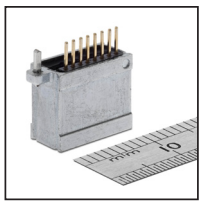
Data sheet
RLMD01_07
Issue 7, 14th January 2015

RoLin™ miniature packaged incremental magnetic encoder sensor system



RoLin™ is a component level encoder consisting of a RoLin readhead and a magnetic scale or ring. It has been designed for embedded motion control applications as a position control loop feedback element.

The information carrier is a periodically magnetised scale with a pole length of 2 mm. Radial or axial reading of the ring is possible.

State of the art position sensing assures highly repeatable position measurement under wide installation tolerances and temperature ranges.

The position information is output in incremental quadrature, SSI and BiSS output format with the option of a periodic reference mark (every pole). When SSI or BiSS output formats are selected the value of internal period counter (1 pole = 1 period) can be output. 8 bit, 12 bit or 24 bit counter lengths can be selected. Optionally, period counter can be reset when traversing the reference mark (if selected).

The maximum traverse velocity depends on the chosen resolution and minimum edge separation time, to 4 m/s at 1 µm and to 40 m/s at 10 µm.

A self-diagnosis feature enables the sub-system to diagnose potential failures of the encoder. The different types of errors are signalled on the Error line using a PWM formatted code.

- **Incremental quadrature**
- **TTL, RS422, SSI and BiSS output options available**
- **Resolutions from 0.244 µm for linear and up to 622,592 cpr for rotary applications (76 pole ring)**
- **High speed operation**
- **Bi-directional reference mark**
- **High reliability from proven non-contact sensing technology**
- **Pin / Flex cable options**
- **Self-diagnosis feature**
- **RoHS compliant**

	RoLin with pins	RoLin with flex cable output	RoLin with RS422 FPC
			
Fixing of readhead	By soldering	Mounting bracket	Mounting bracket
Connection to system PCB	Direct soldering to PCB	With flex cable and zif connector	With flex cable and zif connector
Available flex cable output lengths	-	75 mm or 136 mm	136 mm
Overall distance to subsequent device	Distance depends on loading characteristics and edge separation time; generally: < 300 mm	Distance depends on loading characteristics and edge separation time; generally: < 300 mm	> 50 m (with FPC and extesion cables)
Output type	SSI, BiSS-C and Incremental, no line driver (A, B, Z)	SSI, BiSS-C and Incremental, no line driver (A, B, Z)	Incremental, RS422 (A, B, Z, A-, B-, Z-)
Error signal	Available	Available	Not available
EMC	Should be assured by system's housing and sub-system's circuitry	Should be assured by system's housing and sub-system's circuitry	Enhanced but should still be assured by system's housing and sub-system's circuitry

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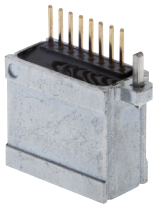
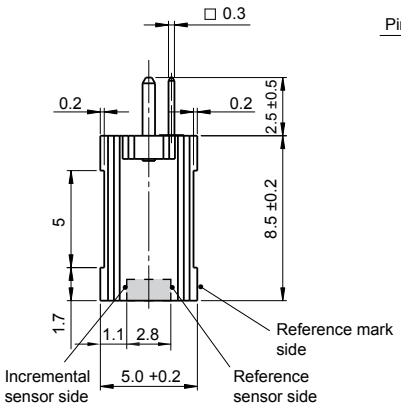
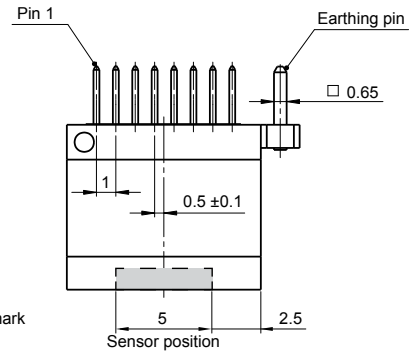
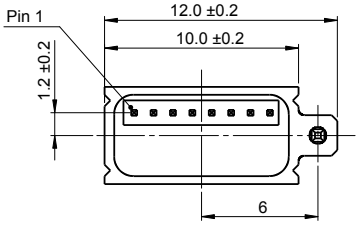
RoLin readhead with pins for direct soldering to PCB

Dimensions and tolerances are in mm.





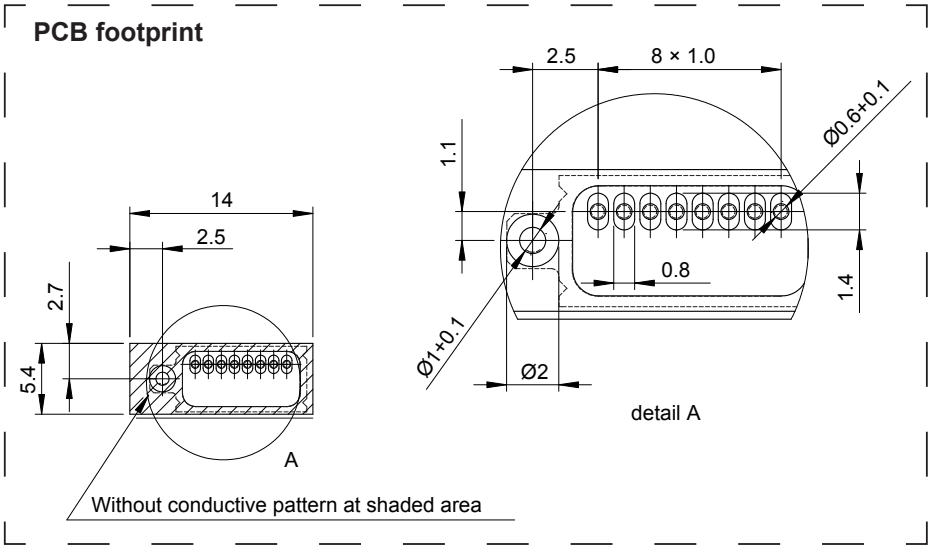




Pinout

Pin	Signal	Function
1	SLO	Output
2	MA	Input
3	Error	Output
4	V_{dd} (+5 V)	Power
5	GND (0 V)	Power
6	A	Output
7	Z	Output
8	B	Output

