

METAL DETECTOR

METAL SHARK[®] BD

Original Manual / Documentation (English)

Software Version 3.94o (English) and higher



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1. General Information

1.1. How to use this Manual / Documentation

Validity: Metal detector type METAL SHARK® BD

Manufacturer: Cassel Messtechnik GmbH

In der Dehne 10

37127 Dransfeld

Germany

Print date of this manual: December 08

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

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

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

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

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

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

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

Note:

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

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2. Declarations

2.1. CE - Declaration of Conformity



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

The manufacturer: **Cassel Messtechnik GmbH
In der Dehne 10
37127 Dransfeld / Germany**

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

fulfils the safety and health requirements of the EC directives:

EC-Machinery Directive 2006/42/EC

EC-Directive electromagnetic compatibility 2006/95/EC

Electromagnetic Compatibility 2004/108/EC

EC-Directive „explosion protection“ 94/9/EC (ATEX)

Relevant harmonised European standards:

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

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

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

Equipment marking:

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

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



Dransfeld, 08 December 2008
Cord Cassel, Managing Director

2.2. Manufacturer's Declaration

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

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

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

EC-Machinery Directive 2006/42/EC

EC-Directive electromagnetic compatibility 2006/95/EC

Electromagnetic Compatibility 2004/108/EC

EC-Directive „explosion protection“ 94/9/EC (ATEX)

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

The equipment complies with:

EN ISO 12100-1	Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology
EN ISO 12100-2	Safety of machinery. Basic concepts, general principles for design. Technical principles and specifications
DIN EN 60204 - 1	Safety of machinery - Electrical equipment of machines - General requirements
DIN EN 60529	Degrees of protection provided by enclosures (IP code)
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Constructional changes which have effects on the technical information in this manual and on the intended utilisation, and therefore convert the machine considerably, make the Manufacturer's Declaration invalid!



Dransfeld, 08 December 2008
Cord Cassel, Managing Director

3. Area of Application and Qualification

3.1. Normal Use

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

- solid,
- liquid or
- powder

form.

3.2. Misuse

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

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

3.3. Owner's Obligation to Exercise Due Care

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

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

The owner of the equipment must, in particular, ensure

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

3.4. Requirements for Operating Staff

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

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

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

3.5. Requirements for Service and Maintenance Staff

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

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

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

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

4. General Safety Instructions

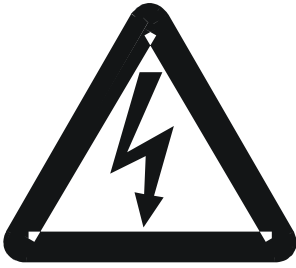
4.1. General Safety Instructions



Danger!

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

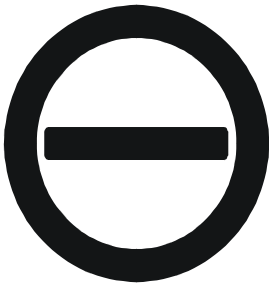
- Never put the metal detector into operation without the safety devices provided by the manufacturer. Only specially trained maintenance staff is allowed to operate the equipment without the safety devices.
- Shut down the machine immediately if the safety devices are not operating properly or if there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

**Danger!**

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

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

4.2. Safety Instructions for the Metal Detector

**Attention!**

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

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

4.2.1. Installation Instructions

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

4.2.2. Connecting Instructions

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

4.2.3. Operating Instructions

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

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

4.2.4. Protection Against Interference

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

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

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

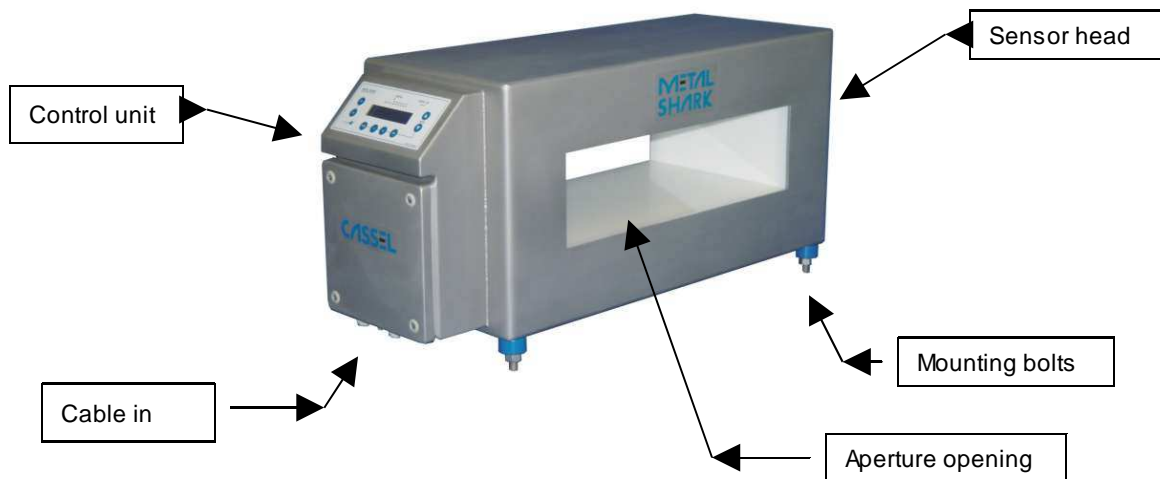
5. Technical Description

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

5.1. Metal Detector METAL SHARK® BD

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

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



There are various versions of control units available:

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

With various accessories, e.g. flashing light.

5.2. Method of Operation

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

The sensor has two coils:

- the transmitter coil and
- the receiver coil.

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

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

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

The amount of current generated (induced) is directly proportional to the magnetic and electrical properties of the metal piece:

- Large metal piece induce a higher current than small metal particles
- Magnetic metals (e.g. steel) induce a higher current than non-magnetic metals (e.g. aluminium)

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

Since this method of measurement responds to

- electrical conductivity and
- magnetism

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

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

5.3. Operating Limits

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

- salts,
- sugar,
- minerals,
- moisture or
- carbons.

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

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

The level of sensitivity which can be achieved in practice often depends on:

- How well the metal detector compensates the product effect.
- How carefully the metal detector has been installed (e.g. strong vibrations, moving metal directly next to the sensor, electromagnetic interferences etc.).

6. Transport

6.1. Safety Instructions for Transport and Installation



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

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

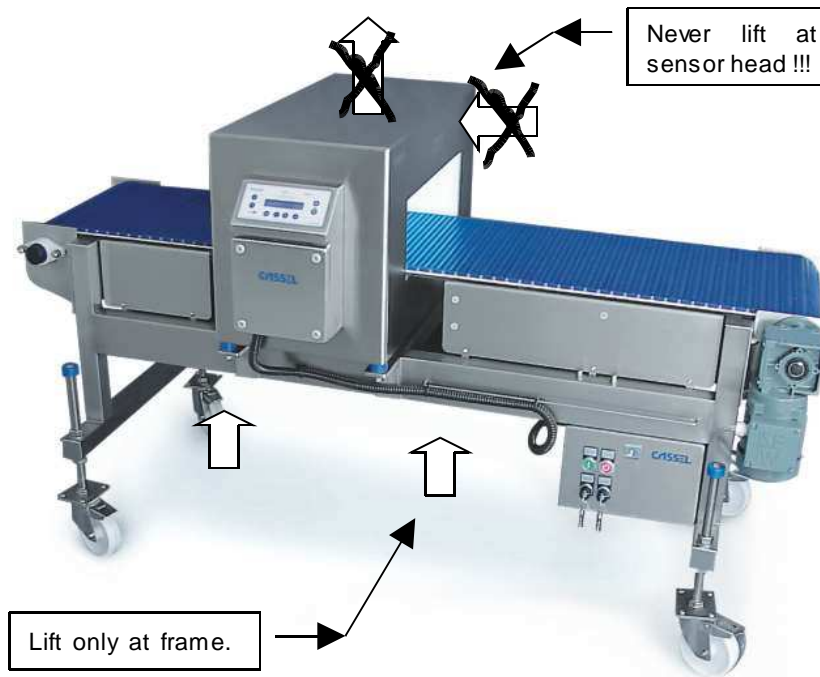
6.2. Transporting

Choosing suitable hoisting equipment.

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

Danger !

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



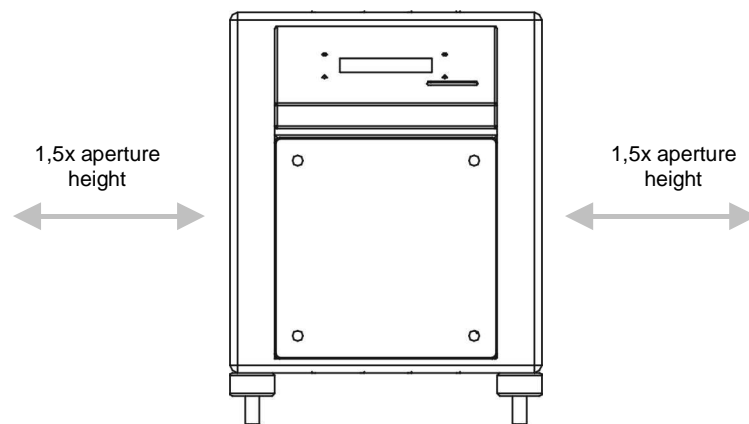
7. Installation Instructions

The following points require special attention during installation:

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

7.1. Metal-Free Zone

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



7.2. Vibration

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

7.3. Feed of Belt Through Sensor

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

7.4. Mounting on Conveyor / Frame

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

7.5. Keep Conveyor Belt Clean

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

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

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

7.6. Installation of Sensor Head

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



Install sensor head with any support frame:

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

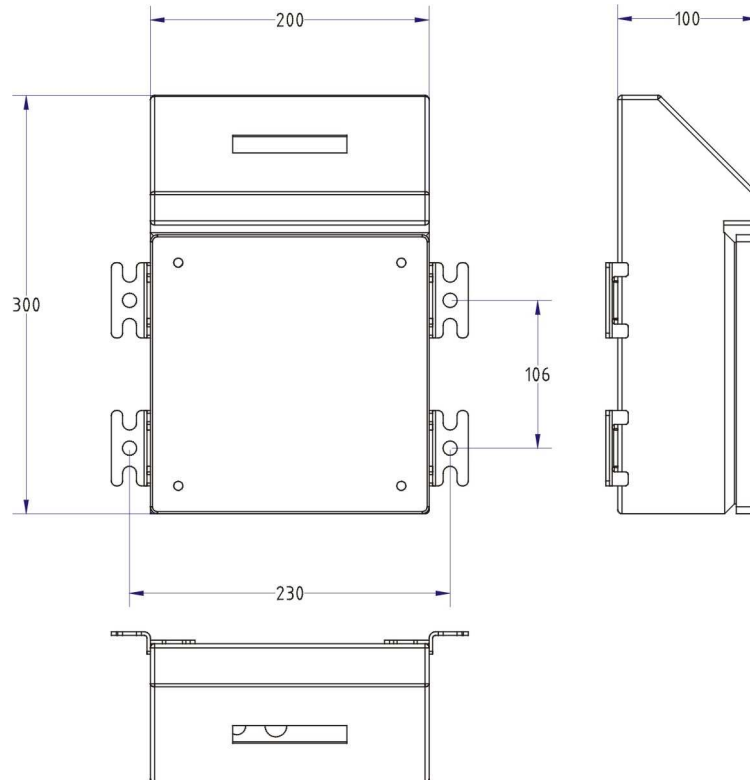
Caution! Always attach the grounding clamp of the welding unit directly next to the welding spot. Do not allow welding current to flow through the case of the metal detector under any circumstances. This will lead to the destruction of the detector!



