RING SENSORS
OVERVIEW

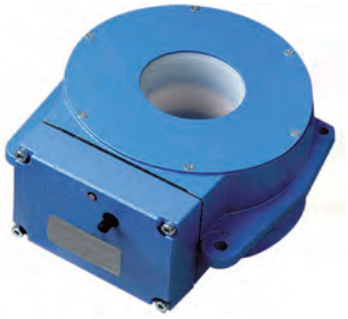
Altech offers 3 types of Ring Sensors with different operating principles. They have different features and advantages.

NORMAL SENSITIVITY RING SENSORS

They are **Static Type Ring Sensors** and their advantage is the ability to detect non-moving static objects. If metal is within its detecting range it generates a permanent output signal. Only when the metal object is removed the signal is deactivated. Due to the working principle the sensitivity is lower than on dynamic Ring Sensors.

Applications include Freefall applications to detect the presence of metal objects, count metal parts or ejection control in punching/ stamping applications, wire breakage and avoid unwanted metal objects in grinding operations. They are used for larger metal objects.

Features
- Static Sensor Technology
- Robust Aluminum housing
- 10-30VDC supply
- Various Ring Diameters 50-300mm
- Complementary NO/ NC output



HIGH SENSITIVITY RING SENSORS

They are **Dynamic Type Ring Sensors** and generate a short signal pulse when metal is detected within its detecting range. Only moving metal objects can be detected. Sensitivity on dynamic Ring sensors is higher than on static type sensors. Therefore smaller objects can be detected.

Applications include Freefall applications to detect the presence of metal objects, count metal parts or ejection control in punching/ stamping applications, wire breakage and avoid unwanted metal objects in grinding operations. They are used for much smaller metal objects than the normal sensitivity Ring sensors.

Features
- Dynamic Sensor Technology
- Robust Aluminum housing
- 0.6mm sensitivity
- 11-30VDC supply
- Various Ring Diameters 50-300mm
- Complementary NO/ NC output

ULTRA HIGH SENSITIVITY RING SENSORS

Ultra High Sensitivity Ring Sensors work different than standard metal sensors. Their system is based on 3 coils. This allows the end user to analyze signals precisely. It is possible to differentiate different targets and draw conclusions on their origin.

Applications include all of the above, but Ultra High Sensitivity Ring Sensors are used primarily for the detection of **very small particles** in bulk material (Pharmaceutical products, Food and animal feed, granulated polymer materials, etc…).

Features
- 3 coil system
- Robust Aluminum housing
- 0.2mm sensitivity
- Including stainless steel control unit for Signal Analysis
- Various Ring Diameters 25-100mm

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RING SENSOR SELECTION CHART

Table 1 allows the user to choose the appropriate Ring Sensor for his Application. The sensitivity shows the smallest detectable ferrous metal object. Environmental conditions or vibrations can decrease the sensitivity.

			Sensitivity - Minimum detectable Steel Ball (diameter) in mm														
	Series/ Type	Diameter	0.20	0.30	0.35	0.60	0.80	1.00	1.30	3.00	4.00	5.00	6.00	8.00	12.00	15.00	30.00	Page
Normal Sensitivity	KJR-D50FAN-DxA	50mm								X								6
	KJR-D100AN-DxA	100mm											X					6
	KJR-D100FAN-DxA	100mm												X				6
	KJR-D200AN-DxA	200mm														X		7
	KJR-D300AN-DxA	300mm															X	7
	KJR-Q130AN-DxA	130x130mm													X			7
High Sensitivity	KJR-D50AN-DxIA	50mm				X												8
	KJR-D50FAN-DxIA	50mm						X										8
	KJR-D70AN-DxIA	70mm						X										8
	KJR-D100AN-DxIA	100mm							X									9
	KJR-D200AN-DxIA	200mm								X								9
	KJR-D300AN-DxIA	300mm									X							9
	KJR-Q130AN-DxIA	130x130mm										X						10
	KJR-Q290AN-DxIA	290x245mm													X			10
Ultra High Sensitivity	AMD-RG25	25mm	X															12
	AMD-RG35	35mm		X														12
	AMD-RG50	50mm			X													12
	AMD-RG70	70mm				X												12
	AMD-RG100	100mm					X											12

Table 1

SENSITIVITY CHART

Sensitivity of Ring sensors is given in terms of a steel ball diameter. It is the minimum diameter steel ball the sensor will be detect under lab conditions (20°C, no vibration, no additional electromagnetic field, etc..). Non-ferrous materials will require larger diameter parts for correct detection from the sensor. Table 2 shows with correction factors for other types of metals.

