

## AksIM-2

### Off-Axis Rotary Absolute Redundant Magnetic Encoder

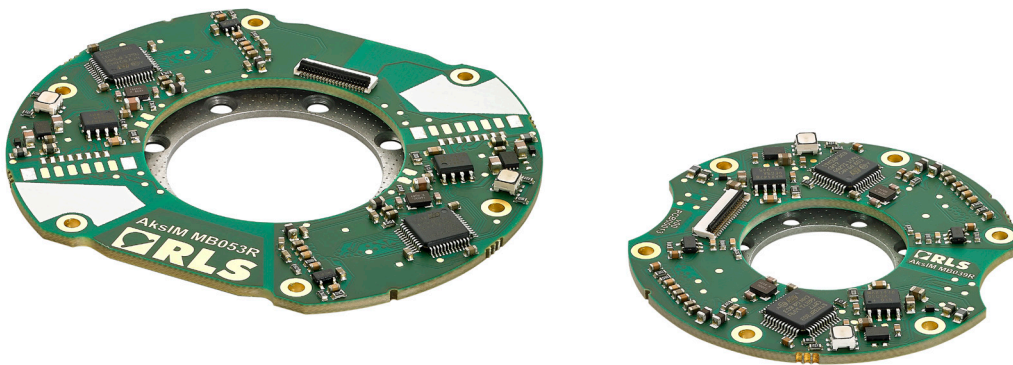
HIGH  
ACCURACY

HIGH SPEED

HIGH SAFETY

The AksIM-2 redundant encoder is an advanced series of non-contact, high performance off-axis absolute encoders suitable for applications requiring a higher level of safety.

The AksIM-2 redundant encoder system consists of two identical, completely independent and electrically isolated encoder modules combined on one PCB and a separate axially magnetized ring.



The encoder is a redundant solution and part of the AksIM-2 absolute encoder range. For technical specifications not included in this document, refer to the latest version of MBD01 data sheet, available for download from the [AksIM-2 website](#).

## Features and benefits

- ▶ Proven AksIM-2 true absolute encoder technology
- ▶ Redundant version for higher safety applications
- ▶ Simple installation and easy connection
- ▶ Resolutions up to 20 bits
- ▶ BiSS communication interface
- ▶ Excellent price-performance ratio



COLLABORATIVE ROBOTS



AGVs



GIMBALS



ROBOTIC JOINTS



AGRICULTURAL  
AUTOMATION

## General information

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With its compact and innovative design, the AksIM-2 redundant encoder system allows easier installation and is available in two dimensions. Two encoder modules on one PCB give much more freedom in designing advanced motion control systems to monitor the encoder position via two independent channels.

The redundant AksIM-2 encoder is available with the advanced BiSS communication protocol with differential signaling (RS422).

With resolutions up to 20 bits and accuracy better than  $\pm 0.05^\circ$ , high performance is assured when the encoder is installed within the required tolerance. Even better accuracy can be achieved by using the encoder's self-calibration function. The encoder operates from  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ .

Like our proven series of standard AksIM-2 encoders, the redundant AksIM-2 encoder has a built-in advanced self-monitoring function that continuously checks several internal parameters. Error, warning and other status reports are available via BiSS register access and are indicated by LEDs.

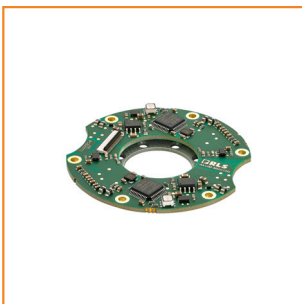
The redundant AksIM-2 encoders are compatible with the standard MRA039 and MRA053 AksIM-2 absolute magnetic rings, providing a reliable solution for a wide range of applications.