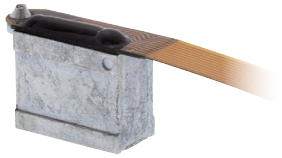
PCB footprint

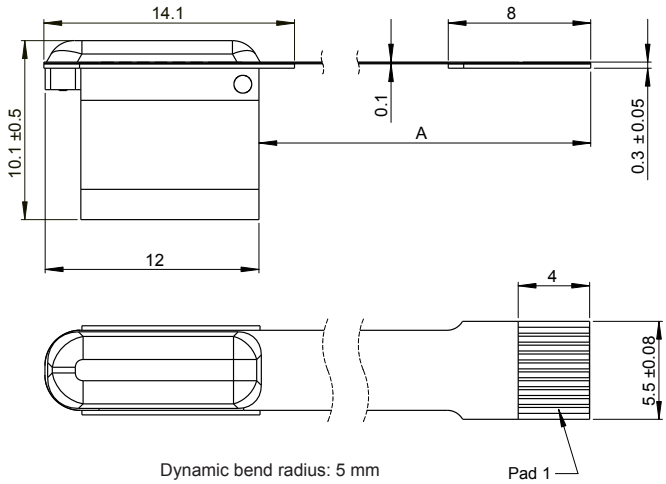


Note: Hand soldering temperature:
T_{max} 260 °C; t_{max} 5 s
Flow soldering not allowed.

RoLin readhead with flex cable

Dimensions and tolerances are in mm.





Dynamic bend radius: 5 mm
Static bend radius: 1 mm

Connections

Pad	Signal	Function
1	-	Case
2	SLO	Output
3	MA	Input
4	Error	Output
5	V_{dd} (+5 V)	Power
6	GND (0 V)	Power
7	A	Output
8	Z	Output
9	B	Output
10	-	Case

Part numbering > Connections	A (mm)
04	75
15	136

Mating connectors*:
Molex - 51281-1094
Molex - 52745-1097
Molex - 52746-1071
JST - 10FLH-SM1-TB
JST - 10FLH-RSM1-TB

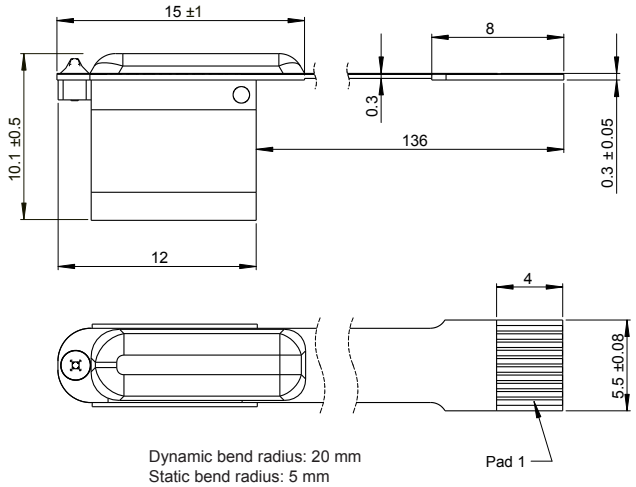
* Not provided.

- **RS422 version**

Connections

Pad	Signal	Function
1	-	Case
2	A	Output
3	A-	Output
4	B-	Output
5	V_{dd} (+5 V)	Power
6	GND (0 V)	Power
7	B	Output
8	Z-	Output
9	Z	Output
10	-	Case

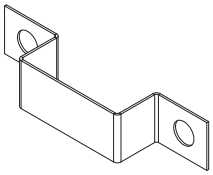
Note: Error signal not output

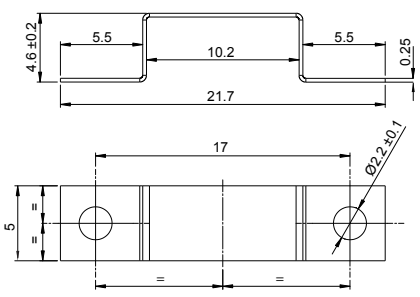


Dynamic bend radius: 20 mm
Static bend radius: 5 mm

Mounting bracket dimensions

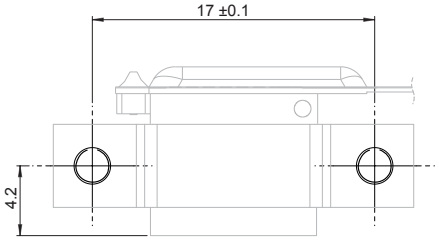
Dimensions and tolerances are in mm.





Position of installation holes

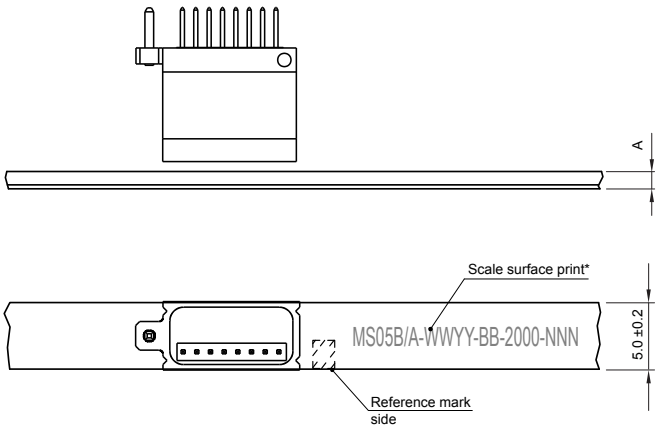
Recommended use of M2 screws with washers.