7.7. Control Unit for Wall-Mounting

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

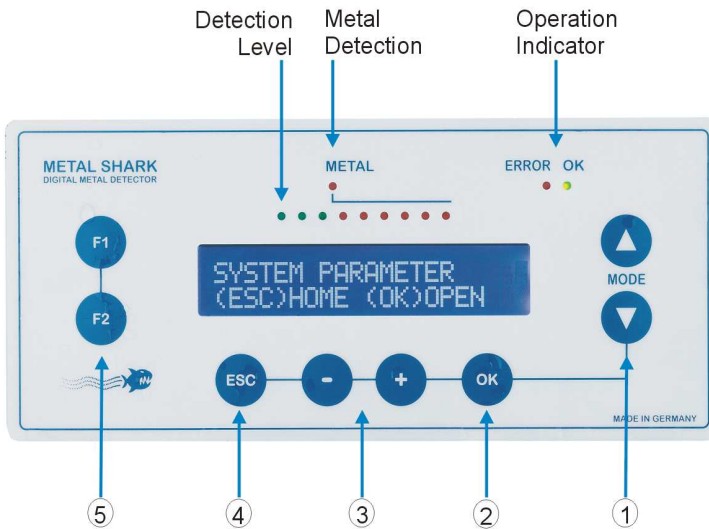
The coaxial cables supplied for connecting the control unit to the sensor have a standard length of 2,5 meters. Upon request, ready-assembled coaxial cables can be supplied in different lengths. We urgently recommend you not to replace the coaxial cables supplied by other qualities of cable. Many qualities of coaxial cable are not suitable for operating the Metal Detector at a high level of sensitivity without any interference.



8. Operating Instructions

8.1. Keyboard





Names and Functions of Parts





- ① **Mode switch keys**
These keys scroll through all the metal detector screens.
- ② **OK key**
This key confirms any selection or setting.
- ③ **Minus/Plus keys**
These keys change any mode setting.
- ④ **Esc**
Escape key
This key quits the current screen and locates the previous menu.
- ⑤ **F1**
F2
Programmable function keys
Press 5 seconds to program actual screen to this key.

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

8.2. Menu Structure




The keys , , and   are used to navigate through the user interface.

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

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

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

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

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

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

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

REPORT MENU: Information, documentation, and communication

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

PRODUCT MENU: Settings which are specific to an individual product

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

TEACH MENU: General settings to control the TEACH PRODUCT – assistant

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

VALIDATION MENU: Supervision of proper operation

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

SYSTEM MENU: General configuration of the metal detector (several submenus)

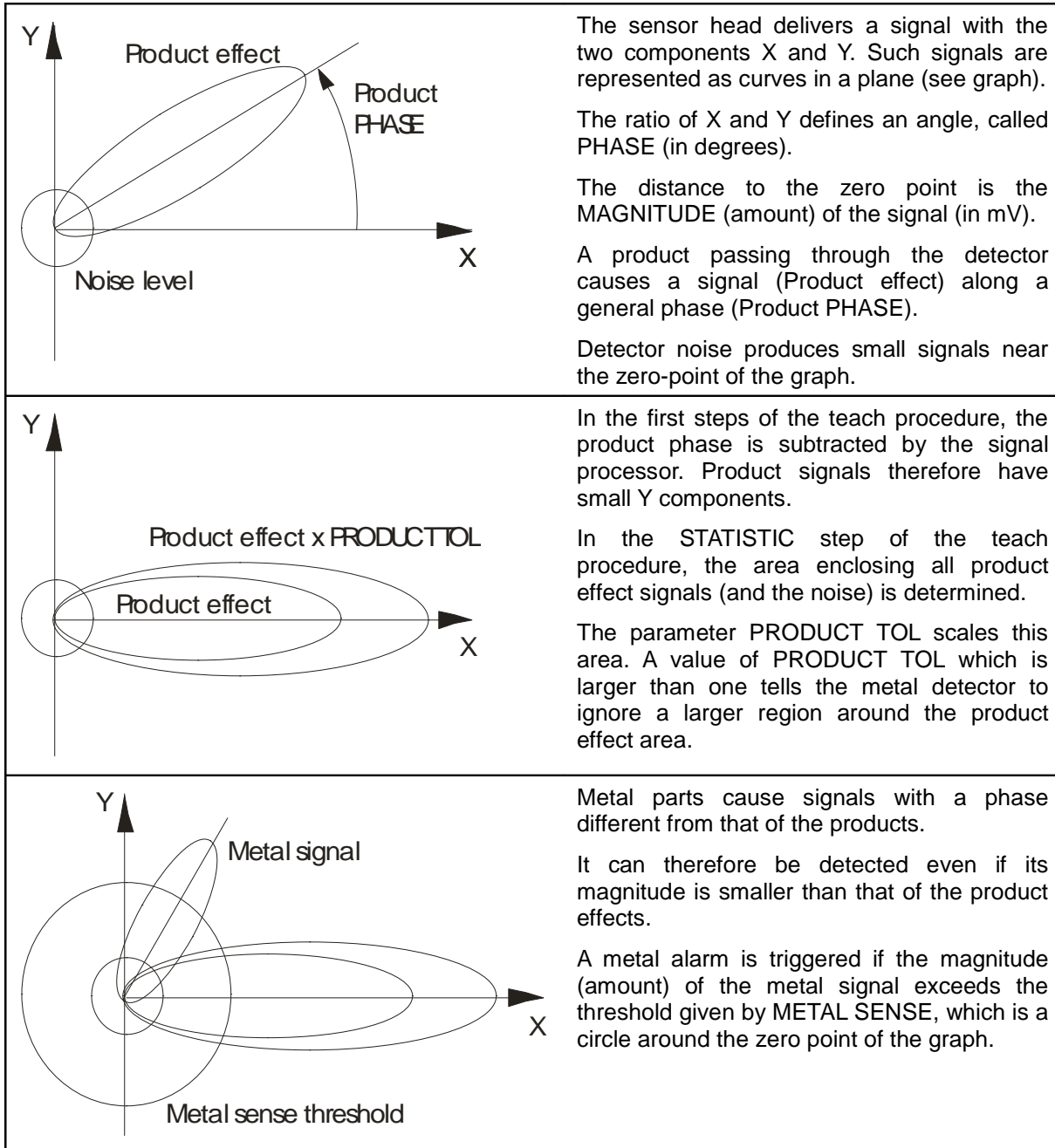
- Product SPEED, PASSWORD protection and REMOTE PRODUCT-number control.
- Date and time (YY/MM/DD, HH:MM:SS)
- Setup of the control signal to the reject device (DELAY, DURATION, METAL CONTACT)
- Automatic belt-SPEED calibration of conveyors driven from frequency inverters
- Clean In Place switching of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

8.3. Product Effect Compensation: Background Information

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

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

Below graphs illustrate the TEACH PRODUCT procedure and related parameters.

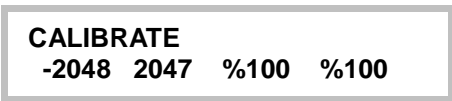



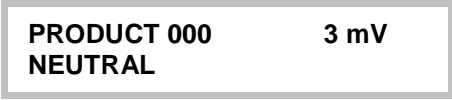



8.4. Starting Up

Steps to put the metal detector into first operation:

- Power on
- Set product speed
- Teach product effects
- Check metal sensitivity

8.4.1. Power On














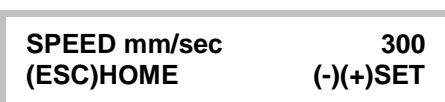
Step	Operation	Screen
1. Check installation	Were the assembly steps followed correctly? Is the electronics connected correctly? Were safety regulations kept? Are all cables intact?	Refer to "10 Electrical Connections"
2. Power On	If the installation is ok, switch power supply on. The metal detector runs an internal auto calibration (CALIBRATE) and then displays the main screen.	
3. Main screen	<p>The metal detector is now in operation. The main screen informs about current product number and signal amplitude (mV).</p> <p>Set PRODUCT 000 with  .</p> <p>Confirm with .</p> <p>Note: If the Expert-Mode is switched off the signal amplitude of products 1-120 will be displayed in percent. For this chapter the Expert Mode is switched off.</p>	 

8.4.2. Expert Mode

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








8.4.3. Set Product Speed

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

Step	Operation	Screen
1. Return to main menu	Press  to return to main screen.	
2. OPEN MENU	Press  until you see OPEN MENU. Press  to open menu.	
3. Go to SYSTEM MENU	Press  until SYSTEM MENU is displayed. Press  to open menu.	
4. Set Speed	Enter product speed using the   keys. Press  to confirm. SHARK® BD: Set the belt speed corresponding to the material that passes through the metal detector. SHARK® BD supplied with conveyor HQ: Speed parameter is set automatically. SHARK® GF, GF compact: 1500 mm/sec is recommended for gravity feed applications. SHARK® IN for sausage stuffer: 300 mm/sec to 600 mm/sec depending on the speed of the stuffer. Others: Set the current speed corresponding to the material that passes through the metal detector.	  

