

Operating Instructions

Metal detector

DLS

Customer:	
Serial no.:	
Order no.:	

We reserve the right to change the contents due to product or technical improvement and innovation.

Please state type of equipment and serial number when contacting us.

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1 General notes

1.1 Introduction

The texts and illustrations in this instruction manual are for the exclusive purpose of explaining how to operate and handle the DLS metal detector. Please check that this is the correct manual for your equipment. S+S accepts no responsibility for damage resulting from the use or misuse of this equipment. All appropriate safety rules and regulations for the use of this equipment must be adhered to. If you have any questions with regard to the installation and operation of this equipment please do not hesitate to contact us.

This instruction manual must not be copied, saved on computer or otherwise reproduced without prior permission of S+S. Nor should any extract of this instruction manual be similarly reproduced.

1.2 Fields of applications

- Product liability
- ISO 9000
- TQM (Total Quality Management)
- Protection of consumers and machines

1.3 Symbols used



= Important notes



= Danger notes



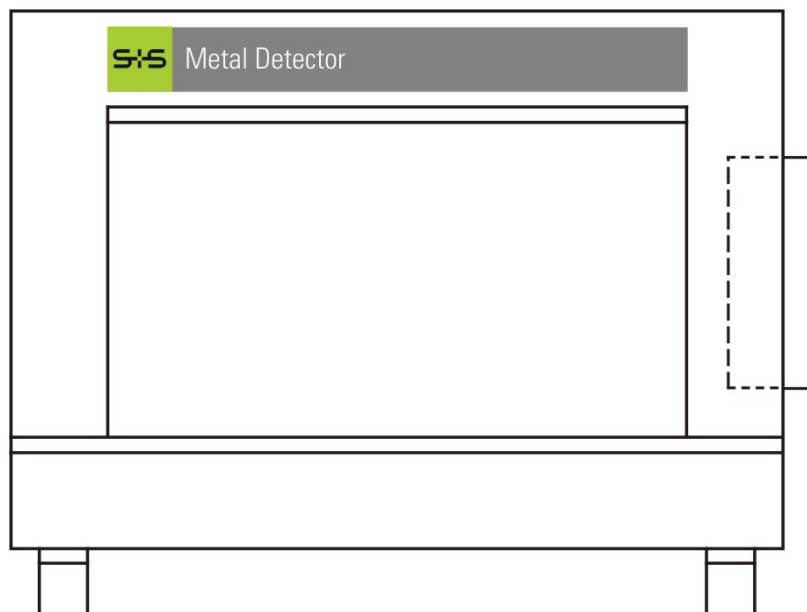
= Safety notes

1.4 Legal basis

This equipment complies with EMC guideline 89/336/EC and 93/97/EC.

This equipment complies with low-voltage guideline 73/23/EC and 93/68/EC.

1.5 Overall view



2 Technical data

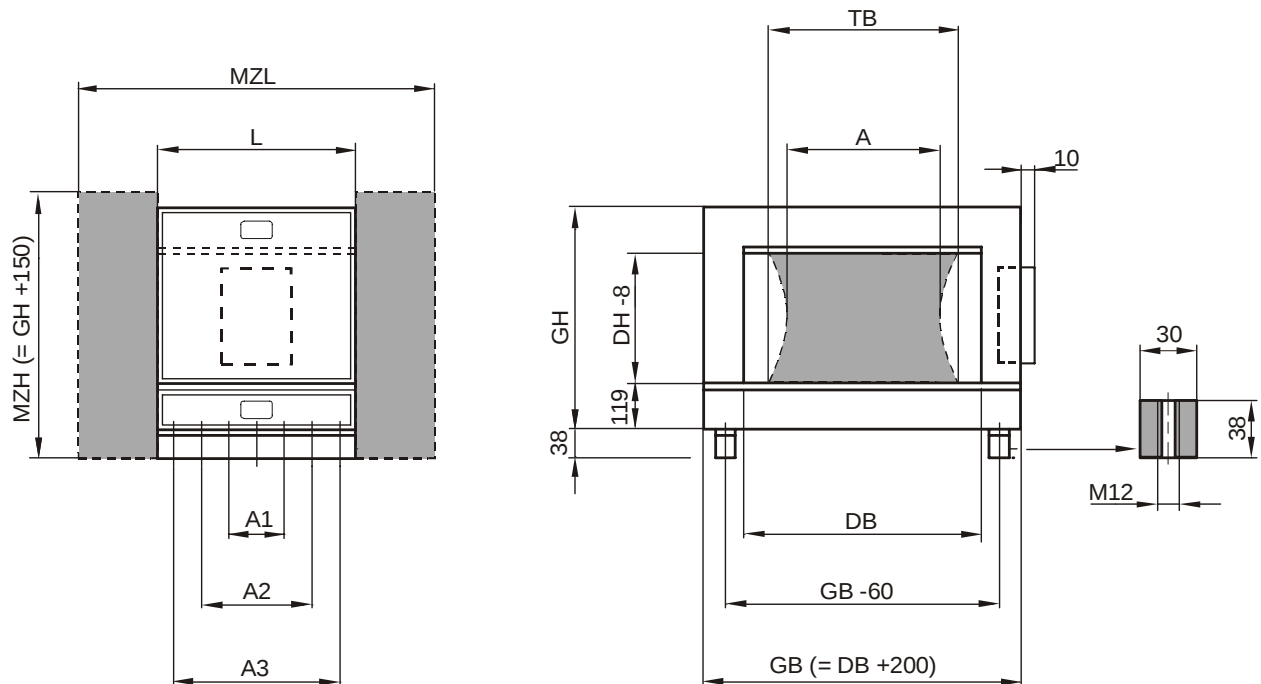
2.1 Performance data

Type	Detection coil DLS
Housing	Mild steel, varnished, aluminium grey (RAL 9007)
Tunnel surface	Laminated wood board
Mounting rail	Ertalon
Weight	Depending on dimensions
Ambient temperature	-10° C to +55° C
Type of protection	IP 54
Connecting cable	(to the control unit) up to 3 m standard (max. up to 15 m)
Can be combined with	Control unit PRIMUS, SENSITY or GENIUS

Subject to changes due to technical innovation!