**For more information, please see the MBD01 AksIM-2 data sheet, available for download at [RLS Media center](#).**

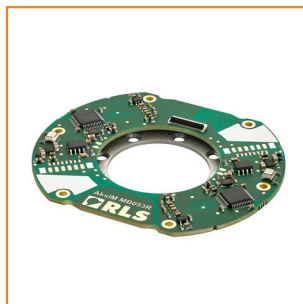
## Choose your AksIM-2 redundant system

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**MB039-R readhead and  
MRA039 magnetic ring**



**MB053-R readhead and  
MRA053 magnetic ring**



## Storage and handling

### Storage temperature



–40 °C to +85 °C

### Operating temperature

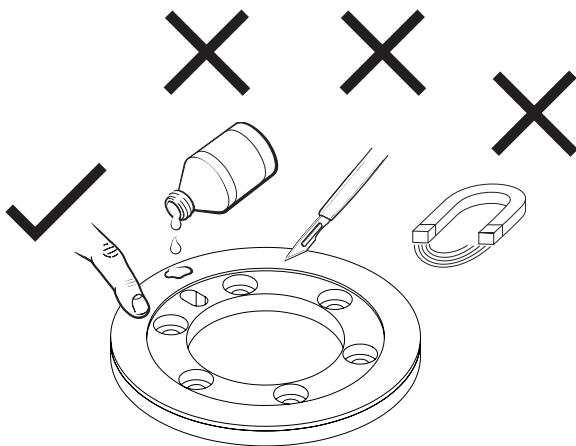


–40 °C to +85 °C

### Humidity



Up to 70 % non-condensing



This encoder system is a high performance metrology product and should be handled with the same care as any other precision instrument. The use of heavy duty industrial tools or exposure to strong magnets such as a magnetic base is unacceptable and carries the risk of irreparable damage to the product.

The magnetic ring should not be exposed to magnetic field densities higher than 50 mT on its surface, as this can damage the ring.



### Readhead is ESD sensitive - handle with care.

Do not touch electronic circuit, wires or sensor area without proper ESD protection or outside of ESD controlled environment.

## Packaging

There are two packaging variants. Up to 20 systems are packed individually in an antistatic box. In case the order quantity is larger than 20 systems, parts are packed in antistatic plastic trays. Magnetic rings and readheads are packed separately.

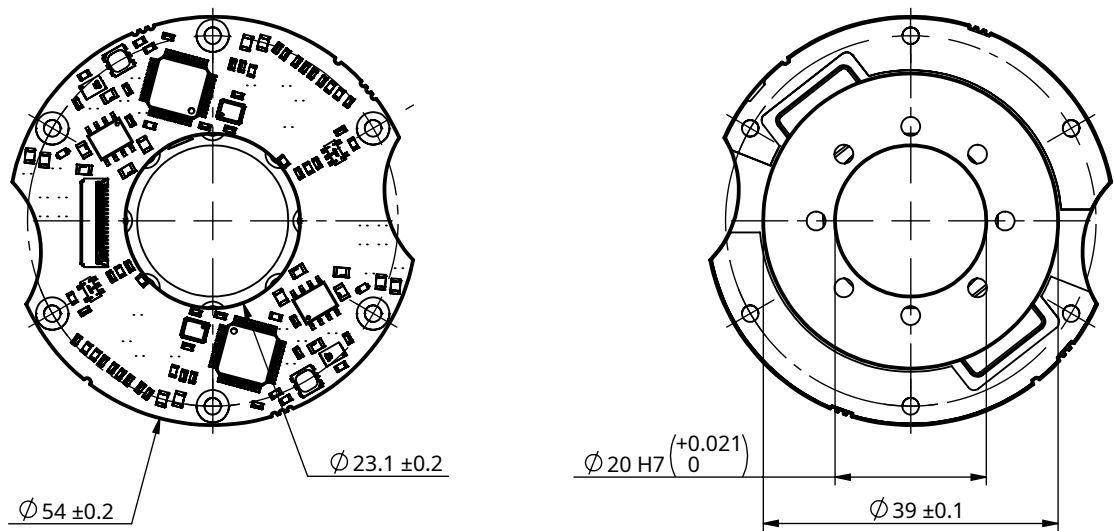
Bulk packaging:

Readheads			Magnetic rings		
Part	Tray size	Box size	Part	Tray size	Box size
MB039-R	10 units per tray	10 trays per box	MRA039	10 units per tray	12 trays per box
MB053-R	6 units per tray		MRA053		

