METAL SHARK® 2
Operator’s Manual

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Software Version 1.10a and higher
1. **Safety Messages**

1.1. **Safety Symbols and Definitions**

In this manual we use the following safety symbols. These symbols are supposed to draw the readers attention especially to the text next to the safety symbol.

- **General Danger!**
  This Symbol indicates that there is a potential danger for life and health.

- **Danger due to High Voltage!**
  This symbol indicates that there is a potential danger for health and life due to high voltage. Only qualified electricians are allowed to carry out tasks that are marked with this symbol.

- **Danger due to Moving Parts!**
  This symbol indicates that exposed moving parts may injure your fingers or hand.

- **Caution!**
  This symbol indicates that there is a potential danger for machinery, material or the environment.

1.2. **General Safety Instructions**

- **Danger!**
  Before working with the metal detector read these safety instructions thoroughly.

- 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 unauthorized persons. An unauthorized 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.

Open flames and smoking are not allowed.

Motor control equipment and electronic controllers are connected to hazardous line voltages.

Never touch any live parts. Electric shocks may lead to severe injury or death.

Disconnect power before checking controllers or performing maintenance, be sure equipment is properly connected to Protective Earth (PE).

During servicing or maintenance work always wear insulated safety shoes with thick crepe soles and safety glasses.

Report any damaged cables to the maintenance staff immediately.

Keep all access doors to the electrical equipment locked.

Do NOT operate the machine without guards in place.

Do NOT touch parts marked with this symbol during machine in operation.
1.3. **Safety Instructions for the Metal Detector**

**Attention!**

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

1.3.1. **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.

1.3.2. **Connecting Instructions**

- Make sure that the mains voltage is the same as that required for the equipment.
- The detector must be fitted and connected up by trained staff only.
- 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 maximum operating voltage and the current-carrying capacity of the output contacts.
- Use screened/twisted-wire mains and control cables.
- Never lay the mains cable and control cable together in a single cable run.
- Make sure the metal detector is properly earthen (protective earth - PE).

1.3.3. **Instructions about Operation**

To prevent Metal Detector METAL SHARK® series from ageing prematurely or being damaged beyond repair, please observe the following instructions:

- The metal detector should always remain switched on. This will maximize the service life of the electronic circuitry.
- Only operate the metal detector under suitable conditions (refer to chapter "3.2.1. Normal Use").

1.3.4. **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.
Software Version 1.10a and higher
2. **Getting Started**

Here we provide an overview of the actions you have to take before starting to work with the metal detector METAL SHARK® 2.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1.   | Read the safety instructions.  
      | *Note: For more information read chapter “1. Safety Messages”.* |
| 2.   | Become familiar with the metal detector.  
      | *Note: For more information read chapter “4. Technical Description”.* |
| 3.   | Move the metal detector to the location where you want to install it.  
      | *Note: For more information read chapter “5. Transport”* |
| 4.   | Install the metal detector mechanically.  
      | *Note: For more information read chapter “6. Mechanical Installation”* |
| 5.   | Check the metal detector’s electrical installation and connect the mains power.  
      | *Note: For more information read chapter “7. Electrical Installation”* |
| 6.   | Become familiar with the control panel and the main screens.  
      | *Note: For more information read chapter “8. Control Panel and Main Screens”* |
| 7.   | Set up parameters for initial operation.  
      | *Note: For more information read chapter “9. Initial Parameter Setup”* |
| 8.   | Teach products, optimize stability and sensitivity, check the performance and then start your normal production.  
| 9.   | If necessary change further settings of the METAL SHARK® 2.  
      | *Note: For more information read chapter “13. MENU - General Settings”* |
3. Introduction

3.1. General Information

3.1.1. Information about this Manual

Validity: Metal detector type METAL SHARK® 2
Manufacturer: CASSEL
9 18812 96 Ave
Surrey, British Columbia
Canada
Print date of this manual: 02. June 2009

3.1.2. Content of this Manual

This manual contains all general information that is necessary for setting up and running METAL SHARK® 2 Metal Detectors.

This manual was compiled in June 2009 according to the guidelines of the European standard EN ISO 12100-1 and EN ISO 12100-2, „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 authorized to work on and with the metal detector have to read and understand this manual. Additionally, the employer should provide short information on what to do and not to do with the machine. Special interest is to be paid to the safety instructions.

The manual must stay with the metal detector. All authorized persons must have access to it at any time. You are not allowed to remove any chapters from this manual. A missing manual or missing pages (especially "1. Safety Messages") have to be replaced immediately.

Note: CASSEL no implicit guarantees regarding standard qualities or suitability for a certain application.

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3.1.3. Target Group for this Manual

This document is directed to operators and quality managers as well as company technicians with the following tasks:

- operation of the metal detector,
- regular inspections,
- safety check before and during the work with the metal detector,
- maintenance of the metal detector (company technicians only).
3.1.4. **Typographic Conventions**

Here the different text formats are explained.

<table>
<thead>
<tr>
<th>Example</th>
<th>Typ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Histogram</strong> shows the last 232 signals and what they were about</td>
<td>Important expressions</td>
</tr>
<tr>
<td>Press <strong>MENU</strong></td>
<td>Function Keys</td>
</tr>
<tr>
<td>Press <strong>ESC</strong> to return to the main screen.</td>
<td></td>
</tr>
<tr>
<td>Select <strong>SYSTEM MENU</strong>...</td>
<td>Menu Points</td>
</tr>
<tr>
<td>dry: Products with low...</td>
<td>Menu Parameters</td>
</tr>
<tr>
<td><strong>BAUDRATE RS232 (A040) sets...</strong></td>
<td>Parameter Code</td>
</tr>
<tr>
<td><strong>Note: Do not...</strong></td>
<td>Hint</td>
</tr>
<tr>
<td>Refer to chapter &quot;3.2. Scope of Application and Qualification&quot;</td>
<td>References</td>
</tr>
<tr>
<td>...the error message <strong>PVS Test Elapsed</strong>.</td>
<td>Errors</td>
</tr>
<tr>
<td><strong>Danger!</strong></td>
<td>Safety hints</td>
</tr>
</tbody>
</table>
3.2. **Scope of Application and Qualification**

3.2.1. **Normal Use**

The Metal Detectors of the METAL SHARK® 2 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.

In addition you have to secure that the metal detector is only operated when standing in a stable position.

*Note*: Refer to chapter “4.3. Technical Data” for more information.

3.2.2. **Misuse**

The METAL SHARK® 2 series is not designed for uses other than those listed in chapter “3.2.1. Normal Use” otherwise it is regarded as misuse. In particular, pay 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 “3.2.1. Normal Use”;
- to use the machine for a purpose which is not approved,
- to convert the machine without consent from CASSEL 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.
- to step on or climb over the machine (especially the conveyor belt),
- to transport humans or any kind of material with the metal detector

3.2.3. **Owner’s Obligation to Exercise Due Care**

The METAL SHARK® 2 series has been designed and built taking due consideration of a hazard analysis and after careful selection of the harmonized 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 supervise their implementation.

The owner of the equipment must, in particular, ensure

- that the machine is only subjected to normal use (“3.2.1. 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 Operator’s Manual is always in a legible state and is available in its entirety in a place accessible for all operators at any time,
- that only adequately qualified and authorized 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.
3.2.4. Requirements for Operating Staff

To operate the Metal Detector METAL SHARK® 2 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:

- Switching the metal detector on and off.
- Adjusting settings that password level 1 and 2 users are able to set up
- Being acquainted with the functions of the metal detector for daily operation (11. Daily Operation) and being able to carry them out.
- Performing regular performance checks (2. TEST - Check Metal Detector's Performance) 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 (e.g. errors 1-7, "14.1. Error Messages").

3.2.5. 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 must have been successfully completed. However, only qualified electricians are allowed to work inside of electrical cabinets. Only trained maintenance staff is allowed to maintain METAL SHARK® 2 Metal Detectors.

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

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

- Same as mentioned 3.2.4. Requirements for operating staff”.
- Adjusting settings that only password level 3 users are allowed to set up (e.g. System Menu, Advanced settings in the Product Menu, refer to “13. MENU - General Settings”)
- Locating and eliminating malfunctions ("4.1. Error Messages").
- Inspecting the safety devices on a regular basis.
- Putting the metal detector into operation and taking it out of operation.
- Maintaining and repairing the metal detector.
4. Technical Description

4.1. 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 voltage is created in the receiver coil. This process is termed „electromagnetic induction”.

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

The voltage thus induced is measured and then processed and analyzed 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.

4.2. 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 voltage 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.).
4.3. **Technical Data**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>110 - 240 VAC, 50 - 60 Hz</td>
</tr>
<tr>
<td>Nominal power rating</td>
<td>100 VA</td>
</tr>
<tr>
<td>External fuse</td>
<td>min. 10A (slow blow), max. 16A (slow blow)</td>
</tr>
<tr>
<td>External wiring</td>
<td>1,5mm² or AWG 14</td>
</tr>
<tr>
<td>Internal fuse</td>
<td>240V / 1 A (slow blow)</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>20W typ. / 60 W max.</td>
</tr>
<tr>
<td>Overload / overtemp protection</td>
<td>yes</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 - +40°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 - +75°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>20% - 85% (non condensing)</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>2000 m</td>
</tr>
<tr>
<td>Dimensions WxHxD in mm</td>
<td>240x345x115 (Type D) or 296x345x115 (Type W)</td>
</tr>
<tr>
<td>Weight (controller only)</td>
<td>6 kg</td>
</tr>
</tbody>
</table>

The metal detector METAL SHARK® 2 BD consists of at least two parts:

- sensor head,
- controller and
- optionally conveyor belt and reject device.
5. **Transport**

5.1. **Safety & Protection Instructions**

**Danger!**

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.
- If the frame of the metal detector has rollers make sure that you only transport it on flat surface.
- 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 unauthorized 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.
- Parts lying unsecured on top of one another may slip and drop.
- Only transport the metal detector after it is disconnected from the power supply.
- Also read chapter “1. Safety Messages”.
5.2. **Lifting**

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.

Only lift the metal detector at the frame provided.

**Caution!**

Never lift the entire set of equipment at the sensor head or other parts. The heavy weight of the entire set of equipment may cause damage to the sensor head.

= Lift here!

= Do not lift here!
6. **Mechanical Installation**

The following points require special attention during installation:

- Metal-free zone
- Vibration
- Laying of the sensor cable
- Installation of the controller

6.1. **Metal-Free Zone**

A metal-free zone is required in front of and behind the sensor head aperture with a length corresponding to 1.5 times the aperture height.
6.2. **Vibrations**

- Install the metal detector so that it is exposed to as little vibration as possible in operation.
- Light vibrations do not affect the metal detector.
- However, metal alarm can be triggered by a hard shocks.

6.3. **Laying of the Sensor Cable**

The coaxial cables supplied for connecting the control unit to the sensor have a standard length of 3 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.

The sensor cable should be subjected to as little vibrations as possible. Therefore, fixate the cable with cable ties to the installing frame.

**Caution!**

- Do not shorten or lengthen the sensor cable! The sensor cable directly influences the sensor's impedance. Changing the length of the sensor cable would require a new calibration of the sensor head.

**Caution!**

- Do not lay the cables on the floor! Stepping on it damages the cable and thus leads to malfunctions.

![Diagram showing correct cable layout](image)

Make sure that the distance between any other cables, such as the power supply of the controller, and the sensor cable is more than 15 cm (see illustrations above). Laying it parallel to other cables causes interferences and thus leads to false trips.
6.4. **Installation of the Controller**

The controller for wall mounting shall be installed with visual contact to 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.

**Caution!**

Inform your cleaning personnel that the door seal of the switch cabinet should not be hit directly by a hard water jet.