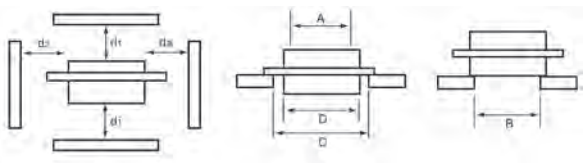
Actual Sensitivity depends on various factors. Unfavorable environmental conditions (Temperature, Humidity) or vibrations can reduce the sensitivity. Please contact Altech form more information. Send us a sample of your smallest metal target and we will test it!

ST37	1
Stainless Steel	1-1.6
Aluminum	1.8-2.3
Copper	1.9-2.4
Brass	1.8-2.3

Table 2. Correction factors for different metal types.

RING SENSOR MOUNTING – METAL-FREE ZONES

When Normal and High Sensitivity Ring Sensors are mounted near or in non-target metal objects, the following metal free areas need to be considered (Table 3):



D = C is permissible

	Inner Diameter		Side Distance	
Sensor Type	Sensor = A	Mounting Plate = B*	d1	d2
KJR-D50AN	50mm	>85mm	>60mm	0
KJR-D50FAN	50mm	>85mm	>50mm	0
KJR-D70AN	70mm	>120mm	>65mm	0
KJR-D100AN	100mm	>180mm	>100mm	>30mm
KJR-D200AN	202mm	>260mm	>150mm	0
KJR-D300AN	294mm	>400mm	>200mm	0

* Mountaing Plate must not move!

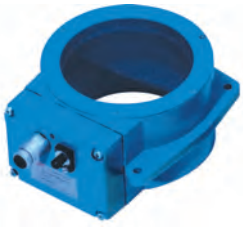
Table 3

RING SENSORS

NORMAL SENSITIVITY RING SENSORS

FEATURES:

- 10-30VDC Supply
- Detection and Counting Application
- Compact and Robust Design
- Static Sensor Technology
- Various Ring Diameters (50-300mm)



RING DIAMETER	50mm (1.97in.)	100mm (3.94in.)	100mm (3.94in.)
SENSITIVITY	3.0mm (0.12in.)	6.0mm (0.24in.)	8.0mm (0.31in.)

Part No.

NPN Output	KJR-D50FAN-DNA-V2	KJR-D100AN-DNA-V2	KJR-D100FAN-DNA-V2
PNP Output	KJR-D50FAN-DPA-V2	KJR-D100AN-DPA-V2	KJR-D100FAN-DPA-V2

Sensor Data

Output	NO/ NC	NO/ NC	NO/ NC
Switching Frequency	500Hz	500Hz	500Hz
Switching State	LED	LED	LED
Connector	M12, 4 pole	M12, 4 pole	M12, 4 pole

Electrical Data

Operating Voltage	10-30VDC	10-30VDC	10-30VDC
Off-state Current	≤ 15mA	≤ 15mA	≤ 15mA
Max. Load Current	200mA	200mA	200mA
Residual Current	≤ 10μA	≤ 10μA	≤ 10μA
Ripple Voltage	≤ 10%	≤ 10%	≤ 10%
Voltage Drop	≤ 2.4V	≤ 2.4V	≤ 2.4V
Hysteresis	≤ 15%	≤ 15%	≤ 15%

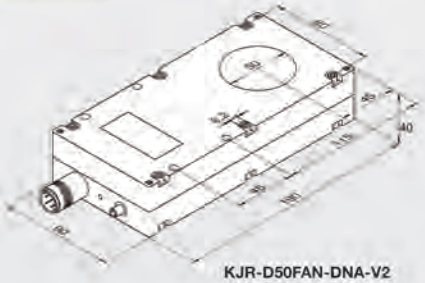
Environmental Data

Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)
Protection Class	IP54	IP54	IP54
Housing Material	Aluminum	Aluminum	Aluminum