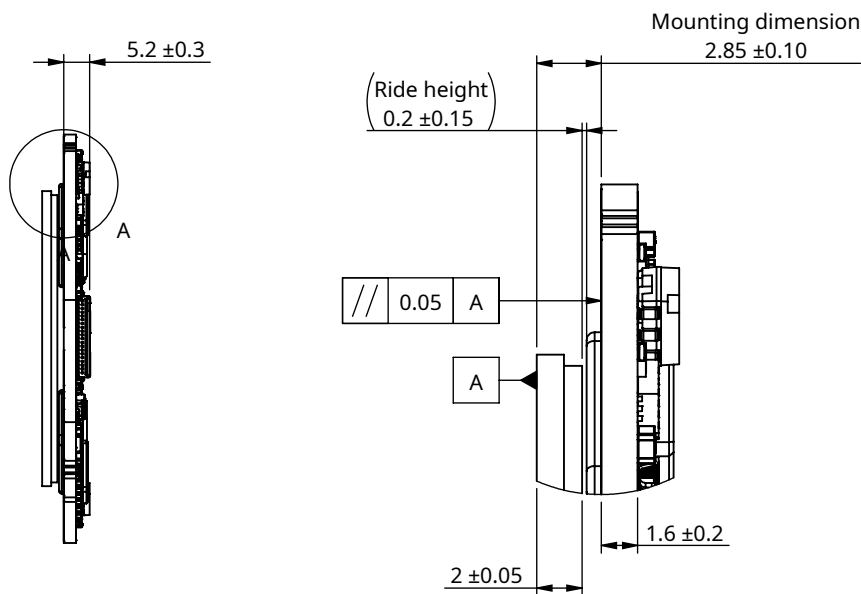
# Dimensions and installation drawings

Dimensions and tolerances are in mm.

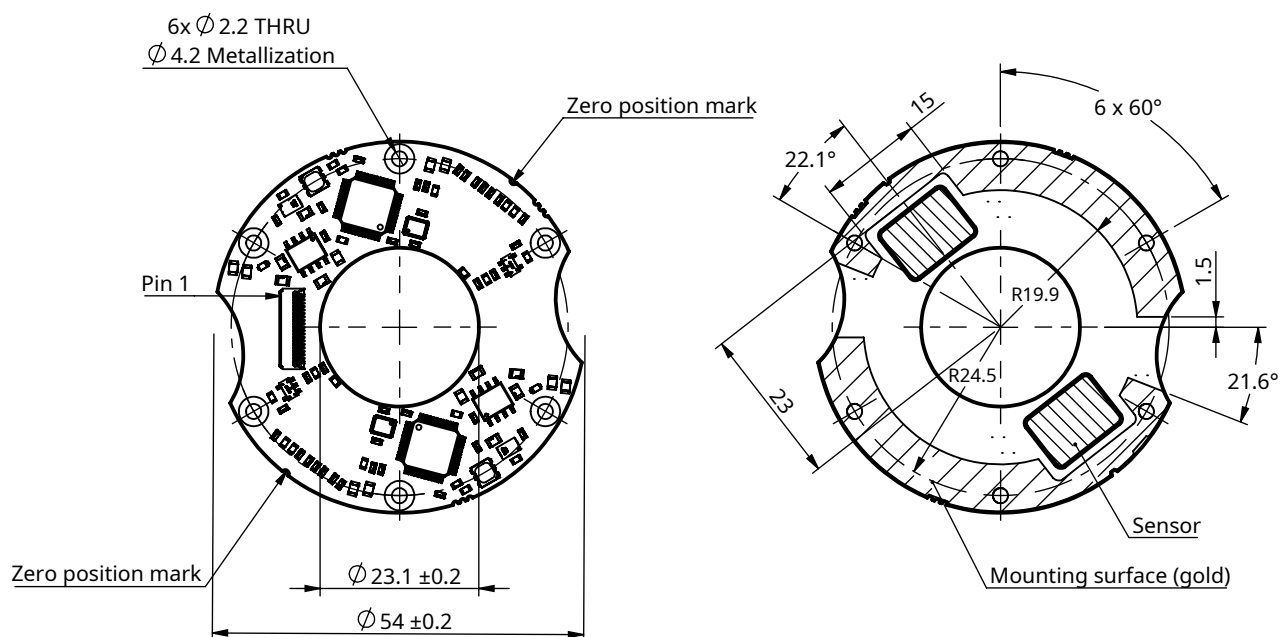
## AksIM-2 redundant encoder assembly size 039