8.4.4. Set Product 000

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

Step	Operation	Screen
1. Return to main screen	Press  to return to main screen.	<div style="border: 1px solid gray; padding: 5px; display: inline-block;"> PRODUCT 001 20 % NO NAME </div>
2. Choose product	Set PRODUCT 1 with   . Press  to confirm. Note: You can only teach a product effect for PRODUCT 1 to 120, not for PRODUCT 0.	<div style="border: 1px solid gray; padding: 5px; display: inline-block;"> PRODUCT 000 3 mV NEUTRAL (OK)STORE </div> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> PRODUCT 00= 3 mV NEUTRAL </div>
3. Set METAL SENSE	Press  until METAL SENSE mV is displayed. Adjust the value with   about 20 – 30 % higher than the highest value you measured. In this example 20 mV.	<div style="border: 1px solid gray; padding: 5px; display: inline-block;"> METAL SENSE mV 35 (ESC)HOME (-)(+)SET </div> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> METAL SENSE mV 20 (ESC)HOME (-)(+)SET </div>

8.4.5. Teach Product 001 to 120

Step	Operation	Screen
1. Return to main screen	Press Esc to return to main screen.	PRODUCT 000 3 mV NEUTRAL
2. Choose product	Set PRODUCT 1 (or ever other number between 1 and 120) with - + . Press OK to confirm. Note: You can only teach a product effect for PRODUCT 1 to 120, not for PRODUCT 0.	PRODUCT 001 3 mV NO NAME (OK)STORE PRODUCT 001 20 % NO NAME
3. Enter TEACH PRODUCT	Press ▲ until TEACH PRODUCT 001 is displayed. Press OK to start teach procedure.	TEACH PRODUCT 001 (ESC)HOME (OK)START
4. Choose product characteristic	Select with - + the product characteristic which fits your product or application the best: DRY: Products with low humidity, e.g. powder and bulk materials. WET: Product contains water, but not too many spices, e.g. sausages, meat, fruits, vegetables. SALTY: Products with high amount of salt or high electrical conductivity, e.g. cheese blocks. MEAT: All kinds of meat FROZEN: Deep frozen products (-18°C/0°F) MELTING: Frozen product in warm environment ALU FOIL: Products packed in alu vaporized foil PLASTIC: Plastic granulates with graphite VIBRATION: Vibration signals SHOCK: Shock-like action on detector DEFAULT: Uses no product tolerances. Confirm your selection with OK .	PRODUCT IS DRY (+)(-)SET (OK)NEXT PRODUCT IS FROZEN (+)(-)SET (OK)STORE
5. RUN PRODUKT LINE	Start running products through the sensor (e.g. start the conveyor). Confirm with OK that the product is now running.	RUN PRODUCT LINE (ESC)HOME (OK)NEXT

<p>6. Automatic teach procedure</p>	<p>The following steps STEP 1 – STEP 3 are performed automatically (STEP 1 – STEP 5 in the case of strong product effects, e.g. meat).</p> <p>IMPORTANT NOTE: While RUN PRODUCT is displayed, keep passing products through the sensor. Otherwise the TEACH process may fail.</p> <p>STEP 1: AMPLIFICATION X in % measures the X-component of the product effect.</p> <p>STEP 2: PHASE adjusts the phase of the product effect.</p> <p>STEP 3: VERSTÄRKUNG Y in % measures the Y-component of the product effect.</p> <p>STEP 4 STATISTIC: Mostly the product composition varies a little. Consequently, the product effect phase also varies. This the STATISTIC STEP takes into consideration. Therefore, run as many products as possible through the sensor</p>	<div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> <p>RUN PRODUCT STEP1 AMP X 200% 2 15</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> <p>RUN PRODUCT STEP2 PHASE 5 12</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> <p>TEACH COUNT (product signals)</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;"> <p>TEACH TIME (countdown n)</p> </div> <div style="border: 1px solid gray; padding: 5px;"> <p>RUN PRODUCT STEP3 STATISTIC 3 27</p> </div>
<p>7. End of teach procedure</p>	<p>When TEACH END is displayed, the teach procedure has been completed.</p> <p>The resulting parameters are displayed. They are stored in a non-volatile memory and can be displayed later in the REPORT MENU under INFO PRODUCT 00X.</p> <p>Press to return to the main menu.</p>	<div style="border: 1px solid gray; padding: 5px;"> <p>X25% Y200% TEACH END (OK)EXIT</p> </div>

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

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

If the result does not satisfy you:

- Choose another product number (e.g. PRODUCT 002)
- Repeat the teach procedure

Hint: Use various product samples.

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

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






Hint: PRODUCT IS ... can also be changed after performing the TEACH –procedure: OPEN MENU . Press until PRODUCT MENU is displayed. Press to enter product menu. Use to choose a different product characteristic. Confirm your choice with .

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

8.4.6. Optimize Product Effect Compensation



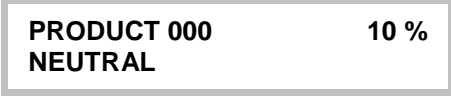
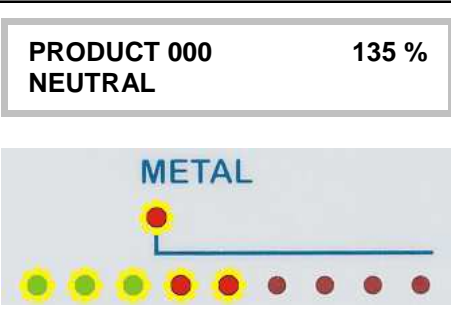


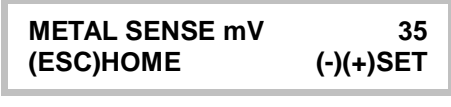
After teaching a product, products which are free of metal should not cause metal alerts. However, product characteristics vary, as well as the surrounding conditions.

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



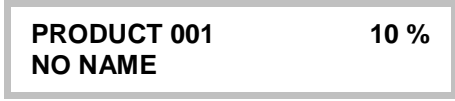

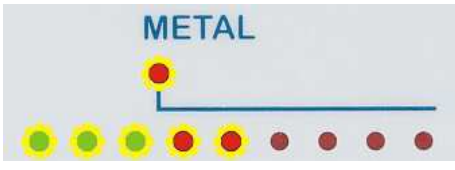
Step	Operation	Screen
1. Return to main screen	Press  to return to main screen.	
2. Choose PRODUCT TOL.	Press  twice to see the PRODUCT TOL screen. Press  to increase the value. High PRODUCT TOL value: Better product effect compensation but reduced metal sensitivity. Check metal sensitivity (see below)!	

8.4.7. Check Metal Sensitivity

8.4.7.1 Of Product 0 (NEUTRAL)

Step	Operation	Screen
1. Return to main screen	Press  to return to main screen.	
2. Run metal test pieces through detector	Run metal test pieces with products several times through the detector.	
3. Watch display	<p>Watch the display:</p> <p>mV = current signal magnitude</p> <p>The mV-value represents the size of the metal objects. The bigger the metal piece, the higher the value. Write down the maximum value for each metal test piece passing the sensor.</p> <p>(Note: The shown values are just examples)</p> <p>Do the specified metal test pieces reliably trigger a metal alert?</p> <p>If not, decrease the METAL SENSE mV value.</p>	
4. Adjust METAL SENSE	<p>Press  until METAL SENSE mV is displayed.</p> <p>Is METAL SENSE much smaller than the smallest value obtained from the test pieces?</p> <p>If so, METAL SENSE can be increased up to the smallest test-piece value. This suppresses more noise and interference, and allows metal objects of negligible size to pass.</p> <p>Press  to increase METAL SENSE.</p> <p>High METAL SENSE mV:</p> <p>Small metal pieces are not detected.</p> <p>Better oppression of interfering signals.</p> <p>Check the metal sensitivity again!</p>	

8.4.7.2 Of Products 1 - 120

Step	Operation	Screen
1. Return to main screen	Press  to return to main screen.	
2. Run metal test pieces through detector	Run metal test pieces with products several times through the detector.	
3. Watch display	<p>Watch the display: % = current signal magnitude</p> <p>If the detector measures more than 100 %, it found metal. The %-value represents the size of metal objects. Write down the maximum value for each metal test piece passing the sensor.</p> <p>Do the specified metal test pieces reliably trigger a metal alert?</p> <p>If not, return to the teach procedure above, or decrease the PRODUCT TOL value.</p>	 

8.4.8. Enter Product Name

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

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

8.4.9. Password Feature

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

8.4.9.1 Enable Password Feature





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

Step	Operation	Screen
1. Return to main screen	Press the Esc key to return to the main screen.	PRODUCT 000 3 mV NEUTRAL
2. OPEN MENU	Press ↓ . Press OK to open menu.	OPEN MENU (ESC)HOME (OK)OPEN
3. Go to SYSTEM MENU	Press ↑ until you see the SYSTEM MENU screen. Open SYSTEM MENU with OK .	SYSTEM MENU (ESC)HOME (OK)OPEN
4. Go to PASSWORD	Press ↑ until you see the PASSWORD screen.	PASSWORD NO (ESC)HOME (-)(+)SET
5. Enable PASSWORD	Press 1x + to enable PASSWORD functions with YES. Confirm with OK .	PASSWORD YES (ESC)HOME (-)(+)SET
6. Return to main screen	Press Esc to return to the main screen.	PRODUCT 000 3 mV NEUTRAL
7. Go PASS UNLOCK	Press ↓ until you see the PASSWORD UNLOCKED screen. The initial password is 0000. It is strongly recommended to set-up your own new password immediately. Refer to next chapter "Set new password".	PASSWORD UNLOCKED (-+)LOCK (OK)NEW

8.4.9.2 Set New Password

Step	Operation	Screen
1. Return to main screen	Press the Esc key to return to the main screen.	<div style="border: 1px solid gray; padding: 5px; width: fit-content;"> PRODUCT 000 3 mV NEUTRAL </div>
2. Go to PASSWORD	Press ▼ until you see the PASSWORD UNLOCKED screen.	<div style="border: 1px solid gray; padding: 5px; width: fit-content;"> PASSWORD UNLOCKED (-+)LOCK (OK) NEW </div>
3. Set new password	<p>Press OK to set a new password. It consists of a four digit number.</p> <p>Press - + to set the first digit.</p> <p>Press OK to move to the next digit. The selected digit will remain and the cursor will now flash at the next cell. Repeat this for all cells to set a 4 digit password.</p> <p>PASSWORD NEW2: Now fill in exactly the same 4 digits to confirm your password.</p> <p>After filling in the last digit you see PASSWORD NEW OK. Then the display shows the PASSWORD UNLOCKED screen.</p> <p>Your password is now set.</p>	<div style="border: 1px solid gray; padding: 5px; width: fit-content;"> PASSWORD UNLOCKED (-+)LOCK (OK)NEW </div> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin-top: 10px;"> PASSWORD NEW1 8 * * * (-+)LOCK (OK)NEXT </div> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin-top: 10px;"> PASSWORD NEW1 * 4 * * (-+)LOCK (OK)NEXT </div> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin-top: 10px;"> PASSWORD NEW2 8 * * * (-+)LOCK (OK)NEXT </div> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin-top: 10px;"> PASSOWRD NEW2 * 4 * * (-+)LOCK (OK)NEXT </div> <div style="border: 1px solid gray; padding: 5px; width: fit-content; margin-top: 10px;"> PASSWORD NEW OK </div>

























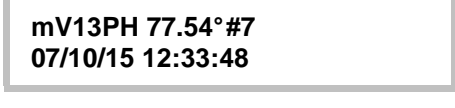
8.4.9.3 Enable Parameter Pass Protection

Step	Operation	Screen
1. Password feature	The password feature is available if SYSTEM PARAMETER / PASSWORD=YES. Refer to above "Enable password feature".	<div style="border: 1px solid gray; padding: 5px; display: flex; justify-content: space-between;"> PASSWORD (ESC)HOME YES (-)(+)SET </div>
2. Enable pass protection	Parameter pass protection is enabled automatically at each power supply on. automatically if no key pressed for 5 minutes. manually by pressing   at the same time in the PASSWORD UNLOCKED screen.	<div style="border: 1px solid gray; padding: 5px; display: flex; justify-content: space-between;"> PASSWORD UNLOCKED (-+)LOCK (OK)NEW </div> <div style="border: 1px solid gray; padding: 5px; display: flex; justify-content: space-between;"> ** ACCESS LOCKED *** (-+)LOCK (OK) NEW </div>
3. Disable parameter pass protection	You can only disable the parameter pass protection manually by entering your 4 digit password with  or  . To enter the password see "Set new password" The screen changes to PASSWORD UNLOCKED once you entered the correct password.	<div style="border: 1px solid gray; padding: 5px; display: flex; justify-content: space-between;"> PASSWORD ***** (-)(+)SET (OK)NEXT </div> <div style="border: 1px solid gray; padding: 5px; display: flex; justify-content: space-between;"> PASSWORD UNLOCKED (-+)LOCK (OK)NEW </div>

