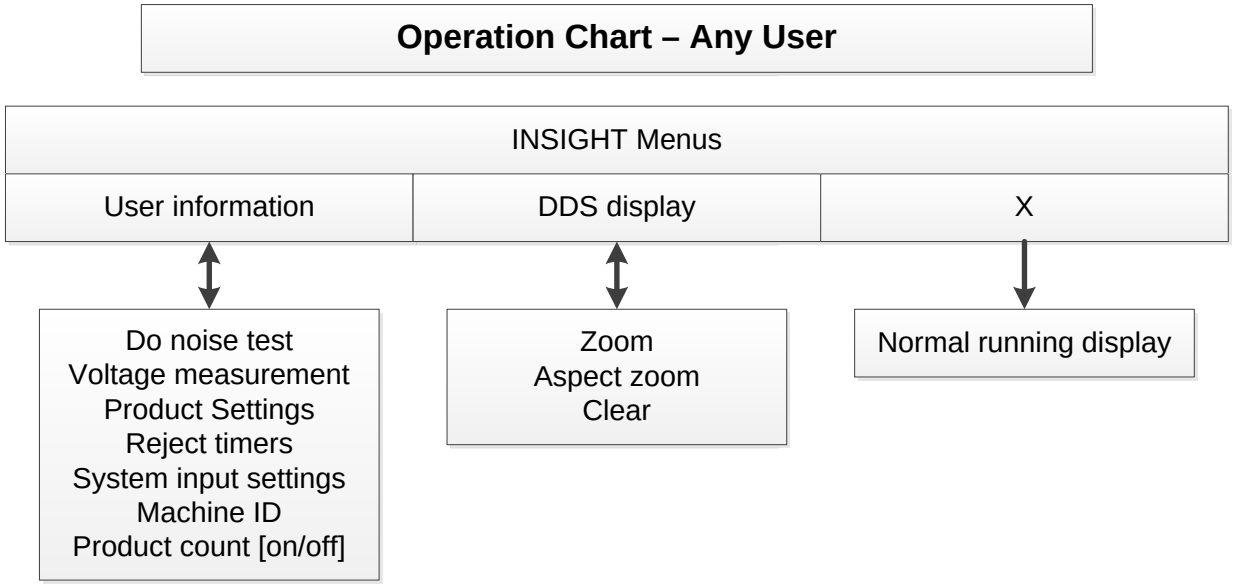
7.7.3.4 Frequency stagger control

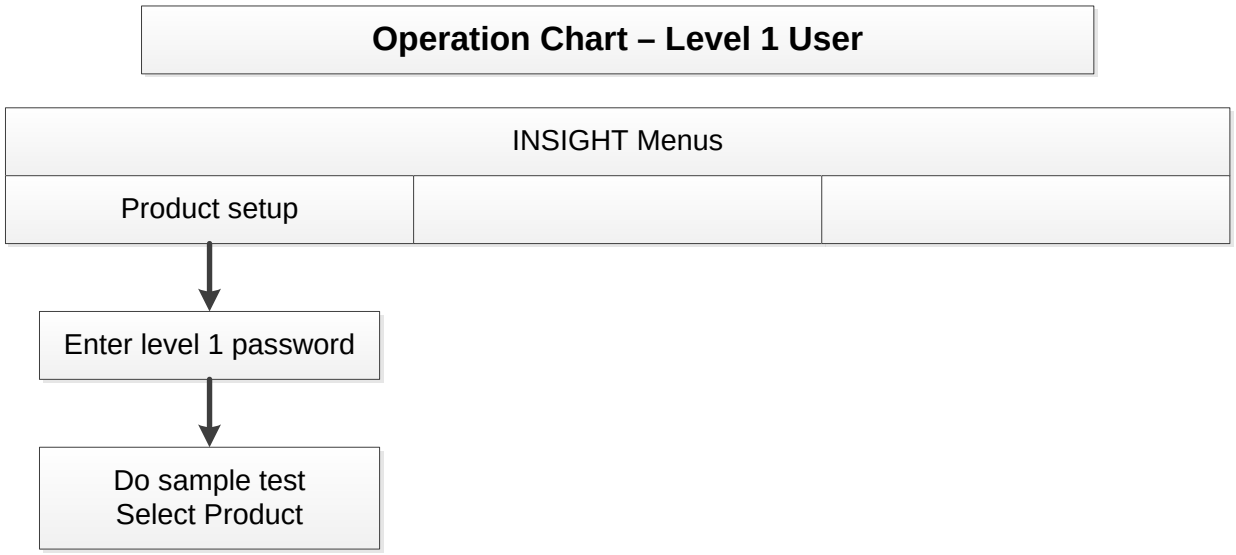
This is the same as Level 3 (See 7.7.3.4)

