Metal Detection

- Metal Detectors
- for the
- Foodstuff Industry
Dear Reader,

Our new catalogue introduces to you our wide range of products which enable integration of metal detecting equipment in almost all production stages of the foodstuff industry.

It is the first time that Pulsotronic-SKS GmbH and Cassel Messtechnik GmbH are trading under a common company name, and are in this way taking account of their many years of co-operation in development and distribution of metal sensing equipment. So both companies are perfectly complementing each other.

The metal separation division of Pulsotronic SKS has many years of experience in development of equipment for the detection of metallic particles in bulk materials.

Since 1994, Cassel Messtechnik GmbH has been dealing with the development of metal detectors for the foodstuff industry. About 1000 metal detectors are manufactured per year and supplied to our customers world-wide. Our export rate of 40% represents the high product quality that is required for international trade.

As our customer, you are profiting from the practical experience of our designers and consultants and may obtain up-to-date information from our comprehensive field staff network. So you can be sure that our products are always representing state-of-the-art technique.

We are looking forward to assisting you with our competence of metal detection.

Pulsotronic
Metal Detectors in Food Production
Technology and function
HACCP and ISO 9000

Pages 4-7

METAL SHARK® Control Unit
The new generation in metal detecting technology

Application and operating principle
Technical characteristics

Pages 8-11

METAL SHARK® BD
Metal detector for conveyor installation

Application and operating principle
Technical characteristics

Pages 12-15

METAL SHARK® GF - Down Pipe
Metal detector for free-falling powder and bulk products

Application and operating principle
Technical characteristics

Pages 16-19

METAL SHARK® GF compact - Down Pipe
Metal detector for free-falling powder and bulk products, low assembly height

Application and operating principle
Technical characteristics

Pages 20-23

METAL SHARK® IN - Inline
Inline metal detector for fluid and pasty products in pipes

Application and operating principle
Technical characteristics

Pages 24-27

Pulsotronic-SKS/Cassel Distribution
National and worldwide

Pages 28-29
Technology & Function

Why a Metal Detector?

The task of metal detectors is to detect metallic foreign bodies in non-metallic products, and they are thus used in many industrial production processes, particularly in the food production sector, where great demands are made to product quality and hygiene.

Raw Material Purity - Incoming Inspection

Producers who can precisely verify raw materials are able to reduce non-conformance costs by making early diagnoses and also to assess their suppliers’ product quality.

Finished Product Purity - Final Inspection

The customer shall receive only pure products with the maximum purity that can be achieved in the technological process.

Protection of Production Facilities - Process Control

Metal pieces having managed to enter the material stream can severely disturb or even destroy production facilities. Down-times of machines and plants can negatively affect the constancy of product quality and quantity.

HACCP-Critical Check Point for Metallic Foreign Bodies

A critical control point is a certain point within the production chain where lacking supervision can result in a non-acceptable risk to human health.

Function

The metal detector operates according to an inductive measuring principle. A high-frequency electromagnetic alternating field is generated by a transmitter coil. If a metal piece passes through the metal detector, the field undergoes a change according to the magnetic and electrical properties of the metal piece.

The change in the field is measured by a balanced pair of receiver coils, subsequently reprocessed and digitally analysed by the control unit.

This measuring principle reacts to electrical conductivity and magnetism and is therefore able to recognise all types of metals, i.e. non-ferrous metals and stainless steel. However, magnetic metals can be recognised slightly better than nonmagnetic metals. The measuring field penetrates the food products and recognises metal pieces even deep within the product or in packages.

Metal Detectors respond to

- Electrical Conductivity
- Magnetism

All metals are detected, even non-ferrous and mild steel.

Magnetic metals can be detected better than non-magnetic metals.

The measuring field penetrates the food products and recognises metals objects even inside packages.

Technical limits = Product Effects

The maximum sensitivity is limited by the physical laws on which the measuring principle is based. Food often has a more or less strong electrical conductivity due to small contents of salt, sugar, minerals and water which cause the metal detectors to respond. This reaction is referred to as product effect.

In most cases, the sensitivity attainable in practice primarily depends on the metal detector’s capability to compensate the product effect.
Metal Detecting Systems

Conveyors / METAL SHARK® BD

Conveyor: The metal detector is integrated into a belt conveyor either with the belt passing through the frame search coil or being installed just below the belt as flat search coil. There are several devices available to reject the detected metal pieces (e. g. Pusher).

Gravitiv Feed / METAL SHARK® GF

Down-pipe applications: Bulk material falls into a pipe through the metal detector. Metal pieces are rejected by means of a separation flap.

Inline / METAL SHARK® IN

Pipeline metal detectors: This in-line system serves to detect metal pieces in pasty or liquid products, and it is integrated into the conveyor pipes (e. g. with milk pipe fittings). The metal pieces can be discharged from the system by means of three-way-special-valves.

Test Procedures and Intervals

With the help of a metallic test bullet of a defined size, the function of the metal detector can be tested in operation. A test bullet is added to the product and subsequently passed through the metal detector. If the detector recognises the bullet, the test is successful.

Metallic test bullet encapsulated in plastic

The test intervals shall be short enough: All products having passed the metal detector since the last test procedure must be able to be re-tested once again. In addition, tests should be carried out at the beginning of the shift and when changing products.

Documentation

Companies working in accordance with HACCP and ISO 9000 shall document the metal detection process in writing to make it traceable, verifiable and safer. By means of a logging printer connected to the metal detector by data interface, it is possible to produce complete, automatic documentation of metal detection, tests and all set parameters. On request, a suitable printer can be supplied together with the metal detector.