![Diagram of Controller](image_url)

Controller: Type W (# 10250077)
Gap Between Sensor Head and Product

If the product has a strong product effect consider a 40 mm gap (minimum) between sensor head and product for best metal sensitivity.
7. Electrical Installation

**High Voltage!**
Only qualified electricians are allowed to perform work inside of electrical cabinets.

**High Voltage!**
Hazard of electrical shock. Disconnect incoming power before opening the control box lid.

*Use a metric Allen key 4 mm to unscrew the control box lid.*
### 7.1. Terminals of Power Supply Board

<table>
<thead>
<tr>
<th>Terminal #</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>45, 46, 47</td>
<td>Ground</td>
<td>Ground potential for internal power supply</td>
</tr>
<tr>
<td>48, 49, 50</td>
<td>+ 24 V DC OUT</td>
<td>Internal Power supply source 24V/300mA max (total max. 400 mA accumulated at all 24V outputs; inclusive of mainboard outputs)</td>
</tr>
<tr>
<td>Relay K2 51, 52, 53</td>
<td>Error alarm OUT</td>
<td>Closed line, potential free, switching capacity: 230V AC at 5 A max or 30V DC at 5A max</td>
</tr>
<tr>
<td>Relay K1 54, 55, 56</td>
<td>Metal alarm OUT</td>
<td>Closed line, potential free, switching capacity: 230V AC at 5 A max or 30V DC at 5A max</td>
</tr>
<tr>
<td>L1, N, PE</td>
<td>AC Power supply IN</td>
<td>Mains power supply 85 - 250 V AC / 47 - 63 Hz / 100 VA</td>
</tr>
</tbody>
</table>

### 7.2. Relay K1, K2 - Function

<table>
<thead>
<tr>
<th>Terminal #</th>
<th>Function</th>
<th>Relay Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Relay K2</td>
<td><img src="image1" alt="Relay Status Image" /></td>
</tr>
<tr>
<td>52</td>
<td>Error alarm OUT</td>
<td><img src="image2" alt="Relay Status Image" /></td>
</tr>
<tr>
<td>53</td>
<td></td>
<td><img src="image3" alt="Relay Status Image" /></td>
</tr>
<tr>
<td>54</td>
<td>Relay K1</td>
<td><img src="image4" alt="Relay Status Image" /></td>
</tr>
<tr>
<td>55</td>
<td>Metal alarm OUT</td>
<td><img src="image5" alt="Relay Status Image" /></td>
</tr>
<tr>
<td>56</td>
<td></td>
<td><img src="image6" alt="Relay Status Image" /></td>
</tr>
</tbody>
</table>
## 7.3. Terminals on the Mainboard

<table>
<thead>
<tr>
<th>Terminal #</th>
<th>Name</th>
<th>Ratings</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AIN</td>
<td>0-10V DC</td>
<td>Analogue input, application specific</td>
</tr>
<tr>
<td>2, 4, 6, 8</td>
<td>AGND</td>
<td>0V Analogue</td>
<td>Analogue Ground</td>
</tr>
<tr>
<td>3</td>
<td>AIN2</td>
<td>0-10V DC</td>
<td>Analogue input, belt speed</td>
</tr>
<tr>
<td>5, 7</td>
<td>AOUT1, AOUT2</td>
<td>0-10V DC</td>
<td>Analogue output, application specific</td>
</tr>
<tr>
<td>9, 11, 13, 15, 17, 19, 21, 23</td>
<td>IN1 - IN8</td>
<td>24V DC, 10kΩ, 3mA</td>
<td>Logic input, functions refer to chapter &quot;13.2.5. IN/OUT MENU&quot; (Parameters E80 - E115)</td>
</tr>
<tr>
<td>10, 12, 14, 16, 18, 20, 22, 24</td>
<td>+24V</td>
<td>24V DC</td>
<td>+24V DC source for logic inputs (total max. 400 mA accumulated at all 24V outputs; inclusive of power supply board outputs)</td>
</tr>
<tr>
<td>25, 27, 29, 31, 33, 35, 37, 39</td>
<td>OUT1 - OUT8</td>
<td>24V DC</td>
<td>Logic output, functions refer to chapter &quot;13.2.5. IN/OUT MENU&quot; (Parameters E120 - E155) (total max. 400 mA accumulated at all 24V outputs; inclusive of power supply board outputs)</td>
</tr>
<tr>
<td>26, 28, 30, 32, 34, 36, 38, 40</td>
<td>0V</td>
<td>0V DC</td>
<td>Logic ground for logic outputs</td>
</tr>
<tr>
<td>41</td>
<td>TX</td>
<td>-5...+5V digital</td>
<td>RS232 Asynchronous Serial-Data (transmitter) output.</td>
</tr>
<tr>
<td>42, 44</td>
<td>GND</td>
<td>0V DC</td>
<td>Ground for RS232</td>
</tr>
<tr>
<td>43</td>
<td>RX</td>
<td>-5...+5V digital</td>
<td>RS232 Asynchronous Serial-Data (receiver) input.</td>
</tr>
</tbody>
</table>

**Caution!**

The sum of all +24 VDC loads must not exceed 400mA, including all loads connected to mainboard (terminals 9 -40) and power supply board (terminals 48-50).
Caution!

The sum of all +24 VDC loads must not exceed 400mA, including all loads connected to mainboard (terminals 9-60) and power supply board (terminals 48-50).
8. Control Panel and Main Screens

8.1. The Control Panel

This chapter describes the functions of the control panel's keys and LEDs.

1. **ERROR** LED indicates a malfunction (more information: chapter "13.1. Error Messages").
2. **OK** LED indicates that the metal detector is working properly.
3. ✔️ **OK** is displayed when the metal detector is working properly.
   - **STOP** is displayed when the conveyor belt is stopped (only when using a conveyor belt)
   - **MET** is displayed in case of a metal alarm.
   - **ERR** is displayed in case of an error.
4. **Function Keys**: On the Main Screen the keys are preset to **PRODUCT, TEST, TEACH, OPTIMIZE and MENU**. In the menu you can assign shortcuts to the upper four keys by pressing the particular key for two seconds in the desired menu.
5. **METAL** LED indicates a metal alarm.
6. **ESC-Key**: Press **ESC** to leave the current menu item or data entry. Keep it pressed to return to the Main Screen.
7. **Arrow-Key**: Press △ or □ to choose the menu items and to change the Main Screen Mode (More information: chapter "8.2. The Main Screens"). When entering names and numbers you select the previous or next character with △ or □.
8. **Plus/Minus-Key**: Press + or - to change parameters and to switch between functions.
9. **OK-Key**: Press **OK** to confirm a selection or entry.
8.2. The Main Screens

The METAL SHARK® 2 has three graphic screen modes:

- **2D plot** (teach area),
- **bar graphs** (histogram) and
- **scope (oscilloscope)**

Press ▼ on the main screen to change the screen mode.

**Bar graphs** (default)

We recommend to use the Bar Graph Screen for daily operation. It indicates how close the signals were to a metal alarm. Moreover, the histogram shows the signals of products and metal alerts that have occurred in the last hours.

For the different screen elements refer to "8.2.1. The Bar Graph's Screen Elements".

**2D plot**

We recommend the 2D Plot Screen to look for details of a single product sample.

For the different screen elements refer to "8.2.2. The 2D Plot's Screen Elements".

**scope**

We recommend that only technicians use the Scope Screen. It shows in detail the signal of short events. It scales automatically. However, when you press ▲ down, the interval of one grid.

For the different screen elements refer to "8.2.3. The Scope's Screen Elements".
8.2.1. The Bar Graph's Screen Elements

1. **Name** of the currently chosen product.
2. **Number** of the currently chosen product.
3. **Histogram** shows the last 232 signals and what they were about:
   - **green** = Good product in secure range (0 - 80%)
   - **yellow** = still good product, but almost identified as metal (80 - 100%)
   - **red** = metal alarm (>100%)
4. **Bar graph** shows the current signal amplitude as described below:
   - 0 - 80% = product signal
   - 80 - 100% = still good product, but almost identified as metal (80 - 100%)
   - over 100% = metal alarm
5. **Signal strength in %** shows how close the signal comes to a metal alarm.
6. **Signal amplitude** shows the signal strength in millivolts.
7. **Phase** shows the direction of the current signal.
8. **Total** shows the total number products. Only displayed if the conveyor is equipped with a photocell.
9. **Percent of products with metal**.
10. **Metal** shows the total number of metal alarms.

Software Version 1.10a and higher
8.2.2. The 2D Plot’s Screen Elements

1. **Name** of the currently chosen product.
2. **Number** of the currently chosen product.
3. **Red dots** show measured values that left the teach area. Normally, this happens with contaminated products. In case the products are not contaminated you have to optimize.
4. **Product signal dots** show measured value of the product signal.
5. **Teach area** displays the tolerance range in which the signal is identified as product. All signals outside the teach area are identified as metal.
8.2.3. The Scope's Screen Elements

① **Name** of the currently chosen product.
② **Number** of the currently chosen product.
③ **Red dots** show signal amplitude of the X-channel.
④ **Green dots** show signal amplitude of the Y-channel.
⑤ **t**: shows the time interval of one grid square.
⑥ **X**: indicates the grid spacing of the X-channel in millivolt.
⑦ **Y**: indicates the grid spacing of the Y-channel in millivolt.
9. Initial Parameter Setup

After the mechanical and electrical installation you have to set up a few parameters. The steps below help you to put the metal detector into first operation.

Note: Step 3, Step 4 and Step 5 are not required if the metal detector is supplied as ready-system, e.g. with pipeline, reject device or conveyor. CASSEL factory sets these parameters for ready-systems.

Step 1
Switch power supply on

Step 2
Set LANGUAGE.

Note: For more information refer to chapter “13.2. SYSTEM MENU”.

Step 3
Set SPEED mm/s.

Note: For more information refer to chapter “13.2. SYSTEM MENU”.

Step 4
Set IN/OUT MENU.

Note: For more information refer to chapter “13.2.5. IN/OUT MENU”.

Step 5
Set up REJECT MENU.

Note: For more information refer to chapter “13.1.1. REJECT MENU”.

Step 6

Note: For more information refer to chapter “11.3. TEACH - Add New Product”.

Software Version 1.10a and higher
10. **Daily Operation Overview**

This chapter explains what steps you have to take in the daily operation of the metal detector.

**Power on**

Switch on the metal detector’s power supply. After having auto-calibrated itself the METAL SHARK® 2 displays the main screen.

*More information: “8. Control Panel and Main Screens”*

**Select & Edit Products**

Press TEACH to add a new product to the product list. The teach assistant starts. Set up a new product. Press NEXT and feed product samples through the sensor.

*More information: “11.3. TEACH- Add New Product”*

**Teach New Product**

Press TEACH to add a new product to the product list. The teach assistant starts. Set up a new product. Press NEXT and feed product samples through the sensor.

*More information: “11.3. TEACH- Add New Product”*

**Select existing product from product list**

Press PRODUCT to open the product list. Press ▲▼ to navigate through the product list and press SELECT to select the product.

*More information: “11.1. PRODUCT- Select and Edit Existing Products”*

**Optimize Stability & Sensitivity**

Best stability when X below 80% and Y below 80%. Best sensitivity when X over 60% and Y over 60%. Press OPTIMIZE.


**Check Performance & Start Normal Production**

Optionally, press TEST to test the metal detector’s sensitivity. If an automatic test is set up, the test starts automatically. Now start your normal production. Metal alarms are indicated on the screen: !MET.

*More information: “11.2. TEST - Check Metal Detector’s Performance” and “12.2. TEST MENU”*

**Print IFS/HACCP-Report**

Optionally, you might want to print IFS/HACCP Reports or send them to a connected PC. Press ENTER to enter the REPORT MENU and open IFS/HACCP REPORT. Then press OK to print it.

*More information: “12.1. REPORT MENU”*
### 11. Daily Operation

You always need these functions in the daily operation of the metal detector.