2.2 Overall dimensions

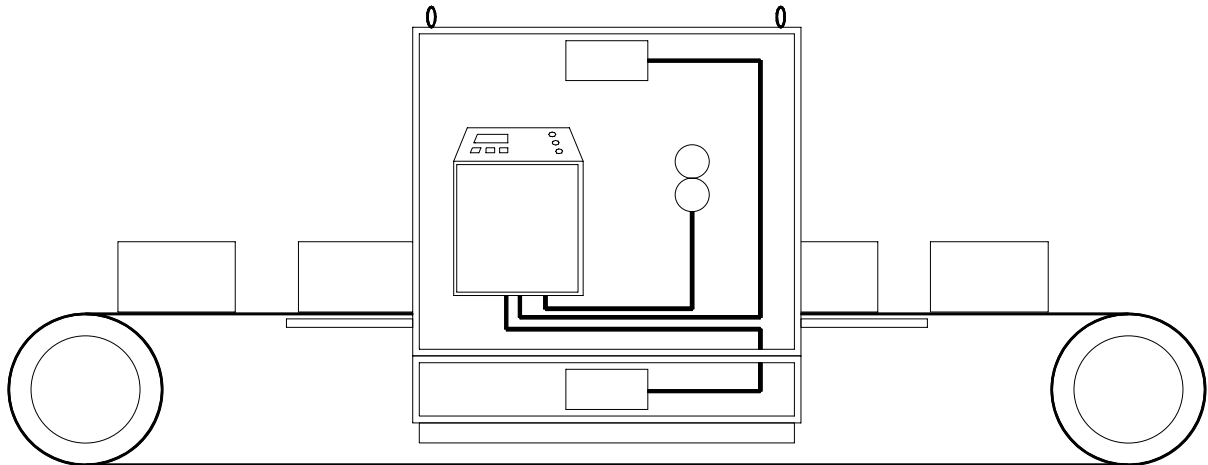
Dimensions see attached data sheet!



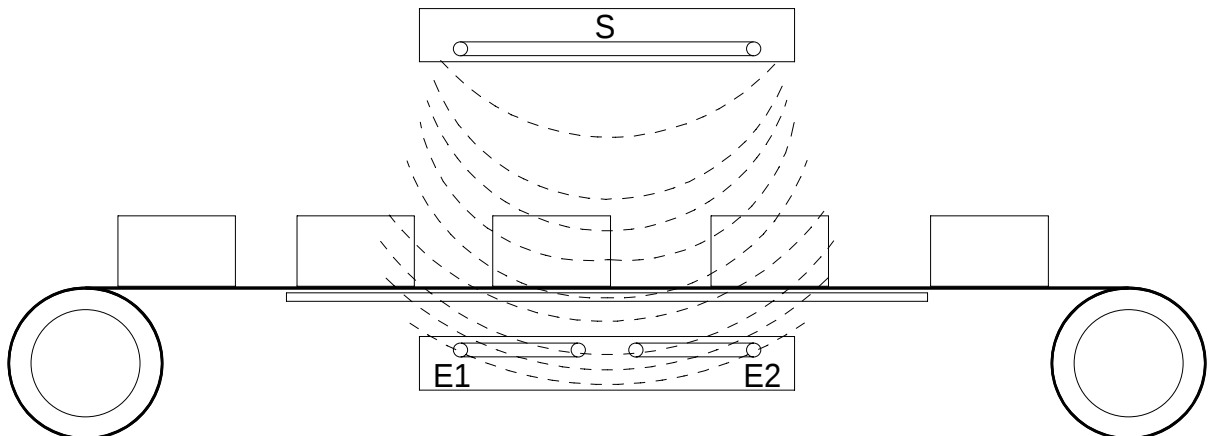
3 Design and method operation

3.1 Functional principle

The material to be inspected (bulk or lump material) passes the detector head on a belt conveyor. For easy installation the top part of detector head can be taken off.

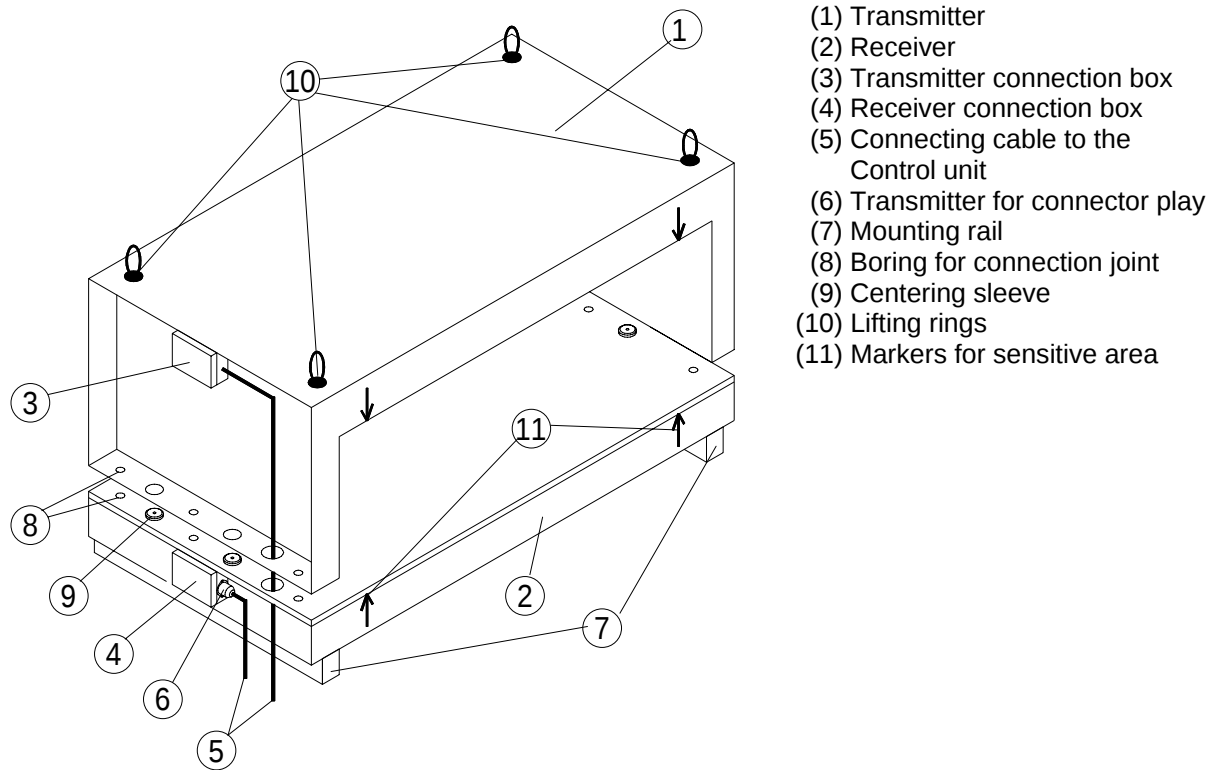


The material is penetrated within the aperture of the detector head by a high frequent electro-magnetic field, which is generated by the control unit and the transmitter coil. Two identical voltages are induced into the receiver coils, and are subtracted to zero if the system is in balance.