Logging printer, integrated into a METAL SHARK® metal detecting system
What is HACCP?

HACCP (Hazard Analysis and Critical Control Points) is a program to avoid non-conformances in the Food Processing Industry.

HACCP and Metal Detectors

With respect to metal detection, the HACCP program requires the following:

**Critical Control Point**
The metal detector is a critical physical control point of the danger of metal pollution. If control is not carried out, there is a risk of health hazard.

**GMP - Good Manufacturing Practice**
Here, detectability defines the critical limiting value for the calibration to the smallest recognisable metal bullet. A product has to be kept free from metal pollution as much as possible by „Good Manufacturing Practice“ (GMP) and according to the latest state-of-the-art. With reference to metal detectors, this means that all metal pieces which a modern metal detector can reliably detect at optimum installation have to be removed from the product.

**Critical limiting value**
Setting of the critical limiting value, however, must in any case enable the metal detector to operate in a stable and reliable manner without giving random or false alarms.

**Systematically and continuously**
It must be guaranteed that all products are systematically and continuously tested by the metal detector.

**Documentation**
Complete documentation must be made on both operation and results of the metal detection.

**Correction Procedure**
If a metal piece is detected in the production process, it is absolutely necessary to find its source. The source of metal contamination has to be rigorously eliminated in order to exclude further pollution from the same source.

**Maintenance**
Modern metal detectors are equipped with an automatic self-control system and are, therefore, maintenance-free.

Preventive maintenance by the manufacturer of metal detectors include consulting the customer and checking the system in situ for correctness of the equipment after a longer operation period. It is checked that no external interference affects the system’s performance and that the detecting sensitivity for the current product and site is still optimally set. This includes, in addition, the training and introduction of new staff and the metal detector's integration into quality management.

**DIN ISO 9000 and Metal Detectors**
It is advisable to elaborate written detailed job instructions for the metal detector wherein e. g. the measures to be taken after metal alarm and testing procedures are laid down.

Upon request, an example for job instructions can be obtained from Pulsotronik-SKS CASSEL. Furthermore, reference is made to all the items specified under HACCP.

**Job instruction: General Function**
Instruction for: Quality management staff, HACCP-Manager.

At job start:
Switch the metal detector on and wait until STATUS OK is displayed.

Select the appropriate product number (refer to job instruction „Recall product number“).

Check Metal Detector Function:

Move some metal free product samples through the metal detector. A metal alarm must NOT occur!

Move another product sample along with a metal test object through the sensor head.

A metal alarm must occur now!

The test intervals must be short enough. All products having passed the metal detector since the last test procedure must be able to be re-tested again. In addition, tests should be carried out at the beginning of the working shift and when changing products.

**Production:**
It must be guaranteed that all products are systematically and continuously tested by the metal detector.

**Metal alarm:**
If a metal piece is detected in the production process, it is absolutely necessary find its source. The source of metal contamination has to be rigorously eliminated in order to exclude further pollution from the same source.
Example: Daily Metal Detector Record

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

A suitable metal testing object and a testing schedule should be established for the examination: The testing object should be a bullet of the smallest diameter which detection is required. The bullet is passed through the detector along with the product in order to observe whether a metal detection signal is generated.

The testing schedule should establish when the detector shall be tested and by whom. Example: The quality manager on duty has to test the detector using the testing object one hour after the start of each shift. The test results including date, time and signature are recorded in the log. Example: Test object recognised, 24 August 2001, 08:30, signed, Smith.

<table>
<thead>
<tr>
<th>Time</th>
<th>Results</th>
<th>Comments</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pass</td>
<td>Fail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pass</td>
<td>Fail</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>No. of packages rejected</th>
<th>Disposition of packages</th>
<th>Comments</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Application and Operating Principle

For a number of years, our company has been developing and producing highly sensitive metal detectors for industrial purposes. Our development department is utilizing practical experience from the daily practice. This results in constant improvement of equipment and production methods. Already when the company started introducing the digital signal processing technology, it became a trendsetter for technical standards.

METAL SHARK® is a new range of products which are particularly ‘aggressive’, i.e. they are extremely sensitive to any kind of metallic contamination. That is why METAL SHARK® systems are preferably used in the foodstuff industry to yield the most precise metal detection results.

The heart of all METAL SHARK® detectors is the electronic control unit with its completely new design. For the first time, all electronic components are arranged on a common board, and almost all functions are digital. Its measurement accuracy and product effect blanking out enable the METAL SHARK® detectors to supply optimum results. So it is one of the most powerful metal detectors available. Owing to series production, its price, however, remains on the level of conventional metal detectors.

In practical use, settings of metal detectors often need to be checked quickly and reliably during running production. That is why great value was attached to user-friendly operation. The software is self-explanatory and leads the operator step by step through the setup menus. A LED bar indicates the quantity of the product effect and the metal detection threshold. The unit is operated by means of a foil keyboard at the outer side of the control cabinet.

The product effect blanking-out of the METAL SHARK® detectors was refined further. Especially the electric conductivity of salty and wet foodstuffs is influencing the measurement signals of the metal detector. Only if these signals are precisely characterised and filtered, even the smallest metallic particles can be found in such products. This precision of product effect blanking-out is achieved by digital sensor processor technology of the latest generation.

The transducer amplification is automatically adapting to the product. In case that products with both very great and very low product effects are scanned by one and the same metal detector, the unit will automatically select the optimum amplification.

For permanent industrial operation, both enclosure and control unit are made of sturdy and food-grade high-grade steel. The unit is service-free.