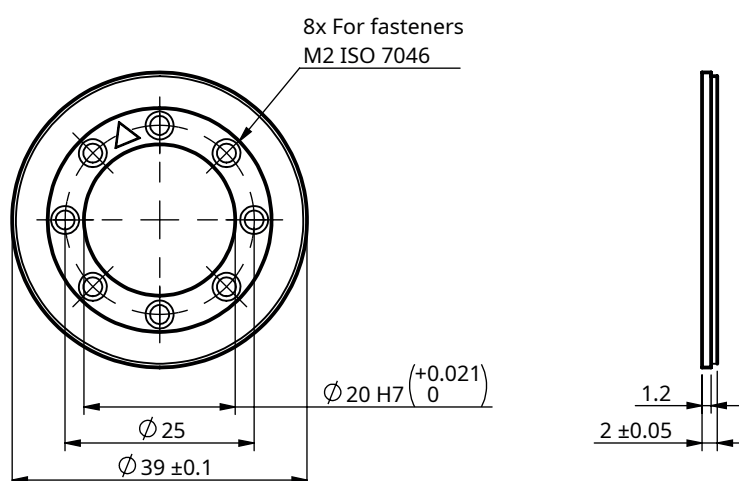
Detail A:



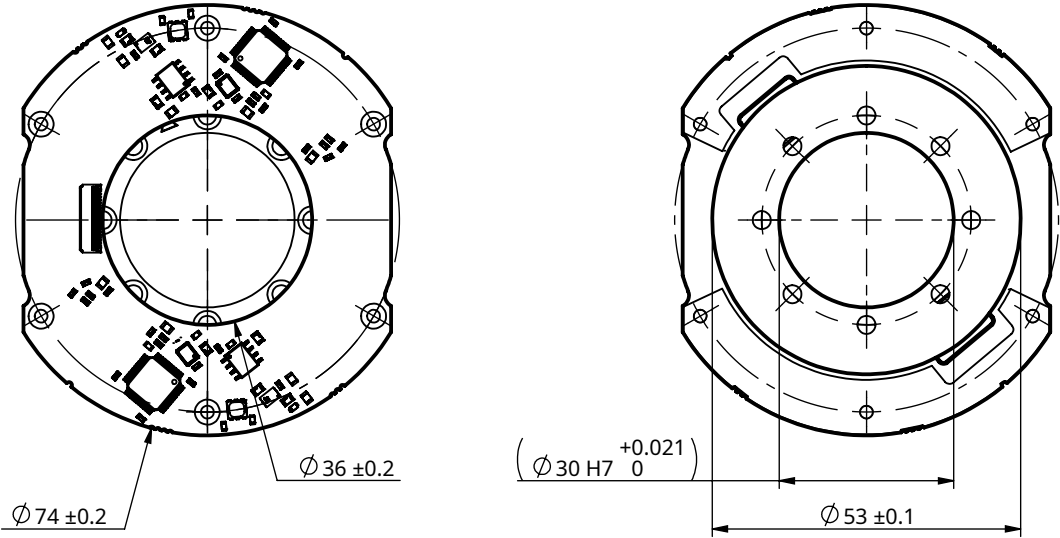
## Readhead MB039 redundant



