METAL DETECTOR
METAL SHARK® BD

Original Manual / Documentation (English)

Software Version 3.94o (English) and higher
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1. General Information

1.1. How to use this Manual / Documentation

Validity: Metal detector type METAL SHARK® BD
Manufacturer: Cassel Messtechnik GmbH
            In der Dehne 10
            37127 Dransfeld
            Germany

Print date of this manual: December 08

This manual / documentation contains all general information that is necessary for setting up and running METAL SHARK® Metal Detectors.

Please refer to the annex for further information about your specific METAL SHARK® metal detector.

This document is directed to operators as well as technical staff with the following tasks:

- Operating metal detector,
- initial operation (only technicians),
- regular inspections and maintenance work,
- safety check before and during the work with the metal detector,
- eliminating errors.

This manual / documentation was compiled in January 2003 according to the guidelines of the European standard EN 292-1/2:1991D, “Safety of machines”. It completes the existing national regulations for accident prevention that you have to follow when running such machines.

Before the initial operation of the metal detector all persons that are authorised to work on and with the metal detector have to read and understand this manual / documentation. Alternatively the employer can deal with the context of this manual / documentation. Special interest is to be paid to the safety instructions.

The manual / documentation must stay with the metal detector. All authorised persons must have access to it at any time. You are not aloud to remove any chapters from this manual / documentation. A missing manual / documentation or missing pages (especially the chapter “Safety instructions”) have to be replaced immediately.

Note:

Cassel Messtechnik GmbH gives no implicit guarantees regarding standard qualities or suitability for a certain application.

This documentation contains information which is subject to copyright. No part of it may be photocopied, duplicated, translated or recorded on data media without prior consent from Cassel Messtechnik GmbH.

This documentation is not subject to change control by Cassel Messtechnik GmbH. The manufacturer reserves the right to make changes to this documentation. All rights reserved.
2. Declarations

2.1. CE - Declaration of Conformity

according to annex II A of the EC Machinery Directive (2006/42/EC)

The manufacturer: Cassel Messtechnik GmbH
In der Dehne 10
37127 Dransfeld / Germany
certifies herewith that the machine Metal detector type METAL SHARK® BD
fulfills the safety and health requirements of the EC directives:

EC-Machinery Directive 2006/42/EC
EC-Directive electromagnetic compatibility 2006/95/EC
Electromagnetic Compatibility 2004/108/EC
EC-Directive „explosion protection“ 94/9/EC (ATEX)

Relevant harmonised European standards:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN ISO 12100-1</td>
<td>Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology</td>
</tr>
<tr>
<td>EN ISO 12100-2</td>
<td>Safety of machinery. Basic concepts, general principles for design. Technical principles and specifications</td>
</tr>
<tr>
<td>DIN EN 60204 - 1</td>
<td>Safety of machinery - Electrical equipment of machines - General requirements</td>
</tr>
<tr>
<td>DIN EN 60529</td>
<td>Degrees of protection provided by enclosures (IP code)</td>
</tr>
<tr>
<td>DIN EN 60947-7</td>
<td>Low-voltage switchgear and control gear - Part 7-1: Ancillary equipment; Terminal blocks for copper conductors.</td>
</tr>
<tr>
<td>DIN EN 61558</td>
<td>Isolating transformers and safety isolating transformers</td>
</tr>
<tr>
<td>DIN EN 61000</td>
<td>Electromagnetic compatibility (EMC)</td>
</tr>
<tr>
<td>EN 50022</td>
<td>Low voltage switchgear and control gear for industrial use; mounting rails, top hat rails, 35 mm wide, for snap-on mounting of equipment</td>
</tr>
<tr>
<td>EN 61000-6-4</td>
<td>Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments</td>
</tr>
<tr>
<td>EN 61000-6-1</td>
<td>Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments</td>
</tr>
</tbody>
</table>

Herewith we declare that we followed the relevant safety norms and requirements for technical safety and for explosion prevention for the intended use when constructing and producing this metal detector.

The metal detector is destined for facilities that are protected against explosions by the safety measure “no potential ignition source”.

Equipment marking:
- Category II 3D T3
- Equivalent to Zone 22 in EN 1127-1
- Complies with EG directive 94/9/EC (ATEX 95)

Constructional changes which have effects on the technical information in this manual and on the intended utilisation, and therefore convert the machine considerably, make this declaration of conformity invalid!

Dransfeld, 08 December 2008
Cord Cassel, Managing Director
2.2. Manufacturer’s Declaration

The producer: Cassel Messtechnik GmbH
In der Dehne 10
37127 Dransfeld, Deutschland

certifies herewith that the machine Metal detector type METAL SHARK® BD

is in conformity with the provisions of the following EC Directive(s) when installed in accordance with the installation instructions contained in the product documentation:

- EC-Machinery Directive 2006/42/EC
- EC-Directive electromagnetic compatibility 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC
- EC-Directive „explosion protection“ 94/9/EC (ATEX)

Herewith we declare that the described product is intended to be incorporated into machinery and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the EU-directives 2006/42/EC and explosion protection 94/9/EC.

The equipment complies with:

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- Category II 3D T3
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Constructional changes which have effects on the technical information in this manual and on the intended utilisation, and therefore convert the machine considerably, make the Manufacturer’s Declaration invalid!

Dransfeld, 08 December 2008
Cord Cassel, Managing Director
3. **Area of Application and Qualification**

3.1. **Normal Use**

The Metal Detectors of the METAL SHARK® series are solely designed for detecting foreign metal bodies in non-metal products. Metal can be detected in products that are in a

- solid,
- liquid or
- powder

form.

3.2. **Misuse**

The METAL SHARK® series is not designed for uses other than those listed in chapter “3.1 Normal Use” otherwise it is regarded as misuse. In particular, we draw attention to the fact that it is not allowed

- to change or remove safety components from the metal detector or the associated peripheral equipment in order to perform measurements other than those indicated in chapter “3.1 Normal Use”,
- to use the machine for a purpose which is not approved,
- to convert the machine without consent from Cassel Messtechnik GmbH in order to use it for a different purpose. Please bear in mind that if you convert the metal detector you are considered the manufacturer – with all the consequences!

3.3. **Owner's Obligation to Exercise Due Care**

The METAL SHARK® series has been designed and built taking due consideration of a hazard analysis and after careful selection of the harmonised standards to be observed, as well as other technical specifications. It is therefore state of the art and guarantees maximum safety.

However, in practical operation this safety can only be maintained if all the necessary measures are taken. As part of his obligation to exercise due care, the owner must take these measures and control their implementation.

The owner of the equipment must, in particular, ensure

- that the machine is only subjected to normal use (refer to “3.1 Normal Use”),
- that the machine will only be operated if it is in good working condition and the safety devices are checked regularly to make sure they are operative,
- that the Operating Instructions are always in a legible state and are available in their entirety at the place where the machine is used,
- that only adequately qualified and authorised staff operates, services and repairs the machine,
- that before working with the metal detector for the first time, and also thereafter on a regular basis, the staff receives instruction on all the relevant issues regarding safety at work and environmental protection and that they are acquainted with the Operating Instructions and particularly the safety instructions therein,
- that all the safety signs and warnings attached to the machine are not removed and remain legible.
3.4. Requirements for Operating Staff

To operate the Metal Detector METAL SHARK® series no special knowledge of measuring technology, mechanical engineering or electrical engineering is necessary. However, the operating staff must be at least 18 years of age and, before working with the metal detector for the first time, must have received training from the owner of the machine.

After receiving initial training the operating staff must be in a position to perform the following activities without supervision:

- Putting the metal detector into operation and taking it out of operation.
- Being acquainted with the functions of the metal detector and being able to carry them out.
- Performing regular performance checks and visual inspections on the metal detector.
- Inspecting the safety devices before and during operation.
- Eliminating minor malfunctions for which no occupational training in the field of mechanical engineering or electrical engineering is required.

3.5. Requirements for Service and Maintenance Staff

To be able to perform maintenance work properly, a period of occupational training in the area of mechanical engineering or electrical engineering must have been successfully completed. Only trained maintenance staff is allowed to repair METAL SHARK® Metal Detectors.

For service and maintenance work on the metal detector knowledge of the German or English language is absolutely essential.

After initial training the service and maintenance staff must be in a position to perform the following activities without supervision:

- Conducting regular performance checks and visual inspections on the metal detector.
- Locating and eliminating malfunctions.
- Inspecting the safety devices on a regular basis.
- Commissioning, maintaining, repairing and turning off the metal detector.
4. General Safety Instructions

4.1. General Safety Instructions

**Danger!**

This Symbol indicates that there is a potential danger for life and health.

- Never put the metal detector into operation without the safety devices provided by the manufacturer. Only specially trained maintenance staff is allowed to operate the equipment without the safety devices.
- Shut down the machine immediately if the safety devices are not operating properly or if there are other apparent defects which pose a danger. Any defects must be eliminated or reported immediately.
- Always observe any warning signs attached to the machine. They help prevent dangerous situations. The removing of these warning signs is strictly prohibited.
- Never put the metal detector into operation
  - if you have not received complete initial training from the owner,
  - if you have not fully read the operating instructions or
  - if you have not fully understood the operating instructions.
- Not operating the machine correctly may result in severe injury or damage.
- Entering the area of the equipment is strictly prohibited for unauthorised persons. An unauthorised person is a person who has not been instructed to work on the metal detector.
- Wear closely fitting working clothes which cannot get caught in rotating parts (e.g. conveyor belt).
- Keep the floor at your place of work clean. Remove oil and obstructions immediately.
- Naked flames and smoking are not allowed.
Danger!

This symbol indicates that there is a potential danger for health and life due to high voltage.

- Never touch any live parts. Electric shocks may lead to severe injury or death.
- During servicing or maintenance work always wear insulated safety shoes with thick crepe soles.
- Report any damaged cables to the maintenance staff immediately.
- Keep all access doors to the electrical equipment locked.

4.2. Safety Instructions for the Metal Detector

Attention!

This symbol indicates that there are potential dangers for the instrument, material and environment.

Smooth and safe running of METAL SHARK® Metal Detectors is only possible if the following measures have been taken.

4.2.1. Installation Instructions

- Always attach an earth clamp for welding equipment directly next to the weld.
- Never allow the welding current to flow through the housing of the metal detector. This would damage the metal detector beyond repair.
4.2.2. Connecting Instructions

- Check to make sure the mains voltage is the same as that required for the equipment.
- Only trained staff is allowed to fit and connect the metal detector.
- Observe general installation regulations for setting up and operating electrical equipment (VDE 0100).
- Consequently, never perform any work on the metal detector when it is switched on.
- Take precautions to protect human life and the machine in accordance with the local conditions and regulations.
- The Metal Detector METAL SHARK® series is designed for permanent, steady-state installation.
- Never connect or disconnect control cables or coaxial cables whilst the metal detector is switched on.
- Never connect mains cables, control cables or coaxial cables incorrectly.
- Observe the current-carrying capacity of the output contacts.
- Use screened/twisted-wire mains and control cables. Only connect the screening to the earth lead at the metal detector end.
- Never put the mains cable and control cable in the same cable run.
- Make sure the metal detector is properly earthed (neutral earth; avoid earth loops; use the shortest connection to the main earth).

4.2.3. Operating Instructions

To prevent the metal detector from ageing prematurely or being damaged beyond repair, please observe the following instructions:

- The metal detector should always remain switched on. This will maximise the service life of the electronic circuitry.
- Only operate the metal detector under suitable conditions (refer to chapters above).

4.2.4. Protection Against Interference

The mains input of the metal detector is protected against interference.

A high level of operational reliability and additional protection against malfunctions is achieved by the following measures:

- Use of mains filters if the mains voltage is affected by the switching-on of heavy-load appliances (compensation systems, welding equipment, HF furnaces, solenoid valves, etc.).
- Providing suppresser circuits for inductance appliances (solenoid valves, contactors, electromagnets) using RC elements (Resistor/Capacitor elements) in order to absorb the energy being released by switching off.
5. Technical Description

This section tells you about the design of your metal detector and how it operates. We are sure that the information will help you to use the metal detector to your full advantage.

5.1. Metal Detector METAL SHARK® BD

The metal detector METAL SHARK® BD consists of two parts:

- A sensor head which you can install in conveyor belts, chutes, etc. and
- the control unit for operating, controlling and signal processing.

There are various versions of control units available:

- Separate wall-mounted unit
- Attached to the side of the sensor head
- Stainless steel housing, sheet steel housing
- Increased EMC protection (available only with steel housing without window)

With various accessories, e.g. flashing light.
5.2. Method of Operation

METAL SHARK® Metal Detectors operate on the principle of inductance measurement, which is briefly described below.

The sensor has two coils:
• the transmitter coil and
• the receiver coil.

The pair of coils must be balanced before measuring. They are balanced automatically after switching on the metal detector. This is called "adjustment".

In the transmitter coil a generator is used to create a flow of electric current. This creates an electromagnetic alternating field (magnetic field) in the sensor.

If a particle of metal now passes through the metal detector — and hence through the magnetic field — the magnetic field of the transmitter coil changes. As a result of the change in the magnetic field an electric current is created in the receiver coil. This process is termed "electromagnetic induction".

The amount of current generated (induced) is directly proportional to the magnetic and electrical properties of the metal piece:
• Large metal piece induce a higher current than small metal particles
• Magnetic metals (e.g. steel) induce a higher current than non-magnetic metals (e.g. aluminium)

The current thus induced is measured and then processed and analysed by the electronic circuitry.

Since this method of measurement responds to
• electrical conductivity and
• magnetism

all types of metal are detected. However, magnetic metals are detected more reliably than non-magnetic ones. This way of measuring also makes it possible to detect metal particles inside the product or in non-metal packaging.

The examined products are not harmed or changed in any way.

5.3. Operating Limits

Not only metals but also many other materials and raw materials are more or less electrically conductive. The reasons for this can, for example, be that the products consist of
• salts,
• sugar,
• minerals,
• moisture or
• carbons.

This means that a current is constantly being induced in the receiver coil although there are no metal particles in the material being examined. This effect is termed "product effect" or "material effect".

The product effect has a characteristic value for each material. Since this value is constant within a certain bandwidth, it can be taken into account by the metal detector and compensated.