The metal detector can be supplied on a short notice. The most common sizes and types - including various accessories, like belt conveyors, pneumatic pushers and signal transducers - are in stock.

In case that no standard design is available for installation in a certain production line, the Pulsonic-SKS/Cassel team will provide a customised solution.

New single-board technology: Using latest state-of-the-art SMD-technology brings advantages as noise immunity and enhanced reliability.
Precise Metal Detection on Highest Level

The METAL SHARK® electronic control unit supplies excellent and reliable metal search results during operation.

**Digital balance control** - keeps the detector coil always at the optimum working point and compensates temperature and humidity influences.

**Digital frequency control** - guarantees constantly stable coil frequencies and phases.

**Digital noise filters** eliminate undesired signals.

**Digital product effect blanking-out** ensures optimum metal recognition even in wet products. Product effects are blanked-out and compensated in an intelligent way (tracking).

**Multi-channel technology** for an optimum recognition of all metals.

**PowerDrive circuit** - An extremely powerful measuring field in the sensor coil provides a reliable operation even in areas of interference.

Large sensor enclosures shield the device effectively against electromagnetic interference fields and concentrate the measuring field in the sensor coil.

**Competitive SHARK® Sensor**

**Highest endurance** - the extra sturdy sensor construction is designed to operate under extreme conditions which cause others to fail.

**Intuitive operation**

The display shows only the information that is really necessary. Reduction to the essential makes operation clear and transparent.

**Programmable function keys** - you can assign frequently used functions and call them later at the touch of a button (e.g. the learning function).

**Product effect library** - to store and recall the characteristics of 50 different products.

**Training function** provides simple and quick learning of product characteristics for product effect compensation.

**Password protection** against unauthorised operation.

**Timer** (pulse length, pulse delay) to control separating systems in a synchronised way.

**Acquisition of internal operation data** - Events such as metal detections or parameter settings are stored including date and time and can be read on the display or exported via serial interface.

**Operation safety**

Maintenance-free - The METAL SHARK®'s digitalized circuitry ensures many years of reliable performance.

Automatic self-control - possible functional defects of the device are displayed at a separate output contact.
## Technical Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>METAL SHARK ® Control Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>85-264 V / 50-60 Hz</td>
</tr>
<tr>
<td>Power input</td>
<td>100 Watts</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10°...+50°C / 15°... 120° F</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP65 (Nema 4, 4x, 6, 1 2, 1 3)</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Stainless steel, Attached to the side of the sensor or wall mounting</td>
</tr>
<tr>
<td>Cables</td>
<td>2.5 m (8.2 feet), with protection tube (with wall mounting unit)</td>
</tr>
<tr>
<td>Weight</td>
<td>8 kg (17.5 pounds)</td>
</tr>
<tr>
<td>Measuring</td>
<td>Balanced pair of inductive coils Multi-chanel-technology</td>
</tr>
<tr>
<td>Electronics</td>
<td>Latest digital technology</td>
</tr>
<tr>
<td></td>
<td>Digital dynamic noise filter</td>
</tr>
<tr>
<td></td>
<td>Digital balance control</td>
</tr>
<tr>
<td></td>
<td>Digital frequency control</td>
</tr>
<tr>
<td></td>
<td>Self-monitoring of function</td>
</tr>
<tr>
<td></td>
<td>No maintenance required</td>
</tr>
<tr>
<td></td>
<td>Self-adjusting of all circuits</td>
</tr>
<tr>
<td></td>
<td>PowerDrive circuit</td>
</tr>
<tr>
<td>User interface</td>
<td>Keyboard</td>
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<tr>
<td></td>
<td>LC-display</td>
</tr>
<tr>
<td></td>
<td>Intuitive, self-explaining menus</td>
</tr>
<tr>
<td></td>
<td>LEDs bar meter (metal signal)</td>
</tr>
<tr>
<td></td>
<td>LEDs for OK /Fault /Metal</td>
</tr>
<tr>
<td></td>
<td>Programmable function keys</td>
</tr>
<tr>
<td></td>
<td>Password protection</td>
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<tr>
<td></td>
<td>Product library for 50 set-ups</td>
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<tr>
<td></td>
<td>Product teach manager</td>
</tr>
<tr>
<td></td>
<td>Timer for reject device control</td>
</tr>
<tr>
<td></td>
<td>History feature (data logging)</td>
</tr>
<tr>
<td>Output signals</td>
<td>Metal relay changeover contact (max 250V/1A)</td>
</tr>
<tr>
<td></td>
<td>Metal alarm signal for PLC (out 24V/20mA)</td>
</tr>
<tr>
<td></td>
<td>Fault relay changeover contact (max 250 V/1 A)</td>
</tr>
<tr>
<td></td>
<td>Reject device drive, e.g. solenoid valve (24V DC/30mA)</td>
</tr>
<tr>
<td>Input signals</td>
<td>Reject trigger, e.g. optical sensor (24V DC)</td>
</tr>
<tr>
<td></td>
<td>Control air pressure of reject device (24V DC)</td>
</tr>
<tr>
<td></td>
<td>Control reject success (24V DC)</td>
</tr>
<tr>
<td></td>
<td>Remote metal reset push button (24V DC)</td>
</tr>
<tr>
<td></td>
<td>Remote lock keyboard against unauthorised access (24V DC)</td>
</tr>
<tr>
<td>Logging interface</td>
<td>RS232, e.g. printer to log reject data according HACCP</td>
</tr>
<tr>
<td>Network interface</td>
<td>RS485 (as option)</td>
</tr>
<tr>
<td>Options</td>
<td>• Ethernet Interface 10Mbit/s</td>
</tr>
<tr>
<td></td>
<td>• Logging printer</td>
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<tr>
<td></td>
<td>• Alarm horn</td>
</tr>
<tr>
<td></td>
<td>• Xenon flash light</td>
</tr>
<tr>
<td></td>
<td>• Remote product selector switch</td>
</tr>
</tbody>
</table>
METAL SHARK® BD -
Metal detector for conveyor installation

Food-grade, stainless design

Application and Operating Principle

Typically, the BD types are used in conveyor belts and provide highest performance in detecting magnetic and non-magnetic metals. Different methods are available to reject metal objects (pusher, belt stop + alarm etc.).