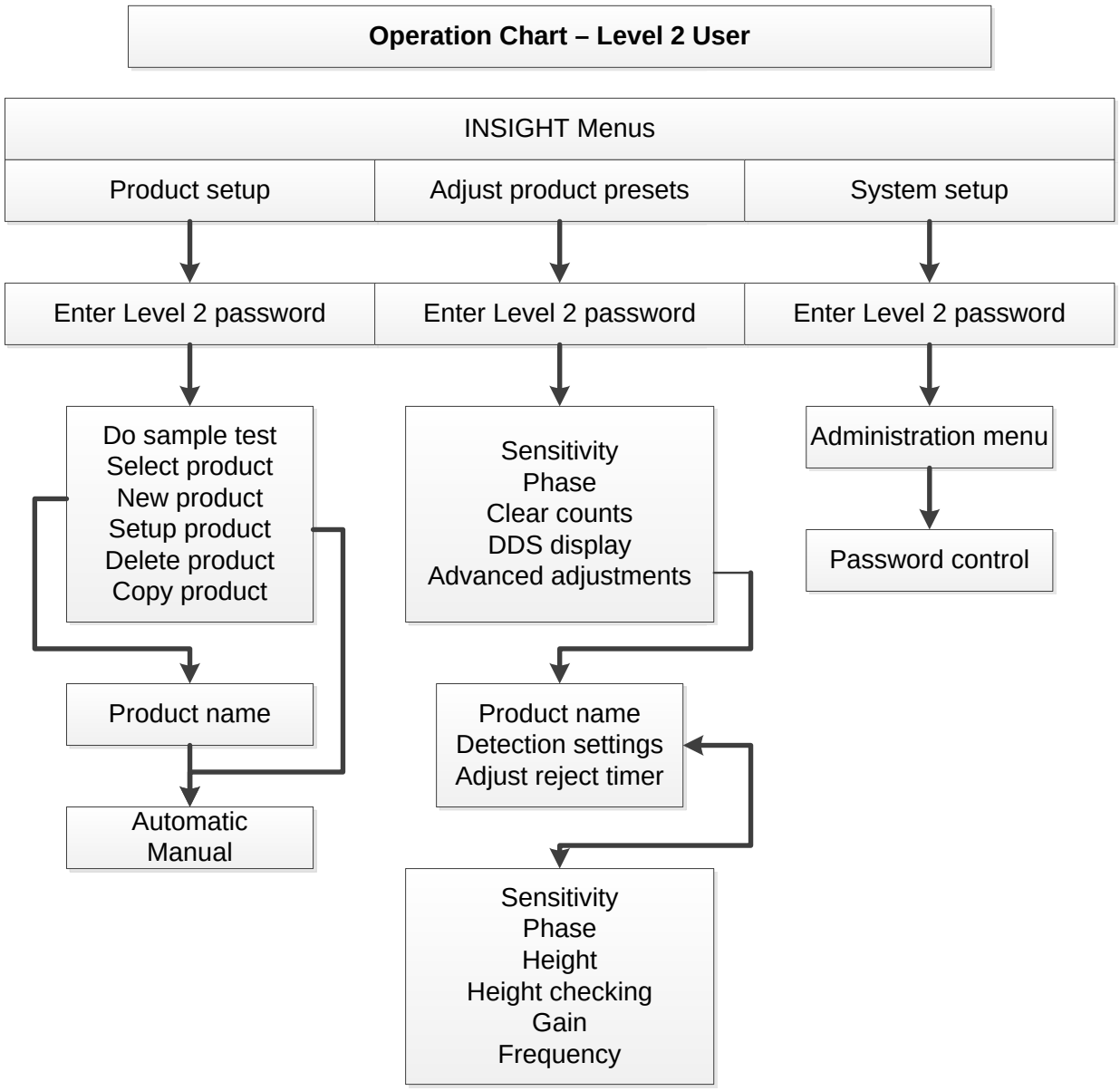
7.7.3.5 Communications ID