#### 11.1. PRODUCT – Select & Edit Existing Products

<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 <strong>OK</strong> to return to the main screen.</td>
<td></td>
</tr>
<tr>
<td>2. Open product list</td>
<td>Press <strong>PRODUCT</strong> to open the product list. Press <strong>▲▼</strong> to navigate through the product list. The following functions are available:</td>
<td><img src="image.png" alt="Screen Screenshot" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>SELECT</strong> or <strong>OK</strong></td>
<td>selects the product marked blue in the screen (in the example you would select CAMEMBERT).</td>
</tr>
<tr>
<td></td>
<td><strong>EDIT</strong></td>
<td>opens the PRODUCT MENU where you can edit the settings of the respective product. (<em>12.4. PRODUCT MENU</em>)</td>
</tr>
<tr>
<td></td>
<td><strong>COPY</strong></td>
<td>copies the currently selected product, in the example PORK 1, to the selected product memory, here CAMEMBERT. Confirm with <strong>OK</strong>.</td>
</tr>
<tr>
<td></td>
<td><strong>DELETE</strong></td>
<td>deletes the selected product memory, in the example CAMEMBERT. Confirm with <strong>OK</strong>.</td>
</tr>
</tbody>
</table>
### 11.2. TEST – Check Metal Detector’s Performance

<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 <strong>ESC</strong> to return to the main screen.</td>
<td>![Screen showing test results]</td>
</tr>
<tr>
<td>2. Start <strong>TEST</strong></td>
<td>Press <strong>TEST</strong> to start the PVS Test (Performance Validation System Test). The screen prompts the required test stick size. The help text indicates whether you are to feed the test stick with or without a product sample. <strong>ESC</strong> aborts the test. <strong>Note</strong>: Refer to chapter “12.2. TEST MENU” to set up the PVS Test (test stick sizes, etc.).</td>
<td>![Screen showing test results]</td>
</tr>
<tr>
<td>3. Feed test sticks through sensor</td>
<td>Feed a test stick of the indicated size through the sensor. <strong>Note</strong>: Do not feed products through the sensor. The display shows: Waiting when it is waiting for the relative test stick. Passed when the correct test stick size has been detected. Skipped when you have set the size of the relative test stick to zero. No Signal when the time set for the parameter PVS WINDOW min is up and the metal detector has not detected a test stick. Big Signal when the signal of the test stick is bigger than the value set for max mV. After 10 seconds it switches back to Waiting and you can try again. Repeat the test for every kind of metal configured in the TEST MENU to secure that the metal detector works properly.</td>
<td>![Screen showing test results]</td>
</tr>
<tr>
<td>4. Test completed</td>
<td>As soon as the METAL SHARK® 2 has detected all test sticks the test is completed and the metal detector switches to normal mode. You can now continue with the normal production process. You can later check the test results in the IFS/HACCP REPORT (‘12.1.1. IFS/HACCP REPORT’)</td>
<td>![Screen showing test results]</td>
</tr>
</tbody>
</table>
### 11.3. TEACH – Add New Product

<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 the main screen.</td>
<td><img src="image1" alt="Screen" /></td>
</tr>
<tr>
<td>2. Start teach assistant</td>
<td>Press TEACH to start the teach assistant. Use ▲▼ to navigate through the menu.</td>
<td><img src="image2" alt="Screen" /></td>
</tr>
<tr>
<td>3. Choose PRODUCT NR.</td>
<td>Go to PRODUCT NR. (D005). Press ▼ to choose the desired product number. Confirm with OK. <strong>Note:</strong> Product 0 is set to neutral and can not be changed.</td>
<td><img src="image3" alt="Screen" /></td>
</tr>
<tr>
<td>4. Choose PRODUCT NAME</td>
<td>Go to PRODUCT NAME (D010). Press OK to edit it. Press ▼ to change the current letter. Press ▲▼ to select the previous/next letter. <strong>Note:</strong> You can only use Latin characters. Confirm the name with OK.</td>
<td><img src="image4" alt="Screen" /></td>
</tr>
</tbody>
</table>

Continued on next page
### Step 5. Select Product characteristics

Go to **PRODUCT IS... (D015)**.

Press **OK**.

Press ** buildup** to choose the characteristic that describes your product:

- **dry**: Products with little residual moisture like powder and solid products
- **wet**: Products with high amount of moisture, but few salt or spice content, e.g. sausages, meat, fruits, vegetables
- **salty**: Products with high salt content and good conductivity, e.g. cheese
- **frozen**: Deep frozen products (-18°C/0°F)
- **melting**: Deep frozen products with lightly melted surface
- **alu foil**: Products packaged in metalized film
- **plastic**: Plastic granulate with graphite
- **vibration**: Vibrations in the construction
- **shock**: Hard knocks and shocks
- **optimize**: All product tolerances are set to x1.0 by default
- **neutral**: No product effect. Run the metal detector without TEACH. Set METAL SENSE mV (D120) only.

Confirm with **OK**.

### Step 6. Select frequency

Go to **FREQ. SELECT (D200)**.

Press **OK**.

Press ** buildup** to select the desired frequency.

**Single-Frequency-Sensor**: This parameter cannot be changed.

**Dual- or Four-Frequency-Sensor and AUTO FREQUENCY (D115) set to yes**: FREQ. SELECT is determined automatically. You cannot change it.

**Dual- or Four-Frequency-Sensor and AUTO FREQUENCY (D115) set to no**: You can choose between the available sensor frequencies (only technicians).

Confirm with **OK**.

---

**Continued on next page**

Software Version 1.10a and higher
### Chapter 11 – Daily Operation

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
</table>
| **7. Select TEACH MODE** | Go to **TEACH MODE (D025)**. Press **OK**. Press **to select** quick or precise:  
  - **quick** 3 to 7 product samples are necessary for the teach process. The product is taught with large tolerance but therefore faster. As a result, the metal detector does not detect with highest metal detection performance. We recommend to optimize the sensitivity afterwards using the **OPTIMIZE-function**.  
  - **precise** 8 to 14 product samples are necessary for the teach process. The result is that the metal detector is almost optimally adjusted to the product and, therefore, achieves very good results. In most cases you do not have to **OPTIMIZE**.  
  
  **Confirm with **OK**.** | ![Screen](image) |
| **8. Check settings and continue** | Check your settings. Press **NEXT** to go to the next teach step. |  |
| **9. Feed products through sensor** | Feed product samples through the sensor. The number of products depends on what you have set up for **TEACH MODE**:  
  - **quick** 3 to 7 product samples  
  - **precise** 8 to 14 product samples | ![Screen](image) |
| **10. Teach successful** | As soon as the METAL SHARK® 2 has collected all necessary data a help text confirms that the teach process has been successful. The product is now added to the product list and the metal detector is adjusted to the product. | ![Screen](image) |
11.4. **OPTIMIZE – Improve Stability & Sensitivity**

Below two ways are described how to optimize the METAL SHARK® 2’s sensitivity and stability. Typically, use **OPTIMIZE** after **TEACH** in case the result of the teach assistant is not satisfactory.

**Note:** For products with **PRODUCT IS... set to neutral** refer to “11.4.3. Optimize with **PRODUCT IS... set to neutral**”.

11.4.1. Optimize with the Histogram

<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 <strong>ESC</strong> to return to the main screen.</td>
<td></td>
</tr>
<tr>
<td>2. Choose graph screen</td>
<td>Press <strong>AV</strong> until the bar graph screen is shown. <strong>Note:</strong> For more information on the 2D plot refer to chapter &quot;8.2.1. The Bar Graph Screen Elements&quot;. The main screen example: Products frequently give out metal alarms (red lines). Many products are only within the tolerance range (yellow lines). Press <strong>OPTIMIZE</strong> if these products are not contaminated.</td>
<td><img src="image1.png" alt="Histogram Screen" /></td>
</tr>
<tr>
<td><strong>Set TOL X</strong> and/or <strong>TOL Y</strong></td>
<td>The yellow help text shows that you should change <strong>TOL X</strong> and <strong>TOL Y</strong>. A value between 60 and 80% is the optimal setting for best sensitivity at highest stability. Press <strong>TOL X</strong> or <strong>TOL Y</strong>. Press <strong>AV</strong> to increase/decrease the value. Confirm with <strong>OK</strong>. In the example we increase <strong>TOL X</strong> and <strong>TOL Y</strong> from 1.2 to 1.3. <strong>Note:</strong> For more information on tolerances refer to “13.1.3. ADVANCED (MENU)”.</td>
<td><img src="image2.png" alt="Histogram Screen" /></td>
</tr>
<tr>
<td>4. Check result and adjust</td>
<td>Due to increasing the tolerance the products are not identified as metal anymore. The histogram of the X-value show, however, that the majority of the signals are still within the tolerance range between 80 and 100%. Consequently, “irregular products” may cause metal alarms. Therefore, increase <strong>TOL X</strong> in this example to 1.4.</td>
<td><img src="image3.png" alt="Histogram Screen" /></td>
</tr>
<tr>
<td>5. Check result and adjust</td>
<td>Due to increasing <strong>TOL X</strong> all signals are in the range below 80%. All histograms are now green. Irregular products do not cause metal alarms. They are within the tolerance range. The metal detector is now set up optimally. Only contaminated products cause metal alarms.</td>
<td><img src="image4.png" alt="Histogram Screen" /></td>
</tr>
</tbody>
</table>
11.4.2. Optimize with the 2D Plot

![Diagram](image)

**Step** | **Operation** | **Screen**
--- | --- | ---
1. Return Main Screen | Press **ESC** to return to the main screen. | ![Screen](image)
2. Choose 2D plot screen and press **OPTIMIZE** | Press **TV** until the 2D plot screen is shown. Note: For more information on the 2D plot refer to chapter “8.2.2. The 2D Plot’s Screen Elements”. In the example an irregular product causes a wrong metal alarm (**MET**). Press **OPTIMIZE** to optimize the teach area (inside of the green line). |
3. Increase tolerance or press **FREZE** | Now you have two options: Either you increase the tolerance (as described in the previous chapter) or you can press **FREZE** which gives you the following options: Records product signals over a longer period of time. This way you see how good the teach area describes the product. For more Information refer to “11.4.2.1. Simple Freeze”. Adds the signals of irregular products to the teach area. For more Information refer to “11.4.2.2. Add to Teach Area”. Deletes the old teach area. The products you feed through the sensor create the new teach area. The settings are the same as the original TEACH. For more Information refer to “11.4.2.3. New Teach Area”. **ZOOM** lets you zoom in and out. *A zooms automatically *1 - *40 zooms 1 to 40-fold | ![Screen](image)

Software Version 1.10a and higher
### 11.4.2.1 Optimize with the 2D Plot - Simple Freeze

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
</table>
| **1. Start Simple Freeze** | Press **OK** to start **Simple Freeze** Mode.  
**Note:** Please read chapter “11.4.2. Optimizing with the Teach Area” first.  
**Simple Freeze** displays all product signals since you have started **Simple Freeze**. It shows how optimally the metal detector is adjusted to your product. | ![Screen](https://via.placeholder.com/150) |
| **2. Increase/decrease tolerance** | In the example the turquoise dots mark the product signals that were recorded. The red circle is the teach area. The white area between the turquoise dots and the teach area is the tolerance range.  
During **Simple Freeze** Mode metal detection is enabled. Product signals that exceed the teach area are marked red and cause metal alarms.  
To increase the metal detection performance and to detect smaller metal contaminants you decrease the tolerance.  
**Note:** If too many irregular products are rejected, as described in 11.4.1, increase the tolerance. | ![Screen](https://via.placeholder.com/150) |
| **3. Decrease tolerance** | Press **TOL. X** or **TOL. Y**.  
Press **OK** to make the area smaller/bigger.  
Confirm with **OK**.  
**Note:** Increase/decrease **TOL. X** and **TOL. Y** in small steps (0.1).  
In the example you see that the teach area wraps itself around the product signals more tightly. The grey lines show the teach area before decreasing the tolerances. | ![Screen](https://via.placeholder.com/150) |
| **4. Confirm** | Decrease the tolerance until the teach area wraps itself perfectly around the product signals.  
**Note:** Keep in mind that the less tolerance range you leave the more often irregular products might cause false metal alarms.  
Press **FREEZE** again to stop the **Simple Freeze** Mode. | ![Screen](https://via.placeholder.com/150) |
### 11.4.2.2 Optimize with the 2D Plot - Add to Teach Area