RoLin installation tolerances

Dimensions and tolerances are in mm.

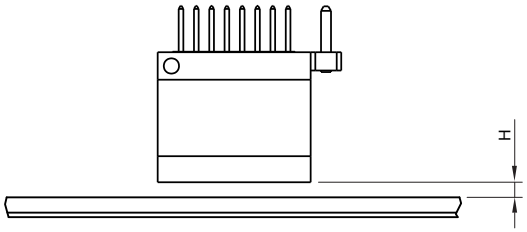
Linear application



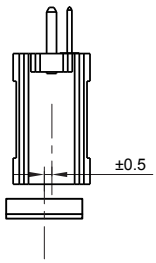
	Magnetic scale thickness (A)	Ride height (H)
With back-adhesion tape (option A)	1.5 ±0.15	0.1–0.8
With back-adhesion tape, with cover foil (option B)	1.6 ±0.15	0.1–0.7
No back-adhesion tape (option I)	1.3 ±0.15	0.1–0.8
No back-adhesion tape, with cover foil (option N)	1.4 ±0.15	0.1–0.7

* Scale surface print does not represent the actual ordering code. It is used for orientation purpose of the scale vs. readhead and contains information which allows the traceability of the scale to production data.

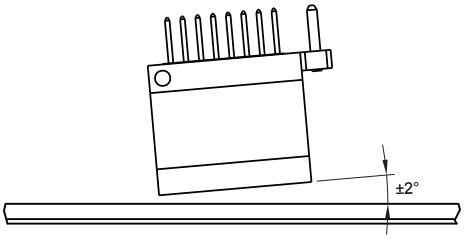
Ride height



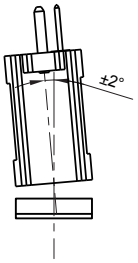
Lateral offset



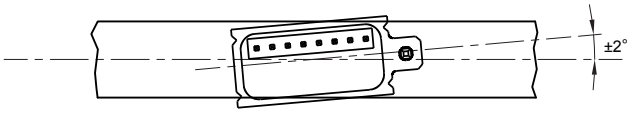
Pitch



Roll

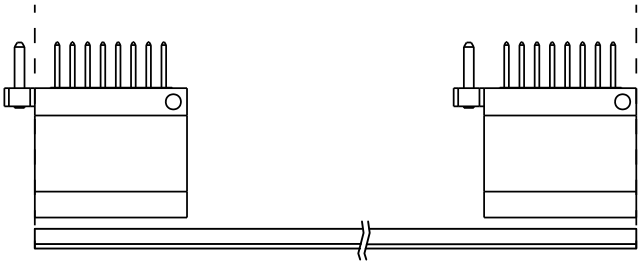


Yaw



Start of measuring length

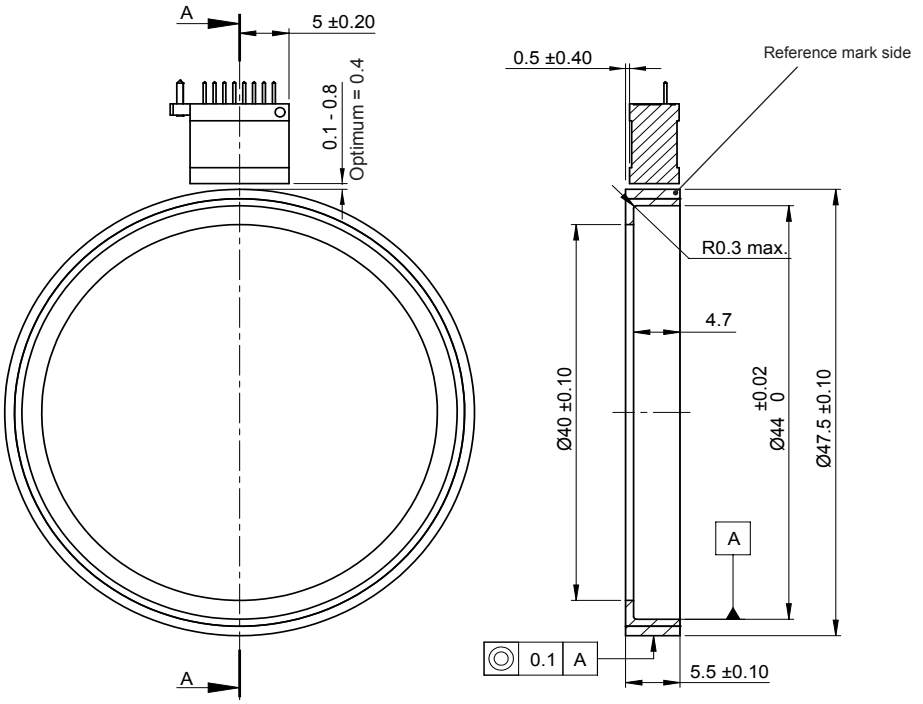
End of measuring length



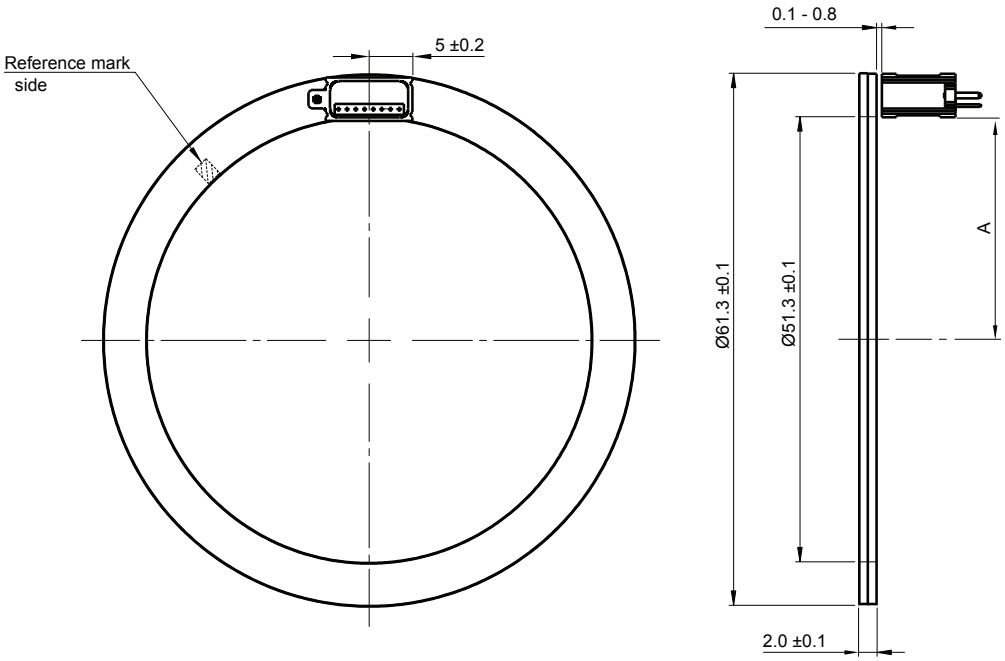
RoLin installation tolerances continued

Dimensions and tolerances are in mm.

Radial ring application **MR047B040A076B00 (76 poles)**



Axial ring application **MR061C051A092B00 (92 poles)**
MR061C051A090B00 (90 poles)



Poles	A
92	25.4 ±0.1
90	25.0 ±0.1

RLM readhead technical specifications

System data	
Maximum length for MS scale	50 m
Pole length	2 mm
Available resolutions and maximum speed	For rotary applications: See tables on page 7 and 8 For linear applications:

Ordering code	Resolution (µm)	Interpolation factor	Maximum speed (m/s)								
13B	**0.244140625**	**8,192**	1.82	0.91	0.23	0.11	0.06	0.03	0.02	0.01	0.01
12B	**0.48828125**	**4,096**	3.65	1.82	0.46	0.23	0.12	0.06	0.05	0.02	0.01
11B	**0.9765625**	**2,048**	7.30	3.65	0.91	0.46	0.24	0.12	0.10	0.05	0.02
001	**1**	**2,000**	7.47	3.73	0.93	0.47	0.24	0.12	0.10	0.05	0.02
1D6	**1.25**	**1,600**	9.33	4.67	1.17	0.58	0.30	0.16	0.12	0.06	0.03
10B	**1.953125**	**1,024**	14.58	7.30	1.82	0.91	0.48	0.24	0.19	0.10	0.05