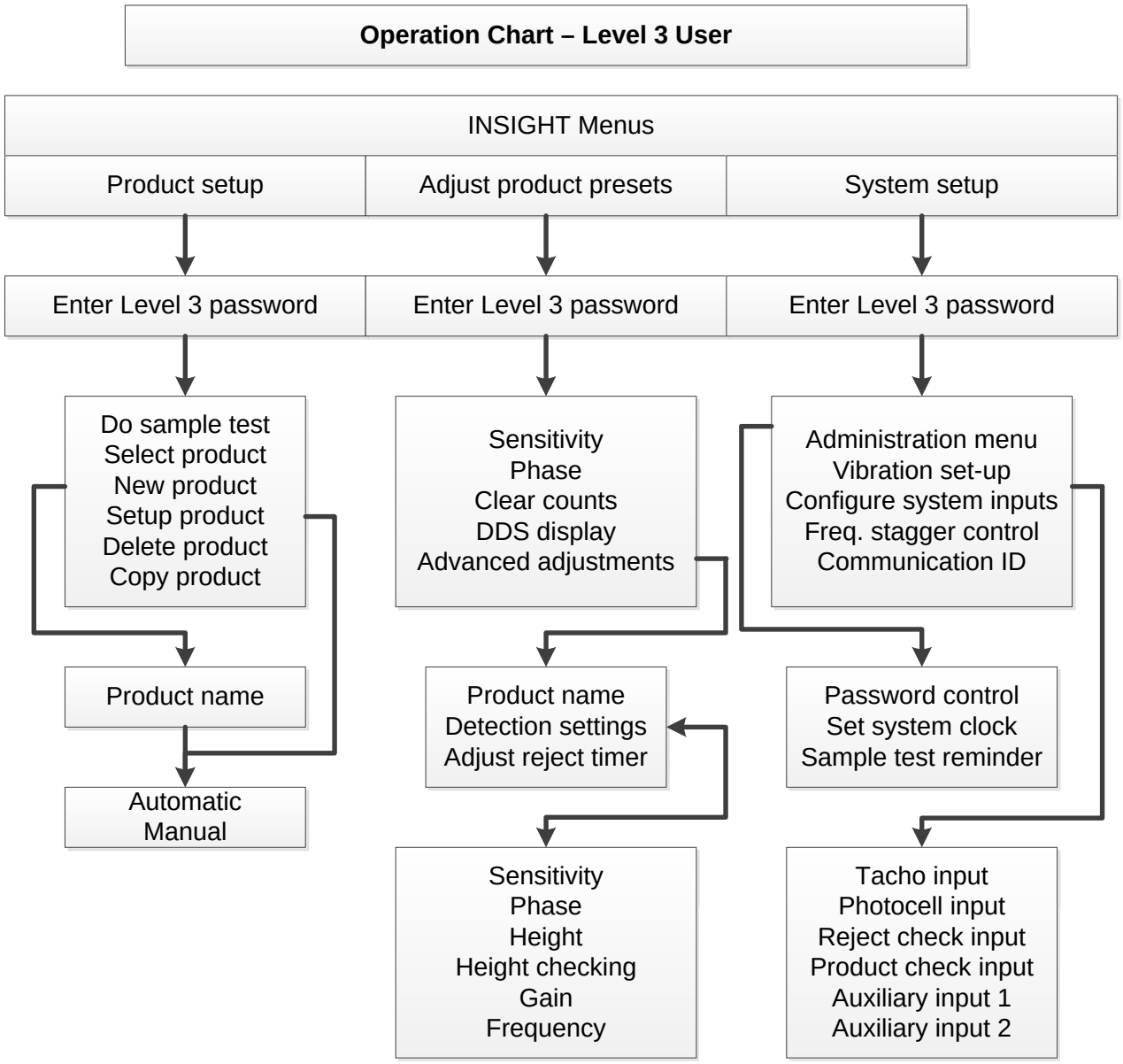
This is the same as Level 3 (See 7.6.3.4)