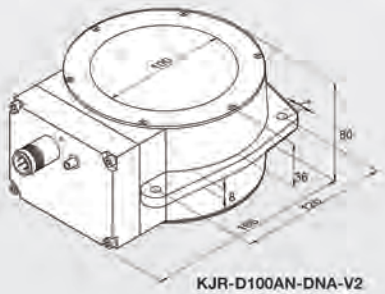
Accessories *(page 11)*

M12 Connecting Cable			
2m	9512-5310	9512-5310	9512-5310
5m	9512-5312	9512-5312	9512-5312
SDK4 Connecting Cable			
2m	–	–	–
5m	–	–	–
Control Unit			
230VAC/ 24VDC	8349005011	8349005011	8349005011
115VAC/ 24VDC	8349005013	8349005013	8349005013

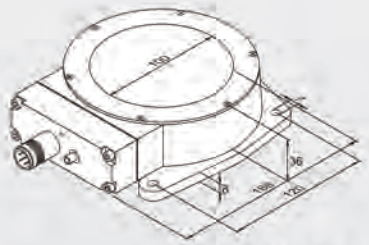
Dimensions



KJR-D50FAN-DNA-V2
KJR-D50FAN-DPA-V2



KJR-D100AN-DNA-V2
KJR-D100AN-DPA-V2



KJR-D100FAN-DNA-V2
KJR-D100FAN-DPA-V2

FEATURES:

- 10-30VDC Supply
- Detection and Counting Application
- Compact and Robust Design
- Static Sensor Technology
- Various Ring Diameters (50-300mm)

RING DIAMETER	200mm (7.87in.)	300mm (11.81in.)
SENSITIVITY	15.0mm (0.59in.)	30.0mm (1.18in.)

Part No.

NPN Output	KJR-200AN-DNA-V2	KJR-D300AN-DNA-V2
PNP Output	KJR-200AN-DPA-V2	KJR-D300AN-DPA-V2

Sensor Data

Output	NO/ NC	NO/ NC
Switching Frequency	300Hz	300Hz
Switching State	LED	LED
Connector	M12, 4 pole	M12, 4 pole

Electrical Data

Operating Voltage	10-30VDC	10-30VDC
Off-state Current	≤ 10mA	≤ 10mA
Max. Load Current	200mA	200mA
Residual Current	≤ 10μA	≤ 10μA
Ripple Voltage	≤ 10%	≤ 10%
Voltage Drop	≤ 2.4V	≤ 2.4V
Hysteresis	≤ 15%	≤ 15%

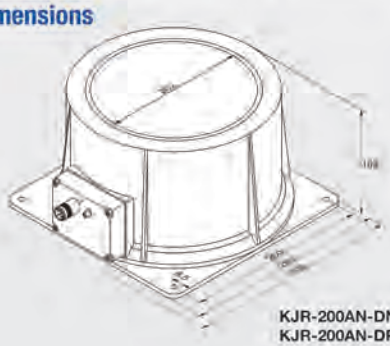
Environmental Data

Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)
Protection Class	IP54	IP54
Aluminum	Aluminum	Aluminum

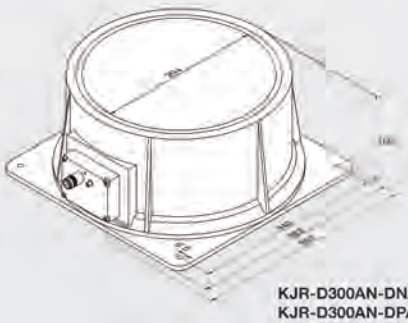
Accessories *(page 11)*

M12 Connecting Cable		
2m	9512-5310	9512-5310
5m	9512-5312	9512-5312
SDK4 Connecting Cable		
2m	–	–
5m	–	–
Control Unit		
230VAC/ 24VDC	8349005011	8349005011
115VAC/ 24VDC	8349005013	8349005013