002	**2**	**1,000**	14.93	7.47	1.87	0.93	0.49	0.25	0.20	0.10	0.05
D80	**2.5**	**800**	18.67	9.33	2.34	1.17	0.61	0.31	0.25	0.12	0.06
09B	**3.90625**	**512**	29.17	14.58	3.65	1.82	0.95	0.49	0.38	0.19	0.10
D50	**4**	**500**	29.87	14.93	3.73	1.87	0.97	0.50	0.39	0.20	0.10
005	**5**	**400**	37.33	18.67	4.67	2.34	1.22	0.62	0.49	0.25	0.12
D32	**6.25**	**320**	46.67	23.33	5.84	2.91	1.52	0.78	0.61	0.31	0.16
08B	**7.8125**	**256**	58.34	29.17	7.30	3.65	1.90	0.97	0.77	0.39	0.19
010	**10**	**200**	74.67	37.33	9.33	4.67	2.43	1.24	0.98	0.50	0.25
D16	**12.5**	**160**	46.67	23.33	5.84	2.91	1.52	0.78	0.61	0.31	0.16
07B	**15.625**	**128**	80.00	58.34	14.58	7.30	3.81	1.94	1.53	0.77	0.39
020	**20**	**100**	74.67	37.33	9.33	4.67	2.43	1.24	0.98	0.50	0.25
D08	**25**	**80**	46.67	23.33	5.84	2.91	1.52	0.78	0.61	0.31	0.16
06B	**31.25**	**64**	80.00	80.00	29.17	14.58	7.62	3.89	3.07	1.55	0.78
050	**50**	**40**	46.67	23.33	5.84	2.91	1.52	0.78	0.61	0.31	0.16
05B	**62.5**	**32**	80.00	80.00	58.34	29.17	15.22	7.78	6.14	3.10	1.56
04B	**125**	**16**	NA	80.00	80.00	58.34	30.43	15.56	12.28	6.19	3.11
03B	**250**	**8**	NA	NA	80.00	80.00	60.86	31.11	24.56	12.39	6.23
		Edge separation (µs)	0.07	0.12	0.50	1	2	4	5	10	20
		Minimum count frequency (MHz)	15	8	2	1	0.5	0.25	0.2	0.1	0.05
		Part numbering	**K**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**

Accuracy grade for MS scales	±40 µm
Linear expansion coefficient for MS scale	~ 17 × 10^{-6}/K
Repeatability	Better than unit of resolution for movement in the same direction
Hysteresis	< 3 µm up to 0.2 mm ride height
Hand soldering (for pin variant only)	T_{max} 260 °C; t_{max} 5 s
Mechanical data	
Readhead housing material	ZnAl4Cu1 - zamak 5
Mass	RLM readhead 1.4 g (without flex), 1.6 g (with flex); magnetic scale MS05 30 g/m; radial ring MR047 8 g; axial ring MR061 9 g
Environmental	
Temperature	Operating -20 °C to +85 °C Storage -40 °C to +85 °C
Vibrations (55 Hz to 2000 Hz)	300 m/s² (IEC 60068-2-6)
Shocks (11 ms)	300 m/s² (IEC 60068-2-27)
RoHS	Compliant with EU Directive 2002/95/EC