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
</table>
| 1. Start Add to Teach Area | This mode lets you modify and extend an existing teach area. Press ‹ to start Add to Teach Area Mode.  
**Note**: Please read “11.4.2. Optimizing with the Teach Area” first. | ![Screen](image1) |
| 2. Feed irregular products | Now add the signals of irregular products to the teach area by feeding these irregular products through the sensor.  
In the example you see that the original teach area is extended by the measured signals.  
**Note**: Metal is not detected during this process. Therefore, FREEZE ends automatically after three minutes. | ![Screen](image2) |
| 3. Con firm result | Press FREEZE.  
Press:  
| OK | to save the new teach area / stop FREEZE,  
| | to collect more irregular product signals or  
| ESC | to quit and keep the old teach area.  
In the example you see that products that would be rejected are now within the teach area and thus in the desired range. They are not rejected anymore.  
Repeat this process if other irregular products cause metal alarms. | ![Screen](image3) |
11.4.2.3  Optimize with the 2D Plot - New Teach Area

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
</table>
| 1. Start New Teach Area | Use New Teach Area if consistency, size or other attributes of your product have changed considerably. Press to start New Teach Area Mode.  
**Note:** Please read “11.4.2. Optimizing with the Teach Area” first. |  |
| 2. Feed products | Now the old teach area is deleted and all products that you feed through the sensor are recognised as product signals.  
**Note:** Metal is not detected during this process. This mode therefore ends automatically after three minutes.  
Feed as many products through the sensor as you think are necessary to optimally teach the product. On the screen you see the current teach area. The most outward line will be the teach area.  
Press **FREEZE** and then  
**OK** to save the new teach area,  
**ESC** to add more product signals to the teach area or  
**ESC** to quit and keep the old teach area. | ![Screen](image-url) |
11.4.3. Optimize when PRODUCT IS... set to 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 ESC to return to the main screen.</td>
<td>![Image of the screen with a neutral set mV for metal sensitivity]</td>
</tr>
</tbody>
</table>

2. Press OPTIMIZE

Press  to increase/decrease the value. Confirm with OK.

**Note:** When you choose the 2D plot screen and press FREEZE only the Simple Freeze Mode is available.

Press OPTIMIZE For products with PRODUCT IS... set to neutral you are only able to change the mV value (METAL SENSE mV (D120)) - no matter which screen you have selected beforehand.

**Note:** For products with PRODUCT IS... set to neutral refer to “13.1.3. ADVANCED (MENU)” for more information.

11.5. Enter and Change Passwords

11.5.1. Default Passwords

The following default passwords are preset by CASSEL factory:

- **LEVEL 1 PASSWORD** = CM0001
- **LEVEL 2 PASSWORD** = CM0002
- **LEVEL 3 PASSWORD** = CM0003

**Note:** Refer to chapter “14.2.1. Passwords and Language” in case you want to reset the default passwords.

11.5.2. ENTER PASSWORD

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ENTER PASSWORD Screen</td>
<td>In case you do not have the necessary rights to enter a specific menu (marked X) you are prompted to enter the specific password. Enter the correct password of the required password level (Level 2 in the example) or the password of any higher level (e.g. Level 3 in the example): Change the current character with X. Select the next or the previous character with ▲ ▼. Confirm the password with OK. You are now logged in with the rights of the specific password level.</td>
<td>![Image of the screen with a neutral set mV for metal sensitivity]</td>
</tr>
</tbody>
</table>
### METAL SHARK® 2 Operator’s Manual

#### 11.5.3. Change Existing Passwords

<table>
<thead>
<tr>
<th>Step</th>
<th>Operation</th>
<th>Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Log out .</td>
<td>When you are done with your work prevent other users from changing settings. Go to the main screen. Press <strong>MENU</strong> Enter <strong>PASSWORD (MENU)</strong>. Go to <strong>LOGOUT</strong>. Press <strong>OK</strong></td>
<td>![Password Screen]</td>
</tr>
</tbody>
</table>

### Level 2 Password

1. Return to Main Screen

Press **ESC** to return to the main screen.

2. Enter **PASSWORD (MENU)**.

Press **MENU** Enter **PASSWORD (MENU)**.

3. Change password

Go to the password level you want to change:

- **LEVEL 1 PASSWORD**
- **LEVEL 2 PASSWORD**
- **LEVEL 3 PASSWORD**

**Note:** To change a password you must have the rights of the same or a higher password level. If you do not have the necessary rights you are prompted to enter the correct password.

For more information on the different user levels refer to chapter “12.3. PASSWORD (MENU)”.

Press **OK** to edit the password.

Change the current letter with **↑↓**.

Select the next or the previous letter with **←→**.

**Note:** You can only use Latin characters.

Confirm the new password with **OK**.
# 12. MENU – Daily Operation Setup

Preset and automate the functions for the daily operation of the metal detector.

<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 <strong>ESC</strong> to return to the main screen.</td>
<td></td>
</tr>
<tr>
<td>2. Open Menu</td>
<td>Press <strong>MENU</strong> to open the menu. Navigate through the menu and submenus with <strong>▲▼</strong>. Open the respective menu with <strong>OK</strong>. Press <strong>ESC</strong> at any time to abort your current operation.</td>
<td>![Screen Screenshot]</td>
</tr>
</tbody>
</table>

- **√** Marks menus that you are allowed to enter.
- **×** Marks menus that only users of a higher password level are allowed to enter.

When you press **OK** however, you are prompted to type in the correct password. Refer to chapter "12.3. PASSWORD (MENU)" for more information.

In case you do not have the necessary rights to enter the specific menu you are prompted to enter the specific password (refer to illustration). If you want to change passwords refer to chapter "12.3. PASSWORD (MENU)".

## 12.1. REPORT MENU

Use the REPORT MENU to monitor the production and to automate data logging.

![REPORT MENU Screenshot]
12.1.1. IFS/HACCP REPORT

The IFS/HACCP REPORT (A005) shows detailed information about the production. It consists of three parts that are described below: SUMMARY, METAL, EVENTS.

You can switch between the different types with "+"/

With ✖you can scroll up and down.

Press ESC to return to the main menu.
Press OK to print the IFS/HACCP REPORT.

Note: Set the parameter PRINT to report to set up a printer connected to the RS232 interface. More information “11.1.6. PRINT”.

The SUMMARY shows the following information:

<table>
<thead>
<tr>
<th>From date/time:</th>
<th>Indicates when the last report was printed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>To date/time:</td>
<td>Indicates the current time and date.</td>
</tr>
<tr>
<td>Number of passed PVS tests:</td>
<td>Indicates the number of PVS tests that were completed accordingly.</td>
</tr>
<tr>
<td>Number of failed PVS tests:</td>
<td>Indicates the number of PVS tests that were not completed accordingly.</td>
</tr>
<tr>
<td>Metal Events:</td>
<td>Indicates the number of metal events that have occurred since the last report was printed.</td>
</tr>
<tr>
<td>Product Events:</td>
<td>Indicates the number of products that have gone through the sensor since the last report was printed.</td>
</tr>
<tr>
<td>Percent Metal:</td>
<td>Indicates the ratio (%) of contaminated products to the total number of products.</td>
</tr>
</tbody>
</table>

METAL shows detailed information about the specific metal events. Here is an example of how to read the list:

0034 number of the metal alarm.
2008-05-05 date the alarm occurred.
17:22:24 time the alarm occurred.
P005 product number.
245 mV voltage that was measured.
132.88° phase that was measured.

EVENTS shows all events since the last print out (max last 1024 events).

Here an example of how to read the list:

0001 number of the event.
2008-05-05 date of the event.
17:22:24 time of the event.
[01] code for the respective type of event.

System started Indicates which parameter was changed or what action was taken.
12.1.2. METAL REPORT

METAL REPORT (A010) shows the same information like the IFS/HACCP REPORT - METAL plus two additional information. Press \( \uparrow \) to display these.

With \( \downarrow \) you can scroll up and down.

Press ESC to return to the main menu.

Press OK to print the METAL REPORT.

Note: Set the parameter PRINT to report to set up a printer connected to the RS232 interface. More information "11.1.6. PRINT".

The two additional pieces of information are:

<table>
<thead>
<tr>
<th>Sensor frequency for this product.</th>
<th>600000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>amplification of X and Y for this product.</td>
<td>12%/800%</td>
</tr>
</tbody>
</table>

12.1.3. EVENT REPORT

EVENT REPORT (A015) shows the same information like the IFS/HACCP REPORT - EVENTS. However, the data is not deleted at any time. The last 1024 events are always listed. For more information refer to “12.1.1. IFS/HACCP REPORT”.

With \( \uparrow \) you can scroll up and down.

Press ESC to return to the main menu.

Press OK to print the EVENT REPORT.

Note: Set the parameter PRINT to report to set up a printer connected to the RS232 interface. More information "11.1.6. PRINT".

12.1.4. METAL COUNTER

METAL COUNTER (A020) shows how many products have been contaminated.

Press OK and then \( \uparrow \) and \( \downarrow \) simultaneously to reset the counter to zero.

12.1.5. TOTAL COUNTER

TOTAL COUNTER (A025): In case you have a conveyor belt with a photo cell the number of products is counted and displayed here.

Press OK and then \( \uparrow \) and \( \downarrow \) simultaneously to reset the counter to zero.

Software Version 1.10a and higher
12.1.6. PRINT


Note: Refer to "12.2.5. IN/OUT MENU" and "7.3. Terminals on the Mainboard" to connect a printer to the METAL SHARK® 2.

<table>
<thead>
<tr>
<th>Default: off</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
</tr>
<tr>
<td>report</td>
</tr>
<tr>
<td>You can print various reports by pressing in the report screens.</td>
</tr>
<tr>
<td>one by one</td>
</tr>
<tr>
<td>Each metal alert and event immediately makes the printer print a message.</td>
</tr>
</tbody>
</table>

SharkDiag for SHARK DIAGNOSE® software at Windows PC
SharkNet for SHARKNET® software at Windows PC

12.1.7. INTERFACE

INTERFACE (A035) sets the output for the data. Options are:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232</td>
<td>Sends data via RS232</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Sends data via optional Ethernet or WLAN to PC</td>
</tr>
</tbody>
</table>

Default: RS232

12.1.8. BAUDRATE RS232

BAUDRATE RS232 (A040) sets the speed of the RS232 interface.

Default: 9600

12.1.9. SHARKNET UNIT #

SHARKNET UNIT # (A045) sets the address of the controller when it is part of a SHARKNET®.

Default: 1

12.1.10. MAIN SCREEN

MAIN SCREEN (A050) sets which screen is displayed after you switch on the METAL SHARK® 2. Options are: 2D plot (teach area), bar graphs (histogram), scope (oscilloscope).

Default: bar graphs

12.1.11. HISTOGRAM LIMIT %

HISTOGRAM LIMIT % (A055) sets a threshold. Only signals that exceed this threshold are displayed in the histogram.

Default: 20

12.1.12. INFO SOFTWARE

INFO SOFTWARE (A060) shows the current software version installed on the METAL SHARK® 2.
12.2. TEST MENU

Use the TEST MENU to adjust the settings of the PVS test, explained in "10.2. TEST – Check Metal Detector’s Performance". Below the various parameters are explained:

**AUTO PVS TEST (B005)**
sets up an automatic reminder reminding you to check the performance of the metal detector.

*Default:* no

**PVS FE mm (B010)**
set the test stick size of the respective metal that is to be found.

*Note:* If you do not want to test a certain metal set the relative parameter to zero.

**PVS NonFE mm (B020)**

**PVS SS mm (B030)**

*Default:* depends on application

*Range:* 0 - 99.9 [Millimetres]

**PVS FE max mV (B015)**
set the voltage that is not to be exceeded during the test. If it is exceeded an alarm is given out.