Dimensions



KJR-200AN-DNA-V2
KJR-200AN-DPA-V2



KJR-D300AN-DNA-V2
KJR-D300AN-DPA-V2

RING SENSORS

HIGH SENSITIVITY RING SENSORS

FEATURES:

- High Sensitivity (0.6mm)
- 10-30VDC Supply
- Detection and Counting Application
- Compact and Robust Design
- Dynamic Sensor Technology
- Various Ring Diameters

RING DIAMETER	50mm (1.97in.)	50mm (1.97in.)	70mm (2.76in.)
SENSITIVITY	0.6mm (0.02in.)	1.0mm (0.04in.)	1.0mm (0.04in.).)
Part No.			
NPN Output	KJR-D50AN-DNIA-V2	KJR-D50FAN-DNIA-V2	KJR-D70AN-DNIA-V2
PNP Output	KJR-D50AN-DPIA-V2	KJR-D50FAN-DPIA-V2	KJR-D70AN-DPIA-V2

Sensor Data

Output	NO/ NC	NO/ NC	NO/ NC
Switching Frequency	100Hz	100Hz	100Hz
Switching State	LED	LED	LED
Connector	M12, 4 pole	M12, 4 pole	M12, 4 pole

Electrical Data

Operating Voltage	11-30VDC	11-30VDC	11-30VDC
Off-state Current	≤ 25mA	≤ 25mA	≤ 25mA
Max. Load Current	50mA	50mA	50mA
Residual Current	≤ 10µA	≤ 10µA	≤ 10µA
Ripple Voltage	≤ 10%	≤ 10%	≤ 10%
Voltage Drop	≤ 2.4V	≤ 2.4V	≤ 2.4V
Hysteresis	≤ 15%	≤ 15%	≤ 15%

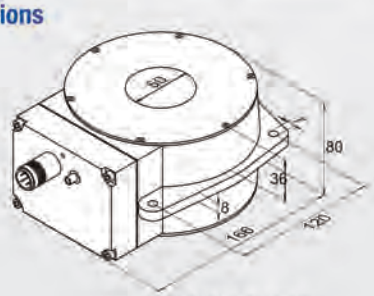
Environmental Data

Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)
Protection Class	IP54	IP54	IP54
Housing Material	Aluminum	Aluminum	Aluminum

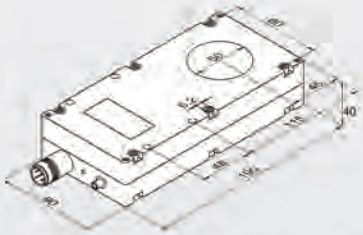
Accessories *(page 11)*

M12 Connecting Cable			
2m	9512-5310	9512-5310	9512-5310
5m	9512-5312	9512-5312	9512-5312
SDK4 Connecting Cable			
2m	–	–	–
5m	–	–	–
Control Unit			
230VAC/ 24VDC	8349005011	8349005011	8349005011
115VAC/ 24VDC	8349005013	8349005013	8349005013

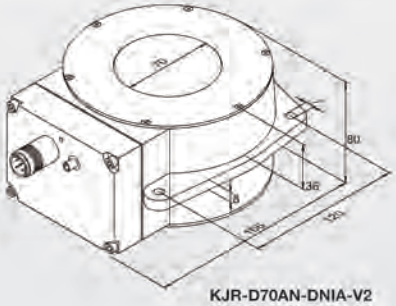
Dimensions



KJR-D50AN-DNIA-V2
KJR-D50AN-DPIA-V2



KJR-D50FAN-DNIA-V2
KJR-D50FAN-DPIA-V2



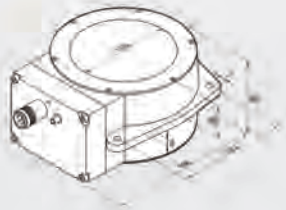
KJR-D70AN-DNIA-V2
KJR-D70AN-DPIA-V2

FEATURES:

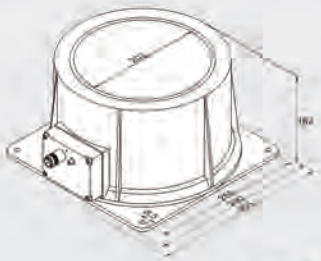
- High Sensitivity (0.6mm)
- 10-30VDC Supply
- Detection and Counting Application
- Compact and Robust Design
- Dynamic Sensor Technology
- Various Ring Diameters