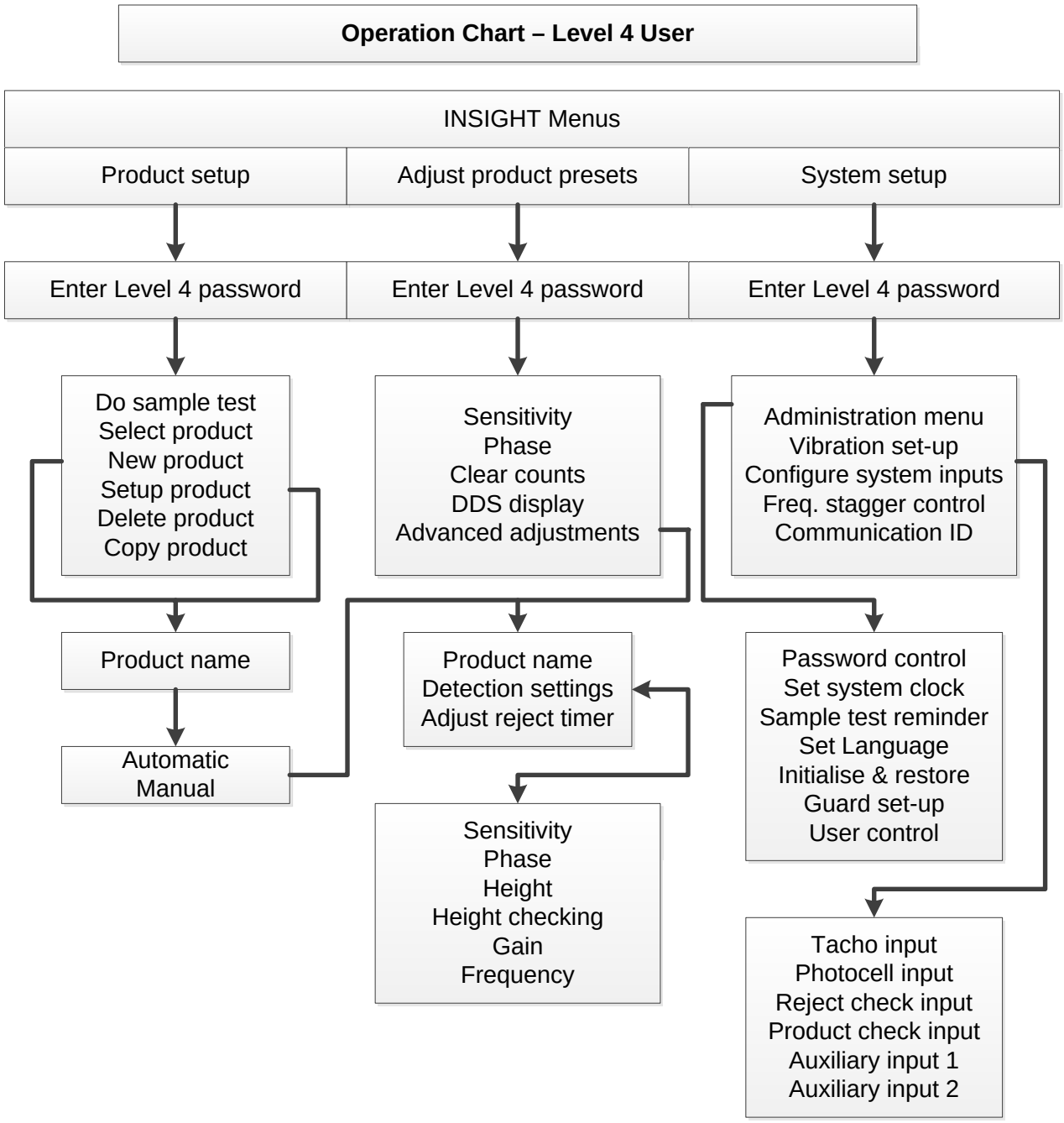
8. OPERATION CHART






Operation Chart – Level 2 User
INSIGHT Menus
Product setup
Adjust product presets
System setup
Enter Level 2 password
Enter Level 2 password
Enter Level 2 password
Do sample test
Select product
New product
Setup product
Delete product
Copy product
Product name
Automatic
Manual
Sensitivity
Phase
Clear counts
DDS display
Advanced adjustments
Product name
Detection settings
Adjust reject timer
Sensitivity
Phase
Height
Height checking
Gain
Frequency
Administration menu
Password control

