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EGE

Brochure No. 8

Metal Detectors

Special-Sensors for Automation

EE80325

Contents

Technique and application for Metal Detectors

Amplifiers, detector coils and accesories

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Metal Detectors
Technique & Application

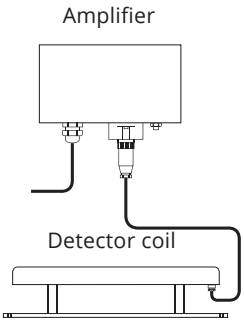
Overview

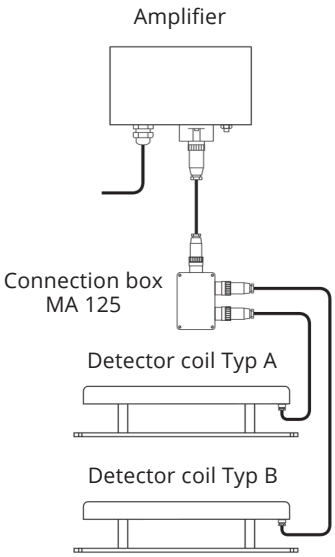
How to use

System3000 provides an eff ective protection solution for industrial equipment such as rock crushers, vibrators and wood chippers. The metal detector detects larger metal objects such as excavator bucket teeth, wrenches and other objects that could cause serious damage to the equipment. In addi- tion, the MDVH 3261 amplifi er detects smaller metal objects such as nails or nuts. This combination provides comprehensive protection that eff ectively minimises machine downtime and repair costs.

Components / setup of the metal detector system

Ametal detector system consists of one or two coils and an amplifi er. The following diagrams illustrate this with examples.





Amplifi er

MDV3172 / 3173

- Robust design with plastic housing
- Fixed cable connection
- Sensitivity adjustable
- 24 V DC / 115 V AC / 230 V AC
- “Fail-safe” logic for switching output for MDV 3173

MDV 3221

- Version with aluminium housing and screw terminal connection
- Sensitivity adjustable
- Internal and external test function
- Extended control range for surrounding metal
- Diagnostic function / LED
- 24 V DC / 230 V AC
- “Fail-safe” logic selectable for switching output

MDVH 3261

- Higher sensitivity for more applications
- Version with aluminium housing and screw terminal connection
- Sensitivity adjustable
- Internal and external test function
- Extended control range for surrounding metal
- Diagnostic function / LED
- 24 V DC / 230 V AC
- “Fail-safe” logic selectable for switching output

Detector coils

The coils areavailable in three diff erent widths:

Coil type A

MDS 3065-SA:	650 mm
MDS 3075-SA:	750 mm
MDS 3095-SA:	950 mm

Coil type B (for combination of coils)

MDS 3065-SB:	650 mm
MDS 3075-SB:	750 mm
MDS 3095-SB:	950 mm

Accessories

Protectionforfaulty mains

DTG 24 (24 V DC)
NTG 251 (230 V AC)
NTG 255 (115 V AC)

Connection box for the simultaneous use of two coils
MA125

Extension cable for coils
KS031-DS

Technique & Application

Application notes

How to use

TheEGE metal detection system is an efficient solution for detecting metal objects in industrial applications. It consists of one or two MDS series detection coils and an MDV or MDVH amplifier. The system detects metal objects, for example on conveyor belts, and sends a signal to the connected control system. This prevents damage to system components before costly repairs become necessary. It protects the system, reduces repair costs and can be easily integrated into existing control systems.

Function

Thedetector coil produces an electromagnetic fi eld. When a suffi ciently large metal object passes through this fi eld, the change in fi eld strength is detected by the amplifi er unit, which activates a relay. A potentiometer can be used to adjust the sensitivity so that only objects above a certain size are detected. Metal parts of the conveyor belt construction and the mounting of the detector coil are masked out in the adjustment range to prevent malfunction.

The switching logic of the output relay can be changed to “fail-safe” logic on the MDV 3221 and MDVH 3261, while it is fi xed on the MDV 3173. In addition, the MDV 3221 and MDVH 3261 off er a test function that can be started either by a button on the unit or by an external voltage. This test function simulates the damping of the system by metal and tests the entire processing chain.