*Note:* If you do not want to test a certain metal set the relative parameter to zero.

**PVS NonFE maxmV (B025)**

**PVS SS max mV (B035)**

*Default:* depends on application

*Range:* 0 - 9999

**PVS FREQ hrs (B040)**
sets every how many hours a test is to occur if AUTO PVS TEST is set to yes.

*Default:* 24

*Range:* 1 - 500

**PVS WINDOW min (B045)**
Time frame for testing after PVS appeared.

*Default:* 30

*Range:* 1 - 180

**PVS ERROR COUNT (B050)**
sets how often you can skip or fail the PVS Test before the error message **PVS Test Elapsed** is displayed.

*Default:* 3

*Range:* 1 - 999

**PVS COUNT METAL (B055)**
If set to no the metal counter does not increase when detecting a test stick.

*Default:* no

**PVS USE PRODUCT (B060)**
If set to no the user is prompted to feed the test stick without a product sample.

*Default:* no
12.3. PASSWORD (MENU)

Use the PASSWORD (MENU) to set the specific passwords and grant operators different rights. This way you ensure that only qualified personnel has access to key functions.

Below the various parameters are explained:

**OPEN LEVELS (C005)**  Sets which password levels are open without having to enter a specific password.

**LEVEL 1 PASSWORD (C010)**  Sets the password for level 1 users, e.g. production line operators. Level 1 users are allowed to SELECT products and TEST the metal detector's functionality.

**LEVEL 2 PASSWORD (C015)**  Sets the password for level 2 users, e.g. production or quality managers. Level 2 users are allowed to TEACH and OPTIMIZE products, print reports and set up TEST.

**LEVEL 3 PASSWORD (C020)**  Sets the password for level 3 users, e.g. company technicians. Level 3 users are allowed to access and alter settings in the PRODUCT MENU and SYSTEM MENU.

**LOGOUT (C025)**  Locks all password levels that are higher than the level set for the parameter OPEN LEVELS. Use this function when you are done with your settings and you want to prevent others from changing any settings.

**Level 1:** e.g. for operators

**Level 2:** e.g. for production manager and quality manager

**Level 3:** e.g. for company technician
12.4. PRODUCT MENU

Use the PRODUCT MENU to preset all products with the same settings or if you want to change settings of an existing product.

Refer to "10.3. TEACH - Teach New Products" for more information on the parameters.

Note: After changing a parameter you are prompted to choose whether you want to change all products or the currently chosen one. Press  and  simultaneously to change all products or  to change the currently chosen one.

Only level 3 users can access the REJECT MENU, TEACH SETUP and ADVANCED. They are explained in detail in the next chapter.
13. **MENU – General Settings**

These settings adapt the METAL SHARK® 2 controller to hardware like pusher, conveyor, sensor head etc.

### 13.1. PRODUCT MENU

### 13.1.1. REJECT MENU

The **REJECT MENU** sets up the timing for reject devices and photo cell triggering.

<table>
<thead>
<tr>
<th>✓OK</th>
<th>MOZZARELLA</th>
<th>5</th>
</tr>
</thead>
</table>

#### DELAY mm (D035)

Delays the metal output signal for a certain distance. Use this to setup the proper reject timing.

The metal detector calculates a time delay based on **DELAY mm** and **SPEED mm/s**.

*Note: During the delay period other metal signals which occur are stored in a shift register and are not lost.*

**Default:** 0 [Millimetres]  
**Range:** 0 - 30,000 [Millimetres]

#### DURATION ms (D040)

is the length of time in milliseconds for which the Metal signal relay remains switched.  
Sets the length of a metal output pulse signal. E.g. use this to setup how long a reject signal remains active.

*Note: Whilst the relay is switched on, other metal signals which occur are stored in a shift register and are not lost.*

**Default:** 500 [Milliseconds]  
**Range:** 150 - 30,000 [Milliseconds]

#### METAL CONTACT (D045)

programs the function of the metal alarm outputs.

<table>
<thead>
<tr>
<th>pulse</th>
<th>Metal alarm as a pulse with the duration <strong>DURATION ms</strong>. Use e.g. when pneumatic nozzles separate the metal</th>
</tr>
</thead>
<tbody>
<tr>
<td>gf1</td>
<td>Drives reject flaps with gravity feed applications. Erreur = flap in reject position</td>
</tr>
<tr>
<td>gf2</td>
<td>Drives reject flaps with gravity feed applications. Erreur = flap in ok position</td>
</tr>
<tr>
<td>mesep</td>
<td>Metal separator model MESEP® SE</td>
</tr>
<tr>
<td>inline</td>
<td>Security drive of inline reject EX-PWC</td>
</tr>
<tr>
<td>hold</td>
<td>Standard value for belt stop with reset push button</td>
</tr>
<tr>
<td>push1</td>
<td>Pusher with photo cell active 0V (synchronized reject signal)</td>
</tr>
<tr>
<td>push2</td>
<td>Pusher with photo cell active 24V (synchronized reject signal)</td>
</tr>
<tr>
<td>push3</td>
<td>Pusher without photo cell synchronization</td>
</tr>
</tbody>
</table>

**Default:** _puls_
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PUSHER TOL</strong>&lt;br&gt;mm (D050)</td>
<td>Tolerance for photo eye trigger. Preset by CASSEL.</td>
</tr>
<tr>
<td>Default</td>
<td>30 [Millimetres]</td>
</tr>
<tr>
<td>Range</td>
<td>0 - 999 [Millimetres]</td>
</tr>
<tr>
<td><strong>METAL-PHOTO</strong>&lt;br&gt;mm (D055)</td>
<td>sets the distance between metal detection and photo cell.</td>
</tr>
<tr>
<td>Default</td>
<td>depends on application</td>
</tr>
<tr>
<td>Range</td>
<td>0 - 200 [Millimetres]</td>
</tr>
<tr>
<td><strong>BELT STOP PUSH (D060)</strong></td>
<td>yes: The conveyor stops when the pusher is activated.</td>
</tr>
<tr>
<td>Default</td>
<td>depends on application</td>
</tr>
</tbody>
</table>
13.1.2. **TEACH SETUP**

In the **TEACH SETUP** you adjust the settings for the teach assistant. For more information refer to chapter **"11.3. TEACH - Add New Product"**.

<table>
<thead>
<tr>
<th>✓OK</th>
<th>MOZZARELLA</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT</td>
<td>TEACH SETUP</td>
<td>Level 3</td>
</tr>
<tr>
<td>FOR AC/DC</td>
<td>TEACH SENSE mV</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>QUICK COUNT</td>
<td>25</td>
</tr>
<tr>
<td>MINI</td>
<td>PRECISE COUNT</td>
<td>3</td>
</tr>
<tr>
<td>TEACH TIME s</td>
<td>TEACH EXTERN</td>
<td>yes</td>
</tr>
<tr>
<td>TEST</td>
<td>TEACH REJECT</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>REMOTE PRODUCT</td>
<td>no</td>
</tr>
<tr>
<td>INFO</td>
<td>SENSE MIN mV</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td>275</td>
</tr>
<tr>
<td></td>
<td>25 mV</td>
<td>142.26</td>
</tr>
</tbody>
</table>

**SENSE MIN mV** *(D065)*

Defines the smallest possible sensitivity that the teach assistant can automatically set. For most cases setup according suggestion of yellow help line.

*Note:* Use product 0 when setting up this parameter

**Range:** 3 - 2,000

**TEACH SENSE mV** *(D070)*

blanks out signals that are smaller than this value. TEACH SENSE mV prevents the metal detector from recognizing e.g. noises as products. It should be at least the value of SENSE MIN mV. Signals that are bigger are identified as products. Set this parameter as the yellow help text indicates.

**Range:** 3 - 2,000

**QUICK COUNT** *(D075)*

defines the maximum number of product samples required for TEACH STEP 2 if TEACH MODE is set to quick.

**Default:** 3

**PRECISE COUNT** *(D080)*

defines the maximum number of product samples required for TEACH STEP 2 if TEACH MODE is set to precise.

**Default:** 7

**TEACH TIME s** *(D085)*

The teach assistant stops after TEACH TIME s is elapsed. You have to feed at least one product sample during that time. In case you do not feed a product the teach assistant stops and sets the highest possible sensitivity.

**VERY IMPORTANT:** TEACH TIME s must be high enough to get at least one product signal. Otherwise the compensation fails!

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

**Default:** depends on application

**Range:** 2 - 300 [Seconds]

**TEACH EXTERN** *(D090)*

**yes:** teach assistant starts when a 24V PLC signal is provided to the appropriate input.

**Default:** no

**TEACH REJECT** *(D095)*

**yes:** activates metal alarm during teach assistant.

**Default:** no

---

**Software Version 1.10a and higher**

---

**Page 81**
**REMOTE PRODUCT (D100)**

**yes:** sets PRODUCT 0 – 20 remotely according input voltage 0-10V at terminal AIN1.

*Note:* Refer to Service Manual for detailed information.

*Note:* Available only for conveyors supplied by CASSEL

**Default:** no

**AUTOMATIC TEACH (D105)**

**yes:** only one product sample is required for the teach process. The conveyor belt goes back and forth feeding the product through the sensor automatically.

*Note:* Make sure that CONV. LENGTH mm is set up correctly.

**Default:** no

**CONV. LENGTH mm (D110)**

sets the length of the conveyor belt for AUTOMATIC TEACH.

**Default:** 1,000 [Millimetres], should be set to actual value

**Range:** 100 - 9,999 [Millimetres]

**AUTO FREQUENCY (D115)**

**yes:** In case of a two or four frequency sensor head the teach assistant chooses automatically the best frequency automatically.

**Default:** no

### 13.1.3. ADVANCED (MENU)

The **ADVANCED (MENU)** is for experts only. Product parameters are automatically set during the teach assistant. This menu allows to modify the product parameters manually.

**OK**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>ADVANCED</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>METAL SENSE mV</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>PRODUCT X TOL.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>PRODUCT Y TOL.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>AMPLIFICATION X</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>AMPLIFICATION Y</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>ATTENUATION</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>PHASE</td>
<td>00.00</td>
<td></td>
</tr>
<tr>
<td>PHASE TRIM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The total is 276 mV, 36 % of the total mV.

**METAL SENSE mV (D120)**

sets the metal sensitivity and thus the threshold for metal detection. If set to 3000 mV metal detection for this product is deactivated and NOT ACTIVE is displayed.

To determine which mV a particular metal object generates, refer to mV value in the lower right corner of the display. 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.

*Note:* Normally, you only have to set METAL SENSE mV for neutral products (PRODUCT IS... = neutral). The teach assistant presets METAL SENSE mV for all other products automatically.

**Default:** set during TEACH

**Range:** 3 - 3,000
adds a tolerance range around the product effect. The tolerance range prevents false alarms from irregular products. Increasing PRODUCT X TOL. increases the teach area at the X-axis.

PRODUCT X TOL. is automatically added as a factor to the result of the teach assistant. It is not altered by the teach assistant. Thus, it allows to preset a larger tolerance range than the teach assistant automatically considers.

**PRODUCT X TOL. (D125)**

**Default:** 1.0  
**Range:** 0.0 - 9.9

adds a tolerance range around the product effect. The tolerance range prevents false alarms from irregular products. Increasing PRODUCT Y TOL. increases the teach area at the Y-axis.

PRODUCT Y TOL. is automatically added as a factor to the result of the teach assistant. It is not altered by the teach assistant. Thus, it allows to preset a larger tolerance range than the teach assistant automatically considers.

**PRODUCT Y TOL. (D130)**

**Default:** 1.0  
**Range:** 0.0 - 9.9

Hardware amplification factor for the product effect (X channel). The larger the product effect is, the smaller the AMPLIFICATION X value has to be. 3% is the smallest hardware amplification.