8.4.10. Set Date and Time

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

8.4.11. Displaying / Printing Reports

Step	Operation	Screen
1. Return to main menu	Press  to return to main menu.	
2. OPEN MENU	Press  until OPEN MENU appears. Press  to open menu.	
3. Open REPORT MENU	REPORT MENU is displayed. Open menu with  .	
4. METAL COUNTER	The current value of the metal counter is displayed Hint: To reset metal counter press   simultaneously.	
5. Go to PRINT	Press  until PRINT is displayed. Press  to choose printing mode REPORT. Confirm with  . In printing mode REPORT, the last 50 metal alerts are sent immediately to the protocol printer (optional). Time and signal magnitude of each alert event will be printed. In the alternative mode ONE BY ONE, metal alerts are printed continuously as soon as they occur.	 
6. Print out Report	Press  until REPORT TO PRINTER is displayed. Press  to start print-out. Note: The printer is optional equipment.	
7. Display Report	Alternatively, the REPORT of the metal alerts can be viewed on the display. Press  until REPORT TO LCD is displayed. Press  to display the last metal alert. Use  and  to navigate through all metal alert entries.	  

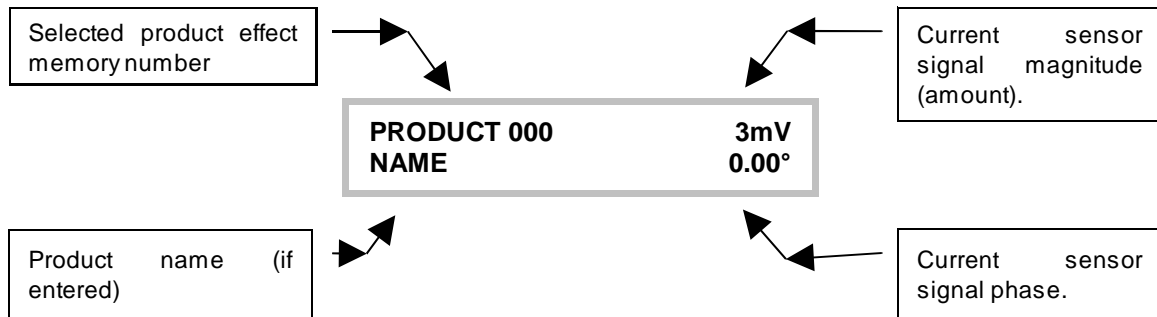
9. The Metal Detector's Functions in Detail

9.1. Main Menu

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

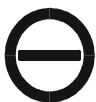
9.1.1. Main Screen: Product and Signal

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



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

IMPORTANT:



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

9.1.2. Teach Product – Teach Product Effect



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

9.1.3. Product Tolerance



PRODUCT TOL	x 1.3
(ESC)HOME	(-)(+)SET

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

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

9.1.4. Metal Sense mV

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

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

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

IMPORTANT:



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

9.1.5. Info Next PV Test

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


Default: Not visible

Date and time of the next performance validation are displayed.

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

9.1.6. Open Menu

```
OPEN MENU
(ESC)HOME      (OK)OPEN
```

Press  to access the advanced parameter menus described below.

9.1.7. Password

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

Default: Not visible.

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

This screen is only visible if password protection is activated.


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


9.2. Report Menu

The REPORT MENU provides

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

```
REPORT MENU
(ESC)HOME      (OK)OPEN
```



Press  to open the REPORT MENU.

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

9.2.1. Metal Counter

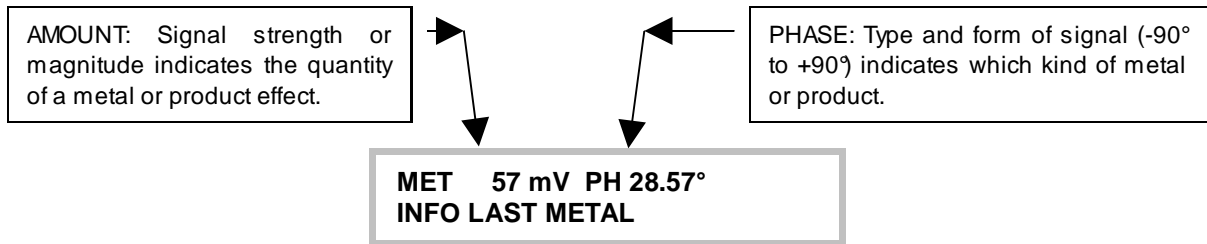
```
METAL COUNTER      0
(ESC)HOME          (-+)RESET
```

With each metal signal the counter increases.

If the   keys are pressed down simultaneously for approx. 2 seconds the counter is reset to zero. This also resets the report memory (see below).

9.2.2. Info Last Metal

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



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

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

9.2.3. Info Product

AMP X %100 AMP Y %100
INFO PRODUCT 001

Information on current product-related parameters is displayed.

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

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

9.2.4. Info Software Version

SHARK BD3.93g
INFO SOFTWARE VERS.

Displays the full name of the software being used.

9.2.5. Print

PRINT (ESC)HOME	OFF (-)(+)SET
----------------------------	--------------------------

Default setting: OFF

Protocol mode of optional printer. Possible settings are:

PRINT OFF: No output to printer

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

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

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

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

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

9.2.6. Interface

INTERFACE (ESC)HOME	RS232 (-)(+)SET
--------------------------------	----------------------------

Default value: RS232

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

RS232 standard serial interface

RS485 serial interface, symmetrical data transmission for improved reliability

ETHERNET with optional Com-Server

9.2.7. BAUD

BAUD (ESC)HOME	9600 (-)(+)SET
---------------------------	---------------------------

Default: 9600

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

Possible values: 9600 / 14400 / 57600 / 115200 / 230400 Baud

9.2.8. SHARKNET / Unit #

SHARKNET / UNIT #	0
(ESC)HOME	(-)(+)SET

Default value: 0

The Unit Number is the identification of each single unit within Sharknet.

The number 0 (zero) automatically sets the unit as the master of a system of detectors.

Numbers 1 to XX automatically set the corresponding unit as a slave, which then is remote controlled.

For single detector, stand alone operation, set SHARKNET / UNIT # = 0.

9.2.9. Report to Printer

REPORT TO PRINTER
(ESC)HOME (OK)OPEN

Press  to print out a report of metal alerts in mode PRINT REPORT (see above).

The print-out is formatted similar to the entries displayed by REPORT TO LCD (see below).

9.2.10. Report to LCD

REPORT TO LCD
(ESC)HOME (OK)OPEN

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

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

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

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

*
 *

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

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

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

9.2.11. Exit Report Menu

EXIT MENU
(ESC)HOME (OK)EXIT

Push **OK** to exit the REPORT MENU.

9.3. Product Menu

Important:


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


Most parameters in the product menu are set automatically during TEACH PRODUCT.

They adapt the control unit to the individual product effect conditions, and are therefore specific for each product number.

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



Press  to open the PRODUCT MENU.



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

9.3.1. Product Name



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

Edit the current digit with  and . Choose next digit with  and .

Press   simultaneously to erase the whole name.

See "8.4.8 Enter Product Name" for detailed instructions.

9.3.2. Product is ...

PRODUCT IS (ESC)HOME	DRY (-)(+)SET
---------------------------------------	--------------------------------

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

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

You can choose one of the following characteristics:

DRY: Products with low humidity, e.g. powder and bulk materials.

WET: Products that contain water, but not too many spices, e.g. sausages, meat, fruits, vegetables.

SALTY: Products with a high amount of salt or high electrical conductivity, e.g. cheese blocks.

MEAT: Products like bloody raw meat.

FROZEN: Deep frozen products (-18°C/0°F)

MELTING: Frozen products in warm environment

ALU FOIL: Products packed in alu vaporized foil

PLASTIC: Plastic granulates with graphite

VIBRATION: Vibration signals

SHOCK: Shock-like action on detector

DEFAULT: No product-specific adjustments are preset. Adjust PRODUCT TOL and related parameters by hand.

9.3.3. Product X TOL

PRODUCT X TOL (ESC)HOME	1.0 (-)(+)SET
--	--------------------------------

Setting range: 0.0 9.9

Default: 1.0

Scales the product effect area along the X-axis.

PRODUCT X TOL is multiplied by PRODUCT TOL.

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

9.3.4. Product Y TOL

PRODUCT Y TOL	1.0
(ESC)HOME	(-)(+)SET

Setting range: 0.0 9.9

Default: 1.0

Scales the product effect area along the Y-axis.

PRODUCT Y TOL is multiplied by PRODUCT TOL.

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

9.3.5. Teach Area

TEACH AREA	1620	74
INFO PRODUCT 001		

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

9.3.6. Amplification X%

AMP X%	100
(ESC)HOME	(-)(+)SET

Default: 100 (only PRODUCT 0)

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

When using product memories 1...120:

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

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

Low product effect amplitude = AMP. FACTOR X% 200

9.3.7. Amplification Y%

AMP Y%	100
(ESC)HOME	(-)(+)SET

Default: 100 (only PRODUCT 0)

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

When using product memories 1...120:

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

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

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

9.3.8. Phase

PHASE	-179.55°
(ESC)HOME	(-)(+)SET

Default: 0.00°

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

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

9.3.9. Phase Track

PHASE TRACK	0.00°
(ESC)HOME	(-)(+)SET

Setting range: 0.00° ... 10.00°

Default: 0.00°

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

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

The higher this value the stronger the phase tracking.

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

9.3.10. Metal Contact

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

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

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

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

9.3.11. Copy Product

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

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

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

9.3.12. Exit Product Menu

EXIT MENU (ESC)HOME	(OK)EXIT
--------------------------------------	-----------------


Press  to exit the PRODUCT MENU.


9.4. Teach Menu

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

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



Press  to open the TEACH MENU.

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

9.4.1. Teach Sense mV



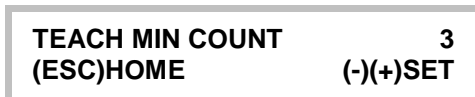
Setting range: 3 ... 2000

Default: optimum value

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

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

9.4.2. Teach min Count



Setting range: 1 ... 2000

Default: 3

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

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

9.4.3. Teach Max Count

TEACH MAX COUNT	5
(ESC)HOME	(-)(+)SET

Setting range: 1 ... 3000

Default: 5

TEACH MAX COUNT defines a maximum number of product samples required for each TEACH STEP.

If any of the TEACH STEPs measures the maximum number of samples the menu switches automatically to the next teach step.