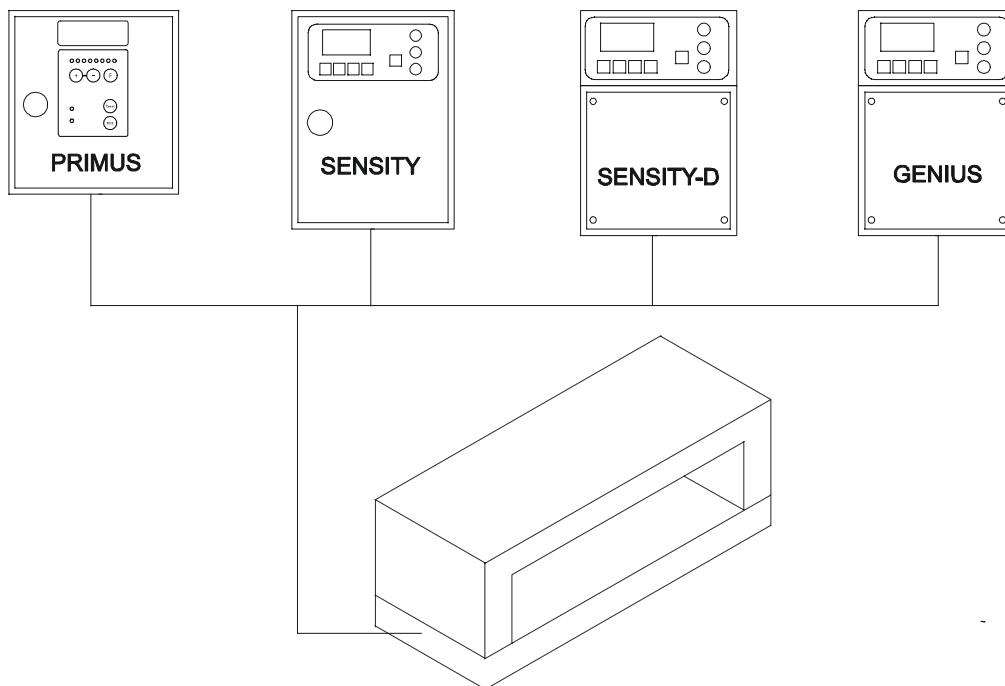
A metallic impurity causes an unbalanced condition and the receiver responds. The control unit generates a signal, which triggers an output relay (see operational manual).

3.2 Functional elements



3.3 Combination scopes

Different Control units can be used to control the detector head:
PRIMUS, SENSITY, SENSITY-D or GENIUS.



4 Safety

S+S equipment conforms with all official technical safety regulations. However, as a manufacturer we believe it is our duty to make you aware of the following information.

Consider also the chapter safety in the operating instructions of the used control unit!

4.1 Use to the intended purpose

The intended purpose of the metal detector is the inspection of bulk or lump materials conveyed on belt conveyors, chutes or vibratory feeders with either the control unit PRIMUS, SENSITY, SENSITY-D or GENIUS. The metal detector system can be used for plastics, food, feed stuff, chemical or recycling industry. The metal detector has to be fastened properly and stable. At the operation field of the device, no steam (e.g. plasticizer) or other substances may occur that attack cord insulation of PVC.



4.2 Notifications of danger

People with cardiac pacemaker should not permanently stay in the area of the detection coil.



4.3 Danger in case of non-observance of the maintenance

There are no known risks or side effects emanating from the detection coil, if the equipment is not used to its intended purpose.



4.4 Safety notes for the operator

The metal detector may only be operated in the intended purpose and in a perfect functioning condition. Particularly the covers of the detector connection boxes must be closed during operation. The operating instructions always have to be in a legible condition and complete available. The operator may only appoint qualified personnel for operation, maintenance and repair work.



4.5 Safety notes during operating and maintenance

Clean the connection boxes of the metal detector from soilage and wetness prior to opening. Entered water or moisture must be removed. During repair avoid touching components or conduits with metallic tools to avoid short circuits. The operator may only appoint qualified personnel for operation, maintenance and repair work.



4.6 Consequences of unauthorized modification

In case of unauthorized modification or repair work all the declarations and guarantees given by the manufacturer will become void.



4.7 Inadmissible operation

For other applications as enumerated in 4.1 the DLS metal detector is not intended for – that is regarded as inadmissible operation.

Inadmissible is the operation out of the specifications given in the technical data and the operation under high mechanical static or dynamic loads (e.g. heavy system parts or strong vibrations). Also inadmissible is the examination of aggressive materials such as materials containing alkaline solutions, acids and solvents.

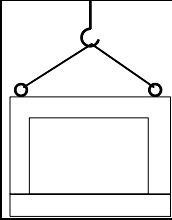
It is not permitted to operate the metal detector in hazardous locations (explosion zones 0, 1, 20 und 21).



5 Commissioning

5.1 Mechanical installation

For details see attached „Installation instruction for the tunnel type detection coil“

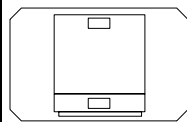


Any lifting of the detector head should only be done at the lifting rings on the top of the detector head.



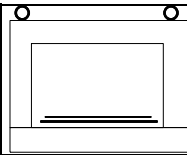
Take care for a stable and vibrationproof mounting!

If shocks and vibrations are unavoidable (i.e. caused by diverter or pushers), a separate support frame is recommended.



Metal-free zone must be strictly observed!

Within the metal-free zone no metallic parts must be situated. For moving machine parts the metal-free zone extends to additional 150% of the stated dimensions. The dimensions of the metal-free zone are given in the attached data sheet.



A nonmetallic slide (plastics or wood) must be used within the aperture as a belt support. Belt and slide must not come in contact with the detector. Recommended gap between slide and detector min. 10 mm.



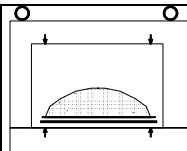
Do not mount or operate the detector near sources of interferences (electric motors, frequency and current converters). The required distance depends on the aperture size of the detector head and the power of the source of interference.