Typical products for METAL SHARK® BD:
- Deep freeze products
- Candies
- Bread, cakes and pastries
- Fish
- Meat and meat products
- Ready-to-serve-meals
- Raw material checks

The devices are of 100% stainless steel and specifically designed for use in the food industry.

Order information: Metal Detector
METAL SHARK® BD a x b
Example METAL SHARK® BD 450 x 175 (18” x 7”)
a = Aperture width 450 mm (18”)
b = Aperture height 175 mm (7”)
Scope of supply:
- SHARK® digital control unit
- Sensor head, non dividable

Order information: Conveyor
HQ axb-c
Example HQ 1800x400 - GK (HQ 6’x16” - GK)
a = Total conveyor length 1800 mm (6 feet)
b = Belt width 400 mm (16 inch)
c = Belt type (GK = chain link belt, PU = polyurethane-belt)
Scope of supply:
- Conveyor unit (complete)
- Rollers with brakes (4x)
- Belt control unit with Start/Stop/Reset
- Frequency inverter for smooth belt speed control
- Belt speed (adjustable) 5-30 m/min. (16-100 ft/min.)
- Belt height = 800 ±100 mm (32 ± 4 inch)

Optional accessories should be advised directly. Example: including log printer.

Tip: The digital electronic control system type SHARK® is described in detail elsewhere in this catalogue.

Complete systems
Cassel offers complete systems consisting of conveyor belt HQ and metal detector METAL SHARK®. The belts are available in standard (short terms of delivery) and customised equipment. A complete system is ready for operation immediately after installation.

How to choose the installation place
Both packed and unpacked products can be tested for metal.

As a rule, the smaller the aperture opening of the metal detector, the better the metal detection performance.

If possible, only packaged goods should be tested, as this prevents new metal contamination.

If the metal detector is used for machine protection, it should be installed as near as possible before the machine to be protected.

METAL SHARK® BD metal detector installation in existing belt conveyors:
The belt conveyor must have a stable frame support. Supports made of angular metal sheets are not suited for installation of metal detectors!
Belt control unit, with optional turn key buttons (lockable keyboard, reset metal alarm)

METAL SHARK® BD 450x175 with Conveyor HQ 1800x400-GK,
Options: Chain link belt Intralox blue (Standard=White belt)

Reject option:
Switching flap at belt end

Reject option:
Pneumatic transversal pusher (for packaged food)

Reject option: Pneumatic push arm (e.g. to reject glasses)
## Technical Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>METAL SHARK® BD (Detector) HQ(Conveyor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture width</td>
<td>50 - 1000 mm/ 2 - 40 inch</td>
</tr>
<tr>
<td>Aperture height</td>
<td>50 - 500 mm/ 2 - 20 inch</td>
</tr>
<tr>
<td>Sensor type</td>
<td>Non dividable</td>
</tr>
<tr>
<td>Installation</td>
<td>typical horizontal, but each angle</td>
</tr>
<tr>
<td>Metal free zone</td>
<td>Fix metal = 1,0 x aperture height</td>
</tr>
<tr>
<td>Before/after detector</td>
<td>Moving metal = 1,5 x aperture height</td>
</tr>
<tr>
<td>Power supply</td>
<td>85-264 MI 50-60 Hz</td>
</tr>
<tr>
<td>Power input</td>
<td>1 00 Watts</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10°...+50°C/15°...120°F</td>
</tr>
<tr>
<td>Product (food) temperature</td>
<td>-20°...+80°C/0°...180°F</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Control unit IP65 (Nema 4x, 12)</td>
</tr>
<tr>
<td></td>
<td>Sensor I P67 (Nema 6R 12)</td>
</tr>
<tr>
<td>Sensor head</td>
<td>Stainless steel housing</td>
</tr>
<tr>
<td>Control unit</td>
<td>Stainless housing, attached to the side of sensor head (Option: prepared for wall mounting, with link cable)</td>
</tr>
<tr>
<td>Link cable</td>
<td>2,5 m(8,2 feet), with cable protection tube, applies only with wall mounting option for the control unit</td>
</tr>
<tr>
<td>Timer</td>
<td>yes, for reject device control Delay and duration adjustable from 0-9990 ms</td>
</tr>
<tr>
<td>Conveyor speed</td>
<td>25 - 2000 mm/sec. (1. „ - 6,6 feet/sec.)</td>
</tr>
</tbody>
</table>

### Output signals
- Metal relay changeover contact (max250V/1A)
- Metal alarm signal for PLC (out 24V/20mA)
- Fault relay changeover contact (max 250 V/1 A)
- Reject device drive, e.g. solenoid valve (24V DC/30mA)

### Input signals
- Reject trigger, e.g. optical sensor (24V DC)
- Control air pressure of reject device (24V DC)
- Control reject success (24V DC)
- Remote metal reset push button (24V DC)
- Remote lock keyboard against unauthorised access (24V DC)