9.4.4. Teach Time

TEACH TIME sec.	15
(ESC)HOME	(-)(+)SET

Setting range: 2 ... 300

Default: 15 seconds

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



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

Otherwise the compensation fails!

Recommendations:

Product speed 100-200 mm/sec. → TEACH TIME sec. 45

Product speed 200-300 mm/sec. → TEACH TIME sec. 30

Product speed 300-500 mm/sec. → TEACH TIME sec. 20

Product speed above 500 mm/sec. → TEACH TIME sec. 15

9.4.5. STATISTIC sec

STATISTIC SEC.	30
(ESC) HOME	(-)(+)SET

Setting range: 5 ... 900

Default: 30 seconds

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



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

Otherwise the compensation may fail!

Recommendations:

Product speed 100-200 mm/sec. → STATISTIC TIME sec. 240

Product speed 200-300 mm/sec. → STATISTIC TIME sec. 120

Product speed 300-500 mm/sec. → STATISTIC TIME sec. 60

Product speed above 500 mm/sec. → STATISTIC TIME sec. 30

9.4.6. Teach enable

TEACH ENABLE	YES
(ESC)HOME	(-)(+)SET

Default: YES

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

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

9.4.7. Teach reject

TEACH REJECT	NO
(ESC)HOME	(-)(+)SET


Default: NO

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

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

9.4.8. Exit Teach Menu

EXIT MENU	
(ESC)HOME	(OK)EXIT

Press  to exit the TEACH MENU.

9.5. Validation Menu

VALIDATION MENU	
(ESC)HOME	(OK)OPEN

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

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

9.5.1. Reject Confirm

REJECT CONFIRM	NO
(ESC)HOME	(-)(+)SET

Default: NO

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

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

9.5.2. Bin Full

BIN FULL	NO
(ESC)HOME	(-)(+)SET

Default: NO

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

9.5.3. Low Air

LOW AIR	NO
(ESC)HOME	(-)(+)SET

Default: NO

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

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

9.5.4. Performance Validation Menu

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

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

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

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

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

PERFORM VALID SYSTEM (ESC)HOME (OK)OPEN

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

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

9.5.5. PVS

PVS NO (ESC)HOME (-)(+)SET

Default: NO

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

9.5.5.1 PV Freq. Hours

PV FREQ. HOURS 8 (ESC)HOME (-)(+)SET

Setting range: 1 ... 500 Default: 8

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

9.5.5.2 PV WINDOW min

PV WINDOW min. 30 (ESC)HOME (-)(+)SET
--

Setting range: 1 ... 180 Default: 30

Set the time available to finish sensitivity check successfully (in minutes).

9.5.5.3 PV FE mm

PV FE mm	2.5
(ESC)HOME	(-)(+)SET

Setting range: 0.0 ... 99.9

Default: 0

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

9.5.5.4 PV FE MAX mV

PV FE MAX mV	320
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 9999

Default: 0

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

9.5.5.5 PV NONFE mm

PV NONFE mm	2.5
(ESC)HOME	(-)(+)SET

Setting range: 0.0 ... 99.9

Default: 0

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

9.5.5.6 PV NONFE MAX mV

PV NONFE MAX mV	320
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 9999

Default: 0

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

9.5.5.7 PV SS mm

PV SS mm	2.5
(ESC)HOME	(-)(+)SET

Setting range: 0.0 ... 99.9

Default: 0

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

9.5.5.8 PV SS MAX mV

PV SS MAX mV	320
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 9999

Default: 0

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

9.5.5.9 PV Error Count

PV ERROR COUNT	3
(ESC)HOME	(OK)START


Setting range: 0 ... 999

Default: 3

Enter the maximum allowed number of signals which are not accepted as the required test piece.

9.5.5.10 Run PV Test?

RUN PV TEST?	
(ESC)HOME	(OK)START

Press  to start a sensitivity check right now.**9.5.5.11 Exit Perform Valid Menu**

EXIT MENU	
(ESC)HOME	(OK)EXIT

Press  to exit the PERFORMANCE VALIDATION MENU.**9.5.6. Exit Validation Menu**


EXIT MENU	
(ESC)HOME	(OK)EXIT


Press  to exit the VALIDATION MENU.

9.6. System Menu

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

SYSTEM MENU	
(ESC)HOME	(OK)OPEN

Press  to open the SYSTEM MENU.

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

9.6.1. Speed

SPEED mm/sec.	330
(ESC)HOME	(-)(+)SET

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

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

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

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

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

IMPORTANT NOTE!

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

9.6.2. Remote Product

REMOTE PRODUCT	NO
(ESC)HOME	(-)(+)SET

Default: NO

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

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

9.6.3. Password

PASSWORD	NO
(ESC)HOME	(-)(+)SET

YES enables password function.

NO disables the password function.

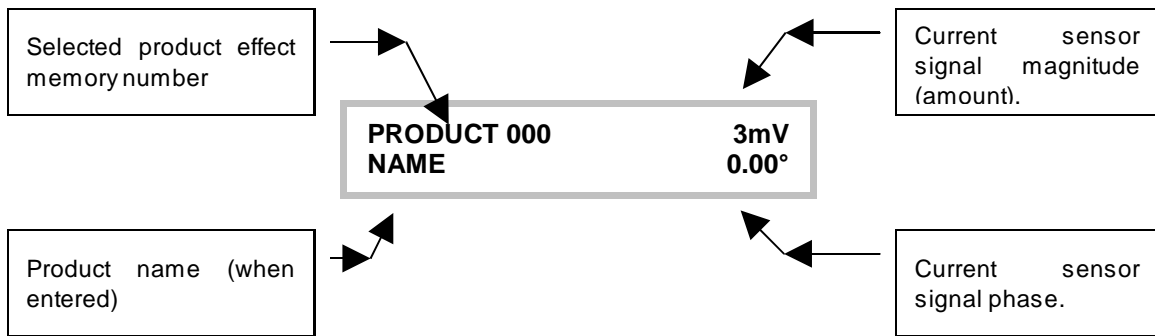
9.6.4. Expert Mode

EXPERT MODE	YES
(ESC)HOME	(-)(+)SET

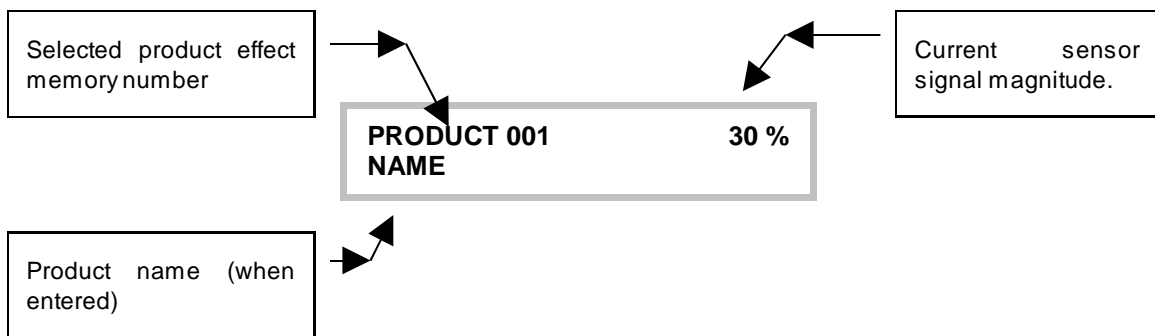
Default: NO

EXPERT MODE = YES enables you to see the current sensor signal phase and the sensitivity in mV on the main screen. You can adjust the METAL SENSE (refer to "9.1.4 Metal Sense mV").

For more information also refer to chapter "8.4.2 Expert Mode".





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



9.6.5. Reject Menu

REJECT MENU (ESC)HOME	(OK)OPEN
--------------------------	----------



Press  to open the REJECT MENU.

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

9.6.5.1 Delay mm

DELAY mm	200
(ESC)HOME	(-)(+)SET



Setting range: 0 ... 30,000 Default: 0

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

9.6.5.2 Duration ms

DURATION ms	500
(ESC)HOME	(-)(+)SET

Setting range: 150 ... 30,000 Default: 500

Metal signal DURATION is the length of time in milliseconds for which the 'Metal signal' relay remains switched. This function is useful if the product which is contaminated with metal is to be separated out automatically after having passed the sensor. Use  and  to set the delay time in the range from 150 to 30000 milliseconds. Whilst the relay is switched on, other metal signals which occur are stored in a shift register and are not lost.

9.6.5.3 Metal Contact

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

This parameter programs the metal out contacts.

- HOLD:** Standard value for belt stop with reset push button.
- PUSH1:** Pusher with photo cell active 0V (synchronized reject signal).
- PUSH2:** Pusher with photo cell active 24V (synchronized reject signal).
- PUSH3:** Pusher without photo cell synchronization
- PULSE:** Metal alarm as a pulse with the duration DURATION (also see main menu)
Use e. g. when pneumatic nozzles separate the metal
- GF1:** Drives reject flaps with gravity feed applications. Error = flap in reject - position
- GF2:** Drives reject flaps with gravity feed applications. Error = flap in ok - position
- MESEP:** Metal separator model MESEP® SE
- INLINE:** Security drive of inline reject EX-PWC
- PRODUC:** Lets you choose for each product number what action is to be taken in case of a metal contact (also see chapter "9.3.10 Metal Contact")

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

9.6.5.4 Metal-Photo mm

METAL-PHOTO mm (ESC)HOME	0 (-)(+)SET
---	------------------------------

Setting range: 0 200 Default: optimum value

Sets the distance between metal detection and photo cell.

9.6.5.5 Push TOL mm

PUSH TOL mm (ESC)HOME	0 (-)(+)SET
--	------------------------------

Setting range: 0 999 Default: optimum value

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

9.6.5.6 Multiple Push

MULTIPLE PUSH (ESC)HOME	x1 (-)(+)SET
--	-------------------------------

Setting range: 1 9 Default: optimum value

Sets how often the pusher is to be activated.

9.6.5.7 Multiple Push mm

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

Setting range: 1 999

Default: optimum value

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

9.6.5.8 Beltstop at Push

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

BELTSTOP AT PUSH – YES: The conveyor stops when the pusher is activated.

BELTSTOP AT PUSH – NO: The conveyor does not stop.

9.6.5.9 Exit Reject Menu

EXIT MENU	
(ESC)HOME	(OK)EXIT

Press  to exit the REJECT submenu.**9.6.6. Date / Time Menu**

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

Press  to open the DATE/TIME submenu.**9.6.6.1 Set Date - YY/MM/DD**

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

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

Refer to chapter "8.4.10 Set Date and Time".

9.6.6.2 Set Time - HH:MM:SS


HH:MM:SS	12:24:58
(ESC)HOME	(-)(+)SET

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

Refer to chapter "8.4.10 Set Date and Time".

9.6.6.3 Exit Date / Time Menu


EXIT MENU	
(ESC)HOME	(OK)EXIT

Press  to exit the DATE / TIME submenu and return to system menu.

9.6.7. Autospeed Menu

Calibration of input "belt speed".

AUTOSPEED MENU	
(ESC)HOME	(OK)OPEN

Press  to open the AUTOSPEED submenu.