Available resolutions and maximum speed for MR047B040A076B00 (radial ring, 76 poles)

Ordering code	Resolution (cpr)	Interpolation factor	Maximum speed (rpm)								
13B	**622,592**	**8,192**	720	360	90	45	23	12	9	5	2
12B	**311,296**	**4,096**	1,440	720	180	90	47	24	19	10	5
11B	**155,648**	**2,048**	2,880	1,440	360	180	94	48	38	19	10
001	**152,000**	**2,000**	2,949	1,472	368	184	96	49	39	20	10
1D6	**121,600**	**1,600**	3,682	1,844	461	230	120	61	48	24	12
10B	**77,824**	**1,024**	5,754	2,880	720	360	188	96	76	38	19
002	**76,000**	**1,000**	5,893	2,949	739	368	192	98	78	39	20
D80	**60,800**	**800**	7,371	3,682	922	461	240	123	97	49	25
09B	**38,912**	**512**	11,514	5,754	1,440	720	375	192	151	76	38
D50	**38,000**	**500**	11,792	5,893	1,472	739	384	196	155	78	39
005	**30,400**	**400**	14,735	7,371	1,844	922	481	246	194	98	49
D32	**24,320**	**320**	18,423	9,208	2,305	1,149	601	307	242	122	61
08B	**19,456**	**256**	23,027	11,514	2,880	1,440	752	384	303	153	77
010	**15,200**	**200**	29,476	14,735	3,682	1,844	960	491	388	196	98
D16	**12,160**	**160**	18,423	9208	2,305	1,149	601	307	242	122	61
07B	**9,728**	**128**	32,508	23,027	5,754	2,880	1,503	768	606	306	154
020	**7,600**	**100**	29,476	14,735	3,682	1,844	960	491	388	196	98
D08	**6,080**	**80**	18,423	9,208	2,305	1,149	601	307	242	122	61
06B	**4,864**	**64**	32,508	32,508	11,514	5,754	3,006	1,535	1,212	611	307
050	**3,040**	**40**	18,423	9,208	2,305	1,149	601	307	242	122	61
05B	**2,432**	**32**	32,508	32,508	23,027	11,514	6,006	3,070	2,424	1,222	614
04B	**1,216**	**16**	NA	32,508	32,508	23,027	12,013	6,141	4,847	2,445	1,229
03B	**608**	**8**	NA	NA	32,508	32,508	24,025	12,282	9,695	4,889	2,458
Edge separation (µs)			0.07	0.12	0.50	1	2	4	5	10	20
Minimum count frequency (MHz)			15	8	2	1	0.5	0.25	0.2	0.1	0.05
Part numbering			**K**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**

Available resolutions and maximum speed for MR061C051A090B00 (axial ring, 90 poles)

Ordering code	Resolution (cpr)	Interpolation factor	Maximum speed (rpm)								
13B	**737,280**	**8,192**	608	304	76	38	20	10	8	4	2
12B	**368,640**	**4,096**	1,216	608	152	76	40	20	16	8	4
11B	**184,320**	**2,048**	2,432	1,216	304	152	79	41	32	16	8
001	**180,000**	**2,000**	2,491	1,243	311	156	81	41	33	17	8
1D6	**144,000**	**1,600**	3,109	1,557	389	194	101	52	41	21	10
10B	**92,160**	**1,024**	4,859	2,432	608	304	159	81	64	32	16
002	**90,000**	**1,000**	4,976	2,491	624	311	162	83	65	33	17
D80	**72,000**	**800**	6,224	3,109	779	389	203	104	82	41	21
09B	**46,080**	**512**	9,723	4,859	1,216	608	317	162	128	65	32
D50	**45,000**	**500**	9,957	4,976	1,243	624	325	166	131	66	33
005	**36,000**	**400**	12,443	6,224	1,557	779	406	207	164	83	41
D32	**28,800**	**320**	15,557	7,776	1,947	971	507	259	205	103	52
08B	**23,040**	**256**	19,445	9,723	2,432	1,216	635	324	256	129	65
010	**18,000**	**200**	24,891	12,443	3,109	1,557	811	415	327	165	83
D16	**14,400**	**160**	15,557	7,776	1,947	971	507	259	205	103	52
07B	**11,520**	**128**	25,047	19,445	4,859	2,432	1,269	648	512	258	130
020	**9,000**	**100**	24,891	12,443	3,109	1,557	811	415	327	165	83
D08	**7,200**	**80**	15,557	7,776	1,947	971	507	259	205	103	52
06B	**5,760**	**64**	25,047	25,047	9,723	4,859	2,539	1,296	1,023	516	259
050	**3,600**	**40**	15,557	7,776	1,947	971	507	259	205	103	52
05B	**2,880**	**32**	25,047	25,047	19,445	9,723	5,072	2,593	2,047	1,032	519
04B	**1,440**	**16**	NA	25,047	25,047	19,445	10,144	5,186	4,093	2,064	1,038
03B	**720**	**8**	NA	NA	25,047	25,047	20,288	10,371	8,187	4,129	2,075
Edge separation (µs)			0.07	0.12	0.50	1	2	4	5	10	20
Minimum count frequency (MHz)			15	8	2	1	0.5	0.25	0.2	0.1	0.05
Part numbering			**K**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**

Available resolutions and maximum speed for MR061C051A092B00 (axial ring, 92 poles)