Control unit not mounted at the detector head:

Changes of the connection cables between the detector head DLS and the control unit must be reconfirmed by S+S. Only original cables must be used otherwise the CE-certification becomes invalid.

The connections cable must be installed separate from other power and control lines and carefully fixed or layed into a cable duct.



The material to be inspected must pass the detector head within the marking arrows, which is the sensitive area of the detector head.



In case of repair or maintenance work (drilling, filing, grinding, welding) take care that no slivers, chips or welding beads remain on the belt. If so, the belt becomes useless for metal detectors.



Proximity effect

In case that two or more DLS detectors are working in adjacent lines:
Do not interchange the control units as they are matched with the detector heads to avoid interferences.

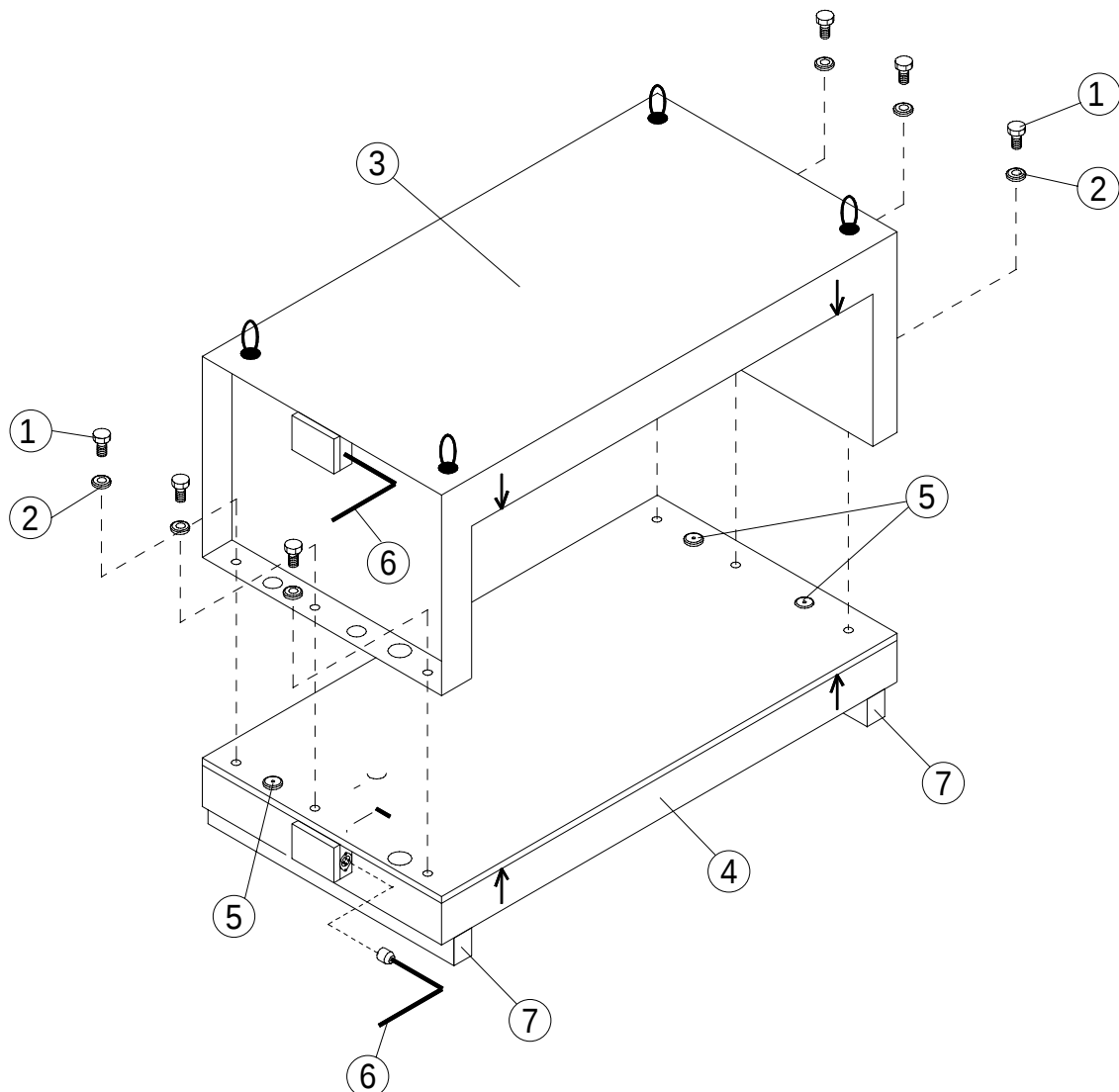
**If more than one detector has to be placed in a room:**

The detectors can interfere with each other. Please contact the S+S service department.

Pay attention to the following order when mounting the DLS to a belt conveyor:

The bolts of the centering disc (5) must not be loosen. The detector head gets unbalanced and out of operation.

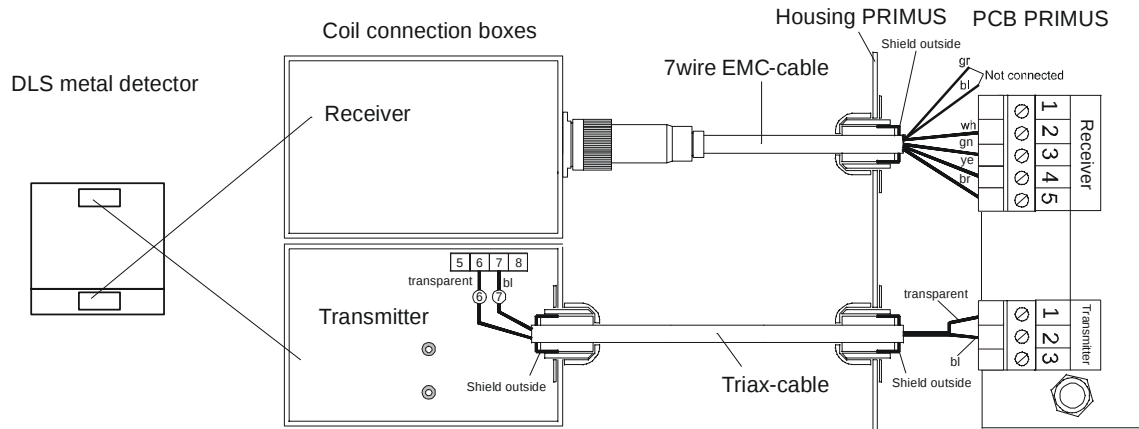
1. If necessary disconnect the connection cable (6) (see also 5.2)
2. Unscrew the hexagon bolts M10x50 (1), three pieces each side
3. Lift the top part (3) of the detector head
4. Fasten the bottom part (4) of the detector head to the conveyor frame. Do not remove the isolation bars (7).
5. Put the top of the detector head (3) back. Note: the connector boxes of top and bottom part must be at the same side
6. Tighten bolts (1) and washers (2) carefully.
7. Connect connector cable (6) according to picture 5.2