The level of sensitivity which can be achieved in practice often depends on:
• How well the metal detector compensates the product effect.
• How carefully the metal detector has been installed (e.g. strong vibrations, moving metal directly next to the sensor, electromagnetic interferences etc.).
6. **Transport**

6.1. **Safety Instructions for Transport and Installation**

To prevent damage to the machine and hazardous injuries when transporting and installing the machine it is absolutely essential that you keep in mind the following instructions:

- Only qualified personnel considering safety instructions is allowed to transport and install the metal detector.
- The machine may only be lifted using the frame provided.
- To transport the machine only the hoisting and sling gear specified here may be used.
- When selecting suitable hoisting equipment always take the following weights into account: depending on size and type, the metal detector can weigh up to 1,000 kg.
- A third person must secure the transport route.
- The transport routes must be cordoned off and secured so that no unauthorised persons may enter the danger zone.
- Sharp edges may cause injuries.
- Suspended loads may drop. There is a risk of fatal injury – never stay under suspended loads.
- Live ends of electric cables and components may cause injuries due to electric shock.
- Parts lying unsecured on top of one another may slip and drop.
- During welding there is a risk of fire.
- Cables which have not been laid properly (e.g. radius of curvature too small) may cause smouldering fires and cable fires.
- Also read chapter “4 General Safety Instructions”.
6.2. Transporting

Choosing suitable hoisting equipment.
When choosing hoisting equipment always use padded cables or straps. Using of chains could lead to damaging of the metal detector.

**Danger!**

Never lift the entire set of equipment at the sensor head (see fig. below). The heavy weight of the entire set of equipment may cause damage to the sensor head.
7. Installation Instructions

The following points require special attention during installation:

- Metal-free zone
- Vibration
- Feed of belt through sensor
- Mounting on conveyor / frame
- Keep conveyor belt clean
- Welding of transversal struts and contact points
- Installation of sensor head

7.1. Metal-Free Zone

A metal-free zone is required in front of and behind the detector opening with a length corresponding to 1.5 times the aperture opening height.

7.2. Vibration

- Install the metal detector so that it is exposed to as little vibration as possible in operation.
- Light vibrations do not affect the detector.
- The metal alarm can be triggered by a hard shock.
7.3. Feed of Belt Through Sensor

- The detector is installed in the upper run of a conveyor belt.
- The transport belt is fed through the detector on a non-metallic guide plate (such as a 16 mm plywood sheet) or tensioned to pass through the detector without contact.
- A minimum clearance of 5 mm must be maintained between the guide plate and the detector.
- The inside of the detector opening may not be touched by the guide plate, belt or fibre mat.

7.4. Mounting on Conveyor / Frame

- Ensure even and stable contact between detector and mounting bracket.
- The metal detector must not be subjected to any mechanical stress or tension during the installation and during tightening of the mounting bolts.
- Before installing, scrape off paint from the conveyor or mounting frame around all of the mounting holes for the metal detector. All of the mounting bolts must have good electrical contact to the conveyor or mounting frame.

7.5. Keep Conveyor Belt Clean

The transport belt must be kept absolutely clean. Even small metal particles and contamination could trigger a metal alarm on cycle of the transport belt.

*The conveyor must be cleaned of metal swarf and dust* before installation. Do not unpack the belt until immediately before installation.

- Do not walk on the conveyor belt without clean protective shoe covers or other protective measures. Visible or invisible shoe prints may contain metal particles.
- Ensure that the belt is well-covered, e.g. with cardboard, before welding or grinding. Hot welding slag or grinding sparks can embed themselves in the surface of the belt.

7.6. Installation of Sensor Head

*Important! The sensor head must not be subjected to any mechanical stress or tension during the installation and during tightening of the mounting bolts.*

Install sensor head with any support frame:

- Clients support holder construction must be made of stainless steel. Do not paint the construction (to ensure good electrical contact between all metal parts)!
- All of the welding points or mounting bolts in and around the installing frame must give very good electrical contact.

*Caution!* Always attach the grounding clamp of the welding unit directly next to the welding spot. Do not allow welding current to flow through the case of the metal detector under any circumstances. This will lead to the destruction of the detector!
7.7. Control Unit for Wall-Mounting

Depending on the version of equipment, the control unit can be supplied as a separate unit for wall mounting. The control unit should be fitted so that there is visual contact with the sensor. Adjustments such as the required level of sensitivity are then easier to perform. The place of installation should be light, clean and readily accessible. Inform your cleaning personnel that the door seal of the switch cabinet should not be hit by the hard water jet of high pressure water jetting equipment directly.

The coaxial cables supplied for connecting the control unit to the sensor have a standard length of 2.5 meters. Upon request, ready-assembled coaxial cables can be supplied in different lengths. We urgently recommend you not to replace the coaxial cables supplied by other qualities of cable. Many qualities of coaxial cable are not suitable for operating the Metal Detector at a high level of sensitivity without any interference.
8. Operating Instructions

8.1. Keyboard

The function which has just been selected is shown on the LCD display. If you hold down a key the value will change rapidly until you release the key.
8.2. Menu Structure

The keys ▲, ▼, and OK Esc are used to navigate through the user interface.

Press Esc several times to return to the main screen (the main screen is displayed after starting the metal detector).

When working with PRODUCT 1 – 120 you can press ▲ to go to the teach assistant (TEACH PRODUCT), as well as to change the product specific settings PRODUCT TOL and METAL SENSE mV (only if EXPERT MODE = YES). When working with PRODUCT 000 you can press ▼ to see the setting METAL SENSE mV.

The TEACH PRODUCT assistant allows you to choose the product characteristics. Then it automatically adjusts the signal analysis of the metal detector to the products which are supplied during the teach process.

Teaching of products is described in detail in the sections “8.3 Product Effect Compensation: Background Information” and “8.4 Starting Up”.

The last menu entry is OPEN MENU. When you press OK you come to the main menu. Here you can navigate through the other menus and sub-menus of the metal detector using the keys ▲▼.

For a complete list of accessible menu-items, see the “Parameter List” at the end of this manual.

The Metal Detector’s Functions in Detail “9 The Metal Detector’s Functions in Detail”.

REPORT MENU: Information, documentation, and communication
- The counter for metal alerts (METAL COUNTER)
- Characteristic data of the last metal alert (INFO LAST METAL)
- Info on current product-related settings (INFO PRODUCT 0xx)
- Info on the next performance validation (if activated) and the software version.
- Settings for the print-out and data logging of metal alarms and related data (PRINT).
- Settings to integrate several detectors into a network, or communicate with a PC (INTERFACE, BAUD, SHARKNET UNIT #).
- A list of the latest 50 metal alerts, providing signal magnitudes and time of alert, which can be printed (REPORT TO PRINTER) or viewed in the display (REPORT TO LCD).

PRODUCT MENU: Settings which are specific to an individual product
- The taught product can be NAMED in alphanumeric format to be easily memorized.
- Settings as obtained after TEACH PRODUCT (PRODUCT IS, AMP X %, AMP Y %, PRODUCT X TOL, PRODUCT Y TOL, PHASE, PHASE TRACK)
- Automatic PHASE TRACKing for products with continuously changing properties
- Transfer of settings to other product number (COPY PROC.)

TEACH MENU: General settings to control the TEACH PRODUCT – assistant
- A minimum value of METAL SENSE which can be set by TEACH PRODUCT (SENSE MIN).
- Settings for the duration and minimum product count during TEACH PRODUCT
- Lock / unlock product number to 0 (no product teach possible – TEACH ENABLE NO)
- Reject – behaviour during TEACH PRODUCT

VALIDATION MENU: Supervision of proper operation
- Supervision of automatic reject devices (REJECT CONFIRM, BIN FULL, LOW AIR)
- The PERFORMANCE VALIDATION SYSTEM menu to enforce periodical tests checking the metal sensitivity

SYSTEM MENU: General configuration of the metal detector (several submenus)
- Product SPEED, PASSWORD protection and REMOTE PRODUCT-number control.
- Date and time (YY/MM/DD, HH:MM:SS)
- Setup of the control signal to the reject device (DELAY, DURATION, METAL CONTACT)
- Automatic belt-SPEED calibration of conveyors driven from frequency inverters
- Clean In Place switching of the reject device for SHARK-Inline-Models
- Setup of the Input and Output control lines (24Vdc switching)
- Choice and setup of digital filters (NOISE LEVEL, FFT FILTER, FIR FILTER, GF MODE)
- Individual factory settings for the delivered sensor head, which must not be changed by the user (FACTORY SETUP).
8.3. Product Effect Compensation: Background Information

Many products, especially in the food industry, generate an effect similar to metal parts when they enter the electromagnetic field. This effect is caused by conductive components in the product (e.g. salt, sugar) and is called 'product effect'.

To enable the metal detector to recognize whether the signal coming from the sensor is caused by the product being monitored or by a metal part, you must teach the product effect to the metal detector. The product effect is learned on the basis of product samples which have to be passed through the sensor. The product effect may vary from one product sample to another. The better the samples represent the product, the better the product effect will be learned.

Below graphs illustrate the TEACH PRODUCT procedure and related parameters.

![Graph 1](image1.png)  
The sensor head delivers a signal with the two components X and Y. Such signals are represented as curves in a plane (see graph).

The ratio of X and Y defines an angle, called PHASE (in degrees).

The distance to the zero point is the MAGNITUDE (amount) of the signal (in mV).

A product passing through the detector causes a signal (Product effect) along a general phase (Product PHASE).

Detector noise produces small signals near the zero-point of the graph.

![Graph 2](image2.png)  
In the first steps of the teach procedure, the product phase is subtracted by the signal processor. Product signals therefore have small Y components.

In the STATISTIC step of the teach procedure, the area enclosing all product effect signals (and the noise) is determined.

The parameter PRODUCT TOL scales this area. A value of PRODUCT TOL which is larger than one tells the metal detector to ignore a larger region around the product effect area.

![Graph 3](image3.png)  
Metal parts cause signals with a phase different from that of the products.

It can therefore be detected even if its magnitude is smaller than that of the product effects.

A metal alarm is triggered if the magnitude (amount) of the metal signal exceeds the threshold given by METAL SENSE, which is a circle around the zero point of the graph.
### 8.4. Starting Up

Steps to put the metal detector into first operation:
- **Power on**
- **Set product speed**
- **Teach product effects**
- **Check metal sensitivity**

#### 8.4.1. Power On

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check installation</td>
<td>Were the assembly steps followed correctly? Is the electronics connected correctly? Were safety regulations kept? Are all cables intact?</td>
<td>Refer to “10 Electrical Connections”</td>
</tr>
<tr>
<td>2. Power On</td>
<td>If the installation is ok, switch power supply on. The metal detector runs an internal auto calibration (CALIBRATE) and then displays the main screen.</td>
<td>CALIBRATE -2048 2047 %100 %100</td>
</tr>
<tr>
<td>3. Main screen</td>
<td>The metal detector is now in operation. The main screen informs about current product number and signal amplitude (mV). Set PRODUCT 000 with ↓↑. Confirm with OK. Note: If the Expert-Mode is switched off the signal amplitude of products 1-120 will be displayed in percent. For this chapter the Expert Mode is switched off.</td>
<td>PRODUCT 000 NEUTRAL 3 mV PRODUCT 001 NO NAME 10 %</td>
</tr>
</tbody>
</table>
## 8.4.2. Expert Mode

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main menu</td>
<td>Press Esc to return to main screen.</td>
<td><strong>PRODUCT 000 NEUTRAL</strong> 3 mV</td>
</tr>
<tr>
<td>2. OPEN MENU</td>
<td>Press ▼ until you see OPEN MENU. Press OK to open menu.</td>
<td><strong>OPEN MENU (ESC)HOME (OK)OPEN</strong></td>
</tr>
<tr>
<td>3. Go to SYSTEM MENU</td>
<td>Press ▼ until SYSTEM MENU is displayed. Press OK to open menu.</td>
<td><strong>SYSTEM MENÜ (ESC)HOME (OK)OPEN</strong></td>
</tr>
<tr>
<td>4. Geschwindigkeit einstellen</td>
<td>Press ▼ until Expert Mode is displayed. Choose YES or NO with ▼▼. When you switch on the Expert Mode, the signal amplitude is always displayed in mV and the phase is displayed. In addition you can adjust the Metal Sense for products 1-120 which is usually not necessary (see chapter “8.4.7 Check Metal Sensitivity”). When you switch off the Expert Mode, the signal amplitude of the products 1-120 is displayed in %</td>
<td><strong>EXPERT MODE (ESC)HOME (-)(+)SET</strong> <strong>EXPERT MODE (ESC)HOME (OK)STORE</strong></td>
</tr>
</tbody>
</table>
8.4.3. Set Product Speed

You only have to adjust the product speed when running a metal detector without frequency controlled drive (Gravity feed applications (GF), IN, PH, etc). If you have a complete system consisting of a metal detector and a frequency controlled conveyor the product speed is preset in the menu AUTOSPEED. In this case, you do not have to adjust it manually.

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to</td>
<td>Press (Esc) to return to main screen.</td>
<td>PRODUCT 000 (\text{NEUTRAL}) 3 mV</td>
</tr>
<tr>
<td>main menu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. OPEN</td>
<td>Press (\downarrow) until you see OPEN MENU.</td>
<td>OPEN MENU (\text{HOME}) (\text{OK}) (\text{OPEN})</td>
</tr>
<tr>
<td>MENU</td>
<td>Press (\text{OK}) to open menu.</td>
<td></td>
</tr>
<tr>
<td>3. Go to</td>
<td>Press (\uparrow) until SYSTEM MENU is displayed.</td>
<td>SYSTEM MENU (\text{HOME}) (\text{OK}) (\text{OPEN})</td>
</tr>
<tr>
<td>SYSTEM MENU</td>
<td>Press (\text{OK}) to open menu.</td>
<td></td>
</tr>
<tr>
<td>4. Set Speed</td>
<td>Enter product speed using the (+) (+) keys.</td>
<td>SPEED mm/sec 550 (\text{HOME}) ((-)(+)) (\text{SET})</td>
</tr>
<tr>
<td></td>
<td>Press (\text{OK}) to confirm.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHARK® BD: Set the belt speed corresponding to the material that passes through the metal detector.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHARK® BD supplied with conveyor HQ: Speed parameter is set automatically.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHARK® GF, GF compact: 1500 mm/sec is recommended for gravity feed applications.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHARK® IN for sausage stuffer: 300 mm/sec to 600 mm/sec depending on the speed of the stuffer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others: Set the current speed corresponding to the material that passes through the metal detector.</td>
<td></td>
</tr>
</tbody>
</table>
### 8.4.4. Set Product 000

Products (e.g. powder), that do not have or have only very little electromagnetic conductivity, cause a very small product signal. You can not teach this. So you have to use product number 000 (PRODUCT NEUTRAL) to inspect it. Please adjust METAL SENSE mV in order to do so.