RING DIAMETER	100mm (3.94in.)	200mm (7.87in.)	300mm (11.81in.)
SENSITIVITY	1.3mm (0.05in.)	3.0mm (0.12in.)	4.0mm (0.16in.)
Part No.			
NPN Output	KJR-D100AN-DNIA-V2	KJR-200AN-DNIA-V2	KJR-D300AN-DNIA-V2
PNP Output	KJR-D100AN-DPIA-V2	KJR-200AN-DPIA-V2	KJR-D300AN-DPIA-V2
Sensor Data			
Output	NO/ NC	NO/ NC	NO/ NC
Switching Frequency	100Hz	100Hz	100Hz
Switching State	LED	LED	LED
Connector	M12, 4 pole	M12, 4 pole	M12, 4 pole
Electrical Data			
Operating Voltage	11-30VDC	11-30VDC	11-30VDC
Off-state Current	≤ 25mA	≤ 25mA	≤ 25mA
Max. Load Current	50mA	50mA	50mA
Residual Current	≤ 10µA	≤ 10µA	≤ 10µA
Ripple Voltage	≤ 10%	≤ 10%	≤ 10%
Voltage Drop	≤ 2.4V	≤ 2.4V	≤ 2.4V
Hysteresis	≤ 15%	≤ 15%	≤ 15%
Environmental Data			
Operating Temperature	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)	-25°C to +70°C (-13°F to +158°F)
Protection Class	IP54	IP54	IP54
Aluminum	Aluminum	Aluminum	Aluminum
Accessories *(page 11)*			
M12 Connecting Cable 2m 5m	 9512-5310 9512-5312	 9512-5310 9512-5312	 9512-5310 9512-5312
SDK4 Connecting Cable 2m 5m	 – –	 – –	 – –
Control Unit 230VAC/ 24VDC 115VAC/ 24VDC	 8349005011 8349005013	 8349005011 8349005013	 8349005011 8349005013

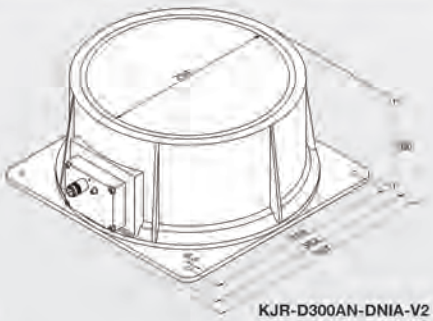
Dimensions



KJR-100AN-DNIA-V2
KJR-100AN-DPIA-V2



KJR-200AN-DNIA-V2
KJR-200AN-DPIA-V2



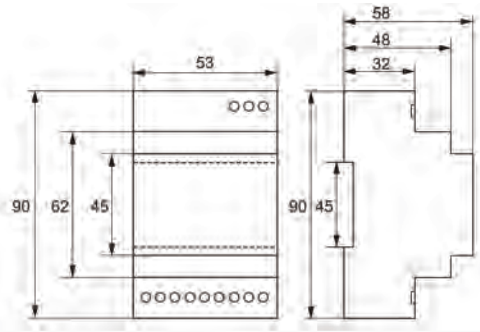
KJR-D300AN-DNIA-V2
KJR-D300AN-DPIA-V2

CONTROL UNIT FOR RING SENSORS

The Control Unit can be operated with all KJR Series Ring Sensors. It allows evaluation of the sensor signals and at the same time it is its power supply.