When using product memories 1 - 120: AMPLIFICATION X is set automatically during teach process according to the following rule:

Very strong product effect amplitude = AMPLIFICATION X 3%

Low product effect amplitude = AMPLIFICATION X 200%

**AMPLIFICATION X (D135)**

**Default:** set during teach process  
**Values:** 3%, 6%, 12%, 25%, 50%, 100% and 200%
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPLIFICATION Y (D140)</td>
<td>Refer to AMPLIFICATION X.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTENUATION (D145)</td>
<td>Attenuates the signal received from the sensor head.</td>
<td>1/1</td>
<td>1/1, 1/3, 1/10</td>
</tr>
<tr>
<td>PHASE (D150)</td>
<td>The setting of the product phase helps to blank out any product effect. It is set automatically during the TEACH process.</td>
<td>0.00°</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> PHASE is only available with product 1 - 120, not with PRODUCT 000.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHASE TRACK (D155)</td>
<td>Adjusts the product's phase during normal operation to compensate slow changes of the product effect phase. The product effect phase may change depending on product temperature and composition.</td>
<td>0.00°</td>
<td>0.00 - 10.00°</td>
</tr>
<tr>
<td></td>
<td>The parameter PHASE TRACK 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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13.2. SYSTEM MENU

The SYSTEM MENU sets general and basic settings.

Note: Most parameters here are factory preset. Only adjust SPEED mm/s and LANGUAGE, unless you need to adapt the metal detector to any special requirements.

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 mm/s 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 mm/s is set automatically.

**SHARK® GF, SHARK® GF compact**: 2000 mm/sec recommended.

**OTHERS**: Set SPEED mm/s at which material is currently passed through the detector.

Range: 100 - 9,999 [Millimetres per Second]

**IMPORTANT NOTE**: A correct calibration of the conveyor belt (with $v_0$ 2 m/min exactness) is absolutely essential. Otherwise lower metal detection sensitivity is the result!

**LANGUAGE (E010)**

sets the language of the display texts.

13.2.1. DATE/TIME MENU

Date and time are used in the various reports of the REPORT MENU. Adjustable parameters are: SET DATE (E015) and SET TIME (E020).
13.2.2. AUTOSPEED MENU

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>AUTOSPEED MENU</th>
<th>✓ Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>AUTOSPEED MENU</td>
<td>✓ Level 3</td>
</tr>
<tr>
<td>YES</td>
<td>0mm/s = x mV</td>
<td>500</td>
</tr>
<tr>
<td>YES</td>
<td>300mm/s = x mV</td>
<td>3000</td>
</tr>
</tbody>
</table>

**Test**
- Total: 276
- Metal: 34 (12%)
- 25 mV

**Caution!**
- Only use the AUTOSPEED MENU if your metal detector is shipped with an original CASSEL belt control unit with frequency inverter, or if you know that a 0-10V speed signal is connected to the AIN2 (input terminal #3).

The speed signal at AIN2 must be calibrated by the parameters 0mm/s = x mV and 300mm/s = x mV. The calibration defines which speed corresponds to how many millivolts (pre-calibrated by Cassel at conveyor models with variable speed control).

**Two values must be calibrated**:
- The voltage in mV at AIN2 (input terminal #3) that corresponds to a belt speed of 0 mm/sec. (=belt stop);
- The voltage in mV at AIN2 (input terminal #3) that corresponds to a belt speed of 300 mm/sec.

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

### AUTOSPEED (E025)
- **Yes** activates the automatic adjustment of the detector to the speed of the belt.
- **Set calibration voltage of frequency inverter for zero belt speed.**
  - **Hint:** The yellow help text shows the current input signal of the frequency inverter. This helps you to find the correct calibration values.
  - **Default:** 0
  - **Range:** 0 - 9,990

### 0mm/s = x mV (E030)
- **Set calibration voltage of frequency inverter for belt speed 300mm/sec (= 18 m/min).**
  - **Hint:** The yellow help text shows the current input signal of the frequency inverter. This helps you to find the correct calibration values.
  - **Default:** 0
  - **Range:** 0 - 9,990

### SPEED mm/s (E005)
- shows the value set for the parameter SPEED mm/s in the SYSTEM MENU.
The CIP MENU (CIP = Clean In Place) is for pipeline models only (METAL SHARK® IN LIQUID).

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 cleans all interior surfaces of the reject device.

- **CIP Reject s (E045)** sets the time for how long the reject device is switched to position “REJECT” (in seconds).
  
  - **Default**: 0
  - **Range**: 0 - 320 [Seconds]

- **CIP Normal s (E050)** sets the time for how long the reject device is switched to position “NORMAL” (in seconds)
  
  - **Default**: 0
  - **Range**: 0 - 999 [Seconds]

- **CIP Timeout min (E055)** sets 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.

  - **Note**: Refer to parameter start cip in chapter “13.2.5. IN/OUT MENU”.
  
  - **Default**: 1
  - **Range**: 0 - 999 [Minutes]
13.2.4. BRC MENU

The BRC MENU allows you to configure the metal detector in order to comply with the British Retail Consortium (BRC) Food Technical Standard.

<table>
<thead>
<tr>
<th>OK</th>
<th>MOZZARELLA</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT</td>
<td>BRC MENU</td>
<td>Level 3</td>
</tr>
<tr>
<td>ITEM/ACCPN</td>
<td>SELECT CONFIRM</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>BIN FULL</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>LOW AIR</td>
<td>no</td>
</tr>
</tbody>
</table>

### REJECT CONFIRM (E060)

**yes** enables reject monitoring (using optional photo eyes). It thus checks whether the contaminated product was indeed rejected.

Status of the metal detector will switch to “ERROR” if reject device fails.

*Note: Refer to parameter reject valid in chapter “13.2.5. IN/OUT MENU”.*

**Default: no**

### BIN FULL (E065)

**yes** enables reject bin monitoring (with optional photo eye). It thus checks whether the rejection bin is full.

*Note: Refer to parameter bin full in chapter “13.2.5. IN/OUT MENU”.*

**Default: no**

### LOW AIR (E070)

**yes** enables air pressure monitoring (with optional pressure sensor).

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

*Note: Refer to parameter low air in chapter “13.2.5. IN/OUT MENU”.*

**Default: no**
13.2.5. **IN/OUT MENU**

Setup of the input and output switching lines of the metal detector. Set up the parameters according to the devices connected to IN1 - IN8 and OUT1 - OUT 8 terminals on the mainboard.

**Note:** For more information refer to “7.3. Terminals on the Mainboard”.

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>INPUT MENU</th>
<th>Level3</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image]</td>
<td>This section is not readable.</td>
<td></td>
</tr>
</tbody>
</table>

![Image](image_url)

Terminals on SHARK mainboard corresponding to **INPUT LINE 1 - INPUT LINE 8**:

<table>
<thead>
<tr>
<th>INPUT LINE 1 = Terminal 9</th>
<th>INPUT LINE 5 = Terminal 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT LINE 2 = Terminal 11</td>
<td>INPUT LINE 6 = Terminal 19</td>
</tr>
<tr>
<td>INPUT LINE 3 = Terminal 13</td>
<td>INPUT LINE 7 = Terminal 21</td>
</tr>
<tr>
<td>INPUT LINE 4 = Terminal 15</td>
<td>INPUT LINE 8 = Terminal 23</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 <strong>TEACH</strong></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>Photo eye, triggers pusher to product centre</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>HIGH: Keyboard is locked, no data entry possible. Typical application: Key switch.</td>
</tr>
<tr>
<td>low air</td>
<td>Monitors compressed air. LOW for more than 30sec.: Triggers Error 7: <strong>Low Air</strong> (refer to “14.1. Error Messages”).</td>
</tr>
<tr>
<td>start cip</td>
<td>HIGH: Activates CIP mode (refer to “13.2.3. CIP MENU”)</td>
</tr>
<tr>
<td>bin full</td>
<td>Monitors reject bin. HIGH for more than 30sec.: Triggers Error 6: <strong>Bin Full</strong> (refer to “14.1. Error Messages”).</td>
</tr>
<tr>
<td>met count reset</td>
<td>HIGH: Resets <strong>METAL COUNTER (A020)</strong></td>
</tr>
<tr>
<td>false trip</td>
<td>HIGH: Sends a false alarm message to the SHARKNET® software</td>
</tr>
<tr>
<td>product 120</td>
<td>HIGH: <strong>PRODUCT NR. (D005)</strong> is set to 120. LOW: <strong>PRODUCT NR. (D005)</strong> is set to original number.</td>
</tr>
<tr>
<td>input off</td>
<td>Input is not active.</td>
</tr>
</tbody>
</table>

**Software Version 1.10a and higher**
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 1</td>
<td>Metal if metal detected, refer to &quot;13.1.5. REJECT MENU&quot; for details</td>
</tr>
<tr>
<td>Terminal 2</td>
<td>Metal inverse if metal detected</td>
</tr>
<tr>
<td>Terminal 3</td>
<td>Error if metal alarm or unit not in normal operation, LOW during normal operation</td>
</tr>
<tr>
<td>Terminal 4</td>
<td>Error inverse if metal alarm or unit not in normal operation, HIGH during normal operation</td>
</tr>
<tr>
<td>Terminal 5</td>
<td>Metal zero del if metal detected, no DELAY mm (refer to &quot;13.1.1. REJECT MENU&quot;)</td>
</tr>
<tr>
<td>Terminal 6</td>
<td>PV test if last sensitivity test more than PV FREQ HOURS ago (refer to &quot;11.2. TEST - Check Metal Detector's Performance&quot;)</td>
</tr>
<tr>
<td>Terminal 7</td>
<td>Dual freq for dual frequency detectors only</td>
</tr>
<tr>
<td>Terminal 8</td>
<td>Teach confirm if Teach ended successfully (&quot;Teach Successful&quot; displayed)</td>
</tr>
<tr>
<td>Terminal 9</td>
<td>CIP out if detector is in CIP mode (refer to &quot;13.2.3. CIP MENU&quot; for details)</td>
</tr>
<tr>
<td>Terminal 10</td>
<td>Start conveyor if conveyor on/off received a start signal</td>
</tr>
<tr>
<td>Terminal 11</td>
<td>Pusher if metal and pusher switch to active at the same time: However, pusher switches back to inactive after 1/3 of the time of DURATION ms (but at least 40 ms). This way a pneumatic pusher is able to return to normal position during DURATION ms</td>
</tr>
<tr>
<td>Terminal 12</td>
<td>Conv. forward internal function, not for common use</td>
</tr>
<tr>
<td>Terminal 13</td>
<td>Conv. reverse internal function, not for common use</td>
</tr>
<tr>
<td>Terminal 14</td>
<td>Output off output not active. Output remains LOW</td>
</tr>
</tbody>
</table>
### 13.2.6. FILTER MENU

The **FILTER MENU** sets filters to improve the detection reliability and suppress noise.

| VIBRATION mV (E160) | To set VIBRATION mV:
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Set PRODUCT 000, AMP X% 100, AMP Y% 100</td>
</tr>
<tr>
<td></td>
<td>2. Run the production line or the conveyor, but without products and without metal.</td>
</tr>
<tr>
<td></td>
<td>3. Read out the peak mV level.</td>
</tr>
<tr>
<td></td>
<td>4. Set VIBRATION mV to the maximum peak mV level plus 30%.</td>
</tr>
<tr>
<td><strong>Default</strong>: 10</td>
<td><strong>Range</strong>: 3 - 2,000</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong>: Only change this filter when advised by CASSEL.</td>
</tr>
</tbody>
</table>

**VIBRATION FILTER (E165)**
- blanks out mechanical vibrations of the sensor head.
- yes activates vibration filter.
- The value of VIBRATION mV (above) controls the filter strength:
- VIBRATION mV increased: Better suppression of vibration noise, lower detection sensitivity.
- VIBRATION mV decreased: Less suppression of vibration noise, better detection sensitivity.
- **Default**: no

**BP FILTER (E170)**
- no filter = filter is deactivated. Do not use unless clearly instructed by CASSEL
- FFT = special Filter mode. Do not use unless clearly instructed by CASSEL
- CCF = default
- **Default**: CCF

**LP FILTER (E175)**
- yes = Lowpass filter activated.
- **Default**: yes

**GF MODE (E180)**
- yes enables fast metal detection. Gives a wide speed range. (for GF or fast applications)
- no = normal applications
- **Default**: no (conveyor applications with defined belt speed)
- yes (applications with undefined speed)
- yes (all gravity feed applications)
13.3. FACTORY MENU

The FACTORY MENU adopts the electronic cards to the sensor head.