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press Esc to return to main screen.</td>
<td>PRODUCT 001 NO NAME 20 %</td>
</tr>
</tbody>
</table>
| 2. Choose product | Set PRODUCT 1 with ⬅️ ⬆️. Press OK to confirm.  
Note: You can only teach a product effect for PRODUCT 1 to 120, not for PRODUCT 0. | PRODUCT 000 NEUTRAL (OK)STORE 3 mV  
PRODUCT 00= NEUTRAL 3 mV |
| 3. Set METAL SENSE | Press ⬆️ until METAL SENSE mV is displayed.  
Adjust the value with ⬅️ ⬆️ about 20 – 30 % higher than the highest value you measured. In this example 20 mV. | METAL SENSE mV (ESC)HOME (-)(+)SET 35  
METAL SENSE mV (ESC)HOME (-)(+)SET 20 |
## 8.4.5. Teach Product 001 to 120

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Return to main screen</td>
<td>Press Esc to return to main screen.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRODUCT 000 3 mV NEUTRAL</td>
</tr>
<tr>
<td>2.</td>
<td>Choose product</td>
<td>Set PRODUCT 1 (or every other number between 1 and 120) with + . Press OK to confirm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRODUCT 001 3 mV NO NAME (OK)STORE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: You can only teach a product effect for PRODUCT 1 to 120, not for PRODUCT 0.</td>
</tr>
<tr>
<td>3.</td>
<td>Enter TEACH PRODUCT</td>
<td>Press ▲ until TEACH PRODUCT 001 is displayed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Press OK to start teach procedure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEACH PRODUCT 001 (ESC)HOME (OK)START</td>
</tr>
<tr>
<td>4.</td>
<td>Choose product characteristic</td>
<td>Select with + the product characteristic which fits your product or application the best:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DRY: Products with low humidity, e.g. powder and bulk materials.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WET: Product contains water, but not too many spices, e.g. sausages, meat, fruits, vegetables.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SALTY: Products with high amount of salt or high electrical conductivity, e.g. cheese blocks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MEAT: All kinds of meat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FROZEN: Deep frozen products (-18°C/0°F)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MELTING: Frozen product in warm environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALU FOIL: Products packed in alu vaporized foil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLASTIC: Plastic granulates with graphite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VIBRATION: Vibration signals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SHOCK: Shock-like action on detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DEFAULT: Uses no product tolerances.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm your selection with OK.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRODUCT IS DRY (+)(-)SET (OK)NEXT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRODUCT IS FROZEN (+)(-)SET (OK)STORE</td>
</tr>
<tr>
<td>5.</td>
<td>RUN PRODUKT LINE</td>
<td>Start running products through the sensor (e.g. start the conveyor).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confirm with OK that the product is now running.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RUN PRODUCT LINE (ESC)HOME (OK)NEXT</td>
</tr>
</tbody>
</table>
6. Automatic teach procedure

The following steps STEP 1 – STEP 3 are performed automatically (STEP 1 – STEP 5 in the case of strong product effects, e.g. meat).

**IMPORTANT NOTE:** While RUN PRODUCT is displayed, keep passing products through the sensor. Otherwise the TEACH process may fail.

**STEP 1:** AMPLIFICATION X in % measures the X-component of the product effect.

**STEP 2:** PHASE adjusts the phase of the product effect.

**STEP 3:** VERSTÄRKUNG Y in % measures the Y-component of the product effect.

**STEP 4 STATISTIC:**
Mostly the product composition varies a little. Consequently, the product effect phase also varies. This the STATISTIC STEP takes into consideration. Therefore, run as many products as possible through the sensor.

<table>
<thead>
<tr>
<th>RUN PRODUCT</th>
<th>STEP1</th>
<th>RUN PRODUCT</th>
<th>STEP2</th>
<th>RUN PRODUCT</th>
<th>STEP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP X 200%</td>
<td>2 15</td>
<td>PHASE 5</td>
<td>12</td>
<td>STATISTIC 3</td>
<td>27</td>
</tr>
</tbody>
</table>

**IMPORTANT NOTE:** As long as the function TEACH is set, metals are neither detected nor signalled!

The metal detector is now adjusted to detect metal with high sensitivity. The product effect is reliably compensated. Check the result of the automatic teach process and, if necessary, adjust the settings described on the next page (“Optimize product effect compensation”).

**If the result does not satisfy you:**
- Choose another product number (e.g. PRODUCT 002)
- Repeat the teach procedure

**Hint:** Use various product samples.

**Hint:** During TEACH, keep away wrist watches, wedding rings, or keys and coins in your pocket from to the sensor aperture!

- Another PRODUCT IS ... setting may lead to better results.

**Hint:** PRODUCT IS ... can also be changed after performing the TEACH procedure:

Press OK. Press until PRODUCT MENU is displayed. Press OK to enter product menu. Use - + to choose a different product characteristic. Confirm your choice with OK.

- Compare the results by switching between the two product numbers.

7. End of teach procedure

When TEACH END is displayed, the teach procedure has been completed.

The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.

**IMPORTANT NOTE:** When TEACH END is displayed, the teach procedure has been completed. The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.

**IMPORTANT NOTE:** When TEACH END is displayed, the teach procedure has been completed. The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.

**IMPORTANT NOTE:** When TEACH END is displayed, the teach procedure has been completed. The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.

**IMPORTANT NOTE:** When TEACH END is displayed, the teach procedure has been completed. The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.

**IMPORTANT NOTE:** When TEACH END is displayed, the teach procedure has been completed. The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.

Press OK to return to the main menu.
8.4.6. Optimize Product Effect Compensation

After teaching a product, products which are free of metal should not cause metal alerts. However, product characteristics vary, as well as the surrounding conditions.

Wrong metal alerts can be avoided by increasing the PRODUCT TOL value:

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press Esc to return to main screen.</td>
<td>PRODUCT 001 NO NAME 10 %</td>
</tr>
<tr>
<td>2. Choose PRODUCT TOL.</td>
<td>Press ✅ twice to see the PRODUCT TOL screen. Press ✪ to increase the value. High PRODUCT TOL value: Better product effect compensation but reduced metal sensitivity. Check metal sensitivity (see below)!</td>
<td>PRODUCT TOL. x1.5 (ESC)HOME (−)(+)SET</td>
</tr>
</tbody>
</table>
### 8.4.7. Check Metal Sensitivity

#### 8.4.7.1 Of Product 0 (NEUTRAL)

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press (\text{ESC}) to return to main screen.</td>
<td><strong>PRODUCT 000 NEUTRAL 10 %</strong></td>
</tr>
<tr>
<td>2. Run metal test pieces through detector</td>
<td>Run metal test pieces with products several times through the detector.</td>
<td><strong>PRODUCT 000 NEUTRAL 10 %</strong></td>
</tr>
</tbody>
</table>
| 3. Watch display | Watch the display:  
\[ mV = \text{current signal magnitude} \]  
The mV-value represents the size of the metal objects. The bigger the metal piece, the higher the value. Write down the maximum value for each metal test piece passing the sensor.  
(Note: The shown values are just examples)  
Do the specified metal test pieces reliably trigger a metal alert?  
If not, decrease the METAL SENSE mV value. | **PRODUCT 000 NEUTRAL 135 %** |
| 4. Adjust METAL SENSE | Press \(\text{ESC}H\)OME \((-)(+\text{SET})\) until METAL SENSE mV is displayed.  
Is METAL SENSE much smaller than the smallest value obtained from the test pieces?  
If so, METAL SENSE can be increased up to the smallest test-piece value. This suppresses more noise and interference, and allows metal objects of negligible size to pass.  
Press \(\text{ESC}H\)OME \((-)(+\text{SET})\) to increase METAL SENSE.  
High METAL SENSE mV:  
Small metal pieces are not detected.  
Better oppression of interfering signals.  
Check the metal sensitivity again! | **METAL SENSE mV 35** |
### 8.4.7.2 Of Products 1 - 120

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press Esc to return to main screen.</td>
<td><img src="PRODUCT_001_NO_NAME_10_.jpg" alt="PRODUCT 001 NO NAME 10 %" /></td>
</tr>
<tr>
<td>2. Run metal test pieces through detector</td>
<td>Run metal test pieces with products several times through the detector.</td>
<td><img src="PRODUCT_001_NO_NAME_10_.jpg" alt="PRODUCT 001 NO NAME 10 %" /></td>
</tr>
</tbody>
</table>
| 3. Watch display | Watch the display:

% = current signal magnitude

If the detector measures more than 100 %, it found metal. The %-value represents the size of metal objects. Write down the maximum value for each metal test piece passing the sensor.

Do the specified metal test pieces reliably trigger a metal alert?

If not, return to the teach procedure above, or decrease the PRODUCT TOL value. | ![PRODUCT 001 NO NAME 135 %](PRODUCT_001_NO_NAME_135_.jpg) |

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Software Version 3.94o and higher

Seite 31
### Enter Product Name

Below you see a description on how to fill in alpha-numeric product names. You can use any combination that is 11 characters (including spaces) long. This feature is available for PRODUCT 1-120.

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press the Esc key to return to the main screen.</td>
<td>PRODUCT 000 mV NEUTRAL 3 mV</td>
</tr>
<tr>
<td>2. Select product #</td>
<td>Set PRODUCT 001 with ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ (or any other product number between 1-120). Confirm with OK.</td>
<td>PRODUCT 001 % NO NAME 10 %</td>
</tr>
<tr>
<td>3. OPEN MENU</td>
<td>Press ▼. Press OK to open menu.</td>
<td>OPEN MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>4. Go to PRODUCT MENU</td>
<td>Press ▲ until PRODUCT MENU is displayed. Press OK to open menu.</td>
<td>PRODUCT MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>5. NAME</td>
<td>In the display appears NAME = . Press OK to enter a name.</td>
<td>NAME= (+)(-)EDIT (MODE)NEXT</td>
</tr>
<tr>
<td>6. Edit NAME</td>
<td>An underline cursor will start flashing. This cell is active. Press ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ until you find the letter or number you wish as the first letter. This letter will flash. Press the ▲ key to move to the next cell. The selected letter will remain and the cursor will now flash at the next cell. If you wish to place a space between a letter or number you press the ▼ key without selecting a letter or number. After naming this product press OK. The screen will change and show you the NAME you have designated for that product #. If you agree press OK to return to the main screen. If you want to modify the name go back to step 3 and make your changes. Hint: If you wish to erase the whole name press Esc at the same time.</td>
<td>NAME= (+)(-)EDIT (MODE)NEXT</td>
</tr>
</tbody>
</table>

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8.4.9. **Password Feature**

METAL SHARK® Metal Detectors provide a password-function. This function helps you to protect the settings against unauthorized access. Only the PRODUCT # can be changed without the password.

**8.4.9.1 Enable Password Feature**

The password feature is shown in the main menu only when enabled. To enable the password feature:

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Return to main screen</td>
<td>Press the Esc key to return to the main screen.</td>
</tr>
<tr>
<td>2. OPEN MENU</td>
<td></td>
<td>Press  . Press OK to open menu.</td>
</tr>
<tr>
<td>3. Go to SYSTEM MENU</td>
<td></td>
<td>Press  until you see the SYSTEM MENU screen. Open SYSTEM MENU with OK.</td>
</tr>
</tbody>
</table>
| 4. Go to PASSWORD | | Press  until you see the PASSWORD screen. | PASSWORD NO (ESC)HOME (-)(+)
SET |
| 5. Enable PASSWORD | | Press 1x  to enable PASSWORD functions with YES. Confirm with OK. | PASSWORD YES (ESC)HOME (-)(+)
SET |
| 6. Return to main screen | | Press Esc to return to the main screen. | PRODUCT 000 3 mV NEUTRAL |
| 7. Go PASS UNLOCK | | Press  until you see the PASSWORD UNLOCKED screen. The initial password is 0000. It is strongly recommended to set-up your own new password immediately. Refer to next chapter “Set new password”. | PASSWORD UNLOCKED (-)LOCK (OK)NEW |
### 8.4.9.2 Set New Password

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main screen</td>
<td>Press the Esc key to return to the main screen.</td>
<td>PRODUCT 000 NEUTRAL 3 mV</td>
</tr>
<tr>
<td>2. Go to PASS-WORD</td>
<td>Press until you see the PASSWORD UNLOCKED screen.</td>
<td>PASSWORD UNLOCKED (-+)LOCK (OK) NEW</td>
</tr>
<tr>
<td>3. Set new password</td>
<td>Press OK to set a new password. It consists of a four digit number. Press to set the first digit. Press to move to the next digit. The selected digit will remain and the cursor will now flash at the next cell. Repeat this for all cells to set a 4 digit password. PASSWORD NEW2: Now fill in exactly the same 4 digits to confirm your password.</td>
<td>PASSWORD UNLOCKED (-+)LOCK (OK)NEW PASSWORD NEW1 8 * * * (-+)LOCK (OK)NEXT PASSWORD NEW1 * 4 * * (-+)LOCK (OK)NEXT PASSWORD NEW2 8 * * * (-+)LOCK (OK)NEXT PASSOWRD NEW2 * 4 * * (-+)LOCK (OK)NEXT PASSWORD NEW OK</td>
</tr>
</tbody>
</table>

After filling in the last digit you see PASSWORD NEW OK. Then the display shows the PASSWORD UNLOCKED screen. Your password is now set.
### 8.4.9.3  Enable Parameter Pass Protection

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Password feature</td>
<td>PASSWORD YES (ESC)HOME (-)(+)SET</td>
</tr>
<tr>
<td></td>
<td>The password feature is available if SYSTEM PARAMETER / PASSWORD=YES.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refer to above “Enable password feature”.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Enable pass protection</td>
<td>PASSWORD UNLOCKED (→)LOCK (OK)NEW</td>
</tr>
<tr>
<td></td>
<td>Parameter pass protection is enabled automatically at each power supply on.</td>
<td>**ACCESS LOCKED *** (→)LOCK (OK) NEW</td>
</tr>
<tr>
<td></td>
<td>automatically if no key pressed for 5 minutes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>manually by pressing ↑↓ at the same time in the PASSWORD UNLOCKED screen.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Disable parameter pass protection</td>
<td>PASSWORD * * * (→)(+)SET (OK)NEXT</td>
</tr>
<tr>
<td></td>
<td>You can only disable the parameter pass protection manually by entering your 4 digit password with ↑ or ↓.</td>
<td>PASSWORD UNLOCKED (→)LOCK (OK) NEW</td>
</tr>
<tr>
<td></td>
<td>To enter the password see “Set new password”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The screen changes to PASSWORD UNLOCKED once you entered the correct password.</td>
<td></td>
</tr>
</tbody>
</table>
### 8.4.10. Set Date and Time