### Logging interface
- RS232, e.g. printer to log process data according HACCP

### Network interface
- RS485 (as option)

### Options
- Pneumatic transversal pusher
- Switching reject flap at belt end
- Belt reversal with metal alarm
- Various reject devices
- Air pressure control signal
- Belt reversal with metal alarm
- Reject confirmation signal
- Remote product selector switch
- Customised conveyor design
- Various belt types (Chain link, Polyurethan etc.)
- Belt control unit
- Start/Stop/Reset with frequency inverter
- Alarm flash light
- Alarm horn
- Logging printer
- Ethernet Interface 10Mbit/s
- Test cubes with metal spheres
Application and Operating Principle

Typically, the GF types are used in gravity feed pipes and provide highest performance in detecting magnetic and nonmagnetic metals. The bulk material fall through the metal detector. With the reject flap EX-S smallest metal objects are separated out of the goods’ stream promptly.

Typical products for the METAL SHARK® GF:
- Powdered milk
- Sugar
- Cereals
- Proteins
- Spices
- Granules

The devices are of 100% stainless steel and are specifically designed for use in the food industry.

Order information: Metal Detector
METAL SHARK® GF xxx
Example METAL SHARK® GF 200
200 = Pipe diameter 200 mm (8 inch)
Scope of supply:
- SHARK® digital control unit
- Sensor Head, round aperture, non divide able
- 2,5 meter (8,2 ft) coaxial cable, incl. protection tube
- Assembly frame, stainless steel
- Plastic pipe, food-grade (FDA)
- Stainless pipe flanges

Order information: Reject Flap
EX-S xxx
Example EX-S 200
200 = Pipe diameter 200 mm (8 inch)
Scope of supply:
- Reject flap, stainless design, ball bearings
- Pneumatic parts
- Cable connection

Optional accessories should be advised directly. Example: including log printer.

Tip: The digital electronic control system type SHARK® is described in detail elsewhere in this catalogue.

How to choose the installation place in the down pipe:
Install the sensor as high up as possible in the upper area of the down pipe.

Check: Is the installation height sufficient?

The pipe hole for separated metal parts should end in a separate container.

How to install the sensor with the assembly frame:
The assembly frame is either directly welded or screwed on to the support of the customer's structure. You can choose the supporting points anywhere on the assembly frame. The supporting structure should be made of stainless steel and not be coated in order to ensure good electric conductivity at the connecting points.

Vibration - When installing the metal detector make sure that vibrations are reduced to a minimum during operation. Small vibrations don’t have any influence on the detector’s function. However, heavy impacts can cause metal alarm.
METAL SHARK® GF

METAL SHARK® GF
with throw-off flap EX-S 150

METAL SHARK® GF 150
with PTFE pipe

SHARK® digital control unit
prepared for wall installation
### METAL SHARK® GF -
for free-falling powder and bulk products
Pipe Ø 100-600 mm / 4-24 inch

Food-grade, stainless design

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**Technical Characteristics**

<table>
<thead>
<tr>
<th>Type</th>
<th>METAL SHARK® GF (Detector) EX-S (Reject flap)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture diameter</td>
<td>Ø 100-600 mm /4-24 inch</td>
</tr>
<tr>
<td>Sensor type</td>
<td>Round aperture, non dividable</td>
</tr>
<tr>
<td>Installation</td>
<td>typical vertical, but any other assembly angle is applicable</td>
</tr>
<tr>
<td>Max. drop height</td>
<td>2x aperture ø (with reject)</td>
</tr>
<tr>
<td></td>
<td>5x aperture ø (without reject)</td>
</tr>
<tr>
<td>Metal free zone</td>
<td>Fix Metal = 0</td>
</tr>
<tr>
<td></td>
<td>Moved Metal = 1x aperture diameter outside around the assembly frame</td>
</tr>
<tr>
<td>Power supply</td>
<td>85-264 V 750-60 Hz</td>
</tr>
<tr>
<td>Power input</td>
<td>100 Watts</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10°...+50°C/15°F...120°F</td>
</tr>
<tr>
<td>Product (food)temperature</td>
<td>-20°...+80°C/0°F...180°F</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Control unit IP65 (Nema 4x, 12)</td>
</tr>
<tr>
<td></td>
<td>Sensor I P67 (Nema 6R 12)</td>
</tr>
<tr>
<td>Sensor head</td>
<td>Stainless steel housing</td>
</tr>
<tr>
<td>Control unit</td>
<td>Stainless housing, prepared for wall mounting, with link cable</td>
</tr>
<tr>
<td>Link cable</td>
<td>2,5 m, with cable protection tube, Option: max. 15 m length</td>
</tr>
<tr>
<td>Timer</td>
<td>yes, for reject device control</td>
</tr>
<tr>
<td></td>
<td>Delay and duration adjustable from 0-9990 ms</td>
</tr>
<tr>
<td>Flanges</td>
<td>Type Jacob</td>
</tr>
<tr>
<td></td>
<td>any other flanges available</td>
</tr>
<tr>
<td>Product falling speed</td>
<td>100-4000 mm/second</td>
</tr>
<tr>
<td></td>
<td>0,3-14 ft/second</td>
</tr>
</tbody>
</table>

**Output signals**
- Metal relay changeover contact (max. 250V/1A)
- Metal alarm signal for PLC (out 24V/20mA)
- Fault relay changeover contact (max. 250 V/1 A)
- Reject device drive, e.g. solenoid valve (24V DC/30mA)