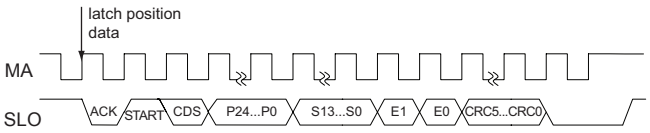
Ordering code	Resolution (cpr)	Interpolation factor	Maximum speed (rpm)								
13B	**753,664**	**8,192**	595	297	74	37	19	10	8	4	2
12B	**376,832**	**4,096**	1,190	595	149	74	39	20	16	8	4
11B	**188,416**	**2,048**	2,379	1,190	297	149	78	40	31	16	8
001	**184,000**	**2,000**	2,437	1,216	304	152	79	41	32	16	8
1D6	**147,200**	**1,600**	3,042	1,523	380	190	99	51	40	20	10
10B	**94,208**	**1,024**	4,753	2,379	595	297	155	79	63	32	16
002	**92,000**	**1,000**	4,868	2,437	610	304	159	81	64	32	16
D80	**73,600**	**800**	6,089	3,042	762	380	198	101	80	40	20
09B	**47,104**	**512**	9,511	4,753	1,190	595	310	159	125	63	32
D50	**46,000**	**500**	9,741	4,868	1,216	610	318	162	128	65	32
005	**36,800**	**400**	12,172	6,089	1,523	762	397	203	160	81	41
D32	**29,440**	**320**	15,219	7,607	1,904	950	496	254	200	101	51
08B	**23,552**	**256**	19,023	9,511	2,379	1,190	621	317	250	126	63
010	**18,400**	**200**	24,350	12,172	3,042	1,523	793	406	320	162	81
D16	**14,720**	**160**	15,219	7,607	1,904	950	496	254	200	101	51
07B	**11,776**	**128**	25,047	19,023	4,753	2,379	1,242	634	501	252	127
020	**9,200**	**100**	24,350	12,172	3,042	1,523	793	406	320	162	81
D08	**7,360**	**80**	15,219	7,607	1,904	950	496	254	200	101	51
06B	**5,888**	**64**	25,047	25,047	9,511	4,753	2,483	1,268	1,001	505	254
050	**3,680**	**40**	15,219	7,607	1,904	950	496	254	200	101	51
05B	**2,944**	**32**	25,047	25,047	19,023	9,511	4,962	2,536	2,002	1,010	508
04B	**1,472**	**16**	NA	25,047	25,047	19,023	9,923	5,073	4,004	2,020	1,015
03B	**736**	**8**	NA	NA	25,047	25,047	19,847	10,146	8,009	4,039	2,030
Edge separation (µs)			0.07	0.12	0.50	1	2	4	5	10	20
Minimum count frequency (MHz)			15	8	2	1	0.5	0.25	0.2	0.1	0.05
Part numbering			**K**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**

NOTE: Other ring sizes available upon request.

RLM2DE – BiSS-C + Incremental, no line driver

Power supply	4.75 V to 5.5 V – voltage on readhead Reverse polarity protection
Power consumption	< 25 mA
Output signals	A, B, Z, Error, SLO
Saturation voltage hi (I = –4 mA)	V_{dd} – 0.4 V
Saturation voltage lo (I = 4 mA)	0.4 V
Rise and fall time (c_c = 50 pF)	60 ns
Input signals	MA
Threshold voltage hi	2 V
Threshold voltage lo	0.8 V
Permissible MA clock frequency	8 MHz
Reference signal	1 or more square-wave pulse Z

Timing diagram – BiSS-C



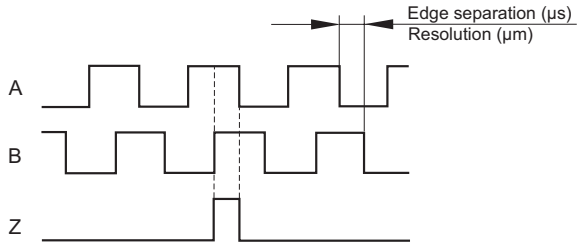
Data	Length	Description
P24 – P0	0 to 24 bit	Period counter value (length depends on the settings chosen)*
S12 – S0	3 to 13 bit	Position inside the period (length depends on the resolution)
E1 – E0	2 bit	Error data
CRC5 – CRC0	5 to 6 bit	Cyclic redundancy check data; polynomial 0 × 25; inverted bit output

* Optionally, period counter can be reset at the reference mark (options E, F and G - see page 12).

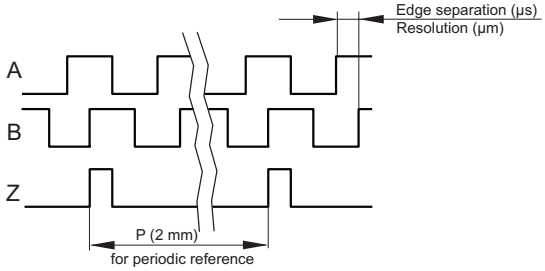
Error	E0	E1
No error	1	1
Amplitude error	0	1
Too high velocity	1	0
Undervoltage; Configuration; System error	0	0

For more information on BiSS-C protocol please visit **www.biss-interface.com**.