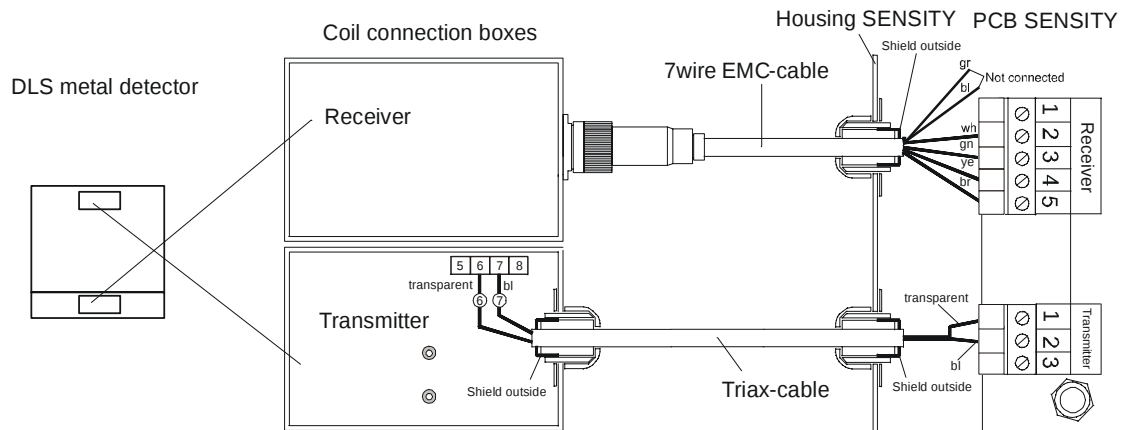
5.2 Connections

If the connection cable between detector head and control unit has been removed reconnect it according to the sketch:

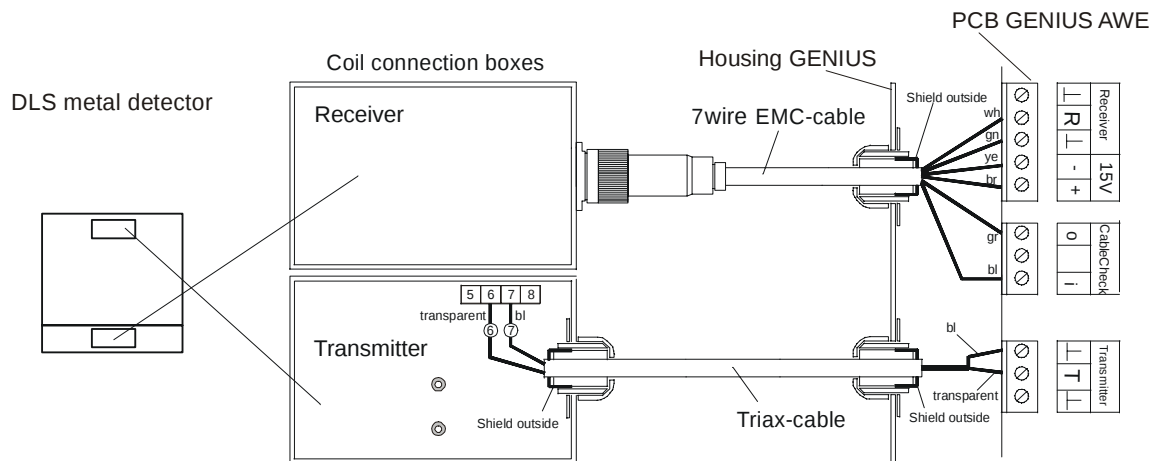
5.2.1 With Control Unit PRIMUS



5.2.2 With Control Unit SENSITY



5.2.3 With Control Unit GENIUS



green	=	gn	blue	=	bl
gray	=	gr	brown	=	br
yellow	=	ye	white	=	wh

6 Maintenance

6.1 Periodic inspection of the DLS

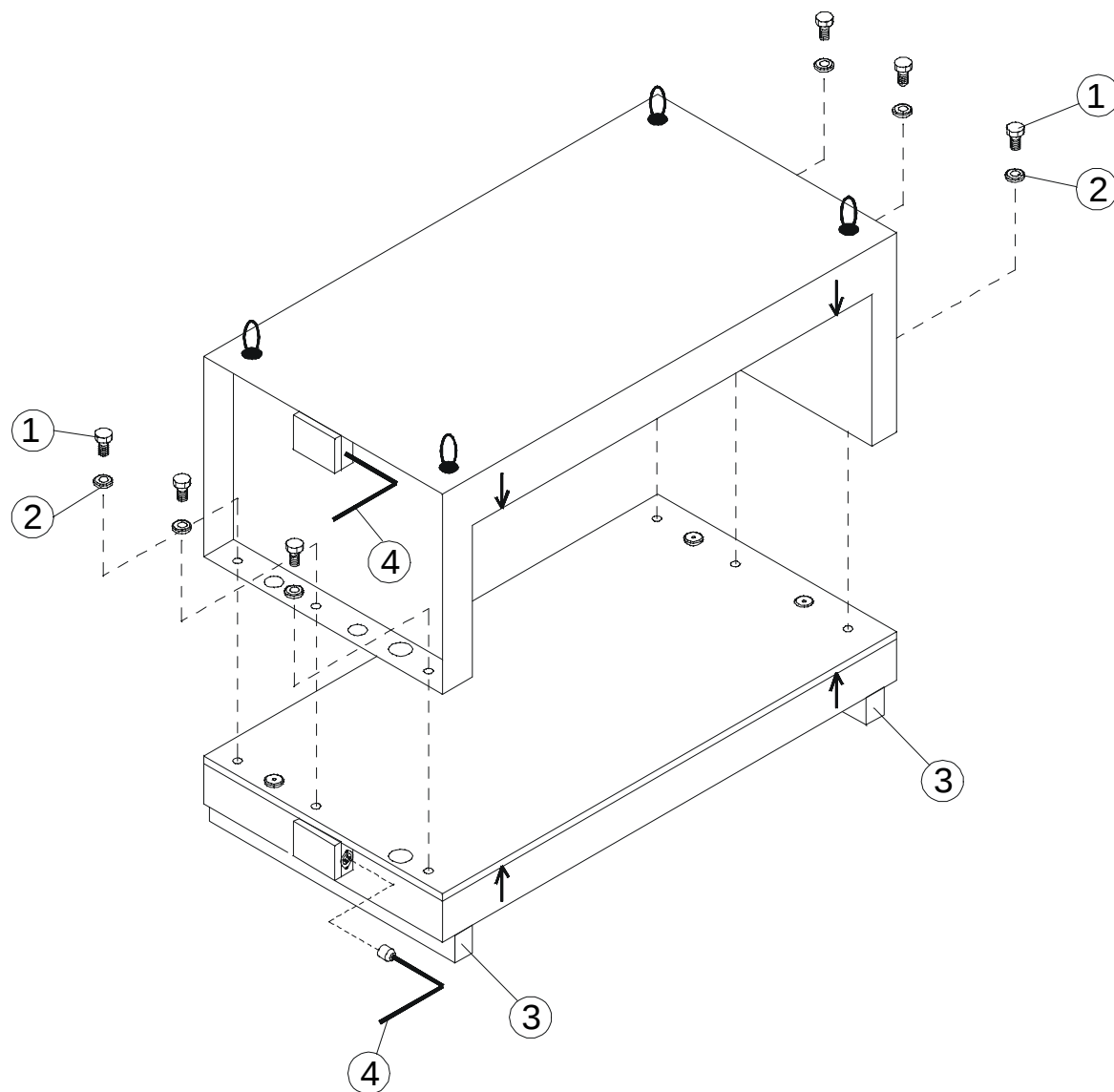
Although the DLS is maintenance-free, it is useful to check the equipment periodically:

- Check if the screws are tightened which hold top and bottom part of the detector head?
- Check if the screws, which hold the plastic parts, are tightened?
- Are there any objects laying on the detector head?
- Are there any objects in the detector passage between belt slide and detector (remains of bulky goods or accumulated dust)?
- Check the throughput opening for damages and cracks, where water can enter?
- Check the connection cable for damages (i.e. the cable sheath).

7 Spare parts / Servicing

If you should have any questions please state equipment type and serial number!

7.1 Spare parts drawing



7.2 Spare parts list

POS.NO.	ARTICLE	ART.NO.	REMARKS
1	Hexagon screw M 10 x 45	15002004	
2	Washer 40 x 10	15000699	
3	Fastening elements ¹⁾		
4	Coil connection cable ²⁾		

¹⁾ Please give exact type code or coil dimensions!

²⁾ Please state the cable length when ordering!

7.3 Service address

Manufacturer:

S+S Separation and Sorting Technology GmbH
Regener Straße 130
D-94513 Schönberg, Germany

Tel.: ++49 8554 308-0
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E-mail: info@se-so-tec.com
Internet: www.se-so-tec.com

Service: Phone: ++49 8554 308-180

Representative:

8 Shipping, preservation, waste disposal, transport, storage

8.1 Shipping, preservation, waste disposal

1. Choose packing that is suitable for the type and size of unit, taking into account whether the shipment is for export by sea or airfreight, or for national or international road transport. The packing material must protect the goods from all damage under normal transport conditions.



2. Depending on the size, weight and nature of the goods packing in cardboard boxes, boxed pallets etc is only suitable for road transport.
Use reinforced card, corrugated cardboard, blister packing and shredded paper to fill and protect the goods.
Electrostatic sensitive components (electronic boards, electronic modules, etc.) must be packed in antistatic foil or foil bags prior to packing! **(this is essential!)**
Stick additional warning labels on the outside of the packaging eg "Attention, electronic equipment, do not drop," etc. The packing should be sealed with adhesive tape and, where the weight exceeds 50 kg, additionally with wrapping tape.



- 2a. When packing for international road transport use the instructions above (see point 2). Larger and heavier shipments must also be protected as for export in wooden crates. Care must be taken to ensure that the goods inside the packing are protected against corrosion.

Any parts that will corrode easily must be wrapped in oil paper or corrosion-protective foil. Care must be taken to prevent the components moving around within the packaging.



- 2b. International air freight shipments must be packed in wooden crates or on export pallets.

Care must be taken that the goods are secure and well-protected inside the packing. Any parts liable to corrode must be wrapped in oil paper, protective foil or sprayed with anti-corrosion spray.



- 2c. Sea-freight must be packed in seaworthy export crates. These crates can be obtained from specialist suppliers.

The crates must be lined with oil paper to make them resistant to sea water and prevent corrosion. In addition the goods must be protected against corrosion by use of a spray or be wrapping in protective foil.

Care must be taken to ensure that the goods cannot move around inside the crate. After packing the sea-freight crates must be properly closed.

The sea crates must also be fastened externally with securing tapes.



During loading care must be taken not to damage the external packaging.

The carrier must certify that the shipment has been accepted and loaded correctly by detailing this on the bill of lading, loading list etc.

3. Waste disposal: Observe the national waste disposal regulations.



8.2 Transport

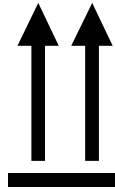
- In order to avoid injury or damage to the unit it must be handled properly. In addition to following the instructions below, general health and safety good practice and specific accident prevention guidelines should be observed.
- For correct handling and storage comply with the following symbols:



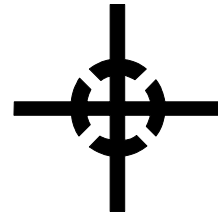
Protect against moisture



Careful: glass



Up



Centre of gravity

- Do not compress the side walls of the unit or any attached parts by pulling obliquely on ropes or chains.
- Only remove handling safeguards once all installation work has been completed.
- When handling in a loading area make sure the unit cannot topple over or slip.
- Damage caused during transportation must always be reported to the manufacturer.



8.3 Storage

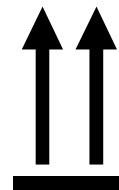
- If possible the unit should be stored in a closed room until final installation.
- If the unit is stored in the open it must be covered over with tarpaulins and open underneath, to allow condensation to drain off.
- If the unit has been packed for transportation by sea the packaging must not be damaged or opened during transit and storage.
- For correct storage comply with all storage and handling symbols:



Protect against moisture



Careful: glass



Up



Installation instruction

for tunnel metal detectors DLS / GLS



Separable tunnel detection coil DLS

To guarantee optimum metal detection performance take notice of the following generally information for installation of tunnel metal detectors of the type GLS and DLS.