**Input signals**
- Reject trigger, e.g. optical sensor(24V DC)
- Control air pressure of reject device (24V DC)
- Control reject success (24V DC)
- Remote metal reset push button (24V DC)
- Remote lock keyboard against unauthorised access (24V DC)

**Logging interface**
- RS232, e.g. printer to log process data according HACCP

**Network interface**
- RS485 (as option)

**Options**
- Free fall pipes made of PTFE, polyethylene, polyamide etc.
- Logging printer
- Reject mechanism for abrasive products
- Test cubes with metal spheres
- Check&Catch filter for test cubes
- Cleaning door for reject mechanism
- Metal detector without reject unit
- Various VA pipe elements, connectors, funnels
- Extension pipe for big falling heights
- Electro polished pipe parts
- Screw pipe flanges
- Compressed air supervision
- Reject and flap supervision
<table>
<thead>
<tr>
<th>dia d</th>
<th>dia d (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>TYPICAL MATERIAL FLOW cu ft/hr</th>
<th>TYPICAL MATERIAL FLOW l/h</th>
<th>APPROXIMATE SENSIVITY Ø mm</th>
<th>ANNOTATION</th>
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<td>450</td>
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<td>700</td>
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<td>0.5 0.7 0.8</td>
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<td>19.3&quot;</td>
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<td>450</td>
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<td>1000</td>
<td>28000</td>
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<td>502</td>
<td>400</td>
<td>1500</td>
<td>43000</td>
<td>0.8 1.1 1.3</td>
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<td>31.1&quot;</td>
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<td>1200</td>
<td>790</td>
<td>615</td>
<td>508</td>
<td>2600</td>
<td>74000</td>
<td>1.2 1.6 1.8</td>
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</tr>
<tr>
<td>10&quot;</td>
<td>250</td>
<td>54.9&quot;</td>
<td>36.8&quot;</td>
<td>31.5&quot;</td>
<td>26.0&quot;</td>
<td>1395</td>
<td>935</td>
<td>800</td>
<td>685</td>
<td>4000</td>
<td>115000</td>
<td>1.5 2.0 2.3</td>
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<tr>
<td>12&quot;</td>
<td>300</td>
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<td>43.3&quot;</td>
<td>37.0&quot;</td>
<td>31.5&quot;</td>
<td>1605</td>
<td>1100</td>
<td>940</td>
<td>800</td>
<td>5800</td>
<td>165000</td>
<td>1.9 2.4 3.0</td>
<td>.</td>
</tr>
<tr>
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<td>350</td>
<td>76.2&quot;</td>
<td>49.8&quot;</td>
<td>40.2&quot;</td>
<td>34.7&quot;</td>
<td>1935</td>
<td>1265</td>
<td>1020</td>
<td>880</td>
<td>7900</td>
<td>225000</td>
<td>2.2 2.7 3.3</td>
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<td>82.7&quot;</td>
<td>53.2&quot;</td>
<td>42.9&quot;</td>
<td>37.4&quot;</td>
<td>2100</td>
<td>1350</td>
<td>1090</td>
<td>950</td>
<td>10300</td>
<td>290000</td>
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<tr>
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<td>500</td>
<td>99.1&quot;</td>
<td>59.1&quot;</td>
<td>48.8&quot;</td>
<td>43.3&quot;</td>
<td></td>
<td>1500</td>
<td>1240</td>
<td>1100</td>
<td>16200</td>
<td>460000</td>
<td>2.8 3.5 4.2</td>
<td>WITHOUT REJECT DEVICE</td>
</tr>
<tr>
<td>24&quot;</td>
<td>600</td>
<td>63.0&quot;</td>
<td>54.5&quot;</td>
<td>50.6&quot;</td>
<td></td>
<td></td>
<td>1600</td>
<td>1385</td>
<td>1286</td>
<td>23200</td>
<td>656000</td>
<td>4.6 5.8 6.9</td>
<td>WITHOUT REJECT DEVICE</td>
</tr>
</tbody>
</table>
METAL SHARK GF® compact - for free-falling powder and bulk products
Low assembly height
Pipe Ø 100-300 mm / 4-12 inch

Food-grade, stainless design

Application and Operating Principle

Typically, the GF compact types are used in gravity feed pipes and provide high performance in detecting magnetic and nonmagnetic metals. The bulk material falls through the metal detector. With the reject flap EX-S, smallest metal objects are separated from the product stream promptly.

The GF compact types have a low assembly height and are specially designed for height limited installation points. However, therefore the metal detecting performance is a little bit lower compared to the GF types.

Typical products for the METAL SHARK® GF:
- Powdered milk
- Sugar
- Cereals
- Proteins
- Spices
- Granules

The devices are 100% Stainless Steel and are specifically designed for use in the food industry.

Order information Metal Detector
METAL SHARK® GF xxx compact
Example METAL SHARK® GF 200 compact
200 = Pipe diameter 200 mm (8 inch)
Scope of supply:
- Digital Control Unit SHARK
- Sensor Head GFc, round aperture, non dividable
- 2,5 meter (8,2 ft) coaxial cable, incl. protection tube
- Assembly frame, stainless steel
- Plastic pipe, food-grade (FDA)
- Stainless pipe flanges

Order information Reject Flap
EX-S 200
200 = Pipe diameter 200 mm (8 inch)
Scope of supply:
- Reject flap, stainless design, ball bearings
- Pneumatic parts
- Cable connection

Optional accessories should be advised directly. Example: including log printer.

Tip: The digital electronic control system type SHARK® is described in detail elsewhere in this catalogue.

How to choose the installation place in the down pipe:

Install the sensor as high up as possible in the upper area of the down pipe.

Check: Is the installation height sufficient?