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Return to main menu</td>
<td>Press Esc to return to main menu.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PRODUCT 000 NEUTRAL</td>
</tr>
<tr>
<td>2.</td>
<td>OPEN MENU</td>
<td>Press down. Press OK to open menu.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OPEN MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>3.</td>
<td>Go to SYSTEM MENU</td>
<td>Press up until you see the SYSTEM MENU screen. Open SYSTEM MENU with OK.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SYSTEM MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>4.</td>
<td>Go to DATE / TIME MENU</td>
<td>Press up until DATE / TIME MENU is displayed. Open submenu with OK.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DATE/TIME MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>5.</td>
<td>Go to YY/MM/DD</td>
<td>Press down until YY/MM/DD is displayed. The date is displayed in the year/month/day format (two digits each).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YY/MM/DD 01/01/01 (ESC)HOME (+)(-)SET</td>
</tr>
<tr>
<td>6.</td>
<td>Set Date</td>
<td>Keep continuously pressed down. The displayed date changes with increasing speed. Release as soon as the displayed date approaches the current date (year/month). Set the exact date using ↑ ↓.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YY/MM/DD 07/10/15 (ESC)HOME (+)(-)SET</td>
</tr>
<tr>
<td>7.</td>
<td>Go to HH:MM:SS</td>
<td>Press up until HH:MM:SS is displayed. The time formatted is hour:minute:second (two digits each).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HH:MM:SS 00:11:34 (ESC)HOME (+)(-)SET</td>
</tr>
<tr>
<td>8.</td>
<td>Set Time</td>
<td>Keep continuously pressed down. The displayed time changes with increasing speed. Release as soon as the displayed time approaches the current time (hour/minute). Set the exact time using ↑ ↓. You do not have to confirm the setting. Just press Esc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HH:MM:SS 11:01:37 (ESC)HOME (+)(-)SET</td>
</tr>
</tbody>
</table>
## 8.4.11. Displaying / Printing Reports

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Return to main menu</td>
<td>Press Esc to return to main menu.</td>
<td>PRODUCT 000 NEUTRAL 3 mV</td>
</tr>
<tr>
<td>2. OPEN MENU</td>
<td>Press ↑ until OPEN MENU appears. Press OK to open menu.</td>
<td>OPEN MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>3. Open REPORT MENU</td>
<td>REPORT MENU is displayed. Open menu with OK.</td>
<td>REPORT MENU (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>4. METAL COUNTER</td>
<td>The current value of the metal counter is displayed. Hint: To reset metal counter press (-) (+) simultaneously.</td>
<td>METAL COUNTER 8 (ESC)HOME (+)RESET</td>
</tr>
<tr>
<td>5. Go to PRINT</td>
<td>Press ↑ until PRINT is displayed. Press + to choose printing mode REPORT. Confirm with OK. In printing mode REPORT, the last 50 metal alerts are sent immediately to the protocol printer (optional). Time and signal magnitude of each alert event will be printed. In the alternative mode ONE BY ONE, metal alerts are printed continuously as soon as they occur.</td>
<td>PRINT OFF (ESC)HOME (OK)STORE</td>
</tr>
<tr>
<td>6. Print out Report</td>
<td>Press ↑ until REPORT TO PRINTER is displayed. Press OK to start print-out. Note: The printer is optional equipment.</td>
<td>REPORT TO PRINTER (ESC)HOME (OK)OPEN</td>
</tr>
<tr>
<td>7. Display Report</td>
<td>Alternatively, the REPORT of the metal alerts can be viewed on the display. Press ↑ until REPORT TO LCD is displayed. Press OK to display the last metal alert. Use ↑ and ↓ to navigate through all metal alert entries.</td>
<td>mv13PH 77.54° #7 07/10/15 12:33:48</td>
</tr>
</tbody>
</table>

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9. The Metal Detector’s Functions in Detail

9.1. Main Menu

You always reach the main menu by returning to the main screen (pressing Esc several times). Then you press ↑ until OPEN MENU is displayed. Press OK to open the menu. Now you can choose between the metal detector’s menus using ↑ ↓.

9.1.1. Main Screen: Product and Signal

You can cancel the current data entry and return to the main screen by pressing Esc.

- PRODUCT indicates which product effect is blanked out at the moment. Use the ← → keys to choose the product number.
- When you choose “Product 000” you can not teach and thus blank out product effects.
- You can teach product effects using the Teach Product assistant for the product memories 1 – 120.
- When the product effect is blanked out the value is only displayed in case of a metal notification.

IMPORTANT:

Always use PRODUCT 000 as long as you have not taught any product effects or if you are not sure what is stored in the product memories 1...120. If you do not consider this, even large metal parts may not be detected.

9.1.2. Teach Product – Teach Product Effect

TEACH PRODUCT assistant – In this screen the teaching process starts that is necessary to learn the product characteristics. Here you teach the product effect which then will be compensated. You can teach product memories 1 to 120. You cannot teach Product 0 because it is neutral.
9.1.3. Product Tolerance

PRODUCT TOL \( \times 1.3 \) 
(ESC)HOME \( + \) SET

This parameter scales the product effect area. Metal alerts due to variations of the product effect can be suppressed by increasing PRODUCT TOL. The initial setting depends on the chosen product characteristic (PRODUCT IS ...).

See chapter “8.3 Product Effect Compensation: Background Information”, “8.4.4 Set Product 000” and “8.4.5 Teach Product 001 to 120” for details.

9.1.4. Metal Sense mV

METAL SENSE mV \( 50 \)
(ESC)HOME \( + \) SET

This function allows the operator to specify the minimum signal amplitude of metal parts which have to be signaled. The mV value can be adjusted in the range of 3 to 3,000 with the keys. With METAL SENSE mV 3 the smallest detectable metal parts are signaled. The sensitivity decreases linearly with increasing value of METAL SENSE. At 2,999 mV only very large metal parts are signaled. At 3,000 mV the sensor is set to NOT ACTIVE.

To determine which magnitude a particular metal part generates, refer to “9.2.2 Info Last Metal”. Bear in mind that non-spherical metal parts may generate different magnitudes depending on their orientation. Magnetic metal parts produce a larger signal than non-magnetic metal parts.

IMPORTANT:

The METAL SENSE is preset by the product memory and must be set separately for each product memory, if you work with different product memories 1...120 (mainly used in food-industries).

9.1.5. Info Next PV Test

03/08/27  17:52:06
INFO NEXT PV TEST

Default: Not visible

Date and time of the next performance validation are displayed.

This screen is only visible if the performance validation system is activated. See PVS MENU in the chapter VALIDATION MENU below.
9.1.6. Open Menu

OPEN MENU
(ESC)HOME (OK)OPEN

Press **OK** to access the advanced parameter menus described below.

9.1.7. Password

PASSWORD ****
(+)(-)SET (OK)NEXT

Default: Not visible.

Enter PASSWORD to make settings. To switch option PASSWORD on/off, go to submenu SYSTEM MENU. Set SYSTEM PARAMETER / PASSWORD = YES.

This screen is only visible if password protection is activated.

See chapter “8.4.9 Password Feature” for a step-by-step introduction.

9.2. Report Menu

The REPORT MENU provides
- information about metal alerts,
- information about the current product parameters and
- settings to control data logging, print-out and network integration.

REPORT MENU
(ESC)HOME (OK)OPEN

Press **OK** to open the REPORT MENU.

Press **Esc** at any time to abort your current data entry and return to main menu.

9.2.1. Metal Counter

METAL COUNTER 0
(ESC)HOME (-+)RESET

With each metal signal the counter increases.

If the **- +** keys are pressed down simultaneously for approx. 2 seconds the counter is reset to zero. This also resets the report memory (see below).
9.2.2. Info Last Metal

Here the most recent metal signal is displayed. This value remains on the display until the next metal object passes through the detector.

Non-spherical metal objects result in a variety of values dependent upon their length. Magnetic metals produce a stronger signal than non-magnetic metals. Signals are stronger at the edges of the opening than in its centre. Long metal objects may lead to several signals.

The “INFO LAST METAL” display allows you to select representative product samples for the teaching process. Each product or each material generates a particular phase. The larger the quantity of the material passing through the sensor at the same time, the larger the phase becomes. The product composition often varies. Consequently, the phase of the product effect also varies. This variation is also taught if varying products are included in the teaching process. It must be ensured that the product samples for the teaching process do not contain any metal parts, because otherwise the metal part will be learned together with the product.

9.2.3. Info Product

Information on current product-related parameters is displayed.

The displayed content changes every few seconds (values are examples):

- NO NAME: Name of product memory (NO NAME if no name is assigned)
- PRODUCT IS DEFAULT: Selected product characteristic
- TOL x1.5 METAL 20mV: Current PRODUCT TOL and METAL SENSE values
- AMP X%100 AMP Y%100: Signal amplification X and Y
- PHASE 0.00°: Product phase
- TEACH AREA 1996 20: Size of product effect area after teach process

9.2.4. Info Software Version

Displays the full name of the software being used.
9.2.5. Print

Default setting: OFF

Protocol mode of optional printer. Possible settings are:

PRINT OFF: No output to printer

PRINT ONE BY ONE: Each metal alert immediately makes the printer print a message indicating date, time, signal magnitude (as displayed in INFO: LAST METAL) and the current number of the METAL COUNTER.

PRINT REPORT: When you choose this option a report with all metal alerts that were recorded after the last reset of the METAL COUNTER. If more than 50 metal alerts have occurred, the last 50 are reported. Print-out is started by REPORT TO PRINTER (see below).

PRINT SERVICE enables you to transfer the current raw data on a connected laptop.

PRINT SHARKNET: All the protocol data is transmitted to an external PC via serial port.

PRINT READ PROD: The product number is transmitted as a digital number via the RS232 interface.

9.2.6. Interface

Default value: RS232

Choose the same interface for all instruments that are communicating with SHARKNET.

RS232 standard serial interface
RS485 serial interface, symmetrical data transmission for improved reliability
ETHERNET with optional Com-Server

9.2.7. BAUD

Default: 9600

Set data transfer rate of the interface for all instruments that are communicating with SHARKNET:

Possible values: 9600 / 14400 / 57600 / 115200 / 230400 Baud
9.2.8. **SHARKNET / Unit #**

<table>
<thead>
<tr>
<th>SHARKNET / UNIT #</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Default value: 0

The Unit Number is the identification of each single unit within Sharknet.
The number 0 (zero) automatically sets the unit as the master of a system of detectors.
Numbers 1 to XX automatically set the corresponding unit as a slave, which then is remote controlled.
For single detector, stand alone operation, set SHARKNET / UNIT # = 0.

9.2.9. **Report to Printer**

<table>
<thead>
<tr>
<th>REPORT TO PRINTER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(OK)OPEN</td>
</tr>
</tbody>
</table>

Press **OK** to print out a report of metal alerts in mode PRINT REPORT (see above).
The print-out is formatted similar to the entries displayed by REPORT TO LCD (see below).
9.2.10. Report to LCD

Press **OK** to display a report of metal alerts on the LCD screen (same information as REPORT TO PRINTER). The last entry is displayed:

```
METAL mV  148  #4
07/10/15 11:53:24
```

Use **▲** and **▼** to navigate through the entries. Press **Esc** to leave display mode and return to INFORMATION MENU.

If METAL COUNTER = 0 (no metal alerts since last counter reset), the display shows:

```
*
```

If no metal alert has occurred since the metal detector was switched on, the current product number and the power-on time are displayed:

```
PRODUCT 0
03/01/27 07:46:57
```

With **▲** and **▼** you can switch between the product numbers, the time they were set, time during switch on and software version. Press **Esc** to leave.

9.2.11. Exit Report Menu

Press **OK** to exit the REPORT MENU.
9.3. Product Menu

Important:
You have to adjust the parameters in the product menu for each product individually.

Most parameters in the product menu are set automatically during TEACH PRODUCT.
They adapt the control unit to the individual product effect conditions, and are therefore specific for each product number.

Experienced users may still change the product parameters after the teach process.

| PRODUCT MENU | (ESC)HOME | (OK)OPEN |

Press **OK** to open the PRODUCT MENU.

Press **Esc** at any time to abort your current data entry and return to main menu.

9.3.1. Product Name

| PRODUCT NAME | (ESC)HOME | (-)(+)SET |

Enter an alpha-numeric name to memorize which product belongs to which product number.

Edit the current digit with **<** and **>**. Choose next digit with **▲** and **▼**.

Press **<** + **>** simultaneously to erase the whole name.

See “8.4.8 Enter Product Name” for detailed instructions.
9.3.2. Product is ...

Choose a product characteristic which characterizes your current product. According to this characteristic, the product compensation will be adjusted to suit your application (see chapter “Teach product effects”).

Here you can still change the product characteristic after finishing TEACH PRODUCT. The result would be the same as if TEACH PRODUCT had been performed with the currently set product characteristic. Therefore, you can try different product characteristics without repeating TEACH PRODUCT every time.

You can choose one of the following characteristics:

DRY: Products with low humidity, e.g. powder and bulk materials.
WET: Products that contain water, but not too many spices, e.g. sausages, meat, fruits, vegetables.
SALTY: Products with a high amount of salt or high electrical conductivity, e.g. cheese blocks.
MEAT: Products like bloody raw meat.
FROZEN: Deep frozen products (-18°C/0°F)
MELTING: Frozen products in warm environment
ALU FOIL: Products packed in alu vaporized foil
PLASTIC: Plastic granulates with graphite
VIBRATION: Vibration signals
SHOCK: Shock-like action on detector
DEFAULT: No product-specific adjustments are preset. Adjust PRODUCT TOL and related parameters by hand.

9.3.3. Product X TOL

Setting range: 0.0 ... 9.9   Default: 1.0

Scales the product effect area along the X-axis.

PRODUCT X TOL is multiplied by PRODUCT TOL.

Refer to chapter “8.3 Product Effect Compensation: Background Information” and “9.1.3 Product Tolerance” for details.
9.3.4. **Product Y TOL**

<table>
<thead>
<tr>
<th>PRODUCT Y TOL</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Setting range: 0.0 .... 9.9  
Default: 1.0

Scales the product effect area along the Y-axis.

PRODUCT Y TOL is multiplied by PRODUCT TOL.

Refer to chapter “8.3 Product Effect Compensation: Background Information” and “9.1.3 Product Tolerance” for details.