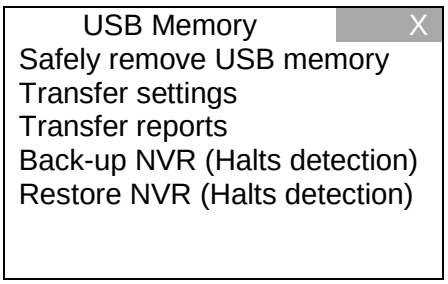

Operation Chart – Level 3 User
INSIGHT Menus
Product setup
Adjust product presets
System setup
Enter Level 3 password
Enter Level 3 password
Enter Level 3 password
Do sample test
Select product
New product
Setup product
Delete product
Copy product
Product name
Automatic
Manual
Sensitivity
Phase
Clear counts
DDS display
Advanced adjustments
Product name
Detection settings
Adjust reject timer
Sensitivity
Phase
Height
Height checking
Gain
Frequency
Administration menu
Vibration set-up
Configure system inputs
Freq. stagger control
Communication ID
Password control
Set system clock
Sample test reminder
Tacho input
Photocell input
Reject check input
Product check input
Auxiliary input 1
Auxiliary input 2


Operation Chart – Level 4 User
INSIGHT Menus
Product setup
Adjust product presets
System setup
Enter Level 4 password
Enter Level 4 password
Enter Level 4 password
Do sample test
Select product
New product
Setup product
Delete product
Copy product
Sensitivity
Phase
Clear counts
DDS display
Advanced adjustments
Administration menu
Vibration set-up
Configure system inputs
Freq. stagger control
Communication ID
Product name
Automatic
Manual
Product name
Detection settings
Adjust reject timer
Password control
Set system clock
Sample test reminder
Set Language
Initialise & restore
Guard set-up
User control
Sensitivity
Phase
Height
Height checking
Gain
Frequency
Tacho input
Photocell input
Reject check input
Product check input
Auxiliary input 1
Auxiliary input 2

9. USB MEMORY

9.1 USB Memory Menu

When a USB memory stick is plugged in, the following menu will be displayed:



Note: The USB memory device must be plugged into any adaptors first before it is plugged into the detector as shown below:

Part No: Q605-0033

9.1.1 Safely remove USB memory

When 'Safely remove USB memory' is selected the USB Memory device can be safely removed and the display returns to normal running. Any files transfers to the USB memory are terminated safely.

9.1.2 Transfers settings

When Transfer settings is selected a text file containing all the product settings is created on the USB memory. While the file is being created 'Transfer settings' menu item changes to 'Stop transfer settings'

9.1.3 Transfers reports

When 'Transfer reports' is selected a text file containing all the reports is created on the USB memory. This may take some time, while the file is being created 'Transfer reports' changes to 'Stop transfer reports'

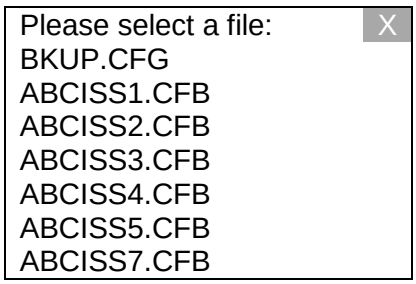
9.1.4 Back-up NVR (Halts detection)

Back-up NVR makes a USB copy of all the **INSIGHT** and product settings. The reports and passwords are NOT copied.

When Back-up NVR is the selected the User is asked to input the name of the file to be copied to (maximum of 8 characters). When the name is entered, metal detection is stopped and the back-up file created. This will take some time and the detector must not be powered off during this process. If the detector is powered off, recovery via Optix will be required. From Optix perform a Memory Backup operation to recover.

9.1.5 Restore NVR (Halts detection)

When Restore NVR is the selected the User is given a list of the available recovery files available in the USB memory. The display will be similar to:



The UP/DOWN CURSOR keys can be used to select the available files. When the file is selected, metal detection is stopped and the back-up file restored. This will take some time and the detector must not be restarted during this process. If the detector is powered off the recovery via Optix will be required, perform a Memory Restore operation to recover the detector.

10. FORCED SAMPLE TEST

It is prudent to have an organised procedure for physically checking the system. A known test sample, shipped with each detector, should be inserted into an identified fresh sample of the product and passed through the detector. It should be detected and accurately rejected. This will ensure that the detector timing devices and auto reject mechanism are functioning correctly. If specifications include ferrous and stainless, both should be used for the test. On a long product, the metal test piece should be positioned at the leading and then the trailing edge to ensure the product will be rejected under all circumstances.