Note: Never touch these parameters. All parameters here are factory preset. Therefore, Password Level 4 is required to change settings in the menu. Level 3 users can enter the menu and read the parameters.
## 14. Troubleshooting

### 14.1. Error Messages

In case of an error:
- the Error-LED lights up,
- the screen indicates \texttt{IERR},
- an error message is displayed.

\textit{Note: Please write down the number of the error and talk to the company technician or call a service technician of CASSEL.}

<table>
<thead>
<tr>
<th>Error #</th>
<th>Error Text</th>
<th>Cause</th>
<th>Remedy</th>
<th>Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error 1:</td>
<td>Comp. Pre</td>
<td>Sensor out of the alignment.</td>
<td>Remove big metal object in the detector</td>
<td>Turn on/of f metal detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mainboard damaged.</td>
<td>Contact technician</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Big metal object in the detector.</td>
<td>Contact technician</td>
<td></td>
</tr>
<tr>
<td>Error 2:</td>
<td>Comp. Fine</td>
<td>Mainboard damaged.</td>
<td>Contact technician</td>
<td>Turn on/of f metal detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error 3:</td>
<td>Signal Clp</td>
<td>Signal permanently too high for one minute.</td>
<td>Use other products</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact technician</td>
<td>Restart teach proc-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ess</td>
</tr>
<tr>
<td>Error 4:</td>
<td>Reject</td>
<td>Reject device has been triggered but the reject sensor did not detect the rejection.</td>
<td>Confirm with \textbf{OK} and repeat test</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact technician</td>
<td></td>
</tr>
<tr>
<td>Error 5:</td>
<td>PVS Test Elapsed</td>
<td>Performance validation test not done within preset period of time.</td>
<td>Confirm with \textbf{OK} and repeat test</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Error reappears, if period of time has expired and the PV test was unsuccessful</td>
</tr>
<tr>
<td>Error 6:</td>
<td>Bin Full</td>
<td>The bin is full or a product blocks the sensor.</td>
<td>Empty bin</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact technician</td>
<td>Error message reappears after 30 seconds, if bin still full</td>
</tr>
<tr>
<td>Error 7:</td>
<td>Low Air</td>
<td>Air pressure monitor signals low pressure.</td>
<td>Check air pressure supply</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact technician</td>
<td>Error message reappears after 30 seconds, if not enough air pressure</td>
</tr>
<tr>
<td>Error 9:</td>
<td>Keyboard</td>
<td>Key is jammed or keyboard connector is loose.</td>
<td>Contact technician</td>
<td>Confirm with \textbf{OK}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Error message appears until keyboard is replaced</td>
</tr>
</tbody>
</table>

Software Version 1.10a and higher

CASSEL
## 14.2. Reset to Default Values

### 14.2.1. Passwords and Language

Press **OK** and **ESC** for 1.5 seconds during start up (SHARK logo is displayed) to reset all passwords to the default values (CM0001 - CM0003). Also **LANGUAGE** is set to **English**.

### 14.2.2. Factory Settings

Press **OK** and **ESC** for 1.5 seconds during start up (SHARK logo is displayed) to reset all parameters to the default settings preset by the factory.
14.3. Problem Solving

14.3.1. Problem: Still Considerable Metal Alarms After TEACH

Solution:
1. **TEACH** again. If metal alarms occur again:
2. Switch main screen to **2D plot** (refer to "8.2. The Main Screens")
3. **OPTIMIZE** (refer to "11.4. OPTIMIZE - Improve Stability & Sensitivity")
4. **FREEZE** (refer to "11.4.2. Optimizing with the 2D Plot")
5. **Add to Teach Area (+)** (refer to "11.4.2.2. Add to Teach Area")

14.3.2. Problem: Still Few Metal Alarms After TEACH

Solution:
1. **TEACH** again. If metal alarms occur again:
2. Switch main screen to **bar graphs** (refer to "8.2. The Main Screens")
3. **OPTIMIZE** (refer to "11.4. OPTIMIZE - Improve Stability & Sensitivity")
4. Adjust **TOL_X** and **TOL_Y** until signal of normal products = below 80% (refer to "11.4.1. Optimizing with the Histogram")

14.3.3. Problem: TEACH ends After Short Period of Time

Problem: TEACH ends after short period of time although no products have been fed through sensor

Solution: Increase **TEACH SENSE mV (D070)** (refer to "13.1.2. TEACH SETUP")

14.3.4. Problem: Poor Metal Sensitivity After TEACH

Solution:
1. Is **SPEED mm/s (E005)** set up correctly? (refer to "13.2. SYSTEM MENU")
2. **TEACH** again. If problem still occurs:
3. Switch main screen to **bar graphs** (refer to "8.2. The Main Screens")
4. **OPTIMIZE** (refer to "11.4. OPTIMIZE - Improve Stability & Sensitivity")
5. Does the display show below 60% when the product is fed through the sensor? (refer to "8.2. The Main Screens")
6. Adjust **TOL_X** and **TOL_Y** until signal of normal products = between 60 and 80% (refer to "11.4.1. Optimizing with the Histogram")
15. **Maintenance and Regular Inspections**

15.1. **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.

15.2. **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 standardized 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 recognized, 24 August 2007, 08.30, signed, Smith.

15.3. **Notes**

Normally, CASSEL commissions to adjust the metal detector to find the smallest metal pieces possible. Therefore please consider the following notes:

- **Keep the conveyor belt clean:** Finger marks and shoe prints, visible or not, may contain metal particles.
- **Do not weld or grind near the detector or the conveyor** without having covered the conveyor belt with e.g. cardboard. Sparks may burn into the surface of the conveyor and thus permanently contaminate the belt.
- **Do not change the conveyor belt construction** without having asked the manufacturer of detector and belt.
16. Annex

16.1. Declarations

16.1.1. CE - Declaration of Conformity

The producer
CASSEL
9 18812  96 Ave
Surrey, British Columbia
Canada V4N 3R1

certifies herewith that the machines metal detector type METAL SHARK® 2

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

- EG-Machinery Directive 2006/42/EC
- EC-Directive electromagnetic compatibility 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC

The equipment complies with:

Safety:

<table>
<thead>
<tr>
<th>EN ISO 12100-1</th>
<th>Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN ISO 12100-2</td>
<td>Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles</td>
</tr>
<tr>
<td>EN 60204-1</td>
<td>Safety of machinery - Electrical equipment of machines - Part 1: General requirements</td>
</tr>
<tr>
<td>EN 61010-1</td>
<td>Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements</td>
</tr>
<tr>
<td>EN 60529</td>
<td>Degrees of protection provided by enclosures (IP code)</td>
</tr>
</tbody>
</table>

Electromagnetic Compatibility (EMC) according to 61000-6-2/4:

<table>
<thead>
<tr>
<th>EN 61000-3-3</th>
<th>Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current &lt;=16 A per phase and not subjected to conditional connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 61000-4</td>
<td>Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques</td>
</tr>
<tr>
<td>EN 61000-6-2</td>
<td>Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments</td>
</tr>
<tr>
<td>EN 61000-6-4</td>
<td>Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments</td>
</tr>
<tr>
<td>EN 55011</td>
<td>Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement</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.

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

G. Balmer, Managing Director
Surrey, 02. June 2009
16.1.2. Declaration of Manufacturer

The producer: CASSEL
9 - 18812 96 Ave
Surrey British Columbia
Canada V4N 3R1

certifies herewith that the machines metal detector type METAL SHARK® 2
are 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

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.

The equipment complies with:

**Safety:**

| EN ISO 12100-1 | Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology |
| EN ISO 12100-2 | Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles |
| EN 60204-1 | Safety of machinery - Electrical equipment of machines - Part 1: General requirements |
| EN 61010-1 | Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements |
| EN 60529 | Degrees of protection provided by enclosures (IP code) |

**Electromagnetic Compatibility (EMC) according to 61000-6-2/4:**

| EN 61000-3-3 | Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subjected to conditional connection |
| EN 61000-4 | Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques |
| EN 61000-6-2 | Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments |
| EN 61000-6-4 | Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments |
| EN 55011 | Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement |

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

**Constructional changes which have effects on the technical information in this manual and on the intended utilization, and therefore convert the machine considerably, make this declaration of manufacturer invalid:**

G Balmer, Managing Director
Surrey 02. June 2009

---

Software Version 1.10a and higher
Parameter List METAL SHARK® 2 / Software Version 1.10a

Project:   Date:   Model:   Unit #: 