9.3.5. **Teach Area**

<table>
<thead>
<tr>
<th>TEACH AREA</th>
<th>1620</th>
<th>74</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO PRODUCT</td>
<td>001</td>
<td></td>
</tr>
</tbody>
</table>

Information on the current TEACH AREA, which is influenced by the parameters mentioned above: PRODUCT IS, PRODUCT X TOL., and PRODUCT Y TOL.

9.3.6. **Amplification X%**

<table>
<thead>
<tr>
<th>AMP X%</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Default: 100 (only PRODUCT 0)

Hardware amplification factor for the product effect (X channel). The larger the product effect is, the smaller the amplification X% value has to be. Possible values are 3%, 6%, 12%, 25%, 50%, 100%, and 200%. 3% is the smallest hardware amplification.

When using product memories 1…120:

AMP X% is set automatically during STEP 1 of the TEACH process (PRODUCT 1-120) according to the following rule:

Very strong product effect amplitude = AMP. FACTOR X% 3
Low product effect amplitude = AMP. FACTOR X% 200

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9.3.7. **Amplification Y%**

Default: 100 (only PRODUCT 0)

Hardware amplification factor for the metal signals (Y channel). The larger the product effect crosstalk is, the smaller the amplification Y% value has to be. Possible values are 3%, 6%, 12%, 25%, 50%, 100%, and 200%. 3% is the smallest hardware amplification.

When using product memories 1…120:

AMP Y% is set automatically during STEP 3 of the TEACH process (PRODUCT 1-120) according to the following rule:

Very strong product effect crosstalk in metal channel = AMP. FACTOR Y% 3
Low product effect crosstalk in metal channel = AMP. FACTOR Y% 200

9.3.8. **Phase**

Default: 0.00°

The setting of the product phase helps to blank out any product effect. PHASE is set automatically during the TEACH process.

PHASE is available with product 1…120, not with PRODUCT 000.

9.3.9. **Phase Track**

Setting range: 0.00°… 10.00°  Default: 0.00°

When working with products 1-120 the product phase determined in the teach process can be adjusted during the operation to compensate slow changes of the products. The product effect phase may change depending on product temperature and composition.

The parameter PHASETRACK indicates the increment with that the phase is adjusted:

The higher this value the stronger the phase tracking.

E.g. a 0.10° means 0.10 degree tracking with each product or metal signal.
9.3.10. Metal Contact

METAL CONTACT PULSE
(ESC)HOME (-)(+)SET

METAL ALARM in the product menu controls the switching behaviour of the metal alarm outputs. The setting is made for every product number individually. This way the pusher can for example be activated when product 001 passes through and when product 002 passes through, the conveyor belt stops and a horn is blown.

This menu entry is only activated and visible respectively when you activate in the SYSTEM MENU / REJECT MENU / METAL CONTACT = PRODUC.

HOLD: Standard value for belt stop with reset push button.
PUSH1: Pusher with photo cell active 0V (synchronized reject signal).
PUSH2: Pusher with photo cell active 24V (synchronized reject signal).
PUSH3: Pusher without photo cell synchronization
PULSE: Metal alarm as a pulse with the duration DURATION (also see main menu)
   Use e. g. when pneumatic nozzles separate the metal
GF1: Drives reject flaps with gravity feed applications. Error = flap in reject - position
GF2: Drives reject flaps with gravity feed applications. Error = flap in ok - position
MESEP: Metal separator model MESEP® SE
INLINE: Security drive of inline reject EX-PWC

9.3.11. Copy Product

COPY PROD. 000 → ALL
(ESC)HOME (-)(+)SET

Copy all PRODUCT MENU parameters of the current PRODUCT to another PRODUCT or to all PRODUCTS.

WARNING: If you copy parameters to a product which has already been taught, all the teach settings of this product will be lost!

9.3.12. Exit Product Menu

EXIT MENU (ESC)HOME (OK)EXIT

Press OK to exit the PRODUCT MENU.
9.4. Teach Menu

The parameters in the TEACH menu are pre-set by CASSEL to reasonable values. They adapt the control unit to suit various product effect conditions.

If you are an experienced user you may change the teach parameters.

Press **OK** to open the TEACH MENU.

Press **Esc** at any time to abort your current data entry and return to main menu.

**9.4.1. Teach Sense mV**

<table>
<thead>
<tr>
<th>TEACH SENSE mV</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Setting range: 3 ... 2000  
Default: optimum value

The value has to be twice the value of the noise level (see “9.6.10.1 Noise Level”). Signals that are smaller than this value are blanked out. Signals that are bigger are identified as products.

This is a threshold to prevent the metal detector from recognizing e.g. noises as products.

**9.4.2. Teach min Count**

<table>
<thead>
<tr>
<th>TEACH MIN COUNT</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Setting range: 1 ... 2000  
Default: 3

TEACH MIN COUNT defines a minimum number of product samples required for each TEACH STEP in order to receive useful results.

If any of the TEACH STEPs measures less product signals the TEACH step is repeated up to 12 times then the TEACH function adjusts the parameters to the most sensitive values.
9.4.3. Teach Max Count

**TEACH MAX COUNT**

<table>
<thead>
<tr>
<th>Setting range: 1 ... 3000</th>
<th>Default: 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME (-)(+)SET</td>
<td>5</td>
</tr>
</tbody>
</table>

TEACH MAX COUNT defines a maximum number of product samples required for each TEACH STEP.
If any of the TEACH STEPs measures the maximum number of samples the menu switches automatically to the next teach step.

9.4.4. Teach Time

**TEACH TIME sec.**

<table>
<thead>
<tr>
<th>Setting range: 2 ... 300</th>
<th>Default: 15 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME (-)(+)SET</td>
<td>15</td>
</tr>
</tbody>
</table>

TEACH TIME sec. defines the time you have during the TEACH PRODUCT procedure for each teach step (but STATISTIC).

VERY IMPORTANT: The TEACH TIME value must be high enough to get at least one product signal during each single TEACH STEP. Each TEACH STEP requires one or more product signals for reliable product effect compensation.
Otherwise the compensation fails!

Recommendations:
Product speed 100-200 mm/sec. ➞ TEACH TIME sec. 45
Product speed 200-300 mm/sec. ➞ TEACH TIME sec. 30
Product speed 300-500 mm/sec. ➞ TEACH TIME sec. 20
Product speed above 500 mm/sec. ➞ TEACH TIME sec. 15

9.4.5. STATISTIC sec

**STATISTIC SEC.**

<table>
<thead>
<tr>
<th>Setting range: 5 ... 900</th>
<th>Default: 30 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC) HOME (-)(+)SET</td>
<td>30</td>
</tr>
</tbody>
</table>

Defines the time for the last TEACH STEP (STATISTIC).

VERY IMPORTANT: The STATISTIC TIME value must be high enough to get at least 3 product signals during the last TEACH STEP.
Otherwise the compensation may fail!

Recommendations:
Product speed 100-200 mm/sec. ➞ STATISTIC TIME sec. 240
Product speed 200-300 mm/sec. ➞ STATISTIC TIME sec. 120
Product speed 300-500 mm/sec. ➞ STATISTIC TIME sec. 60
Product speed above 500 mm/sec. ➞ STATISTIC TIME sec. 30
9.4.6. Teach enable

**TEACH ENABLE**

**YES**

**(ESC)HOME**

**(-)(+)SET**

Default: YES

TEACH ENABLE = YES enables the TEACH function (with product 001-120).

TEACH ENABLE = NO de-activates the TEACH function. In this mode the metal detector operates only with ‘PRODUCT 000’.

9.4.7. Teach reject

**TEACH REJECT**

**NO**

**(ESC)HOME**

**(-)(+)SET**

Default: NO

TEACH REJECT = YES sets metal contacts active during TEACH procedure.

TEACH REJECT = NO de-activates metal alarm during TEACH procedure.

9.4.8. Exit Teach Menu

**EXIT MENU**

**(ESC)HOME**

**(OK)EXIT**

Press **OK** to exit the TEACH MENU.
9.5. Validation Menu

Press **OK** to open the VALIDATION MENU.

Press **Esc** at any time to abort your current data entry and return to main menu.

### 9.5.1. Reject Confirm

Press **(-)(+)SET** to select YES/NO.

Default: NO

REJECT CONFIRM = YES enables supervision of the rejection process (using optional equipment).

Status of the metal detector will switch to “ERROR” (i.e. relais K2 “OFF”) if reject device does not operate.

### 9.5.2. Bin Full

Press **(-)(+)SET** to select YES/NO.

Default: NO

BIN FULL = YES enables supervision of the bin for the rejected product (with optional equipment).

### 9.5.3. Low Air

Press **(-)(+)SET** to select YES/NO.

Default: NO

LOW AIR = YES enables supervision of the air pressure which operates a reject device (with optional equipment).

Status of the metal detector will switch to “ERROR” (i.e. relais K2 “OFF”) if air pressure is too low.
9.5.4. Performance Validation Menu

The PVS menu contains the setup of the PERFORMANCE VALIDATION SYSTEM.

If activated, regular sensitivity checks of the metal detector are enforced. A signal (lamp) indicates the need for a check. The operation personnel are then guided through the check step by step via clear instructions on the display.

If the performance validation fails (timeout, metal test piece not recognized), status of the metal detector will switch to “ERROR” (i.e. relay K2 “OFF”).

The local quality co-ordinator can set up all relevant parameters in this menu.

Unauthorized access to the detector settings can be blocked using the password –feature.

Press (ESC)HOME (OK)OPEN to open the PERFORMANCE VALIDATION MENU.

Press Esc at any time to abort your current data entry and return to main menu.

9.5.5. PVS

Default: NO

PVS = YES enables the performance validation system. Regular checks of the metal sensitivity are enforced by the system.

9.5.5.1 PV Freq. Hours

Setting range: 1 … 500

Default: 8

Set the time between subsequent sensitivity checks (in hours).

9.5.5.2 PV WINDOW min

Setting range: 1 … 180

Default: 30

Set the time available to finish sensitivity check successfully (in minutes).
9.5.5.3  \textit{PV FE mm}

\begin{center}
\begin{tabular}{c|c}
PV FE mm & 2.5 \\
(ESC)HOME & (-)(+SET)
\end{tabular}
\end{center}

Setting range: 0.0 \dots 99.9  \quad \text{Default: 0}

Enter the size of the ferrous metal test piece (in millimetres).

9.5.5.4  \textit{PV FE MAX mV}

\begin{center}
\begin{tabular}{c|c}
PV FE MAX mV & 320 \\
(ESC)HOME & (-)(+SET)
\end{tabular}
\end{center}

Setting range: 0 \dots 9999  \quad \text{Default: 0}

Enter the maximum allowed signal to be recognized as a proper test piece (in millivolts).

9.5.5.5  \textit{PV NONFE mm}

\begin{center}
\begin{tabular}{c|c}
PV NONFE mm & 2.5 \\
(ESC)HOME & (-)(+SET)
\end{tabular}
\end{center}

Setting range: 0.0 \dots 99.9  \quad \text{Default: 0}

Enter the size of the non-ferrous metal test piece (in millimetres).

9.5.5.6  \textit{PV NONFE MAX mV}

\begin{center}
\begin{tabular}{c|c}
PV NONFE MAX mV & 320 \\
(ESC)HOME & (-)(+SET)
\end{tabular}
\end{center}

Setting range: 0 \dots 9999  \quad \text{Default: 0}

Enter the maximum allowed signal to be recognized as a proper test piece (in millivolts).

9.5.5.7  \textit{PV SS mm}

\begin{center}
\begin{tabular}{c|c}
PV SS mm & 2.5 \\
(ESC)HOME & (-)(+SET)
\end{tabular}
\end{center}

Setting range: 0.0 \dots 99.9  \quad \text{Default: 0}

Enter the size of the stainless steel metal test piece (in millimetres).
9.5.5.8  **PV SS MAX mV**

<table>
<thead>
<tr>
<th>Setting range: 0 … 9999</th>
<th>Default: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter the maximum allowed signal to be recognized as a proper test piece (in millivolts).</td>
<td></td>
</tr>
</tbody>
</table>

9.5.5.9  **PV Error Count**

| Setting range: 0 … 999 Default: 3 |
| Enter the maximum allowed number of signals which are not accepted as the required test piece. |

9.5.5.10  **Run PV Test?**

Press **OK** to start a sensitivity check right now.

9.5.5.11  **Exit Perform Valid Menu**

Press **OK** to exit the PERFORMANCE VALIDATION MENU.

9.5.6.  **Exit Validation Menu**

Press **OK** to exit the VALIDATION MENU.
9.6. System Menu

The parameters of the SYSTEM MENU are pre-set by CASSEL. They configure the whole system consisting of sensor, control unit and optional equipment.

Press **OK** to open the SYSTEM MENU.

Press **Esc** at any time to abort your current data entry and return to main menu.

### 9.6.1. Speed

For optimum signal evaluation the unit has to be adjusted to the velocity at which the products are passed through the sensor. A correct SPEED setting is absolutely essential.

**SHARK® BD**: Adjust the setting to the belt speed at which material is passed through the metal detector.

**SHARK® BD supplied with conveyor HQ**: Speed parameter is set automatically.

**SHARK® GF, SHARK® GF compact**: SPEED = 1500 mm/sec recommended.

**OTHERS**: Set the speed at which material is currently passed through the detector.

**IMPORTANT NOTE!**
A correct calibration of the conveyor belt (with ± 2 m/min exactness) is absolutely essential. Otherwise lower metal detection sensitivity is the result!

### 9.6.2. Remote Product

Default: NO

REMOTE PRODUCT = YES enable remote product number setup through Shark terminal 1 (request separate documentation ‘Remote Product’). The product number then is addressed via 0-10 V DC signal.

REMOTE PRODUCT = NO de-activates remote product setup and enables product number setup via keyboard.
9.6.3. Password

<table>
<thead>
<tr>
<th>PASSWORD</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

YES enables password function.
NO disables the password function.

9.6.4. Expert Mode

<table>
<thead>
<tr>
<th>EXPERT MODE</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Default: NO

EXPERT MODE = YES enables you to see the current sensor signal phase and the sensitivity in mV on the main screen. You can adjust the METAL SENSE (refer to “9.1.4 Metal Sense mV”).
For more information also refer to chapter “8.4.2 Expert Mode”.

EXPERT MODE = NO disables the EXPERT MODE. Only for PRODUCT 0 the sensitivity is shown in mV. For PRODUCTs 1-120 it is shown in %. A value above 100 % triggers the metal alarm.
9.6.5. Reject Menu

Press \textbf{OK} to open the REJECT MENU.

Press \textbf{Esc} at any time to abort your current data entry and return to the system menu.