The Lock / Loma metal detectors provide the 'Sample test reminder' facility to ensure regular testing takes place.

This section describes the operation of the ‘Forced Sample Test’. The example flow chart describes the behaviour of a Pharmaceutical machine with a light tower fitted. However, a conveyorised system behaves in a similar manner the differences noted in the description below.

10.1 Operation

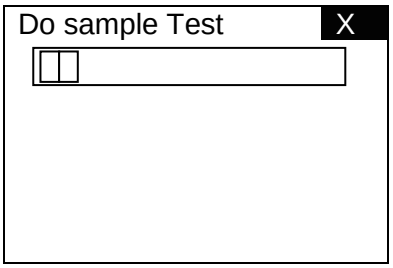
The operation of the sample test reminder facility is shown in the ‘Sample Test Flowchart’ Section below. This shows the messages given on the detector's display, the lights on the tower (if fitted), the state of the detector and the events/operator activities to change from one state to another.

Note 1: To activate the ‘Sample Test Reminder’ follow the ‘Sample Test reminder’ setup instruction. (See. 7.6.3.1.4)

Before you do this, however, make sure that the reject timers are configured correctly for the product (See 7.2.1.4) and, that the machine has been configured for your application and product type. (Ref: Installation Manual)

The detector may well be showing the product bar-graph screen prior to the sample test reminder becoming active, however, the reminder if set, will become active from anywhere in the menu system.

Note 2: When the sample test reminder period has elapsed normal operation continues but the orange sample test reminder warning lamp turns on and the display changes to:



The detector continues functioning normally until either the SELECT key is pressed or the Sample Test Timeout period has elapsed.

Pressing the SELECT key causes the Unique User ID or Group Password screen to be displayed. The user has, up to, the sample test time out period to accept the 'Do Sample Test' screen (See Note 4)

If the Sample Test Timeout period has elapsed then the detector will go into Machine fault. (See Note 3)

Note 3; Machine Fault: If the timeout period has elapsed then the red machine fault lamp is turned on in addition to the orange sample test warning lamp.

On a conveyorised system the belt will be stopped (provided that the fault relay has been configured to stop the conveyor. Ref: Installation Manual)

On a Pharmaceutical system the reject mechanism will be activated into the fail safe position and the blue reject lamp will be turned on in addition to the red and orange lamps. The blue reject lamp will follow the state of the reject mechanism.

In either case the "Machine Fault" or "Sample Test Failed!" screen is displayed.

The "Machine Fault" message is displayed if the machine fault condition was due to either the Key inactivity timeout or Sample test timeout.

The "Sample Test Failed!" message is displayed if the machine fault condition was due to a failed test (See Note 5).

The detector cannot now be used until the sample test is executed successfully. This can be achieved by pressing SELECT which will take the user to the security access screen (See Note 4) or the 'Do Sample Test' screen. (See Note 5) This depends on the cause of the machine fault.

Note 4: If the SELECT key is pressed the user is asked to enter either a valid Unique User ID or Group password. Displaying Unique User ID or Group password depends upon the system security settings. (See 7.3)

The security information entered is recorded in the metal detection sensitivity test

report, which also provides evidence of the time when the test was run and the phase and size of the test sample detected.

Once the ‘Do Sample Test’ screen has been accepted the user has approximately ~5 minutes to enter a valid Unique User ID or Group password after which the system will timeout to the ‘Machine fault’ screen.(See Note 3)

Note 5: Upon entering a valid password or ID the user has 10 seconds within which to pass a test sample. The display shows "Pass test sample" and a figure, which will count down from 10 to 1

On completion of a successful test the blue lamp will turn on and then off in time with the reject mechanism. The orange lamp is turned off and the green lamp is turned on. The display now shows "Test passed". No further sample test will be forced until this screen has been accepted whereby the sample test reminder time will be reset.

Pressing SELECT enables normal operation to be completed.

If the detector fails to detect a metal sample within this time the system will go into machine fault with the message "Test failed!" displayed on the screen. (See Note 3)

If the test fails then pressing SELECT will give the user the choice to either repeat the test (See Note 6) or exit to the menu system (See Note 7).

This screen will not timeout and the request to do a sample test will remain on the display until a selection is made.