Features

- DIN Rail Mount
- For Use with all KJR Series Ring Sensors
- 115V AC and 230V AC version
- Operation with 24VDC
- Transistor and Relay Output
- Adjustable Pulse Duration of Output Signal
- Output signal can be retriggered

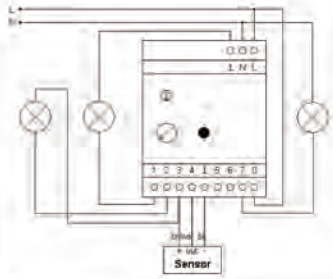


Technical Specifications

Part No.	8349005011	8349005013
Supply Voltage	230 VAC (50/60Hz), 24 VDC	115 VAC (50/60Hz), 24 VDC
Sensor Supply	24 VDC, max. 80mA (Overload and Short Circuit Protected)	24 VDC, max. 80mA (Overload and Short Circuit Protected)
Transistor Output	1 x NPN, 1 x PNP, 25mA open collector	1 x NPN, 1 x PNP, 25mA open collector
Relay Output	1 x SPDT, max. 250 VAC, 5A	1 x SPDT, max. 250 VAC, 5A
Output Pulse Duration	1..10s/ 1..60s adjustable	1..10s/ 1..60s adjustable
Operating Temperature	-10°C..+50°C	-10°C..+50°C
Storage Temperature	-10°C..+60°C	-10°C..+60°C
Protection Class	IP20	IP20
Housing Material	Polycarbonate (UL94V-0)	Polycarbonate (UL94V-0)

Operation

The Duration of a switching Pulse can be adjusted with a built in potentiometer. The User can choose between 2 Timing Ranges using the rotary coding switch. The same switch allows the user to (de) activate the relay output and choose if the connected sensor is NPN or PNP switching.



Wiring Example

CABLES FOR RING SENSORS

M12 4-pole

SD4K Connector

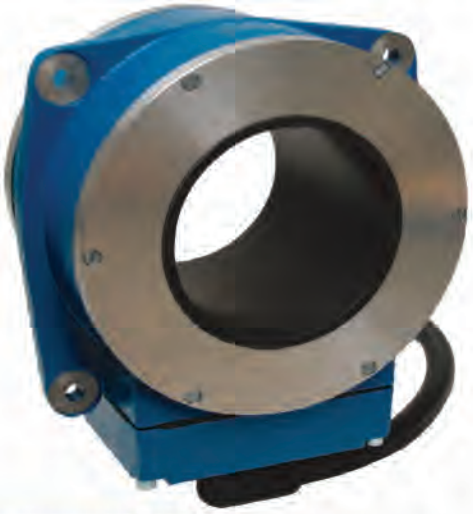
Part No.	2m	5m
M12 Connector Cable	9512-5310	9512-5312
SD4K Connector Cable	9512-0200	9512-0202

Connector M12, 4 pole

SD4K Connector

HIGH SENSITIVITY RING SENSORS

Ultra High Sensitivity Ring sensors are used in applications where the KJR Series is not sufficient. Advantages are their extremely High Sensitivity and the possibility to analyze the Sensor Signal to eliminate e.g. product effects with the included control unit.



Features

- Extremely High sensitivity (0.2mm metal targets)
- 85-265V AC universal supply voltage
- Stainless Steel Control Unit included
- Various Ring Diameters (25-100mm)
- Analysis of Sensor Signal

RING SENSORS (INCLUDING CONTROL UNIT)

	Sensitivity - min. detectable Object			
Part No.	Inner diameter	Height	Ferrous Steel	Stainless Steel
AMD-RG25-DPLUS	**25mm**	95mm	0.2mm	0.5mm
AMD-RG35-DPLUS	**35mm**	95mm	0.3mm	0.6mm
AMD-RG50-DPLUS	**50mm**	95mm	0.35mm	0.9mm
AMD-RG70-DPLUS	**70mm**	95mm	0.6mm	1.1mm
AMD-RG100-DPLUS	**102mm**	120mm	0.8mm	1.3mm

* Mountaing Plate must not move!