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

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

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

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

Two values must be calibrated:

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

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

9.6.7.1 Autospeed

AUTOSPEED	NO
(ESC)HOME	(-)(+)SET

AUTOSPEED = YES activates the automatic adjustment of the detector to the speed of the belt.



9.6.7.2 0mm/sec = mV

0 mm/sec = mV (ESC)HOME	770 (-)(+)SET
----------------------------	------------------

Setting range: 0 ... 9990

Default: 0

Adjust calibration voltage of frequency inverter for zero belt speed.

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



9.6.7.3 300mm / sec = mV

300 mm/sec = mV (ESC)HOME	1820 (-)(+)SET
------------------------------	-------------------

Setting range: 0 ... 9990

Default: 0

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

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

9.6.7.4 Exit Autospeed

EXIT MENU (ESC)HOME	(OK)EXIT
------------------------	----------


Press  to exit the AUTOSPEED Menu.

9.6.8. CIP Menu

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

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

CIP MENU (ESC) HOME	(OK)OPEN
------------------------	----------

Press  to open the CIP submenu.

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

9.6.8.1 CIP Reject sec.

CIP REJECT sec.	1
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 320

Default: 0

Set the time for how long the reject device is switched to position "REJECT" (in seconds).

9.6.8.2 CIP Normal sec.

CIP NORMAL sec.	5
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 999

Default: 0

Set the time for how long the reject device is switched to position "NORMAL" (in seconds).

9.6.8.3 CIP Timeout min.

CIP TIMEOUT min.	10
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 999

Default: 1

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

9.6.8.4 Exit CIP Menu


EXIT MENU	
(ESC) HOME	(OK)EXIT


Press  to exit the CIP submenu and return to system menu.

9.6.9. In/Out Menu

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

IN/OUT MENU	
(ESC)HOME	(OK)OPEN

Press  to open the IN / OUT submenu.

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

9.6.9.1 In 1 ... In 4

IN1 (ESC)HOME	MET / ERR RESET (-)(+)SET
--------------------------------	--

Set function of input lines 1 ... 4.

Terminals on Shark mainboard corresponding to IN 1 ... IN 4:

IN 1 = Terminal 4

IN 2 = Terminal 6

IN 3 = Terminal 11

IN 4 = Terminal 8

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

9.6.9.2 Out 1 ... Out 4

OUT1 (ESC)HOME	METAL (-)(+)SET
---------------------------	----------------------------

Set function of input lines 1 ... 4.


Terminals on Shark mainboard corresponding to OUT 1 ... OUT 4:

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

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


9.6.9.3 Exit In/Out Menu


EXIT MENU (ESC)HOME	(OK)EXIT
--------------------------------	-----------------

Press  to exit the IN / OUT submenu.

9.6.10. Exit In/Out Menu

FILTER MENU	
(ESC)HOME	(OK)OPEN

Press  to open the FILTER MENU.

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

9.6.10.1 Noise Level

NOISE LEVEL mV	10
(ESC)HOME	(-)(+)SET

Setting range: 0 ... 2000

Default: optimum value

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

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

To set NOISE LEVEL:

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

Read peak mV level here.

PRODUKT 000	3mV
NEUTRAL	

With product memory 1...120:

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

9.6.10.2 Vibration Filter

VIBRATION FILTER (ESC)HOME	YES (-)(+)SET
---------------------------------------	--------------------------

Default: YES

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

YES = Vibration filter activated.

NO = Vibration filter deactivated.

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

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

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

9.6.10.3 FFT Filter

FFT FILTER (ESC)HOME	YES (-)(+)SET
---------------------------------	--------------------------

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

NO (gravity feed applications with reject device)

YES (gravity feed applications without reject device)

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

YES = Strong bandpass filter activated.

NO = Bandpass filter deactivated.

9.6.10.4 FIR Filter

FIR FILTER (ESC)HOME	YES (-)(+)SET
---------------------------------	--------------------------

Default: YES

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

YES = Lowpass filter activated.

NO = Lowpass filter deactivated.

9.6.10.5 GF Mode

GF MODE	YES
(ESC)HOME	(-)(+)SET

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

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

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

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

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

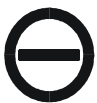
9.6.10.6 Exit Filter Menu

EXIT MENU	
(ESC)HOME	(OK)EXIT

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

9.6.11. Sensor Menu

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



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

SENSOR CALIBRATION	
(ESC)HOME	(OK)OPEN

Push  to open the submenu SENSOR CALIBRATION.

9.6.11.1 Sensor Field

SENSOR FIELD mm	300
(+)(-)SET	(ESC)HOME

Setting range: 10 ... 999

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

Do not change default value.

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

9.6.11.2 Frequency

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

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

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

9.6.11.3 Balance Factor

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

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

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

When BALANCE FACTOR **high**:

- High changes of temperature and similar noises are compensated.
- The signal of slow moving products and metal parts is also compensated.

9.6.11.4 Phase Calib.

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

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

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

9.6.11.5 Analog PH

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

Default value: None / **Auto Calibrated**


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

9.6.11.6 Exit System Menu


EXIT MENU (ESC)HOME	(OK)EXIT
------------------------	----------

Press  to exit the SYSTEM MENU.

9.7. Exit Menu



EXIT MENU
(ESC)HOME (OK)EXIT

Press  to exit the MENU and return to the main screen.

10. Electrical Connections



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

10.1. Terminals of Power Supply Board

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

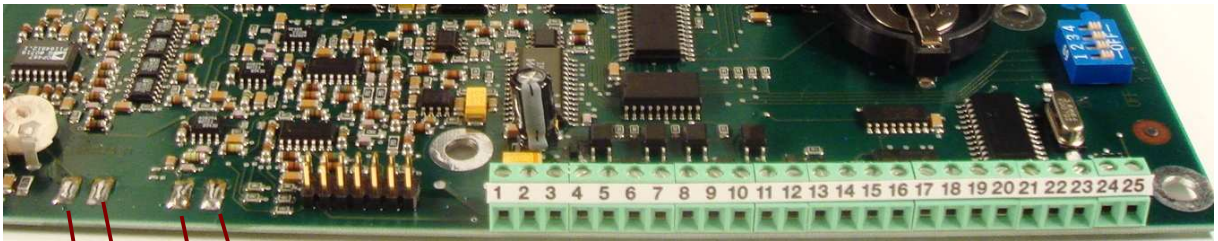


Terminal #	Function	Description
26, 27, 28	Ground	Ground potential for internal power supply
29, 30, 31	+ 24 V DC OUT	Internal Power supply source (max. 100mA)
Relais K2 32, 33, 34	Error alarm OUT	Closed line, potential free, switching capacity 230V AC at 2 A
Relais K1 35, 36, 37	Metal alarm OUT	Closed line, potential free, switching capacity 230V AC at 2 A
L1, N, PE	AC Power supply IN	Mains power supply 85 – 265 V AC / 45 – 440 Hz / 100 Watt

10.2. Relais K1, K2 - Function

Relais #	Terminal #	Power supply OFF	Error or adjust mode	Operational ok mode	Metal alarm
K2 Error	32				
	33				
	34				
K1 Metal	35				
	36				
	37				

10.3. Terminals on the Mainboard



Sender Out
Sender Ground
Receiver In
Receiver Ground

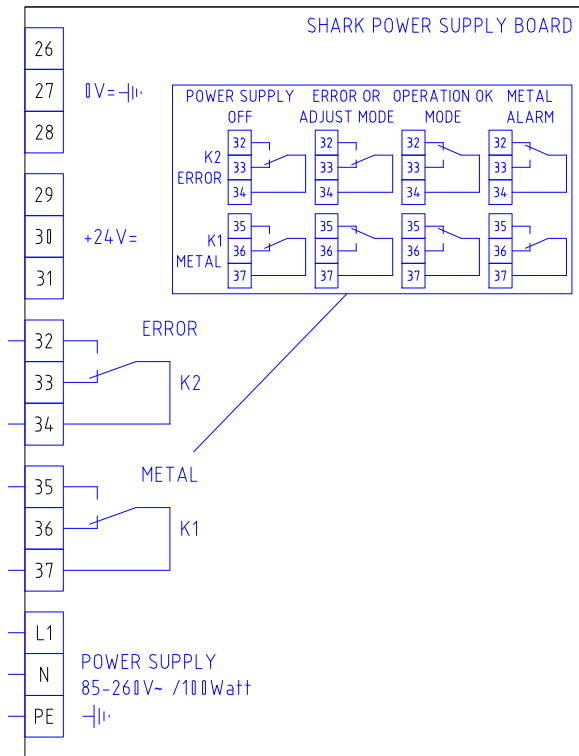
Terminals 1-25

#1
#25
...