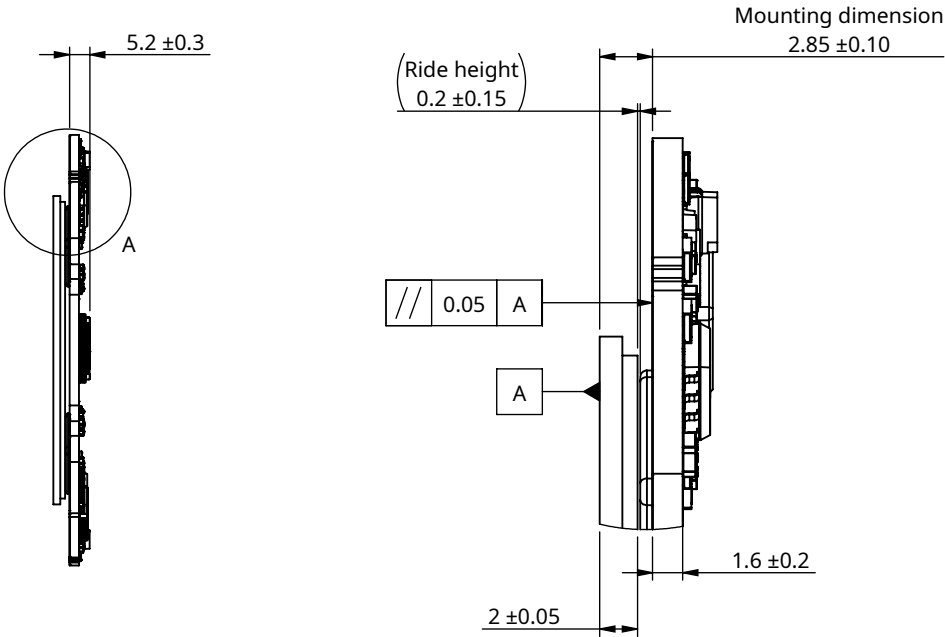
## Magnetic ring MRA039



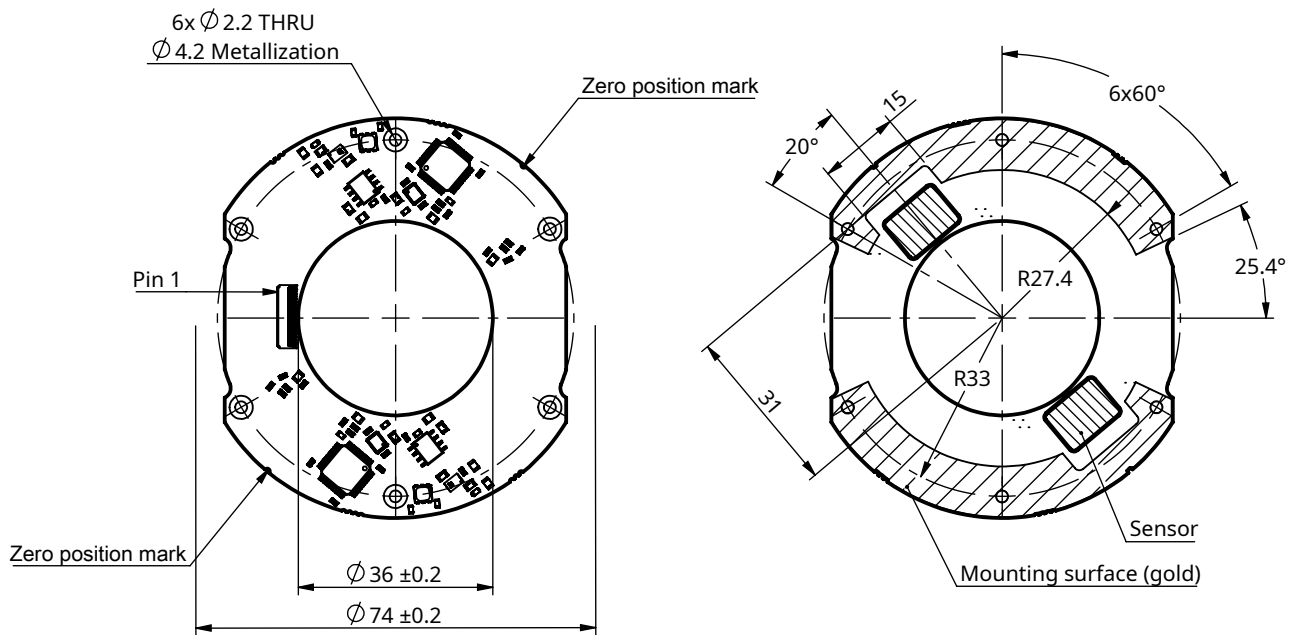
AksIM-2 redundant encoder assembly size 053