Timing diagram – Incremental



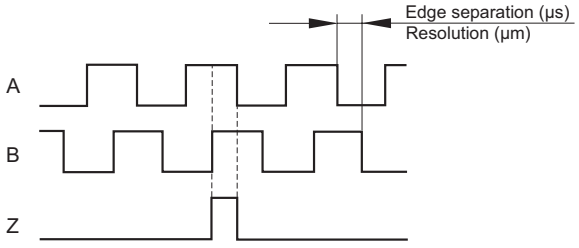
Timing diagram – Incremental, periodic reference mark



RLM2HD – Incremental, no line driver

Power supply	4.75 V to 5.5 V – voltage on readhead Reverse polarity protection
Power consumption	< 25 mA
Output signals	A, B, Z
Saturation voltage hi (I = –4 mA)	V_{dd} – 0.4 V
Saturation voltage lo (I = 4 mA)	0.4 V
Rise and fall time (c_C = 50 pF)	60 ns
Reference signal	1 or more square-wave pulse Z

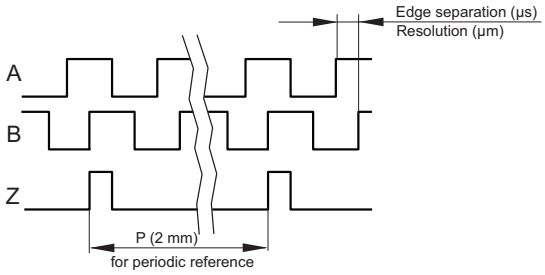
Timing diagram – Incremental, unique reference mark
In the case of RS422 outputs, inverted signals are not shown



RLM2IC – Incremental, RS422

Power supply	4.75 V to 5.5 V – voltage on readhead Reverse polarity protection
Power consumption	< 30 mA
Output signals	A, B, Z, A-, B-, Z-
High level output voltage (I_{OH} = –20 mA)	> 2.4 V
Low level output voltage (I_{OL} = 20 mA)	< 0.4 V
Rise and fall time (c_C = 50 pF)	< 10 ns
Reference signal	1 or more square-wave pulse Z and its inverted pulse Z-

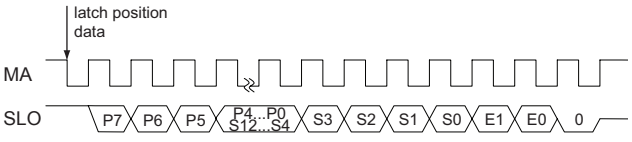
Timing diagram – Incremental, periodic reference mark
In the case of RS422 outputs, inverted signals are not shown



RLM2SJ – SSI + Incremental, no line driver

Power supply	4.75 V to 5.5 V – voltage on readhead Reverse polarity protection
Power consumption	< 25 mA
Output signals	A, B, Z, Error, SLO
Saturation voltage hi (I = –4 mA)	V_{dd} – 0.4 V
Saturation voltage lo (I = 4 mA)	0.4 V
Rise and fall time (c_C = 50 pF)	60 ns
Input signals	MA
Threshold voltage hi	2 V
Threshold voltage lo	0.8 V
Permissible MA clock frequency	4 MHz
Reference signal	1 or more square-wave pulse Z

Timing diagram – SSI



Error	E0	E1
No error	1	1
Amplitude error	0	1
Too high velocity	1	0
Undervoltage; Configuration; System error	0	0

Data	Description
P0 - P7	Period counter value (length depends on the settings chosen)*
S0 - S13	Position inside the period (length depends on the resolution)
E0 - E1	Error data

* Optionally, period counter can be reset at the reference mark (options E, F and G - see page 12).

Error output

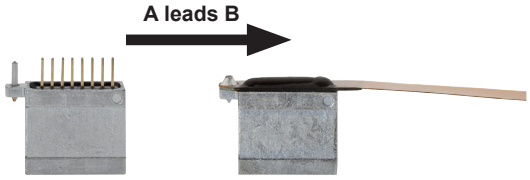
To enable the successful diagnosis of faults, different types of errors are signalled on the Error line using a PWM formatted code as detailed below. In the case of amplitude or frequency failure the PWM cycle frequency is approximately 16.5 Hz (cycle duration: 60.7 ms).

Failure mode	Error output	Possible cause of failure
No error	High	Ride height too high
Amplitude error	Low: 75 % High: 25 %	Readhead removed from tape / ring Demagnetisation of magnetic tape / ring
Frequency error	Low: 50 % High: 50 %	Speed too high
Undervoltage	Low	Power supply low

If an error in amplitude occurs, the conversion process is terminated and the incremental output signals are halted. An error in amplitude rules out the possibility of an error in frequency.

Error output is open collector type with built in pull up resistor. It can be used in “wired-or” configuration with other error signals in the system.

Positive direction



Reference mark

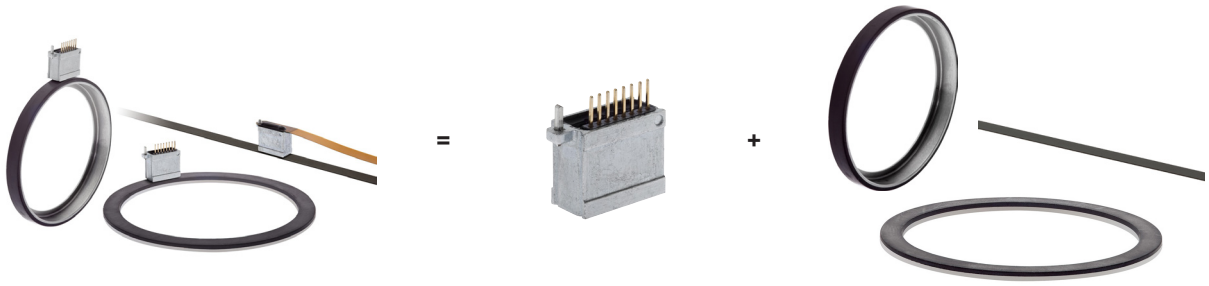
Reference marks can be provided in 2 ways:

1) **Selected at point of order.** The RoLin readhead should be ordered with reference mark option A. Magnetic scale should be ordered with reference mark. If required, the cover foil can be installed over the reference mark.

2) **Periodic reference mark. Every 2 mm.** The RoLin readhead should be ordered with reference mark option C. Magnetic scale should be ordered with **no** reference mark. Position information is output in incremental quadrature format with periodic reference signals. Reference periods correspond to pole length of magnetisation.