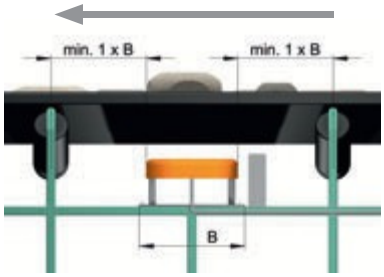
Detection sensitivitydependsonthe type of metal and the speed of the conveyor belt.

Mounting

The detector coil is mounted on an aluminium plate with spacers. This provides both shielding against electromagnetic interference from the ground and a stable mounting. In locations with electromagnetic interference, it is recommended that the coil is additionally shielded at the sides, for example with aluminium plates.

The detector coil is installed under the conveyor belt to detect metal objects in the material being conveyed. Ensure that there is a suffi cient distance (B) from metal components such as conveyor rollers to avoid possible interference. The base plate should be securely bolted to the conveyor structure to prevent vibration.

To minimise the risk of shocks to the detector coil from a swinging or sagging belt, it is recommended that a safety beam be installed to absorb such shocks.



The evaluation unit can be installed either close to the coil or further away, for example in the control room or machine area. To minimise interference, cables carrying high currents or powering frequency controlled motors should be kept well away from the metal detector system components.

Mounting above the conveyor belt

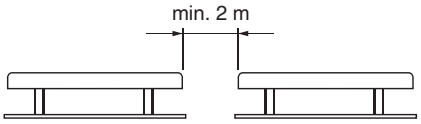
This type of installation is only intended for special cases where other types of installation are not possible. It must be ensured thatthe stackedmaterial does not come intocontactwiththe detector coil to avoid damage.

The coil must not be suspended freely from chains or similar.

Dealing with surrounding metal

The more surrounding metal (e.g. conveyor frame), the harder the leveling system has to work. The distance between the coil and such metal also plays a role. The diagnostic LED (MDVH 3261 and MDV 3221 only) helps with the design: it uses fl ashing codes to indicate if there is a borderline amount of surrounding metal.

Separate Metal Detector Systems



If two detector coils are to be oper- ated, each with its own amplifi er, a minimum lateral distance of 2 metres is required between the coils. Otherwise the coils may infl uence each other, re- sulting in interference or false alarms.

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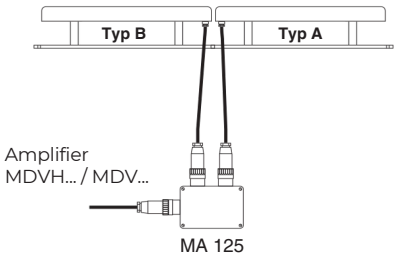
Technique & Application

Application notes

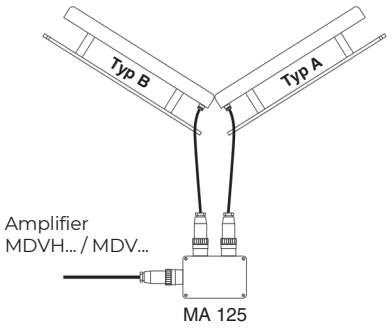
Combination of two detector coils

Two detector coils canbe connected to a single amplifier. This requires the use of the MA 125 connection box. In addition, one coil must be of type A and one of type B.



Horizontal orientation

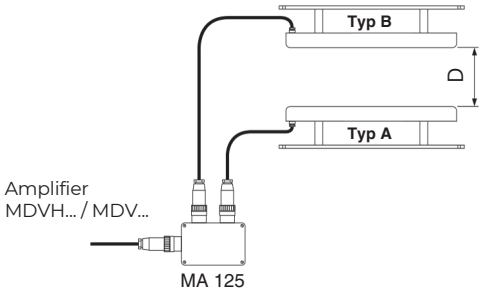
The horizontal orientation and the V-position (see drawing) are used to increase the detection range, e.g. on wider conveyor belts. The distance between the two coils should be as small as possible.



V-position

The stacked arrangement of the coils is used to increase the detection area vertically, e.g. to allow a higher load on the conveyor belt.

When stacked, the distance D can be greater than twice the operating distance of a single coil.