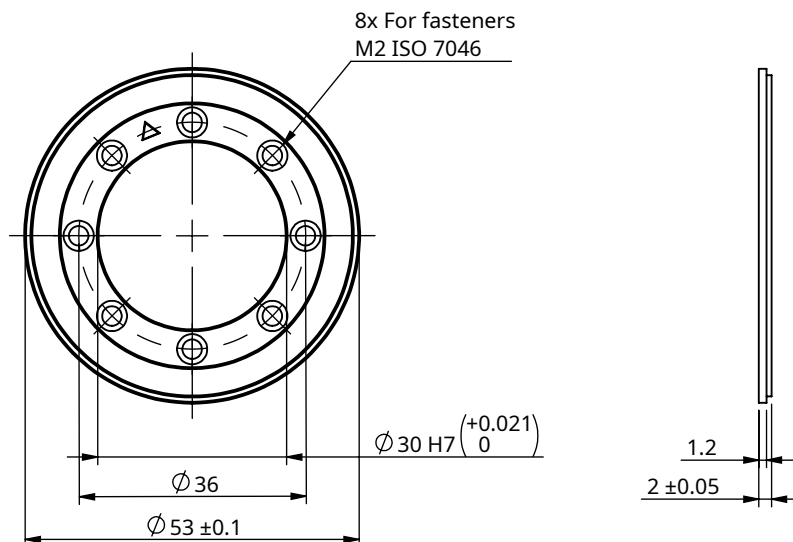
Detail A:



## Readhead MB053 redundant



## Magnetic ring MRA053



## Technical specifications

### System data

Reading type		Axial reading
Resolution	MB039	19 bit
	MB053	20 bit
Maximum speed		10,000 RPM (for higher speeds <b>contact RLS</b> )
Accuracy		±0.05°

### Electrical data

Supply voltage ( $V_{DD}$ )		4.5 V to 5.5 V at the connector. Rise time should be shorter than 20 ms.
Current consumption		2 × 135 mA (typ.)
Isolation		250 V <sub>AC</sub>
Connection		Molex 503480-2000 (Right-Angle, with Flip Lock) FFC, 20-pin, 0.5 mm pitch, contacts on top and bottom side **

### Environmental data

Operating and storage temperature		−40 °C to +85 °C (standard) *
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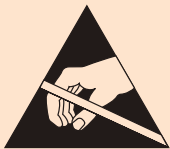
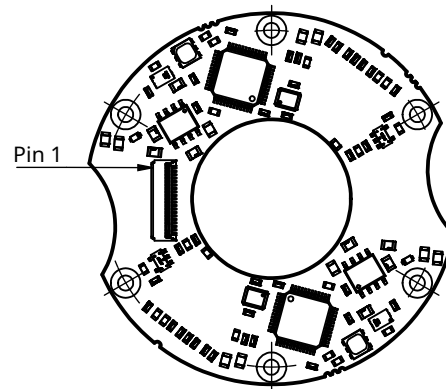
\* For a wider temperature range please **contact RLS**.

\*\* Cable can be flipped, in such case Primary and Secondary encoders are interchanged.

For more information, please see the MBD01 AksIM-2 data sheet, available for download at [RLS Media center](#).

## Electrical connections

Pin	Signal	Encoder
1	Chassis	Chassis
2	$V_{DD}$	$V_{DD}$
3	GND	GND
4	Clock+	Clock+
5	Clock-	Clock-
6	GND	GND
7	Data+	Data+
8	Data-	Data-
9	GND	GND
10	Not connected	
11		
12	GND	GND
13	Data-	Data-
14	Data+	Data+
15	GND	GND
16	Clock-	Clock-
17	Clock+	Clock+
18	GND	GND
19	$V_{DD}$	$V_{DD}$
20	Chassis	Chassis



**Readhead is ESD sensitive - handle with care.**

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# Part numbering

## Readhead

	MB	039	DC	C	19B	R	C	L	00
<b>Series</b>									
MB - AksIM board-level readhead									
<b>MRA ring compatibility</b>									
039 - For use with MRA039 ring									
053 - For use with MRA053 ring									
<b>Communication interface</b>									
DC - BiSS C, RS422									
<b>Communication interface variant</b>									
C - BiSS-C, bidirectional, 13 ACK bits, with register access									
<b>Resolution</b>									
19B - 19 bits per revolution									
20B - 20 bits per revolution									
<b>Shape and connector orientation</b>									
R - Redundant dual readhead									
<b>Connector option</b>									
C - FFC, 20 pin, 0.5 mm, Molex 503480-2000									
<b>Option</b>									
L - Extended low temperature range, -40 °C to +85 °C									
<b>Special requirements</b>									
00 - No special requirements (standard)									

Not all part number combinations are valid. Please refer to the table of available combinations below.