9.6.5.1 Delay mm

Metal signal \textit{DELAY} is the distance in millimetres (mm) between the metal parts being detected and the 'Metal signal' relay switching. Therefore the metal detector calculates a time delay based on 'DELAY mm' and 'SPEED' parameters. Use \textbf{ } and \textbf{ } to set the distance in the range from 0 to 30,000 millimetres. This function is useful if the product which is contaminated with metal is to be rejected automatically after having passed the sensor. During the delay period other metal signals which occur are stored in a shift register and are not lost.

9.6.5.2 Duration ms

Metal signal \textit{DURATION} is the length of time in milliseconds for which the 'Metal signal' relay remains switched. This function is useful if the product which is contaminated with metal is to be separated out automatically after having passed the sensor. Use \textbf{ } and \textbf{ } to set the delay time in the range from 150 to 30,000 milliseconds. Whilst the relay is switched on, other metal signals which occur are stored in a shift register and are not lost.
9.6.5.3 Metal Contact

This parameter programs the metal out contacts.

**HOLD:** Standard value for belt stop with reset push button.

**PUSH1:** Pusher with photo cell active 0V (synchronized reject signal).

**PUSH2:** Pusher with photo cell active 24V (synchronized reject signal).

**PUSH3:** Pusher without photo cell synchronization

**PULSE:** Metal alarm as a pulse with the duration DURATION (also see main menu)
  Use e.g. when pneumatic nozzles separate the metal

**GF1:** Drives reject flaps with gravity feed applications. Error = flap in reject - position

**GF2:** Drives reject flaps with gravity feed applications. Error = flap in ok - position

**MESEP:** Metal separator model MESEP® SE

**INLINE:** Security drive of inline reject EX-PWC

**PRODUC:** Lets you choose for each product number what action is to be taken in case of a metal contact (also see chapter “9.3.10 Metal Contact”)

**Note:** If you select one of the PUSH options you must adjust five additional settings (see chapters below).

9.6.5.4 Metal-Photo mm

Setting range: 0 .... 200  Default: optimum value

Sets the distance between metal detection and photo cell.

9.6.5.5 Push TOL mm

Setting range: 0 .... 999  Default: optimum value

Sets the size of the area that is to be rejected.

9.6.5.6 Multiple Push

Setting range: 1 .... 9  Default: optimum value

Sets how often the pusher is to be activated.
9.6.5.7  Multiple Push mm

```plaintext
MULTIPLE PUSH mm  1
(ESC)HOME  (-)(+)SET
```

Setting range: 1 .... 999        Default: optimum value

Sets the distance between the individual pushes if MULTIPLE PUSH is > 1.

9.6.5.8  Beltstop at Push

```plaintext
BELTSTOP AT PUSH  NO
(ESC)HOME  (-)(+)SET
```

BELTSTOP AT PUSH – YES: The conveyor stops when the pusher is activated.
BELTSTOP AT PUSH – NO: The conveyor does not stop.

9.6.5.9  Exit Reject Menu

```plaintext
EXIT MENU
(ESC)HOME  (OK)EXIT
```

Press `OK` to exit the REJECT submenu.

9.6.6.  Date / Time Menu

```plaintext
DATE/TIME MENU
(ESC) HOME  (OK)OPEN
```

Press `OK` to open the DATE/TIME submenu.

9.6.6.1  Set Date - YY/MM/DD

```plaintext
YY/MM/DD  02/03/19
(ESC)HOME  (-)(+)SET
```

Here you adjust the date variables for the correct printout or the correct documentation of the metal messages. YY=year / MM=month / DD=day.

Refer to chapter “8.4.10 Set Date and Time”.
9.6.6.2 Set Time - HH:MM:SS

Here you adjust the time variables for the correct printout or the correct documentation of the metal messages. HH=hour; MM=minute; SS=second.

Refer to chapter “8.4.10 Set Date and Time”.

9.6.6.3 Exit Date / Time Menu

Press \(\text{OK}\) to exit the DATE / TIME submenu and return to system menu.

9.6.7. Autospeed Menu

Calibration of input “belt speed”.

AUTOSPEED  is  included  if  the  metal  detector  comes  along  with  a  belt  control  unit  with  Hitachi frequency inverter.

With AUTOSPEED the metal detector automatically takes into account the current speed by probing the input terminal AD6 (0-10V dc signal). You do not have to adjust the parameter SPEED manually. Instead the automatically determined speed is displayed.

The input of the metal detector must be calibrated during commissioning (if not preset by manufacturer) to ensure the correct registration of the belt speed.

Two values must be calibrated:

- The voltage in mV at terminal 2 (A/D6) that corresponds to a belt speed of 0 mm/sec. (=belt stop);
- The voltage in mV at terminal 2 (A/D6) that corresponds to a belt speed of 300 mm/sec.

Systems consisting of detector and conveyor belt are pre-set by CASSEL. Then AUTOSPEED is activated.

9.6.7.1 Autospeed

AUTOSPEED = YES activates the automatic adjustment of the detector to the speed of the belt.
9.6.7.2 0mm/sec = mV

<table>
<thead>
<tr>
<th>0 mm/sec = mV</th>
<th>770</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Setting range: 0 … 9990  
Default: 0

Adjust calibration voltage of frequency inverter for zero belt speed.

**Hint:** Press simultaneously to view the current input signal of the frequency inverter. This may help you to find the correct calibration values.

9.6.7.3 300mm / sec = mV

<table>
<thead>
<tr>
<th>300 mm/sec = mV</th>
<th>1820</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Setting range: 0 … 9990  
Default: 0

Set calibration voltage of frequency inverter for belt speed 300mm/sec (= 18 m/min).

Press simultaneously to view the current input signal of the frequency inverter. This may help you to find the correct calibration values.

9.6.7.4 Exit Autospeed

EXIT MENU
(ESC)HOME (OK)EXIT

Press **OK** to exit the AUTOSPEED Menu.

9.6.8. CIP Menu

**Clean In Place** is the automatic cleaning option for METAL SHARK® Inline Metal Detectors.

If activated, the reject device toggles between positions “NORMAL” (production) and “REJECT” as long as the CIP input is in state HIGH. Cleaning fluid running through the product pipes will clean all interior surfaces of the reject device.

CIP MENU
(ESC) HOME (OK)OPEN

Press **OK** to open the CIP submenu.

Press **Esc** at any time to abort your current data entry and return to system menu.
9.6.8.1  **CIP Reject sec.**

<table>
<thead>
<tr>
<th>CIP REJECT sec.</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)(SET)</td>
</tr>
</tbody>
</table>

Setting range: 0 … 320  
Default: 0  
Set the time for how long the reject device is switched to position “REJECT” (in seconds).

9.6.8.2  **CIP Normal sec.**

<table>
<thead>
<tr>
<th>CIP NORMAL sec.</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)(SET)</td>
</tr>
</tbody>
</table>

Setting range: 0 … 999  
Default: 0  
Set the time for how long the reject device is switched to position “NORMAL” (in seconds).

9.6.8.3  **CIP Timeout min.**

<table>
<thead>
<tr>
<th>CIP TIMEOUT min.</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)(SET)</td>
</tr>
</tbody>
</table>

Setting range: 0 … 999  
Default: 1  
Set the maximum time the detector is in CIP-mode (in minutes). After this time, the detector will switch to normal operation even if CIP input remains HIGH. Next CIP can be activated only after CIP input has been reset to low.

9.6.8.4  **Exit CIP Menu**

<table>
<thead>
<tr>
<th>EXIT MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC) HOME</td>
</tr>
</tbody>
</table>

Press (OK) to exit the CIP submenu and return to system menu.

**9.6.9. In/Out Menu**

Setup of the input and output switching lines of the metal detector.

<table>
<thead>
<tr>
<th>IN/OUT MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC) HOME</td>
</tr>
</tbody>
</table>

Press (OK) to open the IN / OUT submenu.  
Press (Esc) at any time to abort your current data entry and return to system menu.
### 9.6.9.1 In 1 … In 4

<table>
<thead>
<tr>
<th>Terminals on Shark mainboard corresponding to IN 1 ... IN 4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1 = Terminal 4</td>
</tr>
<tr>
<td>IN 2 = Terminal 6</td>
</tr>
<tr>
<td>IN 3 = Terminal 11</td>
</tr>
<tr>
<td>IN 4 = Terminal 8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MET / ERR RESET:</th>
<th>HIGH: Return to normal operation mode after METAL or ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONVEYOR ON / OFF</td>
<td>Belt control push button input (START / STOP / RESET)</td>
</tr>
<tr>
<td>START TEACH:</td>
<td>HIGH: Start automatic TEACH – procedure</td>
</tr>
<tr>
<td>REJECT TEST:</td>
<td>HIGH: Trigger reject device now.</td>
</tr>
<tr>
<td>REJECT VALID:</td>
<td>Connect feedback signal from reject device. ERROR if no signal transition after METAL OUT</td>
</tr>
<tr>
<td>REJECT SYNC:</td>
<td>Connect Reject Sync Photodiode. METAL OUT is triggered DELAY mm after REJECT SYNC</td>
</tr>
<tr>
<td>REJECT SAFETY:</td>
<td>LOW: Reject device is locked in position NORMAL, e.g. during cleaning.</td>
</tr>
<tr>
<td>KEYPAD LOCK:</td>
<td>LOW: Keyboard is locked, no data entry possible. Typical application: Key switch.</td>
</tr>
<tr>
<td>LOW AIR:</td>
<td>LOW: Unit switches to ERROR (see “9.5 Validation Menu”) Supervision of compressed air.</td>
</tr>
<tr>
<td>START CIP:</td>
<td>HIGH: Unit operates in CIP- mode (see “”)</td>
</tr>
<tr>
<td>BIN FULL</td>
<td>Supervision of reject bin.</td>
</tr>
<tr>
<td></td>
<td>HIGH for more than 30sec.: Unit switches to ERROR (see “9.5 Validation Menu”)</td>
</tr>
<tr>
<td>RESET METAL COUNTER</td>
<td>HIGH: resetting of the metal counter</td>
</tr>
<tr>
<td>False trip</td>
<td>To mark a metal alarm a false alarm in connection with the SHARKNET software</td>
</tr>
<tr>
<td>OFF</td>
<td>Input is not active.</td>
</tr>
<tr>
<td>TEST+NO REJECT</td>
<td>Deactivates the output lines METAL and METALINV as well as the Metal Counter. With this function you can test the METAL SHARK. The rejection is deactivatet. CIP Mit der Funktion kann das Gerät getestet werden, ohne dass ein Auswurf erfolgt. CIP TIMEOUT min (refer to „9.6.8.3 CIP Timeout min.“) indicates after how many minutes the output lines are reactivated again in case that the input line TEST+NO REJECT is activated steadily.</td>
</tr>
</tbody>
</table>
9.6.9.2  Out 1 … Out 4

Set function of input lines 1 … 4.
Terminals on Shark mainboard corresponding to OUT 1 … OUT 4:

OUT 1 = Terminal 14
OUT 2 = Terminal 15
OUT 3 = Terminal 17
OUT 4 = Terminal 19

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>METAL</td>
<td>HIGH if metal detected, see “9.6.5 Reject Menu” for details</td>
</tr>
<tr>
<td>METAL INVERSE</td>
<td>LOW if metal detected.</td>
</tr>
<tr>
<td>ERROR</td>
<td>HIGH during normal operation, LOW if detector is not in normal operation</td>
</tr>
<tr>
<td>ERROR INVERSE</td>
<td>LOW during normal operation, HIGH if detector is not in normal operation</td>
</tr>
<tr>
<td>MET + ERROR</td>
<td>HIGH if metal alarm or unit not in normal operation, LOW during normal operation</td>
</tr>
<tr>
<td>MET + ERROR INVERS</td>
<td>LOW if metal alarm or unit not in normal operation, HIGH during normal operation</td>
</tr>
<tr>
<td>MET ZERO DELAY</td>
<td>HIGH if metal detected, no DELAY (see “9.6.5 Reject Menu”)</td>
</tr>
<tr>
<td>PV TEST</td>
<td>HIGH if last sensitivity test more than PV FREQ HOURS ago (see “9.5 Validation Menu”)</td>
</tr>
<tr>
<td>DUAL FREQ</td>
<td>For dual frequency detectors only.</td>
</tr>
<tr>
<td>TEACH CONFIRM</td>
<td>HIGH if TEACH procedure ended successfully (TEACH END displayed)</td>
</tr>
<tr>
<td>CIP OUT</td>
<td>HIGH if detector is in CIP mode (see “ “ for details)</td>
</tr>
<tr>
<td>REJECT DEVICE</td>
<td>HIGH: Conveyor belt stops for a short time and triggers the reject device</td>
</tr>
<tr>
<td>START CONVEYOR</td>
<td>Conveyor belt control output (state toggled by BELT ON/OFF input)</td>
</tr>
<tr>
<td>OFF</td>
<td>Output not active (always LOW).</td>
</tr>
</tbody>
</table>

9.6.9.3  Exit In/Out Menu

Press OK to exit the IN / OUT submenu.
9.6.10.  Exit In/Out Menu

Press **OK** to open the FILTER MENU.

Press **Esc** at any time to abort your current data entry and return to system menu.

### 9.6.10.1 Noise Level

**NOISE LEVEL mV**

<table>
<thead>
<tr>
<th>(-) (+) SET</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Setting range: 0 … 2000  
Default: optimum value

This parameter sets a trigger level to avoid teaching of noise signals. Noise signals are e.g. vibrations, metal impurities in the conveyor belt etc.

In addition, it controls action of the VIBRATION FILTER, which blanks out ALL signals deviating less than +/- NOISE LEVEL from an axis along the calibrated phase.

To set NOISE LEVEL:

1. Set PRODUCT 000, AMP X% 100, AMP Y% 100
2. Run the production line or the conveyor, but **without** products and without metal.
3. Read out the peak mV level.
4. Set NOISE LEVEL to the maximum peak mV level plus 30%.

With product memory 1…120:

The minimum setting of METAL SENSE is limited by NOISE LEVEL.
9.6.10.2 Vibration Filter

<table>
<thead>
<tr>
<th>VIBRATION FILTER</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)-</td>
</tr>
</tbody>
</table>

Default: YES

With this parameter it is possible to blank out noise due to mechanical vibrations of the sensor head.

YES = Vibration filter activated.

NO = Vibration filter deactivated.

The value of NOISE LEVEL (above) controls the filter strength:

NOISE LEVEL increased: Better suppression of vibration noise, lower detection sensitivity.

NOISE LEVEL decreased: Less suppression of vibrations, better detection sensitivity.