Stacked arrangement

Protectionforfaulty mains DTG / NTG

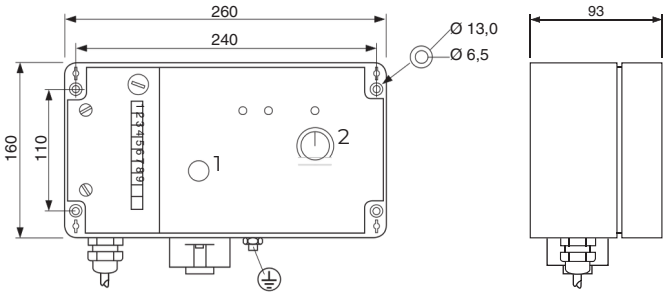
Themains isolator is connected between the mains supply and the MDV.../MDVH... amplifier and is used to protect the amplifier from mains overvoltages and overloads. It is particularly useful where there is no overvoltage protection, where power is supplied via overhead mains or unregulated chargers, or where large inductances such as motors are directly switched on. The mains isolator also acts as a noise filter by reducing electromagnetic interference. The potential-free change-over output contact is designed for connection to a control contactor, but is not suitable for operating large loads.

Amplifier for detector coils

Higher sensitivity for more applications
Sensitivity adjustable
Internal and external test function
Extended control range for surrounding metal
Diagnostic LED for faster setup
"Fail-safe" logic selectable for switching output

Design	MDVH 3261

Dimensions

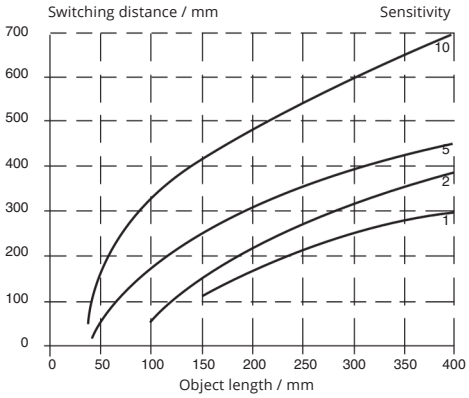


1 Test button
2 Potentiometer

ID-No.		P81066	P81067
Type		MDVH 3261 GR	MDVH 3261WR
Supply voltage	[V]	24 DC ±10%	230 AC ±10%
Current consumption	[mA]	< 250	< 50
Output		Relay / Change-over contact	
Switching voltage		250 V AC / 220 V DC	
Switching current		1 A AC / 2 A DC	
Switching power		125 VA / 60 W	
Test input	[V]	≤ 24 DC	
Ambient temperature	[°C]	– 25...+60	
Protection	[EN 60529]	IP 67	
Display		LED	
Clamping area		4...10	
Cable gland	[mm]	Aluminium	
Housing material		Screw terminals	
Connection			

Note:

The sensitivity of the system can be adjusted using the potentiometer.
The test function can be used to check the complete operation of the MDVH 3261 with the detector coil connected. The test is triggered by pressing the test button or by applying a voltage to the test input.



Maximum sensitivity with ST 37 sample

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Amplifier for detector coils