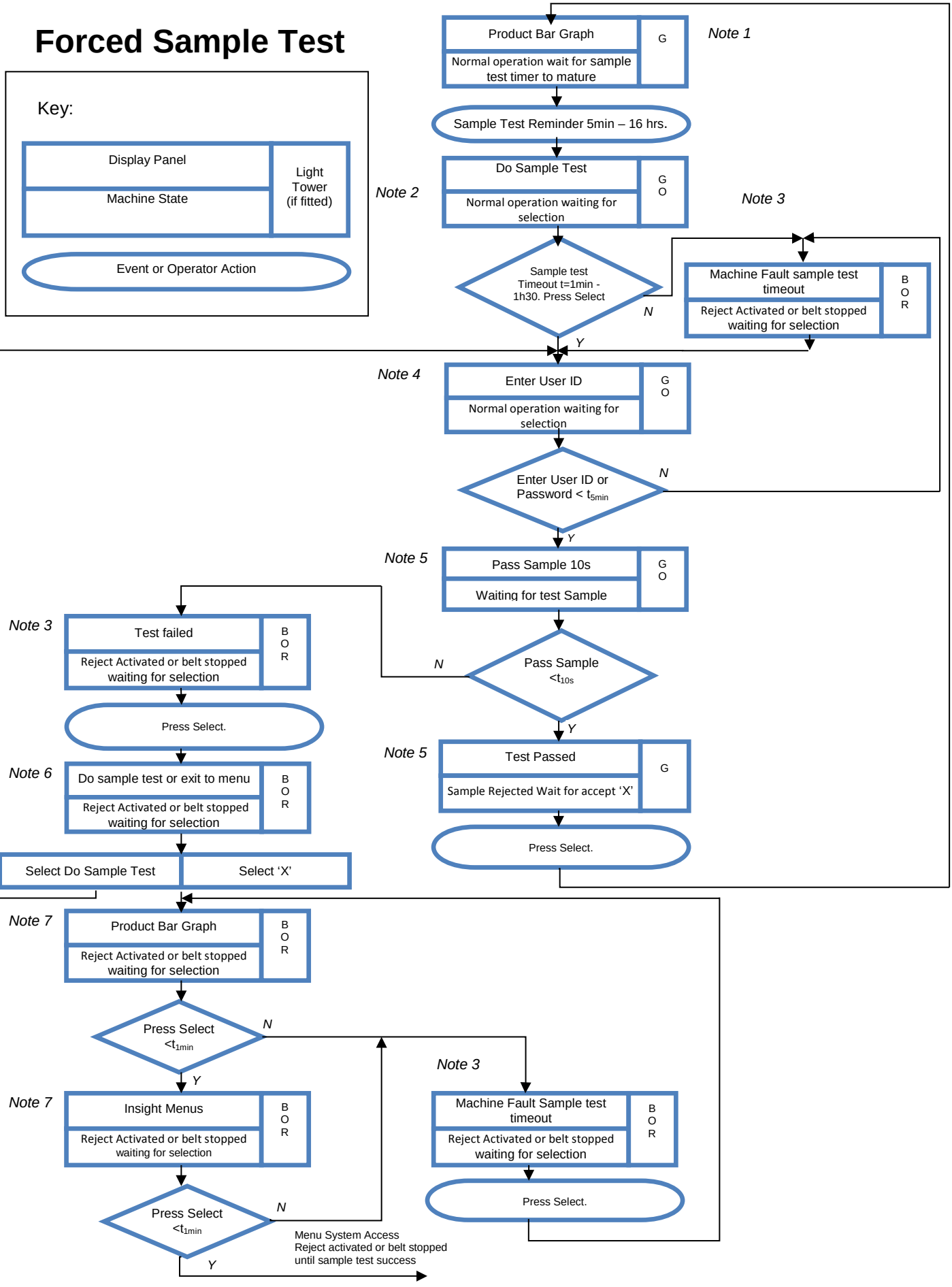
Note 6: If ‘Do Sample Test’ is selected the user is asked to enter valid security information (See Note 4) for the test to resume. The detector cannot be used again until there is a successful test.

Note 7: If the ‘X’ is selected the user is taken back to the ‘Bar Graph Screen’ whereby the user can access the menu system. The machine remains in ‘Machine Fault’ (See Note 3) and at any point within the menu system the ‘Machine Fault’ message will be displayed if there has been no keypad activity for greater than ~1 minute. The detector cannot be used again until there is a successful test.