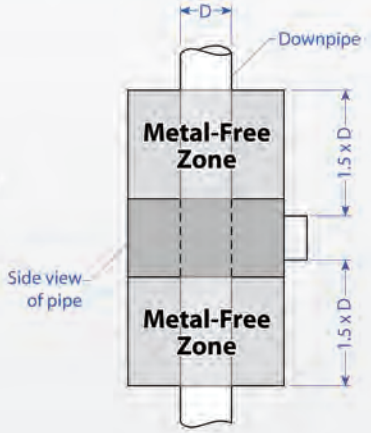
Environmental Data

Operating Temperature	-10°C..+50°C (14°F..122°F)
Storage Temperature	-10°C..+50°C (14°F..140°F)
Protection Class Sensor	IP54
Protection Class Control Unit	IP65

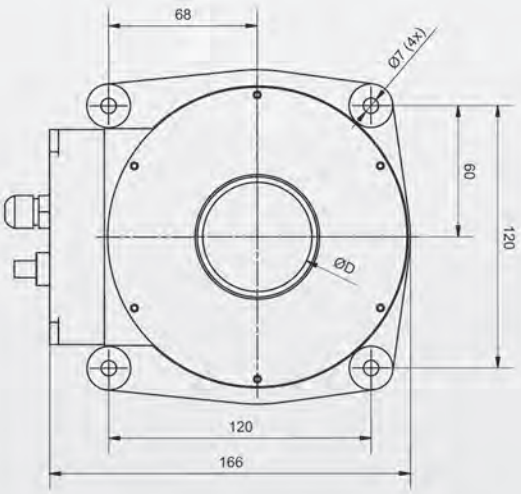
Ring Sensor Mounting

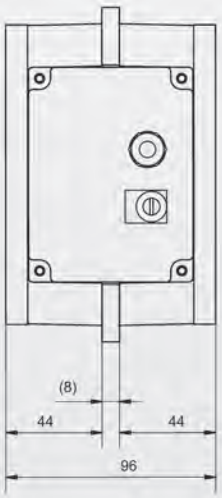
The Ring Sensor is sensing metal partially above and under its opening. Bigger metal pieces can be already detected in that area. In order to guarantee correct functioning of the ring sensor areas above and under the device need to be kept free of metal (Metal-Free Zone). The Metal-Free Zone is different for non-moving (static) and moving dynamic (objects).

Metal-Free Zone Static parts: **1 x inner Diameter**
Metal-Free Zone Dynamic parts: **1.5 x inner Diameter**



Dimensions





CONTROL UNIT ULTRA HIGH SENSITIVITY RING SENSORS

The Control Unit automatically controls and adjusts the connected sensor. This allows a maintenance-free operation. A32-Bit Processor System analysis the sensor data in realtime and filters out product effects and interferences. The device can be monitored via several In- and Outputs.

Features

- Stainless Steel Housing (IP65)
- Easy Handling and Operation
- High Sensitivity Application
- Fade-Out product Effect
- Maintenance Free operation

Technical Specifications

Part No.	included with AMD-RG Series
Supply Voltage	85-265 VAC, 50/60Hz
Power Consumption	max. 40W
Switching State	LED
Electrical Connection	3m connection cable (L1, N, Ground)
Digital I/O	
Digital Inputs	4
Digital Input Types	Optical isolated; VL= -5..1.5V, VH= 6..50V; (Multifunction-Key, Ejector Guard)
Digital Outputs	6
Digital Output Types	PNP; max. 200mA (Transducer, Ejector, Device State)
Sensor - Transmitter	50 Ohm; Overload/ Short Circuit Proof (50..650kHz)
Sensor - Receiver	HDC-IQ - Receiver with Sensor-Readjustment
Serial Interfaces	2
Relay Output	2 SPDT; 250V, 1A
Voltage Output	24 VDC, Overload/ Short Circuit Proof; max. 2.5W for internal Components

Environmental Data

Operating Temperature	-10°C..+60°C
Storage Temperature	0°C..+50°C
Protection Class	IP65
Housing Material	Stainless Steel
Dimensions	200x300x80mm (7.9"x11.8"x3.2")
Weight	3000g (6.6lb)

Operation and Handling

Operation of the Control Unit is easy. The user can adjust the sensitivity and sets the parameters for various targets and their product effect. The parameters are set via the display and saved by pressing a button. Each saved product can be recalled by a single button. 3 LEDs signalize if there is a product loaded and which product it is.

The device is entirely maintenance-free. An integrated self-diagnosis tool immediately signalizes errors. All connections are pluggable.

Display

Keyboard	6 Keys (2 Selection Arrows, Enter, 3 x Keys for product
Display	2 x 20 Characters, Backlit

Dimensions