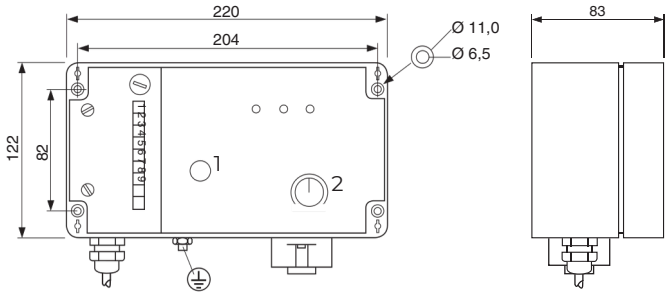
Sensitivity adjustable

Internal and external test function

Extended control range for surrounding metal

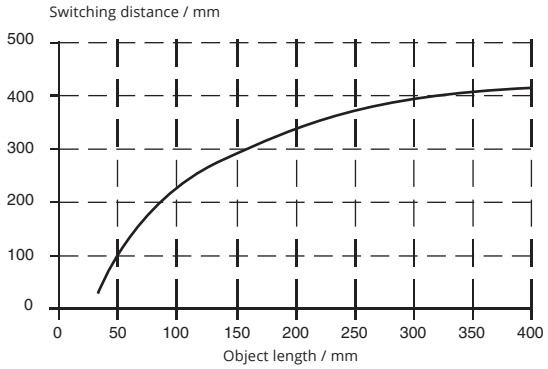
Diagnostic LED for faster setup

"Fail-safe" logic selectable for switching output

Design		MDV 3221	
Dimensions		 1 Test button 2 Potentiometer	
ID-No.		P81068	P81069
Type		MDV 3221 GR	MDV 3221WR
Supply voltage	[V]	24 DC ±10%	230 AC ±10%
Current consumption	[mA]	< 100	< 20
Output		Relay / Change-over contact	
Switching voltage		250 V AC / 220 V DC	
Switching current		1 A AC / 2 A DC	
Switching power		125 VA / 60 W	
Test input	[V]	≤ 24 DC	
Ambient temperature	[°C]	– 25...+60	
Protection	[EN 60529]	IP 67	
Display		LED	
Clamping area			
Cable gland	[mm]	4...10	
Housing material		Aluminium	
Connection		Screw terminals	

Note:

The sensitivity of the system can be adjusted using the potentiometer.
The test function can be used to check the complete operation of the MDV 3221 with the detector coil connected. The test is triggered by pressing the test button or by applying a voltage to the test input.



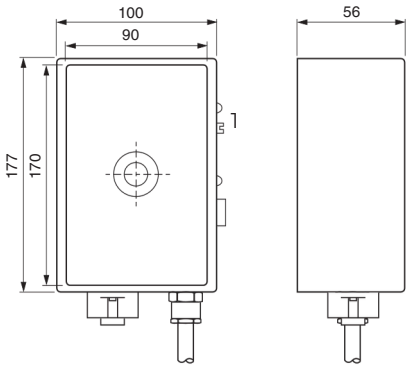
Maximum sensitivity with ST 37 sample

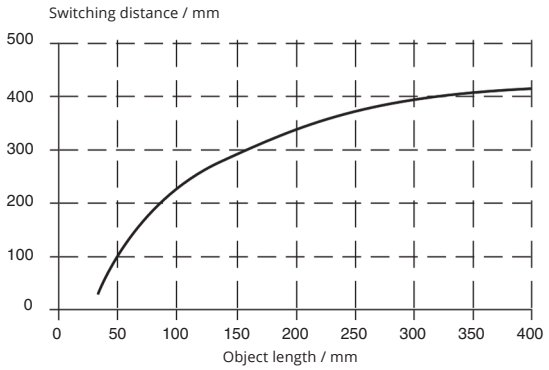
Amplifier for detector coils

Rugged design with plastic housing

Automatic control range for surrounding metal

Sensitivity adjustable

Design		MDV 3172		
Dimensions		 1 Potentionmeter		
ID-No.		P81011	P81010	P81017
Type		MDV 3172 GR	MDV 3172 WR2	MDV 3172WR1
Supply voltage	[V]	24 DC ±10%	230 AC ±10%	115 AC ±10%
Current consumption	[mA]	< 100	< 20	< 60
Output		Relay / Change-over contact		
Switching voltage		250 V AC / 220 V DC		
Switching current		1 A AC / 2 A DC		
Switching power		125 VA / 60 W		
Ambient temperature	[°C]	– 25...+60		
Protection	[EN 60529]	IP 67		
Display		LED		
Housing material		PBT		
Connection		2 m PVC cable 7x0.5 mm2		



Maximum sensitivity with ST 37 sample

Accessories	Central screw M16x1 (Z00105) is part of delivery

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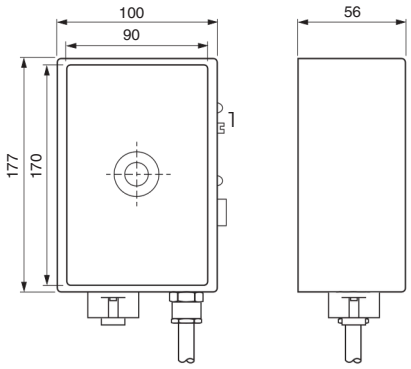
Amplifier for detector coils