10.4. Terminals / Electrical Wiring and Functions

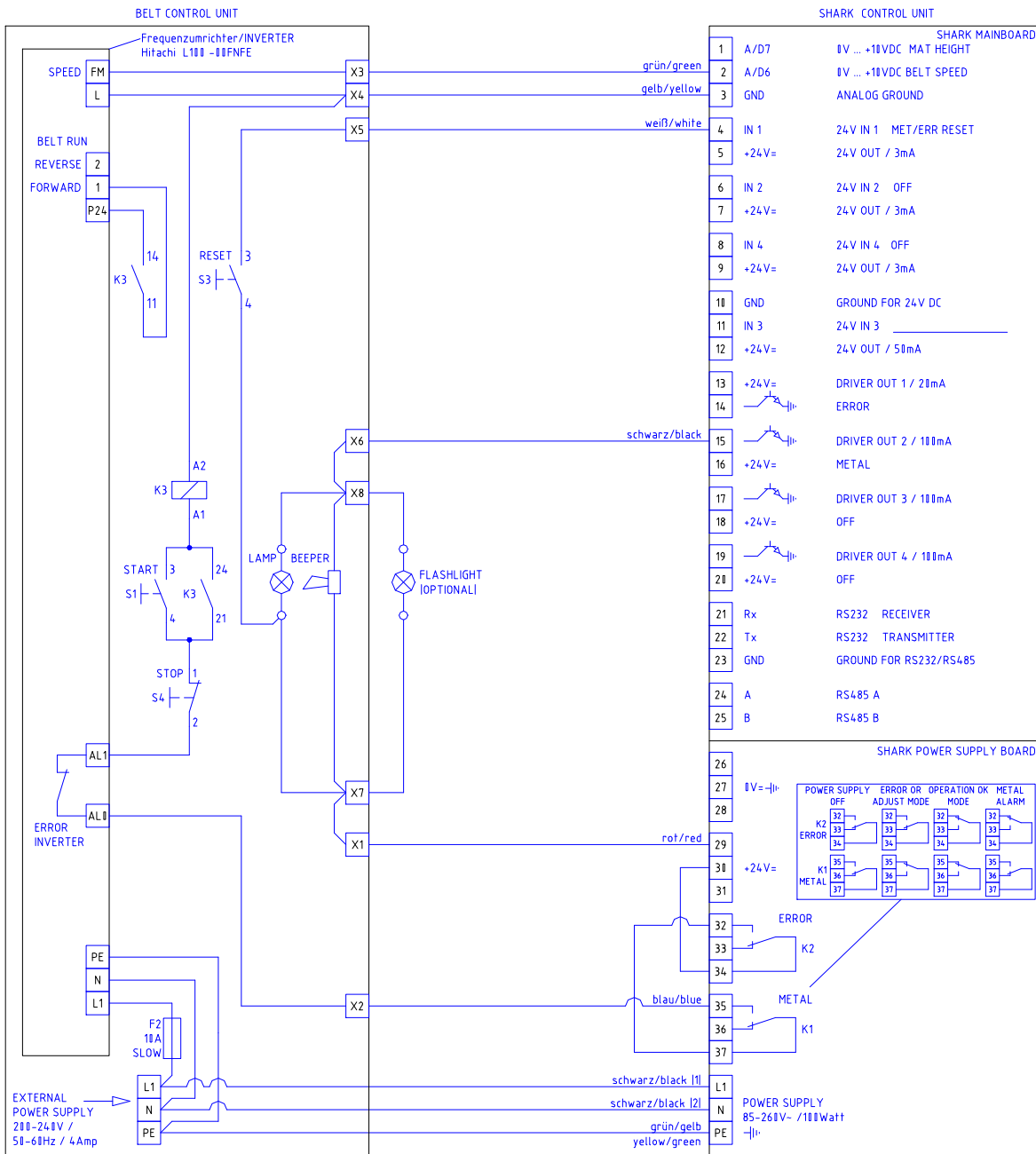
Terminal	Name	Ratings	Function
1	A/D7	0-10V DC	Analogue input, application specific
2	A/D6	0-10V DC	Analogue input, SHARK BD = belt speed input for speed
3	AGND	AGND	Analogue Ground
4	IN1	24V DC	Logic input, functions (see settings in the IN / OUT MENU)
5	+24=	24V DC, 3mA	+24V DC source for logic inputs
6	IN2	24V DC	Logic input, functions (see settings in the IN / OUT MENU)
7	+24=	24V DC, 3mA	+24V DC source for logic inputs
8	IN4	24V DC	Logic input, functions (see settings in the IN / OUT MENU)
9	+24=	24V DC, 3mA	+24V DC source for logic inputs
10	GND	GND	Ground for +24V DC
11	IN3	24V DC	Logic input, functions (see settings in the IN / OUT MENU)
12	+24=	24V DC, 50mA	+24V DC source for photo cell, proximity switch, etc.
13	+24=	24V DC, 20mA	+24V DC source for alarm device, e. g. bulb, buzzer, etc.
14	OUT1	24V DC	Logic output, functions (see settings in the IN / OUT MENU)
15	OUT2	24V DC	Logic output, functions (see settings in the IN / OUT MENU)
16	+24=	24V DC, 100mA	+24V DC source for alarm device, e. g. bulb, buzzer, etc.
17	OUT3	24V DC	Logic output, functions (see settings in the IN / OUT MENU)
18	+24=	24V DC, 100mA	+24V DC source for alarm device, e.g. bulb, buzzer etc.
19	OUT4	24V DC	Logic output, functions (see settings in the IN / OUT MENU)
20	+24=	24V DC, 100mA	+24V DC source for alarm device, e.g. bulb, buzzer etc.
21	Rx	-5...+5V digital	RS232 Asynchronous Serial-Data (receiver) input.
22	Tx	-5...+5V digital	RS232 Asynchronous Serial-Data (transmitter) output.
23	GND	GND	Ground for RS232 / RS485
24	A	+3V	RS485 Non-inverting Receiver Input and Non-inverting Driver Output
25	B	+3V	RS485 Inverting Receiver Input and Inverting Driver Output
26	GND	GND	Ground for +24V DC
27	GND	GND	Ground for +24V DC
28	GND	GND	Ground for +24V DC
29	+24=	24V DC, 33mA	+24V DC source for PLC, alarm device, e.g. bulb, buzzer etc.
30	+24=	24V DC, 33mA	+24V DC source for PLC, alarm device, e.g. bulb, buzzer etc.
31	+24=	24V DC, 33mA	+24V DC source for PLC, alarm device, e.g. bulb, buzzer etc.
32, 33, 34	K2	max. 230V AC at 2A	ERROR ALARM Dry contacts 34 - 33 close contact = Power off, Error, Adjust mode, Failure 34 - 32 close contact = Normal metal detector function
35, 36, 37	K1	max. 230V AC at 2A	METAL ALARM Dry contacts 37 - 36 close contact = Power off, Metal alarm 37 - 35 close contact = Normal metal detector function
L1	LIVE	85-260V AC 50-60Hz Single Phase 100 Watt	Power supply Input Never mix 24 VDC and 115/230 VAC wiring in the same cable!
N	NEUTRAL	0V	Neutral wire of single phase power supply.
PE	PE	Ground	Safety ground This point must be connected to protective earth or adjacent building steel.

SHARK CONTROL UNIT



		SHARK MAINBOARD
1	A/D7	0V ... +10VDC MAT HEIGHT
2	A/D6	0V ... +10VDC BELT SPEED
3	GND	ANALOG GROUND
4	IN 1	24V IN 1 _____
5	+24V=	24V OUT / 3mA
6	IN 2	24V IN 2 _____
7	+24V=	24V OUT / 3mA
8	IN 4	24V IN 4 _____
9	+24V=	24V OUT / 3mA
10	GND	GROUND FOR 24V DC
11	IN 3	24V IN 3 _____
12	+24V=	24V OUT / 50mA
13	+24V=	DRIVER OUT 1 / 20mA
14		_____
15		DRIVER OUT 2 / 100mA
16	+24V=	_____
17		DRIVER OUT 3 / 100mA
18	+24V=	_____
19		DRIVER OUT 4 / 100mA
20	+24V=	_____
21	Rx	RS232 RECEIVER
22	Tx	RS232 TRANSMITTER
23	GND	GROUND FOR RS232/RS485
24	A	RS485 A
25	B	RS485 B

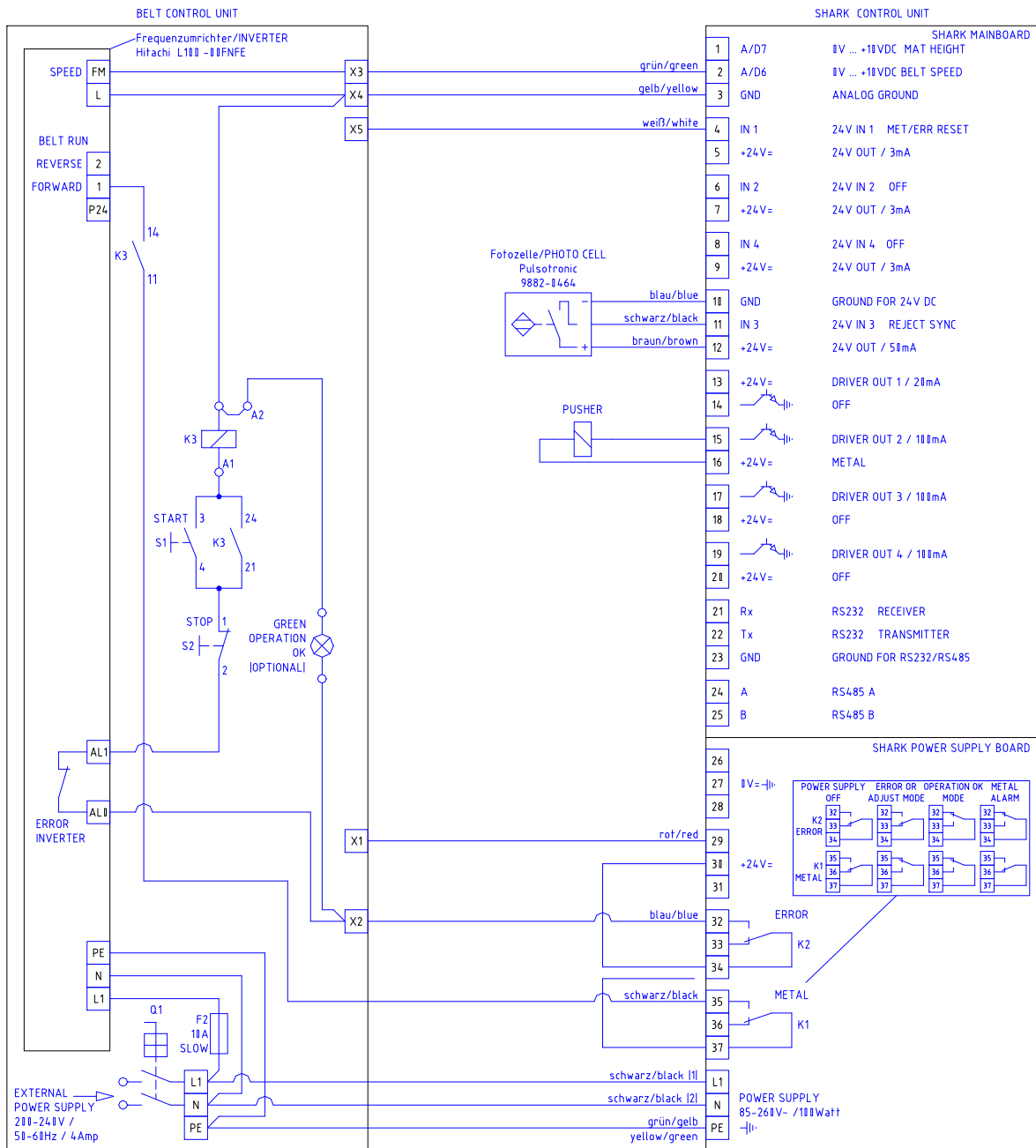
10.5. Wiring Diagram: Reject = Belt Stop (Conveyor Models)



IMPORTANT NOTE for use with 110V AC, (three phase) power supply:

Connect one phase of 110VAC to L and another phase of 110VAC to N. Connect Ground / PE to PE.

10.6. Wiring Diagram: Reject = Pneumatic Pusher (Conveyor Models)



IMPORTANT NOTE for use with 110V AC (three phase) power supply:

Connect one phase of 110VAC to L and another phase of 110VAC to N. Connect Ground / PE to PE.

11. Maintenance and Regular Inspections

11.1. Maintenance

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

11.2. Regular Inspections

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

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

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

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

11.3. Notes

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

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

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

Do not change the conveyor belt construction without having asked the manufacturer of detector and belt.

12. Conveyor Belt System

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

12.1. Conveyor Belt Maintenance

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

1. **Check belt tension:** The conveyor belt must only be tensioned so that it is just moved by the driving drum. **IMPORTANT:** If belt tension is too strong, the roller bearing may be damaged or subjected to premature wear.
2. **Check belt run:** If the conveyor belt is to run at the side, the drums will have to be readjusted. The belt always runs to the side which is tensioned less.
3. **Clean belt:** Never use aggressive detergents.
4. **Check belt for damage:** Replace the belt if it is considerably damaged.
5. **Check bearing of the drive and deflection drum:** The bearings are equipped with maintenance-free tension bearings. The filling of grease is generally adequate for the service life of the bearing.
6. **Check deflection rollers:** The deflection rollers are equipped with maintenance-free bearings and require no lubrication whatsoever. If you discover any wear, the rollers must be replaced.
7. **Check electrical connections and cable entries for damage:** If you discover damage, repairs must be carried out immediately by expert personnel.