How to install the sensor with the assembly frame:

The assembly frame is either directly welded or screwed on to the support of the customer's structure. You can choose the supporting points anywhere on the assembly frame. The supporting structure should be made of stainless steel and not becoated, in order to ensure good electric conductivity on the connecting points.

Vibration - When installing the metal detector make sure that that vibrations are reduced to a minimum during operation. Small vibrations don't have any influence on the detector's function. However, heavy impacts can cause metal alarm.
METAL SHARK® GF compact
sensor head

SHARK® digital control unit prepared for wall installation
## Technical Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>METAL SHARK® GF compact (Detector) EX-S (Reject flap)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aperture diameter</strong></td>
<td>ø100-300 mm/4-12 inch</td>
</tr>
<tr>
<td><strong>Sensor type</strong></td>
<td>Round aperture, non dividable</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td>typical vertical, but any other assembly angle is applicable</td>
</tr>
<tr>
<td><strong>Max. falling height above detector unit</strong></td>
<td>2x aperture ø (with reject) 5x aperture ø (without reject)</td>
</tr>
<tr>
<td><strong>Metal free zone</strong></td>
<td>Fix Metal = 0 Moved Metal = 1x aperture diameter outside around the assembly frame</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>85-264 V 750-60 Hz</td>
</tr>
<tr>
<td><strong>Power input</strong></td>
<td>100 Watts</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-10°...+50°C/15°...120°F</td>
</tr>
<tr>
<td><strong>Product (food) temperature</strong></td>
<td>-20°...+80°C/0°...180°F</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>Control unit IP65 (Nema 4x, 12) Sensor I P67 (Nema 6R 12)</td>
</tr>
<tr>
<td><strong>Sensor head</strong></td>
<td>Stainless steel housing</td>
</tr>
<tr>
<td><strong>Control unit</strong></td>
<td>Stainless housing, prepared for wall mounting, with link cable</td>
</tr>
<tr>
<td><strong>Link cable</strong></td>
<td>2,5 m, with cable protection tube, Option: max. 15m length</td>
</tr>
<tr>
<td><strong>Timer</strong></td>
<td>yes, for reject device control Delay and duration adjustable from 0-9990 ms</td>
</tr>
<tr>
<td><strong>Flanges</strong></td>
<td>Type Jacob any other flanges available</td>
</tr>
<tr>
<td><strong>Product falling speed</strong></td>
<td>100-4000 mm/second 0,3-14 ft/second</td>
</tr>
<tr>
<td><strong>Output signals</strong></td>
<td>Metal relay changeover contact (max. 250V/1A) Metal alarm signal for PLC (out 24V/20mA) Fault relay changeover contact (max. 250 V/1 A) Reject device drive, e.g. solenoid valve (24V DC/30mA)</td>
</tr>
<tr>
<td><strong>Input signals</strong></td>
<td>Reject trigger, e.g. optical sensor(24V DC) Control air pressure of reject device (24V DC) Control reject success (24V DC) Remote metal reset push button (24V DC) Remote lock keyboard against unauthorised access (24V DC)</td>
</tr>
<tr>
<td><strong>Logging interface</strong></td>
<td>RS232, e.g. printer to log process data according HACCP</td>
</tr>
<tr>
<td><strong>Network interface</strong></td>
<td>RS485 (as option)</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>• Free fall pipes made of PTFE, polyethylene, polyamide etc. • Logging printer • Reject mechanism for abrasive products • Test cubes with metal spheres • Check&amp;Catch filter for test cube • Cleaning door for reject mechanism • Metal detector without reject unit • Various VA pipe elements, connectors, funnels • Extension pipe for big falling heights • Electro polished pipe parts • Screw pipe flanges • Compressed air parts • Reject and flap supervision</td>
</tr>
<tr>
<td>dia d</td>
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</tr>
<tr>
<td>-------</td>
<td>-----------</td>
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<tr>
<td>4&quot;</td>
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<td>5&quot;</td>
<td>120</td>
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<td>6&quot;</td>
<td>150</td>
</tr>
<tr>
<td>8&quot;</td>
<td>200</td>
</tr>
<tr>
<td>10&quot;</td>
<td>250</td>
</tr>
<tr>
<td>12&quot;</td>
<td>500</td>
</tr>
</tbody>
</table>
METAL SHARK® IN -
Inline metal detector for fluid and pasty products in pipes
Pipe Ø 40/65/80 mm (1 / 2 / 3 inch)

Food grade, stainless design

Application and Operating Principle

METAL SHARK® IN has been designed specifically for the supervision of fluid and pasty products in piping systems and provides highest performance in detecting magnetic and nonmagnetic metals.

In the pipeline system, the product flows through the metal detector. With the reject valve EX-PWC metal objects are separated instantly from the product stream. The EX-PWC is designed even for flowing products with non-fluid components.

Typical products for the METAL SHARK® IN:
Sausage meat
Baby food (puree)
Fruit mash
Tooth paste

The devices are of 100% stainless steel and are specifically designed for use in the food industry.

Order information: Metal Detector
METAL SHARK® IN xx
Example METAL SHARK® IN 65
65 = Pipe diameter 65 mm (2' inch)
Scope of supply:
Digital Control Unit SHARK®
Sensor Head, non dividable
2,5 meter (8,2 ft) coaxial cable, incl. protection tube
Assembly frame, made of stainless steel
Plastic pipe, food compatible (FDA),
Pipe suitable for high pressures
Stainless pipe flanges

Order information: Reject Valve
EX-PWC xx
Example EX-PWC 65
65 = Pipe diameter 65 mm (2' inch)
Scope of supply:
Reject valve, stainless design
Plastic reject piston (FDA quality), hygienic design,
Easy cleaning without any tools
Pneumatic parts
Cable connection

Optional accessories should be advised directly. Example: including log printer.