✓ 1-3 = Required Password Level to enter this menu

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Description</th>
<th>Read/ Write</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REPORT MENU (✓ 1 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A005</td>
<td>IFS/HACCP REPORT</td>
<td>Quality inspection report, printed to screen or printer</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A010</td>
<td>METAL REPORT</td>
<td>Shows report about last metal alerts</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A015</td>
<td>EVENT REPORT</td>
<td>Shows information about last events</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A020</td>
<td>METAL COUNTER</td>
<td>Increased by each metal detection</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A025</td>
<td>TOTAL COUNTER</td>
<td>Increased when product passes sensor</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>A030</td>
<td>PRINT</td>
<td>Print mode</td>
<td>R/W</td>
<td>1 offreport</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 one by one</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 SharkDiag</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 SharkNet</td>
</tr>
<tr>
<td>A035</td>
<td>INTERFACE</td>
<td>Interface protocol</td>
<td>R/W</td>
<td>1 RS232</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Ethernet</td>
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<tr>
<td>A040</td>
<td>BAUDRATE RS232</td>
<td>Speed of the interface</td>
<td>R/W</td>
<td>1 9600</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 14400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 57600</td>
</tr>
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<td></td>
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<td></td>
<td>4 115200</td>
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<td></td>
<td>5 230400</td>
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<tr>
<td>A045</td>
<td>SHARKNET UNIT #</td>
<td>Number of the controller when in SHARKNET</td>
<td>R/W</td>
<td>1 2D plot</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 bar graphs</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>3 scope</td>
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<tr>
<td>A050</td>
<td>MAIN SCREEN</td>
<td>Defines the main screen that is shown when metal detector is started</td>
<td>R/W</td>
<td></td>
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<tr>
<td>A055</td>
<td>HISTOGRAM LIMIT %</td>
<td>Only signals exceeding this threshold appear in histogram</td>
<td>R/W</td>
<td></td>
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<tr>
<td>A060</td>
<td>INFO SOFTWARE</td>
<td>Shows software version</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Name</td>
<td>Description</td>
<td>Read/Write</td>
<td>Setting</td>
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<td>-----------------------</td>
<td>---------------------------------------------------------</td>
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<tr>
<td></td>
<td><strong>TEST MENU (✓ 2 )</strong></td>
<td></td>
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<td></td>
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<tr>
<td>B005</td>
<td>AUTO PVS TEST</td>
<td>Performance Validation System Test</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td>B010</td>
<td>PVS FE mm</td>
<td>Size of FE-test stick to be used</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B015</td>
<td>PVS FE max mV</td>
<td>Max signal, that is accepted as FE-test stick</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B020</td>
<td>PVS NonFE mm</td>
<td>Size of N- FE-test stick to be used</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B025</td>
<td>PVS NonFE max mV</td>
<td>Max signal, that is accepted as N- FE-test stick</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B030</td>
<td>PVS SS mm</td>
<td>Size of SS-test stick to be used</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B035</td>
<td>PVS SS max mV</td>
<td>Max signal, that is accepted as SS-test stick</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B040</td>
<td>PVS FREQ hrs</td>
<td>Time between two PVS tests</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B045</td>
<td>PVS WINDOW min</td>
<td>Max duration of PVS test</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B050</td>
<td>PVS ERROR COUNT</td>
<td>Max number of trials</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>B055</td>
<td>PVS COUNT METAL</td>
<td>Test stick increases metal counter</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td>B060</td>
<td>PVS USE PRODUCT</td>
<td>PVS Test with product</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td></td>
<td><strong>PASSWORD (MENU) (✓ 2 )</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C005</td>
<td>OPEN LEVELS</td>
<td>No password protection up to this level</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>C010</td>
<td>LEVEL 1 PASSWORD</td>
<td>Password for Level 1 user</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>C015</td>
<td>LEVEL 2 PASSWORD</td>
<td>Password for Level 2 user</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>C020</td>
<td>LEVEL 3 PASSWORD</td>
<td>Password for Level 3 user</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>C025</td>
<td>LOGOUT</td>
<td>Logs out current user</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>PRODUCT MENU (✓ 2 )</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D005</td>
<td>PRODUCT NR</td>
<td>Product number</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>D010</td>
<td>PRODUCT NAME</td>
<td>Product name</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D015 PRODUCT IS...</td>
<td>Product characteristic (sets product adjusted settings)</td>
<td>RW</td>
<td>1 dry 2 wet 3 salty 4 frozen 5 melting 6 alu foil 7 plastic 8 vibration 9 shock 10 neutral</td>
</tr>
<tr>
<td></td>
<td>D020 FREQ. SELECT</td>
<td>Selects frequency for product</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D025 TEACH MODE</td>
<td>Sets whether to teach quick or precise</td>
<td>RW</td>
<td>1 quick 2 precise</td>
</tr>
<tr>
<td>Code</td>
<td>Name</td>
<td>Description</td>
<td>Read/Write</td>
<td>Setting</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>D035</td>
<td>DELAY mm</td>
<td>Reject delay in millimeter, calculated depending on SPEED</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D040</td>
<td>DURATION ms</td>
<td>Reject duration in milliseconds</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D045</td>
<td>METAL CONTACT</td>
<td>Programs the function of the metal alarm outputs</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D050</td>
<td>PUSHER TOL mm</td>
<td>Trigger tolerance for photo sensor</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D055</td>
<td>METAL-PHOTO mm</td>
<td>Distance metal detection – pusher’s photo sensor</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D060</td>
<td>BELT STOP PUSH</td>
<td>Conveyor stops during rejection</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D065</td>
<td>SENSE MIN mV</td>
<td>Signals below this value are ignored (relate. to AMPLIFICATION X, Y = 100%)</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D070</td>
<td>TEACH SENSE mV</td>
<td>Sensitivity during teach (relating to AMPLIFICATION X, Y = 100%)</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D075</td>
<td>QUICK COUNT</td>
<td>Min number of products when teaching quick</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D080</td>
<td>PRECISE COUNT</td>
<td>Min number of products when teaching precise</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D085</td>
<td>TEACH TIME s</td>
<td>Duration of teach STEP1 and STEP2</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D090</td>
<td>TEACH EXTERN</td>
<td>Enables external product teach</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D095</td>
<td>TEACH REJECT</td>
<td>Enables rejection during teach</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D100</td>
<td>REMOTE PRODUCT</td>
<td>Activates remote product selection</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D105</td>
<td>AUTOMATIC TEACH</td>
<td>One product used for teach process (only possible with forwards/backwards</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D11</td>
<td>CONV. LENGTH mm</td>
<td>Conveyor length, for AUTOMATIC TEACH</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D11</td>
<td>AUTO FREQUENCY</td>
<td>Auto. frequency selection during teach</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D120</td>
<td>METAL SENSE mV</td>
<td>Metal detection above this threshold</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D125</td>
<td>PRODUCT X TOL</td>
<td>Product compensation X (additionally to TOL X)</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D130</td>
<td>PRODUCT Y TOL</td>
<td>Product compensation Y (additionally to TOL Y)</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D135</td>
<td>AMPLIFICATION X</td>
<td>Amplification X-channel (product signals )</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D140</td>
<td>AMPLIFICATION Y</td>
<td>Amplification Y-channel (metal signals )</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D145</td>
<td>ATTENUATION</td>
<td>Reduces sensor signal, e.g. at strong product effect</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D150</td>
<td>PHASE</td>
<td>Phase for product compensation</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>D155</td>
<td>PHASE TRACK</td>
<td>Tracking steps when product phase drifts</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Name</td>
<td>Description</td>
<td>Read/Write</td>
<td>Setting</td>
</tr>
<tr>
<td>------</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>E005</td>
<td>SPEED mm/s</td>
<td>Speed of product through sensor. IMPORTANT – Must match with real speed.</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>E010</td>
<td>LANGUAGE</td>
<td>Sets language</td>
<td>RW</td>
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### SYSTEM MENU ▶ DATE/TIME MENU (✓ 3 )

<table>
<thead>
<tr>
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<th>Name</th>
<th>Description</th>
<th>Read/Write</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>E015</td>
<td>SET DATE</td>
<td>Date used in all reports</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>E020</td>
<td>SET TIME</td>
<td>Time used in all reports</td>
<td>RW</td>
<td></td>
</tr>
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### SYSTEM MENU ▶ AUTOSPEED MENU (✓ 3 )

<table>
<thead>
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<th>Name</th>
<th>Description</th>
<th>Read/Write</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>E025</td>
<td>AUTOSPEED</td>
<td>Activates autospeed (only belts with frequency inverter)</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td>E035</td>
<td>0mm/s = x mV</td>
<td>Calibrates belt speed (IN 4) at 0 mm/sec</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>E040</td>
<td>300mm/s = x mV</td>
<td>Calibrates belt speed (IN 4) at 300 mm/sec</td>
<td>RW</td>
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</table>

### SYSTEM MENU ▶ CIP MENU (✓ 3 )

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Description</th>
<th>Read/Write</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>E045</td>
<td>CIP Reject s</td>
<td>Clean in place: reject open timing (seconds)</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>E050</td>
<td>CIP Normal s</td>
<td>Clean in place: timing for normal position</td>
<td>RW</td>
<td></td>
</tr>
<tr>
<td>E055</td>
<td>CIP Timeout min</td>
<td>Clean in place: reject normal timing (seconds)</td>
<td>RW</td>
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### SYSTEM MENU ▶ BRC MENU (✓ 3 )

<table>
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<th>Read/Write</th>
<th>Setting</th>
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<tbody>
<tr>
<td>E060</td>
<td>REJECT CONFIRM</td>
<td>Checks if product was rejected (photo sensor needed)</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td>E065</td>
<td>BIN FULL</td>
<td>Checks if bin is full (photo sensor required)</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
<tr>
<td>E070</td>
<td>LOW AIR</td>
<td>Checks if enough air pressure (air jet required)</td>
<td>RW</td>
<td>1 yes 2 no</td>
</tr>
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### SYSTEM MENU ➤ IN/OUT MENU (✓ 3)

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
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<tbody>
<tr>
<td>E080</td>
<td>INPUT LINE 1</td>
<td></td>
</tr>
<tr>
<td>E085</td>
<td>INPUT LINE 2</td>
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</tr>
<tr>
<td>E090</td>
<td>INPUT LINE 3</td>
<td></td>
</tr>
<tr>
<td>E095</td>
<td>INPUT LINE 4</td>
<td></td>
</tr>
<tr>
<td>E100</td>
<td>INPUT LINE 5</td>
<td></td>
</tr>
<tr>
<td>E105</td>
<td>INPUT LINE 6</td>
<td></td>
</tr>
<tr>
<td>E11</td>
<td>INPUT LINE 7</td>
<td></td>
</tr>
<tr>
<td>E11</td>
<td>INPUT LINE 8</td>
<td></td>
</tr>
<tr>
<td>E120</td>
<td>OUTPUT LINE 1</td>
<td></td>
</tr>
<tr>
<td>E125</td>
<td>OUTPUT LINE 2</td>
<td></td>
</tr>
<tr>
<td>E130</td>
<td>OUTPUT LINE 3</td>
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<tr>
<td>E135</td>
<td>OUTPUT LINE 4</td>
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<tr>
<td>E140</td>
<td>OUTPUT LINE 5</td>
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<tr>
<td>E145</td>
<td>OUTPUT LINE 6</td>
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<tr>
<td>E150</td>
<td>OUTPUT LINE 7</td>
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<tr>
<td>E155</td>
<td>OUTPUT LINE 8</td>
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### SYSTEM MENU ➤ FILTER MENU (✓ 3)

<table>
<thead>
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<th>Name</th>
<th>Description</th>
<th>Read/Write</th>
<th>Setting</th>
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</thead>
<tbody>
<tr>
<td>E160</td>
<td>VIBRATION mV</td>
<td>makes VIBRATION FILTER stronger (increase mV) or weaker (decrease mV)</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td>E165</td>
<td>VIBRATION FILTER</td>
<td>Avoids false trips if sensor is subjected to vibrations</td>
<td>R/W</td>
<td>1 yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 no</td>
</tr>
<tr>
<td>E170</td>
<td>BP FILTER</td>
<td>Shall always be CCF, unless specified</td>
<td>R/W</td>
<td>1 no filter</td>
</tr>
<tr>
<td></td>
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<td>other by Cassel CASSEL</td>
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<td>2 FFT 3 CCF</td>
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<tr>
<td>E175</td>
<td>LP FILTER</td>
<td>Avoids false trips from VFDs and similar noise sources</td>
<td>R/W</td>
<td>1 yes</td>
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<tr>
<td></td>
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<td>2 no</td>
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<tr>
<td>E180</td>
<td>GF MODE</td>
<td>Enables superfast metal detection for gravity feed</td>
<td>R/W</td>
<td>1 yes</td>
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<tr>
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<td></td>
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<td>2 no</td>
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### FACTORY MENU (✓ 3 )

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Description</th>
<th>Read/Write</th>
<th>Setting</th>
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<tbody>
<tr>
<td>F005</td>
<td>SENSOR FIELD</td>
<td>Sensor size (NEVER CHANGE!)</td>
<td>R/W</td>
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<tr>
<td>F010</td>
<td>BALANCE FACTOR</td>
<td>Sensor balance regulation factor (NEVER CHANGE!)</td>
<td>R/W</td>
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<td>F015</td>
<td>FREQUENCY 1[Hz]</td>
<td>Sensor resonance frequency (NEVER CHANGE!)</td>
<td>R/W</td>
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<td>F020</td>
<td>PHASE 1 CALIB.</td>
<td>Sensor calibration zero phase (NEVER CHANGE!)</td>
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<td>F025</td>
<td>FREQUENCY 2[Hz]</td>
<td>Sensor resonance frequency (NEVER CHANGE!)</td>
<td>R/W</td>
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<td>F035</td>
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<td>Sensor calibration zero phase (NEVER CHANGE!)</td>
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<td>F050</td>
<td>FREQUENCY 4[Hz]</td>
<td>Sensor resonance frequency (NEVER CHANGE!)</td>
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<td>F055</td>
<td>PHASE 4 CALIB.</td>
<td>Sensor calibration zero phase (NEVER CHANGE!)</td>
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<td>F060</td>
<td>FF BOARD REV.</td>
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<td>R/W</td>
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ASBUILT- Electrical Drawings and Firmware Parameters
About CASSEL

As a manufacturer CASSEL is committed to highest quality standards. For more than ten years our goal has been to ensure the quality of your products. We have earned our reputation by protecting yours.

We supply customers in different industries worldwide such as Foods, Plastics, Pharmaceuticals, Textile, Timber and Mining.

Our state of the art manufacturing facilities and service centers are located near Hanover in the heart of Germany, Thailand, and Vancouver Canada.

Each year we manufacture and deliver over 1000 metal detection systems.

Approximately 80% of the production is heading for export markets. We have a worldwide network of partners and representations. This way we ensure that you get the very best service and support no matter where you use one of our metal detectors.

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About this manual

Original Manual / Documentation for Metal Detector METAL SHARK® 2
Updated: 02. June 2009