1. Preliminary Remarks

The control unit can be mounted directly at the detector head or separately.

This type of metal detectors are specially used to inspect bulky and lumpy goods on belt conveyors, vibration feeders or feeding chutes providing high sensitivity and stable, reliable operation.

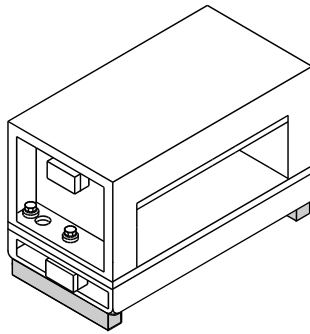
S+S supplies two kinds of metal detector heads:

- Closed detection coils GLS
- Separable detection coils DLS

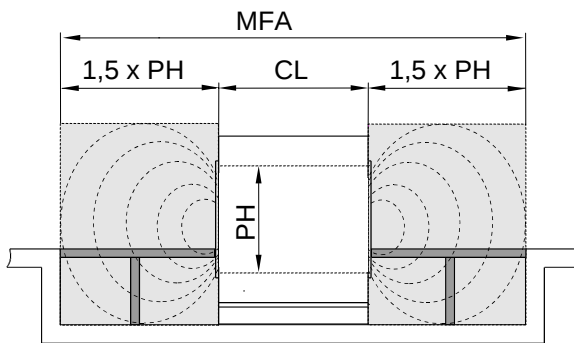


Closed tunnel detection coil GLS

Please contact our service department or representative for detailed information.



Separable tunnel detection coil DLS:
Plastic rails for insulation



Metal-free area of the tunnel detection coil:
Must be taken into account in the construction!

2. Insulation

As a rule the detection coil is delivered with the plastic rails already fitted. When the coil is mounted at the conveyor belt these rails provide the necessary insulation.

3. Metal-free area

At the top, at the bottom, and at the sides the tunnel detection coil is electrically shielded by the housing. At the passage opening, however, the field emanates to the left and right side.

The presence of metallic items near the coil passage opening may impair the performance of the metal detector, because it must be operated with reduced sensitivity. Therefore a „metal-free area“ must be observed. Fixed metal parts should not extend into this area. Large moving metal parts must be kept at an additional 50% distance (at least, however, twice the height of the search coil opening).

The dimensions of the metal-free area can be calculated with the following general rule:

General rule for fixed metal parts:

$$\text{MFA} = (1,5 \times \text{PH}) + \text{CL} + (1,5 \times \text{PH})$$

General rule for moving metal parts:

$$\text{MFA} = (2 \times \text{PH}) + \text{CL} + (2 \times \text{PH})$$

MFA = metal-free area

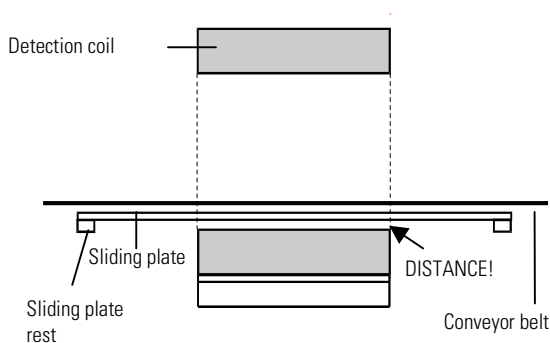
PH = passage height

CL = coil length

4. Detection coil opening

It is important that the goods to be inspected do not touch the inside of the passage of the detector head. A sliding table, made of nonconductive material (i.e. laminated plastics or wood plates), have to be used to carry the goods.

The material also should not generate static electricity and touch the inside of the passage (see sketch beside).



Side view of the detection coil: Conveyor belt and sliding plate arrangement

5. Current loops

The detector coil forms together with the belt conveyor a functional unit.

The electromagnetic field generated within the aperture of detector head generates a high frequency current in the framework of the conveyor resp. frame parts.

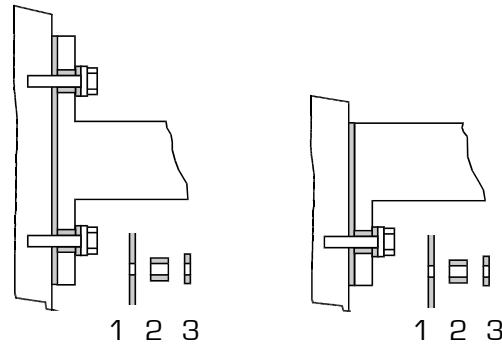
Current loops are formed by cross struts and rollers that are automatically compensated after power on. Fast changes due to mechanical movements (vibrations, shocks etc) of this currents loops affect the metal detector to generate false alarms.

For proper operation a stable situation has to be created; either open or closed current loops. Alternating loops affects the metal detector even at a distance of several meters.

It is therefore necessary to weld cross struts on both sides or insulate them electrically at one side.

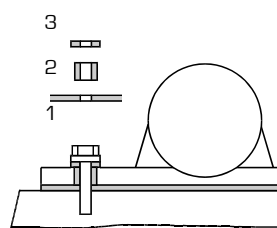
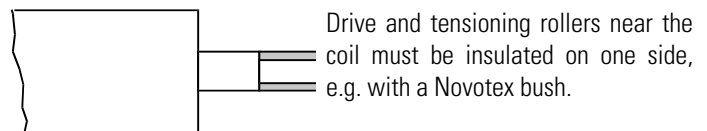
Rollers have be insulated principlly at one side.

Insulation for cross connections:



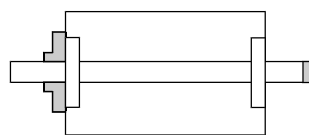
Use plates (1), bushes (2) and washers (3) of suitable material (e.g. Teflon, PVC)

Insulation for rollers:



In case of a chain belt drive the drive roller must be insulated on both sides.