Tip: The digital electronic control system type SHARK® is described in detail elsewhere in this catalogue.

Metal detection in sausage production

Even in production lines that meet highest quality requirements dangerous metal parts get into the raw sausage mass again and again without being noticed. The metal comes, for example, from broken cutter knives, shavings from aluminium clips, or is in the raw meat already on delivery.

The METAL SHARK® IN metal detectors are integrated into pipelines between sausage stuffer and clip machine. A special reject valve installed behind the metal detector sorts out the metal objects together with small amounts of meat mass. A cutter trolley is placed under the reject valve and collects the contaminated mass.

The metal detector has an intelligent sensitivity control and fully automatic product effect blanking-out. That is why modification of the metal detector settings are not needed when changing the products, and the device adjusts automatically for the new product.

According to HACCP, the metal detector is a critical control point and therefore, it must be checked regularly. A special inspection hole in the pipeline allows to test the detector function regularly and easily. To this aim a flexible test stick with small metal balls is pushed through the pipe.

For daily cleaning, the hygienic structure can be easily dismantled.
METAL SHARK® IN 65 with reject valve EX-PWC in a sausage stuffer application.

METAL SHARK® IN 65 with assembly frame for simple and fast integration into existing production lines.

Reject valve EX-PWC: complete hygienic design. Easy and quick cleaning.

SHARK® digital control unit prepared for wall installation.
**METAL SHARK® IN**  
**Inline metal detector for fluid and pasty products in pipes**  
Pipe Ø 40/65/80 mm (1 / 2 / 3 inch)

**Technical Characteristics**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>METAL SHARK® IN (Detector) EX-PWC (Reject valve)</td>
</tr>
<tr>
<td><strong>Aperture diameter</strong></td>
<td>40/65/80 mm (1 / 2 / 3 inch)</td>
</tr>
<tr>
<td><strong>Sensor type</strong></td>
<td>non dividable</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td>typical horizontal, but any other assembly angle is possible</td>
</tr>
<tr>
<td><strong>Metal free zone</strong></td>
<td>Fix Metal = 0 outside around Moved Metal =1x pipe diameter the assembly frame</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>85-264 VAC 50-60 Hz</td>
</tr>
<tr>
<td><strong>Power input</strong></td>
<td>100 Watts</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-10°C...+50°C/15°F...120°F</td>
</tr>
<tr>
<td><strong>Product (food) temperature</strong></td>
<td>-20°C...+80°C/0°F...180°F</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>Control unit IP65 (Nema 4x, 12) Sensor IP67 (Nema 6P, 12) Option: Control unit IP67 (Nema 6R 12)</td>
</tr>
<tr>
<td><strong>Sensor head</strong></td>
<td>Stainless steel housing</td>
</tr>
<tr>
<td><strong>Control unit</strong></td>
<td>Stainless housing, prepared for wall mounting, with link cable Option: Control unit attached to sensor head</td>
</tr>
<tr>
<td><strong>Link cable</strong></td>
<td>2.5 m (8.2 feet), with flexible cable protection tube Option: max. 15 m (68 ft) length</td>
</tr>
<tr>
<td><strong>Timer</strong></td>
<td>yes, for reject device control Delay and duration adjustable</td>
</tr>
</tbody>
</table>

**Output signals**  
- Metal relay changeover contact (max. 250V/1A)  
- Metal alarm signal for PLC (out 24V/20mA)  
- Fault relay changeover contact (max. 250 V/1 A)  
- Reject device drive, e.g. solenoid valve (24V DC/30mA)

**Input signals**  
- Reject trigger, e.g. optical sensor (24V DC)  
- Control air pressure of reject device (24V DC)  
- Control reject success (24V DC)  
- Remote metal reset push button (24V DC)  
- Remote lock keyboard against unauthorised access (24V DC)

**I/O signals for sausage**  
- Clip control (avoid double clip during metal alarm)  
- Stuffer drive control

**Logging interface**  
- RS232, e.g. printer to log process data according HACCP

**Network interface**  
- RS485 (as option)

**Options**  
- Pipes made of PTFE, polyethylene, polyamide etc.  
- Logging printer  
- Butterfly reject valve (for totally liquid products)  
- Flexible test sticks with metal spheres  
- Metal detector without reject unit  
- Various VA pipe elements, connectors  
- Assembly frame custom tailored  
- Compressed air supervision  
- Reject supervision
METAL SHARK® IN 65 with reject valve EX-PWC
Assembly frame for weld or screw installation into existing customer structure
Questionnaire of metal detector application.
Please fax to: (03 72 96) 93 01 80
or mail to: info@pulsotronic.de

Costumer ________________________________
Contact ________________________________
Phone ____________ Fax ________________ email ___________________

Product properties ________________________________
Product to be monitored ________________________________
Product dimensions (length x with x height) ________________________________
Consistency ______ Temperature ______ Packed? ☐ Yes ☐ No

Metal detector type:
☐ BD (Conveyor)

Aperture with _______ Height ____________ Belt with ________________

Belt length _______ Working height _______ Belt speed ________________

☐ GF (Gravity Feed)
☐ GF compact (Gravity Feed)

Free falling pipe diameter ________________

☐ IN (Inline)

Pipe diameter ________________

Options
☐ Reject system ________________
☐ Printer ________________
☐ Any other options ________________

Special comments