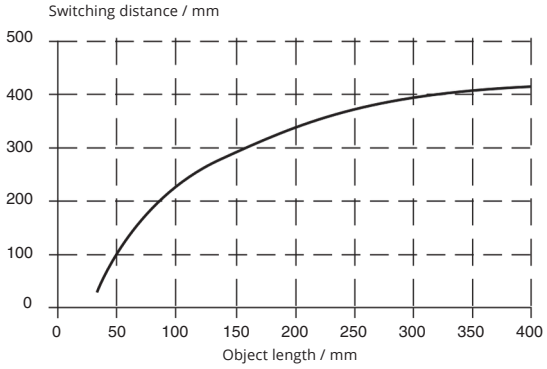
Rugged design with plastic housing

Automatic control range for surrounding metal

Sensitivity adjustable

"Fail-safe" logic permanently set for switching output

Design		MDV 3173		
Dimensions				
ID-No.		P81064	P81063	P81065
Type		MDV 3173 GR	MDV 3173 WR2	MDV 3173WR1
Supply voltage	[V]	24 DC ±10%	230 AC ±10%	115 AC ±10%
Current consumption	[mA]	< 100	< 20	< 60
Output		Relay / Change-over contact		
Switching voltage		250 V AC / 220 V DC		
Switching current		1 A AC / 2 A DC		
Switching power		125 VA / 60 W		
Ambient temperature	[°C]	– 25...+60		
Protection	[EN 60529]	IP 67		
Display		LED		
Housing material		PBT		
Connection		2 m PVC cable 7x0.5 mm2		



Maximum sensitivity with ST 37 sample

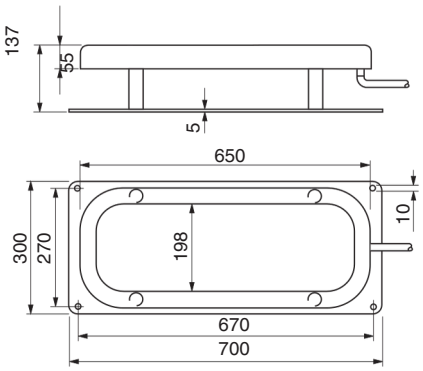
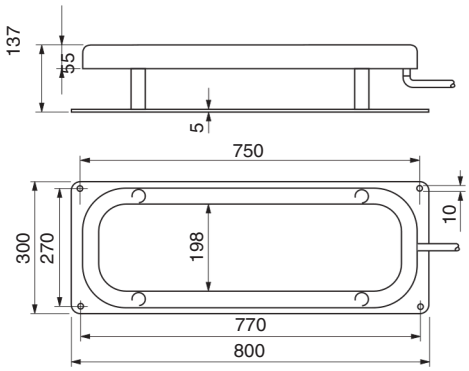
Accessories	Central screw M16x1 (Z00105) is part of delivery

Detector coils

Designed for outdoor use

Rugged construction

High stability

Design	MDS 3065-S		MDS 3075-S	
Dimensions				
ID-No.	P81054	P81055	P81070	P81071
Type	MDS3065-SA	MDS3065-SB	MDS3075-SA	MDS 3075-SB
Coiltype	A	B	A	B
Ambient temperature [°C]	– 25...+70			
Protection [EN 60529]	IP 67			
Housing material	PBT / Aluminium plate			
Connection	3 m PUR cable with cable plug			

Note:
If two coils are to be connected to an amplifier via the MA 125 connection box, one type A coil and one type B coil must be used.

Accessories	Connection box MA 125 p. 8.13, Extension cable for coils KS031-DS.., p. 8.14

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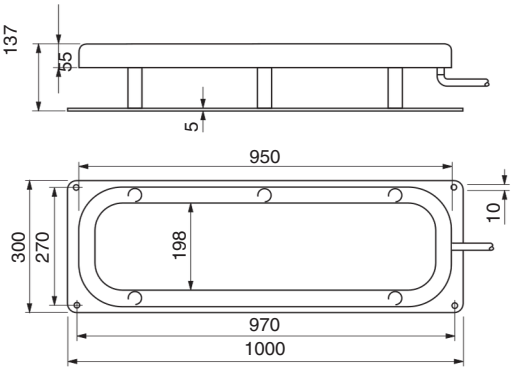
Detector coils