Multiple reference marks. For reference marks on multiple locations on the MS magnetic scale please contact RLS for a special part numbering.

RLM readhead part numbering



RoLin system = **RLM readhead**
eg. RLM2HDA13BA00A00 + **Magnetic scale / ring**
eg. MS05BM100AM010 for scale / MR047B040A076B00 for ring

RL M 2 HD A 13B A 00 A 00

Housing
M - Vertical

Pole length (P)
2 - 2 mm pole length

Output type
DE - BiSS-C + Incremental, no line driver
HD - Incremental, no line driver
IC - Incremental, RS422
SJ - SSI + Incremental, no line driver

Period counter length
A - None
B - 8 bit
C - 12 bit
D - 24 bit
E - 8 bit, reset by reference mark
F - 12 bit, reset by reference mark
G - 24 bit, reset by reference mark

Interpolation factor

13B - 8192 (0.244 µm)	**09B** - 512	**D10** - 100
12B - 4096 (0.488 µm)	**D50** - 500	**D08** - 80
11B - 2048	**D40** - 400 (5 µm)	**06B** - 64
2D0 - 2000 (1 µm)	**D32** - 320	**D04** - 40 (50 µm)
1D6 - 1600	**08B** - 256	**05B** - 32
10B - 1024	**D20** - 200 (10 µm)	**04B** - 16 (125 µm)
1D0 - 1000 (2 µm)	**D16** - 160	**03B** - 8
D80 - 800	**07B** - 128	

Minimum edge separation (Frequency)
K - 0.07 µs (15 MHz) **
A - 0.12 µs (8 MHz) *
B - 0.5 µs (2 MHz)
C - 1 µs (1 MHz)
D - 2 µs (0.5 MHz)
E - 4 µs (0.25 MHz)
F - 5 µs (0.2 MHz)
G - 10 µs (0.1 MHz)
H - 20 µs (0.05 MHz)

Connections
00 - Pins only (**DE** and **HD** output types only)
04 - Flex cable, length 75 mm (**DE** and **HD** output types only)
15 - Flex cable, length 136 mm

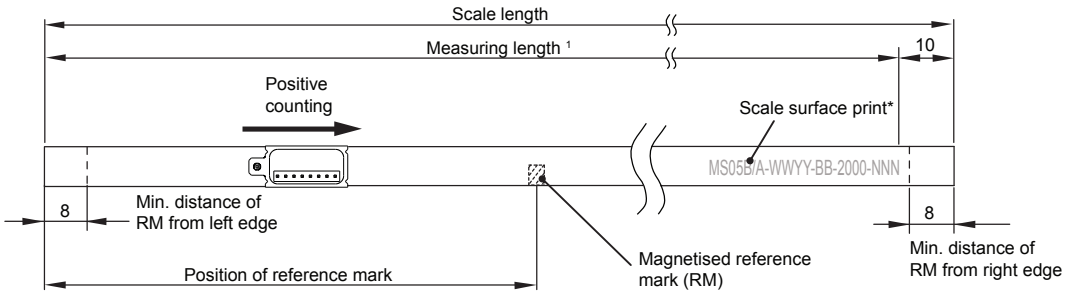
Reference
A - With reference *
B - No reference
C - Periodic as per scale pitch (2 mm)

Special requirements
00 - No special requirements (standard)

* Not available with **03B** interpolation.
** Not available with **03B** and **04B** interpolation.

$$\text{Resolution (µm)} = \frac{2000}{\text{Interpolation}}$$

Magnetic scale part numbering



[1] Measuring length = scale length - 10 mm

* Scale surface print does not represent the actual ordering code. It is used for orientation purpose of the scale vs. readhead and contains information which allows the traceability of the scale to production data.

MS05 B M100 A M010

Series
MS05 - 5 mm width, 2 mm pole

Accuracy grade
B - ±40 µm/m

Scale length
Mxxx - Where xxx equals scale length in **mm**
xxxx - Where xxxx equals scale length in **cm**

Position of reference mark
0000 - No reference mark
Mxxx - Where xxx equals position of magnetised reference mark in mm
xxxx - Where xxxx equals position of magnetised reference mark in cm

NOTE: Reference mark position will be within ±0.1 mm from requested position.

Options
A - Back-adhesion tape (standard)
B - Back-adhesion tape, with CF05 cover foil*
D - Special back-adhesion tape with additional moisture and solvent resistance
E - Special back-adhesion tape with additional moisture and solvent resistance, with CF05 cover foil*
I - No back-adhesion tape
N - No back-adhesion tape, with CF05 cover foil*

* Cover foil supplied separately.

Cover foil part numbering

CF05 1000

Foil length
xxxx - Where xxxx equals foil length in **cm** (eg. 0400 equals 400 cm of foil)
Mxxx - Where xxx equals foil length in **mm** (eg. M040 equals 40 mm of foil)

Magnetic ring part numbering

Counts per revolution = Nr. of poles × Interpolation

Radial ring

MR 047 B 040 A 076 B 00

Reference mark
A - With reference
B - No reference

Axial ring

MR 061 C 051 A 092 B 00

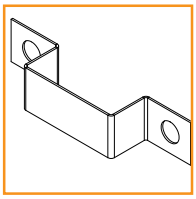
Special requirements
00 - None (standard)
02 - With back-adhesion tape

Reference mark
A - With reference
B - No reference

Number of poles
092 - 92 poles
090 - 90 poles

NOTE: Other ring sizes available upon request.

Accessories part numbering



Mounting bracket

RLMMB01

USB encoder interface

E201

Connector adapters FFC to DB9
(connect to E201):

RLACC001 for RLM2IC

RLACC002 for RLM2HD

RLACC003 for RLM2DE and RLM2SJ