9.6.10.3 FFT Filter

<table>
<thead>
<tr>
<th>FFT FILTER</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)-</td>
</tr>
</tbody>
</table>

Default: YES (BD detectors, when using a conveyor belt)

NO (gravity feed applications with reject device)

YES (gravity feed applications without reject device)

With this parameter it is possible to choose between two different signal evaluation programs.

YES = Strong bandpass filter activated.

NO = Bandpass filter deactivated.

9.6.10.4 FIR Filter

<table>
<thead>
<tr>
<th>FIR FILTER</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)-</td>
</tr>
</tbody>
</table>

Default: YES

With this parameter it is possible to choose between two different signal evaluation programs:

YES = Lowpass filter activated.

NO = Lowpass filter deactivated.
9.6.10.5 **GF Mode**

<table>
<thead>
<tr>
<th>GF MODE</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td>(-)(+)SET</td>
</tr>
</tbody>
</table>

Default: NO (BD type, conveyor applications with defined belt speed)

YES (BD type, applications with non-defined speed, e.g. chutes, rollers)

YES (all gravity feed applications)

With this parameter it is possible to choose between two different signal evaluation programs:

YES = FFT bandpass filter is set to a wide characteristic.

NO = FFT bandpass filter is set to a very narrow characteristic.

9.6.10.6 **Exit Filter Menu**

<table>
<thead>
<tr>
<th>EXIT MENU</th>
<th>(OK)EXIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td></td>
</tr>
</tbody>
</table>

Press **OK** to exit the FILTER submenu and return to system menu.

9.6.11. **Sensor Menu**

Sensor calibration is done by CASSEL to adapt the control unit to the specific sensor settings. This menu is only to be opened by the user when CASSEL tells him to check the settings.

**VERY IMPORTANT:** Never change any value in the factory set-up without clear advice from Cassel! This would lead to malfunction or damage the electronic board.

<table>
<thead>
<tr>
<th>SENSOR CALIBRATION</th>
<th>(OK)OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ESC)HOME</td>
<td></td>
</tr>
</tbody>
</table>

Push **OK** to open the submenu SENSOR CALIBRATION.

9.6.11.1 **Sensor Field**

<table>
<thead>
<tr>
<th>SENSOR FIELD mm</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+)(-)SET</td>
<td>(ESC)HOME</td>
</tr>
</tbody>
</table>

Setting range: 10 ... 999

Default value: refer to LIST OF PARAMETER SET-UP.

**Do not change default value.**

This parameter calibrates the control unit to the dimensions of the sensor. The value is specified by CASSEL. The original value is written on the inside of the control box lid.
9.6.11.2 Frequency

FREQUENCY HZ 299600
(+)(-SET (ESC)HOME

Setting range: 290000 ... 310000 Default value: refer to LIST OF PARAMETER SET-UP.
Do not change default value.

This parameter calibrates the control unit to the sensor resonance frequency. The value is specified by CASSEL. The original value is written on the inside of the control box lid.

9.6.11.3 Balance Factor

BALANCE FACTOR 3
(ESC)HOME (-)(+)(SET

Setting range: 0 ... 110 Default: 6 (BD type, conveyor applications)
20 (Gravity feed applications, MESEP® SE)

This parameter sets up the regulation speed for the automatic temperature drift compensation circuit of the sensor. Do not change this value.

When BALANCE FACTOR high:
• High changes of temperature and similar noises are compensated.
• The signal of slow moving products and metal parts is also compensated.

9.6.11.4 Phase Calib.

PHASE CALIB. -79.50°
(ESC)HOME (-)(+)(SET

Default value: refer to LIST OF PARAMETER SET-UP. Do not change this value.

This parameter calibrates the measured product effect phases. The value is specified by CASSEL. The original value is written on the inside of the control box lid.

9.6.11.5 Analog PH

ANALOG PH -12,09°
(ESC)HOME (-)(+)(SET

Default value: None / Auto Calibrated

This parameter calibrates the measured product effect phases of the main board (pcb). The value is automatically measured and set when pushing PLUS and MINUS keys simultaneously. During auto calibration process make sure that no metal is inside the sensor head.

9.6.11.6 Exit System Menu

EXIT MENU
(ESC)HOME (OK)EXIT

Press OK to exit the SYSTEM MENU.
9.7. Exit Menu

Press OK to exit the MENU and return to the main screen.
10. **Electrical Connections**

**WARNING:** Only qualified electricians are allowed to perform work inside of electrical cabinets.

### 10.1. Terminals of Power Supply Board

The connectors are on the left side of the power supply in the main controller box.

<table>
<thead>
<tr>
<th>Terminal #</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>26, 27, 28</td>
<td>Ground</td>
<td>Ground potential for internal power supply</td>
</tr>
<tr>
<td>29, 30, 31</td>
<td>+ 24 V DC</td>
<td>Internal Power supply source (max. 100mA)</td>
</tr>
<tr>
<td>Relais K2</td>
<td>Error alarm OUT</td>
<td>Closed line, potential free, switching capacity 230V AC at 2 A</td>
</tr>
<tr>
<td>32, 33, 34</td>
<td>Metal alarm OUT</td>
<td>Closed line, potential free, switching capacity 230V AC at 2 A</td>
</tr>
</tbody>
</table>

**Relais K2, K1 - Function**

<table>
<thead>
<tr>
<th>Relais #</th>
<th>Terminal #</th>
<th>Power supply OFF</th>
<th>Error or adjust mode</th>
<th>Operational ok mode</th>
<th>Metal alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2</td>
<td>32</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Error</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>35</td>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
<td><img src="image7.png" alt="Diagram" /></td>
<td><img src="image8.png" alt="Diagram" /></td>
</tr>
<tr>
<td>Metal</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10.3. Terminals on the Mainboard

Terminals 1-25

#1

#25

...
## 10.4. Terminals / Electrical Wiring and Functions

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Name</th>
<th>Ratings</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A/D7</td>
<td>0-10V DC</td>
<td>Analogue input, application specific</td>
</tr>
<tr>
<td>2</td>
<td>A/D6</td>
<td>0-10V DC</td>
<td>Analogue input, SHARK BD = belt speed input for speed</td>
</tr>
<tr>
<td>3</td>
<td>AGND</td>
<td>AGND</td>
<td>Analogue Ground</td>
</tr>
<tr>
<td>4</td>
<td>IN1</td>
<td>24V DC</td>
<td>Logic input, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>5</td>
<td>+24=</td>
<td>24V DC, 3mA</td>
<td>+24V DC source for logic inputs</td>
</tr>
<tr>
<td>6</td>
<td>IN2</td>
<td>24V DC</td>
<td>Logic input, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>7</td>
<td>+24=</td>
<td>24V DC, 3mA</td>
<td>+24V DC source for logic inputs</td>
</tr>
<tr>
<td>8</td>
<td>IN4</td>
<td>24V DC</td>
<td>Logic input, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>9</td>
<td>+24=</td>
<td>24V DC, 3mA</td>
<td>+24V DC source for logic inputs</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>GND</td>
<td>Ground for +24V DC</td>
</tr>
<tr>
<td>11</td>
<td>IN3</td>
<td>24V DC</td>
<td>Logic input, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>12</td>
<td>+24=</td>
<td>24V DC, 50mA</td>
<td>+24V DC source for photo cell, proximity switch, etc.</td>
</tr>
<tr>
<td>13</td>
<td>+24=</td>
<td>24V DC, 20mA</td>
<td>+24V DC source for alarm device, e. g. bulb, buzzer, etc.</td>
</tr>
<tr>
<td>14</td>
<td>OUT1</td>
<td>24V DC</td>
<td>Logic output, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>15</td>
<td>OUT2</td>
<td>24V DC</td>
<td>Logic output, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>16</td>
<td>+24=</td>
<td>24V DC, 100mA</td>
<td>+24V DC source for alarm device, e. g. bulb, buzzer, etc.</td>
</tr>
<tr>
<td>17</td>
<td>OUT3</td>
<td>24V DC</td>
<td>Logic output, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>18</td>
<td>+24=</td>
<td>24V DC, 100mA</td>
<td>+24V DC source for alarm device, e. g. bulb, buzzer, etc.</td>
</tr>
<tr>
<td>19</td>
<td>OUT4</td>
<td>24V DC</td>
<td>Logic output, functions (see settings in the IN / OUT MENU)</td>
</tr>
<tr>
<td>20</td>
<td>+24=</td>
<td>24V DC, 100mA</td>
<td>+24V DC source for alarm device, e. g. bulb, buzzer, etc.</td>
</tr>
<tr>
<td>21</td>
<td>Rx</td>
<td>-5...+5V digital</td>
<td>RS232 Asynchronous Serial-Data (receiver) input.</td>
</tr>
<tr>
<td>22</td>
<td>Tx</td>
<td>-5...+5V digital</td>
<td>RS232 Asynchronous Serial-Data (transmitter) output.</td>
</tr>
<tr>
<td>23</td>
<td>GND</td>
<td>GND</td>
<td>Ground for RS232 / RS485</td>
</tr>
<tr>
<td>24</td>
<td>A</td>
<td>+3V</td>
<td>RS485 Non-inverting Receiver Input and Non-inverting Driver Output</td>
</tr>
<tr>
<td>25</td>
<td>B</td>
<td>-3V</td>
<td>RS485 Inverting Receiver Input and Inverting Driver Output</td>
</tr>
<tr>
<td>26</td>
<td>GND</td>
<td>GND</td>
<td>Ground for +24V DC</td>
</tr>
<tr>
<td>27</td>
<td>GND</td>
<td>GND</td>
<td>Ground for +24V DC</td>
</tr>
<tr>
<td>28</td>
<td>GND</td>
<td>GND</td>
<td>Ground for +24V DC</td>
</tr>
<tr>
<td>29</td>
<td>+24=</td>
<td>24V DC, 33mA</td>
<td>+24V DC source for PLC, alarm device, e. g. bulb, buzzer etc.</td>
</tr>
<tr>
<td>30</td>
<td>+24=</td>
<td>24V DC, 33mA</td>
<td>+24V DC source for PLC, alarm device, e. g. bulb, buzzer etc.</td>
</tr>
<tr>
<td>31</td>
<td>+24=</td>
<td>24V DC, 33mA</td>
<td>+24V DC source for PLC, alarm device, e. g. bulb, buzzer etc.</td>
</tr>
</tbody>
</table>
| 32, 33, 34 | K2   | max. 230V AC at 2A | ERROR ALARM  
Dry contacts  
34 – 33 close contact = Power off, Error, Adjust mode, Failure  
34 – 32 close contact = Normal metal detector function |
| 35, 36, 37 | K1   | max. 230V AC at 2A | METAL ALARM  
Dry contacts  
37 – 36 close contact = Power off, Metal alarm  
37 – 35 close contact = Normal metal detector function |
| 38       | LIVE   | 85-260V AC    | Power supply Input                                                        |
| 39       |       | 50-60Hz       |                                                                          |
| 40       |       | Single Phase  |                                                                          |
| 41       |       | 100 Watt      |                                                                          |
| N        | NEUTRAL | 0V           | Neutral wire of single phase power supply.                               |
| PE       | PE     | Ground       | Safety ground  
This point must be connected to protective earth or adjacent building steel. |

Never mix 24 VDC and 115/230 VAC wiring in the same cable!
10.5. Wiring Diagram: Reject = Belt Stop (Conveyor Models)

IMPORTANT NOTE for use with 110V AC, (three phase) power supply:
Connect one phase of 110VAC to L and another phase of 110VAC to N. Connect Ground / PE to PE.
10.6. Wiring Diagram: Reject = Pneumatic Pusher ( Conveyor Models)

**IMPORTANT NOTE for use with 110V AC (three phase) power supply:**
Connect one phase of 110VAC to L and another phase of 110VAC to N. Connect Ground / PE to PE.
11. Maintenance and Regular Inspections

11.1. Maintenance

The metal detector is a sensitive measuring device which serves to protect other machinery from damage, thus preventing expensive, unscheduled interruptions of production. This manual describes how to install, operate and adjust the sensitivity. The conveyor belt upon which the metal detector is mounted is designed to ensure that the detector works accurately. The metal detector will generally work safely and reliably without having to make additional adjustments after the initial commissioning.

11.2. Regular Inspections

Regular tests of the metal detector’s functions are very important to ensure safe operations. The detector must be tested at least on a weekly basis. Additionally, it has to be tested after each maintenance stop or after works have been performed near the detector. If the detector does not function appropriately eliminate the malfunctions immediately; if not, machines protected by the detector must be stopped.

It is recommended to regularly test the metal detector with standardised test objects and to keep records of these tests in a log book. Metal testing spheres are generally supplied with the detector.

A suitable metal testing object and a testing schedule should be established for the examination:

- The testing object should be a sphere of the smallest diameter which detection is required. The sphere can be glued to a piece of plastic or may be cast in. The sphere is passed through the detector together with the product in order to observe whether a metal detection signal is issued.
- The testing schedule should state when the detector is to be tested and by whom. Example: The electrician on duty on a given shift has to test the detector using the testing object one hour after the start of each shift. The test results are recorded in the log book with the date, time and signature. Example: Test object recognised, 24 August 2007, 08.30, signed, Smith.

11.3. Notes

Normally, Cassel adjusts the metal detector to find the smallest metal pieces possible. Therefore please consider the following notes:

**Keep the conveyor belt clean:** Fingermarks and shoe prints, visible or not, may contain metal particles.

**Do not melt or grind near the detector or the conveyor** without having covered the conveyor belt with e.g. Cardboard. Sparks may burn the surface of the conveyor.

**Do not change the conveyor belt construction** without having asked the manufacturer of detector and belt.
12. Conveyor Belt System

This chapter is only valid if the metal detector METAL SHARK® was supplied with a conveyor belt as a complete system.

12.1. Conveyor Belt Maintenance

Please maintain the conveyor belt frequently to achieve a long service life. We therefore suggest you to perform inspections on a monthly (1 shift operation) or weekly (2/3 shift operation) basis depending on operating conditions. During the running-in period the conveyor belt may have to be readjusted.

1. **Check belt tension:** The conveyor belt must only be tensioned so that it is just moved by the driving drum. **IMPORTANT:** If belt tension is too strong, the roller bearing may be damaged or subjected to premature wear.

2. **Check belt run:** If the conveyor belt is to run at the side, the drums will have to be readjusted. The belt always runs to the side which is tensioned less.

3. **Clean belt:** Never use aggressive detergents.

4. **Check belt for damage:** Replace the belt if it is considerably damaged.

5. **Check bearing of the drive and deflection drum:** The bearings are equipped with maintenance-free tension bearings. The filling of grease is generally adequate for the service life of the bearing.