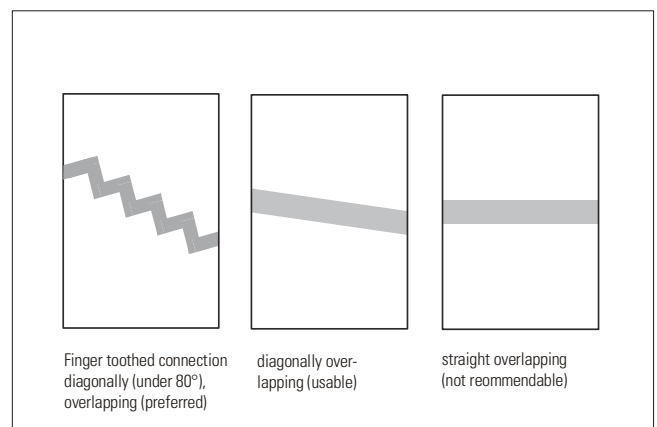
Use plates (1), bushes (2) and washers (3) of suitable material (e.g. Teflon, PVC)



In case of internal bearings insulation is established at one shaft end, and on the sprocket side by means of an insulation disk.

6. Conveyor belt joint

- The belt needs not be antistatic.
- The joint of the belt should be carried out according to the sketches.
- Pay very carefully attention to keep the belt clean during installation. Boring chips and welding beads causes permanent false alarms.





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Einbauanleitung DLS-GLS-PR-BN-0605-V1.0

7. Mounting

- Use only the provided bore holes to fasten the device.
- The place of installation has to be as stable possible.
- Avoid contacts of any parts at the inside of the throughput opening of the detector head like side guides or sliding table of the belt conveyor.
- The passing material may not touch the inside of the throughput opening of the detector head.
- The fitting position is either horizontal or vertical.
- It is recommended to use a belt conveyor only for the metal detector to avoid influences of other equipment
- Feeding and take away conveyors as well as other equipment should not have any contact to the detector belt conveyor to avoid transmission of vibrations and current loops.
- The framing has to be carried out as a welded frame.
- In case of heavy products to be inspected a separate frame for the metal detector head is recommended to avoid vibrations.

8. Product to be inspected

- Products with product effect (electrical conductivity due to humidity or acidic or salty ingredients) affects the sensitivity. The control unit SENSITY or GENIUS is able to suppress this effect. Preliminary tests of samples in our lab will provide optimum results.
- Ambient temperature -10°C up to +55°C
- Max. product temperature +80°C. Ask for higher temperature ranges.
- The product to be inspected should pass the detector without interruption. However the control unit provides an operation mode for stop and go operation.
- Pay attention to the allowed conveying speeds (see data sheets and operational manual)

9. Ambience

- The equipment meets the CE-guidelines, which includes particularly the EMC standards. This standard, EN 50082-2, sets the intensity of magnetic stray fields to 30 A/m. Do not mount the equipment close to electromagnetic noise sources like electric motors, power supplies for electric motors, power frequency converters drives.
- Avoid big moving metallic parts close to the detector head like chain drives, rollers or even a fork lift.

10. Electric installation

- Do not install the control unit into existing switch cabinets to avoid interferences caused by contactors or other control devices.
- Install connection cables only separately from other wirings using metallic ducts.
- In case of replacement of connection cables between detector coil and control unit contact our service staff for advise.
- Use for all wirings from and to the control unit shielded cables. Ground carefully the shields at the cable bushings.
- The power cord and skintop gland may not be removed - it is an essential part of the EMC-concept. If the mains plug cannot be used a conduit box should be used.
- Avoid cabling of power supplies and control lines close to the metal detector.
- Select the mains supply voltage $230/115 \pm 10\%$, 50/60 Hz. In case of different mains supply voltages a transformer has to be used.
- Degree of protection IP 65.
- Eject systems like pushers or diverters can be controlled directly by the control units (Sensitivity or Genius). In case of variable conveyor speeds only the control unit Genius provides the necessary inputs and outputs.

Pay also attention to the corresponding storage, mounting and commissioning instructions!

Maß-/Datenblatt

Data sheet

Tunnel-Metalldetektor Typ DLS 1040/800/400 PRIMUS

Tunnel Metal Detector Type DLS 1040/800/400 PRIMUS

Durchlaßbreite - <i>Passage width</i>	DB =	1040	[mm]
Tastbreite - <i>Scanning width</i>	TB =	800	[mm]
Durchlaßhöhe - <i>Passage height</i>	DH =	400	[mm]
Spulenhöhe - <i>Coil height</i>	GH =	630	[mm]
Spulenbreite - <i>Coil width</i>	GB =	1240	[mm]
Spulenlänge - <i>Coil length</i>	L =	650	[mm]
Gewindebohrung 1 - <i>Drill hole 1</i>	A1 =	0	[mm]
Gewindebohrung 2 - <i>Drill hole 2</i>	A2 =	190	[mm]
Gewindebohrung 3 - <i>Drill hole 3</i>	A3 =	570	[mm]
Optimale Tastempf. - <i>Optimum scanning sensitivity</i>	A =	520	[mm]
Reduzierte Tastempf. - <i>Reduced scanning sensitivity</i>	B =	140	[mm]
Keine Tastempfindlichkeit - <i>No scanning sensitivity</i>	C =	120	[mm]
Metallfreie Zone (Höhe) - <i>Metal free zone (height)</i>	MZH =	780	[mm]
Metallfreie Zone (Länge) - <i>Metal free zone (length)</i>	MZL =	1450	[mm]
Tastempfindlichkeit*) - <i>Scanning Sensitivity*)</i>		6,24	¢ Fe
Angegebene Fördergeschwindigkeit		V = 0,20	[m/s]
Förd.Geschw. - ohne Empf.verlust		Von = 0,16	[m/s]
<i>Conveying speed, without sensitivity loss</i>		<i>from =</i>	
Förd.-Geschw. - ohne Empf.verlust		Bis = 28,13	[m/s]
<i>Conveying speed, without sensitivity loss</i>		<i>Up to =</i>	
min. Förd.Geschw. - <i>Conveying Speed min.</i>		Vmin = 0,03	[m/s]
Tastempfindlichkeit* - <i>Scanning Sensitivity*</i>		9,36	¢ Fe
max. Förd.Geschw. - <i>Conveying Speed max.</i>		Vmax = 112,50	[m/s]
Tastempfindlichkeit* - <i>Scanning Sensitivity*</i>		12,12	¢ Fe

*) Tastempfindlichkeit:

Bezieht sich auf das Zentrum der Durchlaßöffnung (= ungünstigste Stelle). Die wirklich erzielbaren Werte sind abhängig von Art und Form des Metallteiles, Art und Temperatur des zu untersuchenden Materials sowie Einflüsse am Gerätestandort.

*)Basic sensitivity:

It refers to the center of the detection coil aperture (=most unfavourable position). The actual achieved values are dependent on type and shape of the metal contaminant, kind and temperature as well as on influences at the location.