Series	Ring Compatibility	Communication Interface	Variant	Resolution	Shape	Connector	Option	Special requirements
MB	039	DC	C	19B	R	C	L	00
	053			20B				

## Magnetic ring

	MRA	039	B	C	020	D	S	E	00
<b>Series</b>									
MRA - AksIM magnetic ring									
<b>Outer diameter and readhead compatibility</b>									
039 - 39 mm									
053 - 53 mm									
<b>Thickness</b>									
B - 2.0 mm									
<b>Installation type</b>									
C - Countersunk fasteners									
<b>Inner diameter</b>									
020 - 20 mm									
030 - 30 mm									
<b>Accuracy grade</b>									
D - $\pm 0.1^\circ$									
<b>Material</b>									
S - Stamped metal plate with CPE rubber									
<b>Zero marking</b>									
E - Engraved									
<b>Special requirements</b>									
00 - No special requirements (standard)									

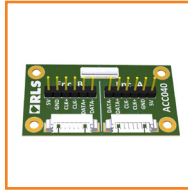
Not all part number combinations are valid. Please refer to the table of available combinations below.

Series	Outer diameter and readhead compatibility	Thickness	Installation type	Inner diameter	Accuracy grade	Material	Zero marking	Special requirements
MRA	039	B	C	020	D	S	E	00
	053			030				

## Accessories



Cable assembly  
**ACC039**

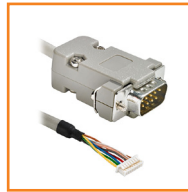


Breakout board  
**ACC040**



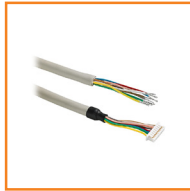
Cable assembly, 1 m  
**ACC015**  
**ACC049**

See chapter **Cable assemblies.**



Cable assembly, 1 m  
**ACC016**  
**ACC065**

See chapter **Cable assemblies.**



Cable assembly, 3 m  
**ACC061**  
**ACC070**

See chapter **Cable assemblies.**



Magnet viewer  
**MM0001**



USB interface  
**E201-9B**

## Cable assemblies

Part number	Length	Diameter	Connector 1	Connector 2	Notes
ACC039	152 mm	-	FFC, 20 Cores, 0.5 mm pitch	FFC, 20 Cores, 0.5 mm pitch	Contacts on the same side

Part number	Length	Diameter	Connector 1	Connector 2	Notes
ACC040	PCB board	-	FFC, 20 Cores, 0.5 mm pitch	2x FCI 10114830-11108LF	For direct connection of following cables with 8-pin FCI connector

Part number	Length	Diameter	Connector 1	Connector 2	Notes
ACC015	1.0 m	5 mm	FCI 10114826-00008LF and 10114827-002LF	Flying leads	Twisted pairs, shielded, up to +100 °C
ACC016				DSUB-9 M	
ACC061	3.0 m			Flying leads	
ACC049	1.0 m	6.2 mm		Flying leads	Twisted pairs, shielded, up to +75 °C
ACC065				DSUB-9 M	
ACC070	3.0 m			Flying leads	

The ACC039 cable assembly is for direct connection between the readhead and other electronic board. If a wired connection is required (for testing, etc.), an additional breakout board ACC040 is recommended along with ACC015, ACC049 or ACC061, ACC070 with split wires or ACC016, ACC065 for direct connection to the USB interface E201.

ACC015, ACC016 and ACC061 may be discontinued in future.

For more information, please see the MBD01 AksIM-2 data sheet, available for download at [RLS Media center](#).

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## Global support

Visit our [website](http://www.rls.si) to contact your nearest sales representative.

Date	Issue	Page	Description
24. 9. 2021	2	5, 7	Dimensions of the fasteners amended.
		12	ACC039, ACC040 and ACC061 added
1. 3. 2022	3	3	Cable assemblies amended

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