6. **Check deflection rollers:** The deflection rollers are equipped with maintenance-free bearings and require no lubrication whatsoever. If you discover any wear, the rollers must be replaced.

7. **Check electrical connections and cable entries for damage:** If you discover damage, repairs must be carried out immediately by expert personnel.
## 13. Error Messages and Trouble Shooting

### 13.1. Error Messages of the Software

Frequent reasons for malfunctions are wrong settings or insufficient carefulness when connecting the metal detector. Please isolate the cause using the index below. Often it is just a bagatelle that causes the malfunction. If all attempts are not successful write down the number of your metal detector (located on a white label on the base plate in the control unit) and contact Cassel Messtechnik.

<table>
<thead>
<tr>
<th>Error</th>
<th>Error text</th>
<th>Cause</th>
<th>Remedy</th>
<th>Confirmation</th>
</tr>
</thead>
</table>
| 1     | COMP. PRE  | • Sensor out of the alignment  
       |           | • Mainboard damaged  
       |           | • big metal object in the detector  |  
|       |            |       | • Replace mainboard  
       |           | • Contact technician |  
|       |            |       | • Turn on/off metal detector |  |
| 2     | COMP. FINE | • Mainboard damaged  | • Replace mainboard | • Turn on/off metal detector |
| 3     | SIGNAL CLIP| • During the learn process product effect to high  | • Use other products  
       |          |       | • Contact technician |  
|       |            |       | • Confirm with OK  
       |          |       | • Restart learn process |  |
| 4     | REJECT     | • Reject problem  | • Check pusher for mechanical problem  
       |          |       | • Check reject sensor (photo cell or proximity switch) |  
|       |            |       | • Parameter REJECT CONFIRM must be set to NO, if no photo cell for reject validation is connected |  
|       |            |       | • confirm with OK  
       |          |       | • Error reoccurs after next rejection when pusher does not work properly |  |
| 5     | PV ELAPSED | • Performance validation test not done within preset period of time  | • Confirm with OK  
       |          |       | • and repeat test |  
|       |            |       | • Confirm with OK  
       |          |       | • Error reappears, if period of time has expired and the PV test was unsuccessful |  |
| 6     | BIN FULL   | • The bin is full or a product blocks sensor  | • Empty bin  
       |          |       | • Check bin (photo cell or proximity switch) |  
|       |            |       | • Confirm with OK  
<pre><code>   |          |       | • Error message reappears after 30 seconds, if bin still full |  |
</code></pre>
<table>
<thead>
<tr>
<th>Error</th>
<th>Error text</th>
<th>Cause</th>
<th>Remedy</th>
<th>Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>LOW AIR</td>
<td>• Compressed air problem</td>
<td>• Check air pressure</td>
<td>Confirm with OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Check air pressure sensor</td>
<td>Error message reappears after 30 seconds, if not enough air pressure</td>
</tr>
<tr>
<td>8</td>
<td>NO PRODUCT</td>
<td>• During learn period no product effects measured</td>
<td>• Check whether products pass sensor during learn period</td>
<td>Confirm with OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Product does not have a product effect</td>
<td>Restart LEARN</td>
</tr>
<tr>
<td>9</td>
<td>KEYBOARD</td>
<td>• Keyboard problem, e.g. due to mechanical damage (a key is jammed)</td>
<td>• Disconnect the connection between keyboard and mainboard. Error 9 should not reoccur.</td>
<td>Confirm with OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Replace keyboard.</td>
<td>Error message appears until keyboard is replaced</td>
</tr>
<tr>
<td>10</td>
<td>MEMORY</td>
<td>• Memory problem, parameters can not be saved</td>
<td>• Turn on/off metal detector</td>
<td>Confirm with OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Replace the memory if error reappears after turning on/off 10 times</td>
<td>Error message appears until memory is replaced</td>
</tr>
<tr>
<td>11</td>
<td>SLAVE NET (Option)</td>
<td>• Network error (no connection to master in case of slave net)</td>
<td>• Control network settings and network wiring</td>
<td>Push OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Power on Master Unit</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>BELT (Option)</td>
<td>• Conveyor does not start</td>
<td>• Check function of conveyor</td>
<td>Push OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• check belt sensor (photo cell or proximity switch)</td>
<td>Search reason for belt stop</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• check colored marked area on belt: still visible?</td>
<td>adjust belt sensor (photo cell or proximity switch)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>renew marked area on belt</td>
</tr>
</tbody>
</table>
14. Instruction Sheet

14.1. General Function

Target group for this manual: quality checking personnel, HACCP-agent

Start of work:

- Turn on the metal detector and wait about 1 min (alignment time) until the message PRODUCT xx appears on the display and the green LED goes on.
- Retrieve the product relevant product number.

Metal detection:

- Pass numerous metal free samples through the metal detector.
- No metal alarm is to occur.
- Pass a sample with a metal sphere through the metal detector.
- A metal alarm is to occur!

The test intervals must be specified in a way that when an irregularity occurs all products can be checked again that have run through the metal detector since the last test. Furthermore a test should be made every time a new shift begins and a new product is running through the metal detector.

Production:

You must secure that the metal detector is checking all products systematically and steadily.

Metalliferous product:

You must secure that all metalliferous products are not accidentally reused or delivered to a customer. These products are to be removed from the production and labelled clearly, e.g. with a red label “Locked/metal”.

14.2. General Metal Detector Manual

Target group for this manual: HACCP-agent, ISO9000-manual

ISO 9000:
The metal detector is installed to protect our customers from metallic impurity in their products.

HACCP:
The metal detector is a crucial “physical” control point against the danger of a metal impurity. It is possible that when you do not have this control a health risk occurs.

Method of operation:
The metal detector establishes an electromagnetic field in the search coil. This field changes when a metal passes through. Then a metal alarm is set off.

A metal detector reacts on magnetism and electric conductivity.

Operating instructions:
• In order to minimize interferences do not install any mobile metal parts near the search coil.
• The search coil must be free from vibrations. Do not put any objects on the search coil.
• The settings in the specific operating instructions of our products must be made.
• Always take metal alarms seriously. You have to look for the source of the metal impurity.
• Most food is conductive. Therefore the metal detector has to learn the product effect and blank it out.

Additional hints:
Withdraw the regular metal detector check from the specific operating instructions.
Inform the HACCP-agent about irregularities and error messages.
**Parameter List METAL SHARK® / Software 3.94o**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT</td>
<td>Product memory number</td>
</tr>
<tr>
<td>TEACH PRODUCT</td>
<td>Starts product teach procedure (Product 1-120)</td>
</tr>
<tr>
<td>PRODUCT TOL</td>
<td>Product effect compensation (Product 1-120)</td>
</tr>
<tr>
<td>METAL SENSE mV</td>
<td>Metal-sensitivity</td>
</tr>
<tr>
<td>OPEN MENU</td>
<td>Enters the menus listed below</td>
</tr>
<tr>
<td>REPORT MENU</td>
<td></td>
</tr>
<tr>
<td>METAL COUNTER</td>
<td>Counts each metal alarm (just for information)</td>
</tr>
<tr>
<td>INFO LAST METAL</td>
<td>Last metal signal amplitude (just for information)</td>
</tr>
<tr>
<td>INFO PRODUCT</td>
<td>Display of product parameters (just for information)</td>
</tr>
<tr>
<td>INFO SOFTWARE VERS.</td>
<td>Display software version (just for information)</td>
</tr>
<tr>
<td>PRINT</td>
<td>Print mode for metal alarms and data logging</td>
</tr>
<tr>
<td>INTERFACE</td>
<td>Type of serial interface and Network protocol</td>
</tr>
<tr>
<td>BAUD</td>
<td>Data rate of serial interface</td>
</tr>
<tr>
<td>SHARKNET UNIT #</td>
<td>Network-ID of unit (1 = master / stand alone system)</td>
</tr>
<tr>
<td>REPORT TO PRINTER</td>
<td>Sends report of metal alarms to printer (via RS232)</td>
</tr>
<tr>
<td>REPORT TO LCD</td>
<td>Displays report of metal alarms on LCD</td>
</tr>
<tr>
<td>PRODUCT MENU</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>Product name (Product 1-120)</td>
</tr>
<tr>
<td>PRODUCT IS</td>
<td>Product property (for product teach process)</td>
</tr>
<tr>
<td>PRODUCT X TOL</td>
<td>Product suppression X (in addition to PRODUCT TOL)</td>
</tr>
<tr>
<td>PRODUCT Y TOL</td>
<td>Product suppression Y (in addition to PRODUCT TOL)</td>
</tr>
<tr>
<td>TEACH AREA</td>
<td>Info teach area</td>
</tr>
<tr>
<td>AMP X %</td>
<td>Amplification X channel (product signals)</td>
</tr>
<tr>
<td>AMP Y %</td>
<td>Amplification Y channel (metal signals)</td>
</tr>
<tr>
<td>PHASE</td>
<td>Product compensation phase (Product 1-120)</td>
</tr>
<tr>
<td>PHASE TRACK</td>
<td>Step size for automatic product phase tracking</td>
</tr>
<tr>
<td>COPY PROD.</td>
<td>Copy content of current product menu to other product #</td>
</tr>
<tr>
<td>TEACH MENU</td>
<td></td>
</tr>
<tr>
<td>TEACH SENSE mV</td>
<td>Sensitivity after TEACH PRODUCT</td>
</tr>
<tr>
<td>TEACH MIN COUNT</td>
<td>Minimum product signals in each TEACH STEP</td>
</tr>
<tr>
<td>TEACH MAX COUNT</td>
<td>Next TEACH STEP after max. Product count</td>
</tr>
<tr>
<td>TEACH TIME sec</td>
<td>Time duration for each single TEACH STEP 1 and 2</td>
</tr>
<tr>
<td>STATISTIC sec</td>
<td>Time duration for STATISTIC STEP</td>
</tr>
<tr>
<td>TEACH ENABLE</td>
<td>Enables or disables TEACH PRODUCT (disabled: Product 0 only)</td>
</tr>
<tr>
<td>TEACH REJECT</td>
<td>Activates metal out contact during TEACH PRODUCT</td>
</tr>
<tr>
<td>VALIDATION MENU</td>
<td></td>
</tr>
<tr>
<td>REJECT CONFIRM</td>
<td>Enables reject check option</td>
</tr>
<tr>
<td>BIN FULL</td>
<td>Enables bin full option</td>
</tr>
<tr>
<td>LOW AIR</td>
<td>Enables low air option</td>
</tr>
<tr>
<td>PERFORM VALID SYSTEM</td>
<td>Enables Performance Validation System</td>
</tr>
<tr>
<td>PV FREQ. hrs</td>
<td>Time between PV tests</td>
</tr>
<tr>
<td>PV WINDOW min</td>
<td>Time available to perform PV</td>
</tr>
<tr>
<td>PV FE mm</td>
<td>Size of Fe test sphere requested for PV</td>
</tr>
<tr>
<td>PV FE max mV</td>
<td>Maximum signal accepted as test sphere</td>
</tr>
<tr>
<td>PV NONF mm</td>
<td>Size of NFe test sphere requested for PV</td>
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<tr>
<td>PV NONF max mV</td>
<td>Maximum signal accepted as NFe test sphere</td>
</tr>
<tr>
<td>PV SS mm</td>
<td>Size of SS test sphere requested for PV</td>
</tr>
<tr>
<td>PV SS max mV</td>
<td>Maximum signal accepted as SS test sphere</td>
</tr>
<tr>
<td>PV ERROR COUNT</td>
<td>Maximum number of failed tries</td>
</tr>
<tr>
<td>RUN PV TEST ?</td>
<td>OK = Performance validation NOW !</td>
</tr>
</tbody>
</table>

Seite 84  Software Version 3.94o and higher
**SYSTEM MENU**

- **SPEED mm/sec**
  - Product speed through sensor (e.g., Belt speed)
- **REMOTE PRODUCT**
  - Enables or disables remote product number setup
- **PASSWORD**
  - Avoids unauthorized parameter setup
- **EXPERT MODE**
  - Enables or disables expert mode
- **REJECT MENU**
  - **DELAY mm**
    - Time delay for metal out contact
  - **DURATION ms**
    - Time duration for metal out contact
  - **METAL CONTACT**
    - Program switching mode of metal out contacts
- **DATE / TIME MENU**
  - **YY/MM/DD**
    - Sets date
  - **HH:MM:SS**
    - Sets time
- **AUTOSPEED MENU**
  - **AUTOSPEED**
    - Enables Autospeed function (for BD conveyor type only)
    - 0 mm/sec. = mV
    - Calibrates belt speed input at 0 mm/sec.
    - 300 mm/sec. = mV
    - Calibrates belt speed input at 300 mm/sec.
- **CIP MENU**
  - **CIP REJECT sec.**
    - Clean in place: timing for reject position
  - **CIP NORMAL sec.**
    - Clean in place: timing for normal position
  - **CIP TIMEOUT min.**
    - Clean in place: stops after this time has elapsed
- **IN / OUT MENU**

<table>
<thead>
<tr>
<th>IN1</th>
<th>OFF</th>
<th>REJECT</th>
<th>METAL</th>
<th>TEST</th>
<th>TEACH</th>
<th>START</th>
<th>CONFIRM</th>
<th>INVALID</th>
<th>REJECT</th>
<th>SYNC</th>
<th>SAFETY</th>
<th>LOCK</th>
<th>LOW</th>
<th>START</th>
<th>CIP</th>
<th>FULL</th>
<th>COUNT</th>
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<th>TRIP</th>
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<tbody>
<tr>
<td>IN2</td>
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<th>OUT1</th>
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<th>METAL</th>
<th>INVERSE</th>
<th>ERROR</th>
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<tbody>
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</tbody>
</table>

**FILTER MENU**

- **NOISE LEVEL mV**
  - Sensor Noise Level
- **VIBRATION FILTER**
  - Vibration filter on/off
- **FFT FILTER**
  - Bandpass filter on/off
- **FIR FILTER**
  - Lowpass filter on/off
- **GF MODE**
  - Gravity Feed – Mode on/off
- **SENSOR CALIBRATION (DO NOT CHANGE !)**
  - **SENSOR FIELD mm**
    - Adapts sensor size to electronic (never change)
  - **FREQUENCY Hz**
    - Sensor resonance frequency (never change)
  - **BALANCE FACTOR**
    - Sensor balance regulation factor (never change)
  - **PHASE CALIB.**
    - Sensor calibration zero phase (never change)
  - **ANALOG PH**
    - Mainboard calibration zero phase (auto cal by +/-)