13. Error Messages and Trouble Shooting

13.1. Error Messages of the Software

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

Error	Error text	Cause	Remedy	Confirmation
1	COMP. PRE	<ul style="list-style-type: none"> • Sensor out of the alignment • Mainboard damaged • big metal object in the detector 	<ul style="list-style-type: none"> • Replace mainboard • Contact technician 	<ul style="list-style-type: none"> • Turn on/off metal detector
2	COMP. FINE	<ul style="list-style-type: none"> • Mainboard damaged 	<ul style="list-style-type: none"> • Replace mainboard 	<ul style="list-style-type: none"> • Turn on/off metal detector
3	SIGNAL CLIP	<ul style="list-style-type: none"> • During the learn process product effect to high 	<ul style="list-style-type: none"> • Use other products • Contact technician 	<ul style="list-style-type: none"> • Confirm with OK • Restart learn process
4	REJECT	<ul style="list-style-type: none"> • Reject problem 	<ul style="list-style-type: none"> • Check pusher for mechanical problem • Check reject sensor (photo cell or proximity switch) • Parameter REJECT CONFIRM must be set to NO, if no photo cell for reject validation is connected. 	<ul style="list-style-type: none"> • confirm with OK • Error reoccurs after next rejection when pusher does not work properly
5	PV ELAPSED	<ul style="list-style-type: none"> • Performance validation test not done within preset period of time 	<ul style="list-style-type: none"> • Confirm with OK and repeat test 	<ul style="list-style-type: none"> • Confirm with OK • Error reappears, if period of time has expired and the PV test was unsuccessful
6	BIN FULL	<ul style="list-style-type: none"> • The bin is full or a product blocks sensor 	<ul style="list-style-type: none"> • Empty bin • Check bin (photo cell or proximity switch) 	<ul style="list-style-type: none"> • Confirm with OK • Error message reappears after 30 seconds, if bin still full

Error	Error text	Cause	Remedy	Confirmation
7	LOW AIR	<ul style="list-style-type: none"> Compressed air problem 	<ul style="list-style-type: none"> Check air pressure Check air pressure sensor 	<ul style="list-style-type: none"> Confirm with OK Error message reappears after 30 seconds, if not enough air pressure
8	NO PRODUCT	<ul style="list-style-type: none"> During learn period no product effects measured 	<ul style="list-style-type: none"> Check whether products pass sensor during learn period Product does not have a product effect 	<ul style="list-style-type: none"> Confirm with OK Restart LEARN
9	KEYBOARD	<ul style="list-style-type: none"> Keyboard problem, e. g. due to mechanical damage (a key is jammed) 	<ul style="list-style-type: none"> Disconnect the connection between keyboard and mainboard. Error 9 should not reoccur. Replace keyboard. 	<ul style="list-style-type: none"> Confirm with OK Error message appears until keyboard is replaced
10	MEMORY	<ul style="list-style-type: none"> Memory problem, parameters can not be saved 	<ul style="list-style-type: none"> Turn on/off metal detector Replace the memory if error reappears after turning on/off 10 times 	<ul style="list-style-type: none"> Confirm with OK Error message appears until memory is replaced
11	SLAVE NET (Option)	<ul style="list-style-type: none"> Network error (no connection to master in case of slave net) 	<ul style="list-style-type: none"> Control network settings and network wiring Power on Master Unit 	<ul style="list-style-type: none"> Push OK
12	BELT (Option)	<ul style="list-style-type: none"> Conveyor does not start 	<ul style="list-style-type: none"> Check function of conveyor check belt sensor (photo cell or proximity switch) check colored marked area on belt: still visible? 	<ul style="list-style-type: none"> Push OK Search reason for belt stop adjust belt sensor (photo cell or proximity switch) renew marked area on belt

14. Instruction Sheet

14.1. General Function

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

Start of work:

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

Metal detection:

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

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

Production:

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

Metalliferous product:

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

14.2. General Metal Detector Manual

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

ISO 9000:

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

HACCP:

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

Method of operation:

The metal detector establishes an electro magnetic field in the search coil. This field changes when a metal passes through. Then a metal alarm is set off.

A metal detector reacts on magnetism and electric conductivity.

Operating instructions:

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

Additional hints:

Withdraw the regular metal detector check from the specific operating instructions.

Inform the HACCP-agent about irregularities and error messages.

Parameter List METAL SHARK® / Software 3.94o

Project :	Date:	Model: BD	Unit #:
PRODUCT	_____	Product memory number	
TEACH PRODUCT		Starts product teach procedure (Product 1-120)	
PRODUCT TOL.	_____	Product effect compensation (Product 1-120)	
METAL SENSE mV	_____	Metal-sensitivity	
OPEN MENU		Enters the menus listed below	
REPORT MENU			
METAL COUNTER		Counts each metal alarm (just for information)	
INFO LAST METAL		Last metal signal amplitude (just for information)	
INFO PRODUCT		Display of product parameters (just for information)	
INFO SOFTWARE VERS.	<u>3.94o</u>	Display software version (just for information)	
PRINT	<u>NO</u>	Print mode for metal alarms and data logging	
INTERFACE	<u>RS232</u>	Type of serial interface and Network protocol	
BAUD	<u>9600</u>	Data rate of serial interface	
SHARKNET UNIT #	<u>1</u>	Network-ID of unit (1 = master / stand alone system)	
REPORT TO PRINTER		Sends report of metal alarms to printer (via RS232)	
REPORT TO LCD		Displays report of metal alarms on LCD	
PRODUCT MENU			
NAME	_____	Product name (Product 1-120)	
PRODUCT IS	_____	Product property (for product teach process)	
PRODUCT X TOL	___	Product suppression X (in addition to PRODUCT TOL)	
PRODUCT Y TOL	___	Product suppression Y (in addition to PRODUCT TOL)	
TEACH AREA	___ / ___	Info teach area	
AMP X %	<u>200</u>	Amplification X channel (product signals)	
AMP Y %	<u>200</u>	Amplification Y channel (metal signals)	
PHASE	_____ °	Product compensation phase (Product 1-120)	
PHASE TRACK	<u>0.00°</u>	Step size for automatic product phase tracking	
COPY PROD.	<u>001->002</u>	Copy content of current product menu to other product #	
TEACH MENU			
TEACH SENSE mV		Sensitivity after TEACH PRODUCT	
TEACH MIN COUNT	___	Minimum product signals in each TEACH STEP	
TEACH MAX COUNT	___	Next TEACH STEP after max. Product count	
TEACH TIME sec	___	Time duration for each single TEACH STEP 1 and 2	
STATISTIC sec	___	Time duration for STATISTIC STEP	
TEACH ENABLE	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Enables or disables TEACH PRODUCT (disabled: Product 0 only)	
TEACH REJECT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Activates metal out contact during TEACH PRODUCT	
VALIDATION MENU			
REJECT CONFIRM	<input type="checkbox"/> YES <input type="checkbox"/> NO	Enables reject check option	
BIN FULL	<input type="checkbox"/> YES <input type="checkbox"/> NO	Enables bin full option	
LOW AIR	<input type="checkbox"/> YES <input type="checkbox"/> NO	Enables low air option	
PERFORM VALID SYSTEM			
PVS	<input type="checkbox"/> YES <input type="checkbox"/> NO	Enables Performance Validation System	
PV FREQ. hrs	<u>8</u>	Time between PV tests	
PV WINDOW min	<u>30</u>	Time available to perform PV	
PV FE mm	_____	Size of Fe test sphere requested for PV	
PV FE max mV	_____	maximum signal accepted as test sphere	
PV NONFE mm	_____	Size of NFe test sphere requested for PV	
PV NONFE max mV	_____	Maximum signal accepted as NFe test sphere	
PV SS mm	_____	Size of SS test sphere requested for PV	
PV SS max mV	_____	Maximum signal accepted as NFe test sphere	
PV ERROR COUNT	<u>3</u>	Maximum number of failed tries	
RUN PV TEST ?		OK = Performance validation NOW !	

|SYSTEM MENU

- |SPEED mm/sec _____ Product speed through sensor (e.g. Belt speed)
- |REMOTE PRODUCT YES NO Enables or disables remote product number setup
- |PASSWORD YES NO Avoids unauthorized parameter set-up
- |EXPERT MODE YES NO Enables or disables expert mode
- |REJECT MENU**
- |DELAY mm _____ Time delay for metal out contact
- |DURATION ms _____ Time duration for metal out contact
- |METAL CONTACT _____ Program switching mode of metal out contacts
- |DATE / TIME MENU**
- |YY/MM/DD _____ Sets date
- |HH:MM:SS _____ Sets time
- |AUTOSPEED MENU**
- |AUTOSPEED YES NO Enables Autospeed function (for BD conveyor type only)
- |0 mm/sec. = mV _____ Calibrates belt speed input at 0 mm/sec.
- |300 mm/sec. = mV _____ Calibrates belt speed input at 300 mm/sec.
- |CIP MENU**
- |CIP REJECT sec. 0 Clean in place: timing for reject position
- |CIP NORMAL sec. 5 Clean in place: timing for normal position
- |CIP TIMEOUT min. 180 Clean in place: stops after this time has elapsed

|IN / OUT MENU

	OFF	RESET MET/ERR	ON / OFF CONVEYOR	START TEACH	REJECT TEST	REJECT VALID	REJECT SYNC	REJECT SAFETY	KEYPAD LOCK	LOW AIR	START CIP	BIN FULL	MET COUNT RESET	FALSE TRIP	CONVEYOR RUNS?
IIN1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IIN2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IIN3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IIN4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	OFF	METAL	METAL INVERSE	ERROR	ERROR INVERSE	MET+ERR	MET+ERR INVERSE	MET ZERO DELAY	PV TEST	DUAL FREQ	TEACH CONFIRM	CIP OUT	PUSHER	METAL CLOCKED	START CONVEYOR
IOUT1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IOUT2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IOUT3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IOUT4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

|FILTER MENU

- |NOISE LEVEL mV _____ Sensor Noise Level
- |VIBRATION FILTER YES NO Vibrationfilter on/off
- |FFT FILTER YES NO Bandpass filter on/off
- |FIR FILTER YES NO Lowpass filter on/off
- |GF MODE YES NO Gravity Feed – Mode on/off
- |SENSOR CALIBRATION (DO NOT CHANGE !)**
- |SENSOR FIELD mm _____ Adapts sensor size to electronic (never change)
- |FREQUENCY Hz _____ Sensor resonance frequency (never change)
- |BALANCE FACTOR _____ Sensor balance regulation factor (never change)
- |PHASE CALIB. _____ ° Sensor calibration zero phase (never change)
- |ANALOG PH _____ ° Mainboard calibration zero phase (auto cal by +/-)

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