Designed for outdoor use

Rugged construction

High stability

Design	MDS 3095-S	
Dimensions		
ID-No.	P81056	P81057
Type	MDS3095-SA	MDS 3095-SB
Coiltype	A	B
Ambient temperature [°C]	– 25...+70	
Protection [EN 60529]	IP 67	
Housing material	PBT / Aluminium plate	
Connection	3 m PUR cable with cable plug	

Note:
If two coils are to be connected to an amplifier via the MA 125 connection box, one type A coil and one type B coil must be used.

Accessories	Connection box MA 125 p. 8.13, Extension cable for coils KS031-DS.., p. 8.14

Overvoltage protection | Power supply isolation device

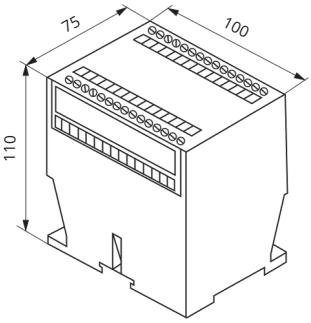
Limits mains overvoltages

Protects the amplifier from overload

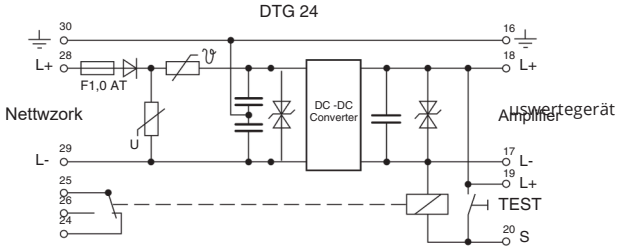
Acts as a noise filter

Floating change-over output contacts

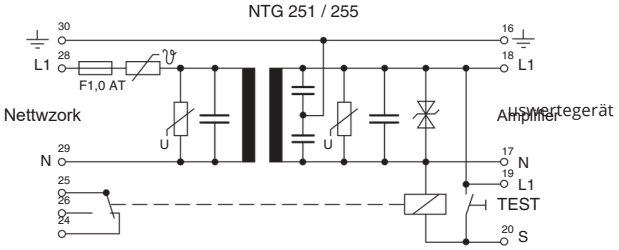
Quick mounting on standard rail
(DIN EN 50022)

Design	DTG / NTG		
Dimensions			
ID-No.	P81053	P81030	P81032
Type	DTG 24	NTG 251	NTG 255
Output	Relay	Relay	Relay
Supply voltage [V]	19...30 DC	230 AC ±15%	115 AC ±15%
Power consumption [VA]	6	8	8
Output voltage	24 V DC ±2%	230 V AC ±15%	115 V AC ±15%
Output	Relay / Change-over contact		
Switching voltage max. [V]	250 AC		
Switching current max. [A]	4 AC		
Switching power max.	1000 VA / 60 W		
Ambient temperature [°C]	– 25...+60		
Protection [EN 60529]	Terminals: IP 20 / Housing: IP 40		
Display	LED		
Connection	Screw terminals		

DTG 24



NTG 251 / 255



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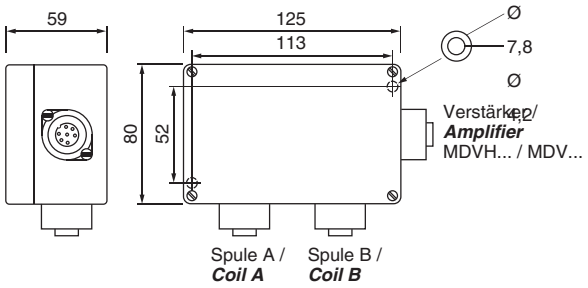
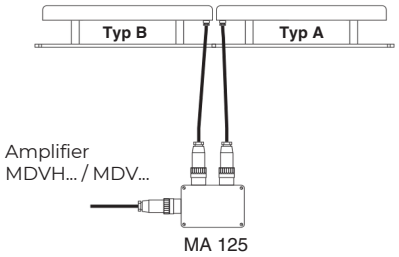
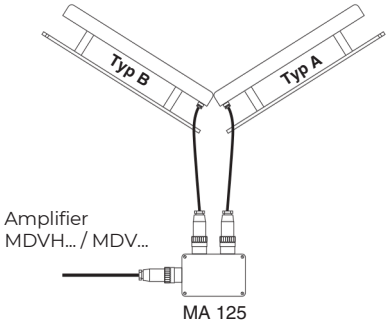
Connection box for detector coils