10.2 Recommended action on failing test

If the standard test sample is not detected, the product setup and reject timers should be checked and adjusted as required - refer to the ‘Product setup’ and ‘Troubleshooting’ sections of this manual. If this should occur, all production since the previous testing should be considered as suspect and possibly contaminated.

Forced Sample Test



11. TROUBLESHOOTING GUIDE

The aim of this section is to list common problems and possible solutions. The fault finding section of the Installation Manual should also be consulted.

11.1 False Triggering / Poor Sensitivity

This is the most common problem with metal detectors. There are many possible reasons for it, so the first thing to do is to narrow down the source of the problem. To do this, select the "TEST SETUP" preset and pass the test sample provided through the metal detector. Now read the relevant paragraph below:

11.2 Fails to detect test sample

The detector is now less sensitive than when it left Lock Inspection / Loma Systems. A technician should check that the power supply cables are wired correctly. If everything appears to be OK call Lock Inspection / Loma Systems.

11.3 Detects sample but false triggers

There are many possible reasons for this, below is a list of possible causes:

Components guiding/transferring products through the metal detector should be clean and contain no metal. Sometimes metal becomes embedded in the guiding/transferring components causing the head to trigger at regular intervals. Under no circumstances should metal fasteners be used in guiding/transferring components.

Moving metal in the metal-free-zone - there must be no metal in the metal-free zone. Consult the Installation manual.

Earth loops - all metal items must be securely bonded to each other or insulated. Intermittent metal-to-metal contacts can often cause problems.

Electrical interference - all high-current cables should be routed well away from the detector and it’s cabling.

12. GLOSSARY

12.1 Aperture

Aperture is the ‘hole’ in the metal detector through which product passes.

12.2 Bar-graph

On the bottom line of the detector's display, after power on or reset, a line of blocks is displayed. The more blocks, the larger the signal from the product. Solid blocks indicate that metal has been detected, while hollow blocks indicate product effect or noise.

12.3 Test setup

This product setting is set up at the factory to detect the standard test sample provided with the detector, without false triggering. By selecting TEST SETUP and passing the standard test sample it is possible to see if the basic sensitivity of the detector has reduced since it left the factory. If it sees the sample but false triggers, then the environment is noisier (see *noise* below) than when the detector was initially set up.

12.4 False Triggering

False triggering is when the detector indicates that it has seen metal when none is present. This can mean that good product is incorrectly rejected.

12.5 Metal-Free Zone

Any metal that moves near to the aperture may be detected by the metal detector. This could result in false triggering. To prevent this, there should be a metal-free zone around the detector aperture i.e. an area where no metal is present.

12.6 Noise

In connection with metal detectors, noise usually refers to electrical noise, sometimes called interference. Noise is unwanted signal picked up by the metal detector, sometimes resulting in false triggering or reduced sensitivity. Noise can be generated by unsuppressed solenoids, inverters, earth loops, high-current-carrying cables, welding equipment operating nearby etc.

12.7 Noise Test

This is a fault diagnosis test. It is an automatic setup which can be carried out in the event of a fault occurring on the detector. The auto setup values should be noted and then passed to Lock / Loma when calling for assistance.

12.8 Product Effect

Some products have a signal, which can be seen by the metal detector - this is called the product effect. Its effect, in some cases, is to partially mask the signal from metal contamination resulting in a lower sensitivity. Product effect can be caused: by small amounts of metal in the product's recipe e.g. iron-fortified cereals, vitamin tablets or packaging materials e.g. metallised film or recycled cardboard as well as salt content and fat content.

12.9 Sensitivity

Sensitivity is the smallest size of metal contaminant that can be reliably detected without false triggering. If the detector is too sensitive, unwanted rejection of good product will take place. If the detector is not sensitive enough, metal contamination may be missed. Sensitivity can be changed in the software by changing the product parameters.

12.10 Systemchek

A means of verifying that the reject mechanism has operated when required to do so (reject systemchek) or that the contaminated product has entered the reject bin (product systemchek). It is controlled by one or two photocells connected to the PSU and settings in the software.

12.11 Test Sample

When a metal detector is shipped by Lock / Loma, a test sample is sent with it. This is a small piece of metal embedded in plastic or a laminated card. This can be used to test the basic sensitivity of the metal detector, i.e. the sensitivity of the detector without compensating for product effect.

12.12 Trigger

When the metal detector detects metal it is indicated by the bar-graph showing solid bars, and the reject count incrementing.