Connection box for the combination of detector coils

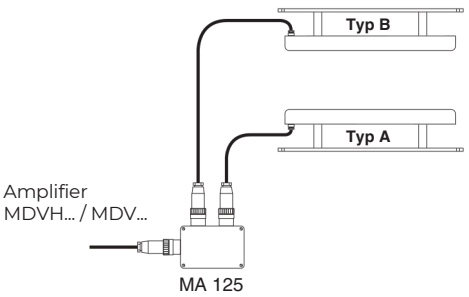
Design	MA 125
Dimensions	
ID-No.	P81058
Type	MA 125
Ambient temperature [°C]	– 25...+60
Protection [EN 60529]	IP 67
Housing material	Aluminium, painted
Connection	Plug connection, 2x socket / 1x plug
Two detector coils can be operated together with one MDVH / MDV... using the MA 125 connection box. The maximum cable length between a coil and the MA 125 connection box is 3 m.	



Horizontal orientation



V-position



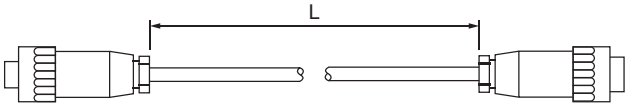
Stacked arrangement

Extension cable for detector coil

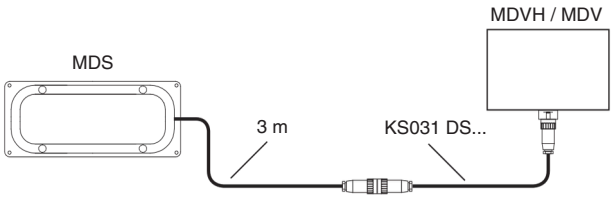
The extension cable KS031-DS connects the detector coil MDS... with the amplifi er MDVH... / MDV...

Design		KS031-DS		
ID-No.		P81051	P81052	
Type		KS031-DS05	KS031-DS10	KS031-DSXX
Cable length L	[m]	5	10	length on request
Cable shield			•	
Cable material			PUR	
Protection	[EN 60529]		IP 67	
Connection			Socket, plug	

Dimensions



The KS031-DS detector coil extension cable is designed for use with 3000 series metal detectors. Its rugged construc-tion and tough PUR jacket means it will not generate interference that could cause an error signal in the amplifier.



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Process Sensors

Flow sensors

- Electronical monitoring of flow
- Lubrication monitoring
- Measuring range 1 ml/min...100 l/min
- Detection range 1...300 cm/s
- Reaction time 0.5 s

Level sensors

- For level monitoring – 230...+230 °C
- Steam proof at a pressure of up to 30 bar
- For hot motor oil
- For liquid nitrogen
- For chemically aggressive media

Infrared detectors

- Measurement of temperature
- Monitoring of hot media
- Position control

Temperature sensors

- Monitoring in pipes and containers
- Temperature – 40...+120 °C (±0,3 °C)
- Pressure up to 100 bar
- Compact models
- Multi use output NO/NC + analog

Pressure sensors

- Monitoring in pipes and containers
- Pressure up to 16 bar
- Level up to 10 m (±1 cm)
- Compact models
- Programmable

Ultrasonic sensors

- Switching distanceup to 6000 mm
- Level monitoring
- Watertight housing
- Teach-in functions

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GREECE, Sindos - Thessaloniki
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ROMANIA, Bucharest
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SLOVAKIA, Banská Bystrica
SLOVENIA, Ljubljana - Crnuce
SOUTH AFRICA, Cleveland
SOUTH KOREA, Gwangmyeongsi, Gyeonggi-do
SPAIN, Nigran
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TAIWAN, New Taipeh City
TURKEY, Kurtköy / Pendik / Istanbul
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