



Magnetic Encoder ME1 Series

Datasheet

Ver. 1.4

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Revision History

Version	Date	Description	Remarks
1.0	November 2017	Initial release	--
1.1	June 2018	First revision	Amended Dimensions data. (Ch. 4)
1.2	September 2018	Second revision	Added System Accuracy and Coefficient of Linear Expansion to Technical Specifications. (Ch. 6)
1.3	February 2020	Third revision	English version
1.4	March 2020	Fourth revision	Amended the following: <ul style="list-style-type: none"> - Boost module requirement in Electrical Specifications. (Ch. 7.2.1) - D-Sub9 Pin definitions. (Ch. 7.2.2) - Boost module requirement in Readhead Part Numbering. (Ch. 11.1)

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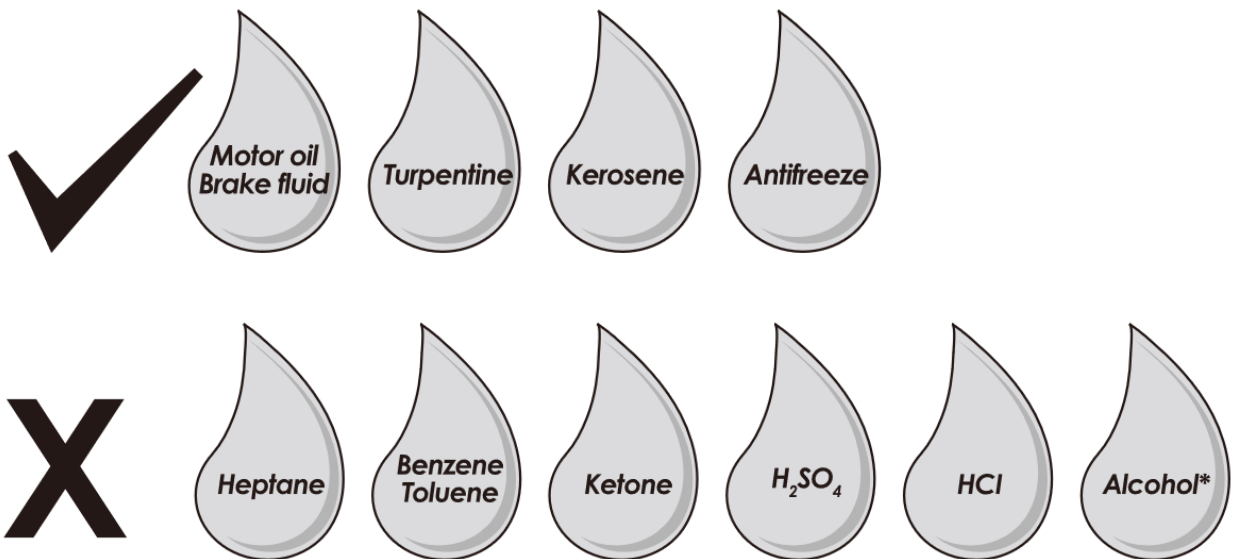
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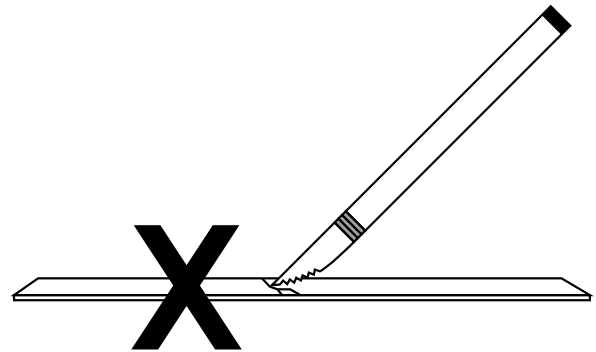
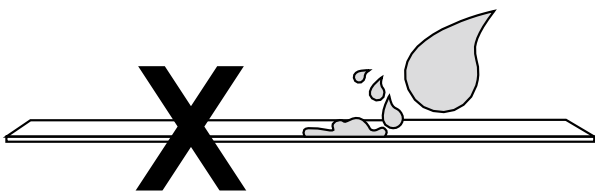
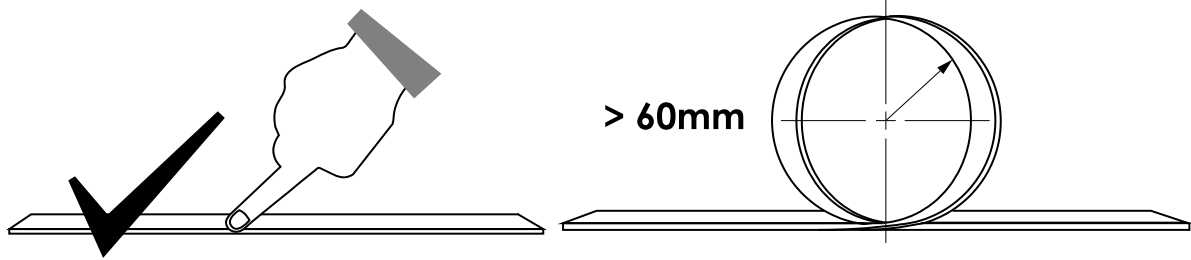
1. Product Features

- Compact and durable design.
- Customer selectable resolutions.
- Index sensor included.
- Status LEDs.
- Magnetic stick-on reference mark.
- Scale lengths up to 50 m.

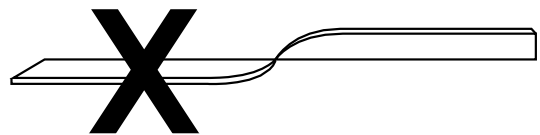
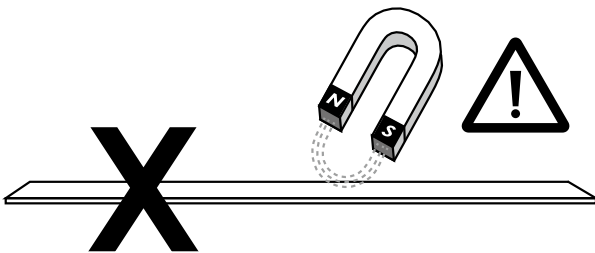
2. Storage and Handling



*Use of alcohol for cleaning is acceptable; however, do not immerse the scale in alcohol.



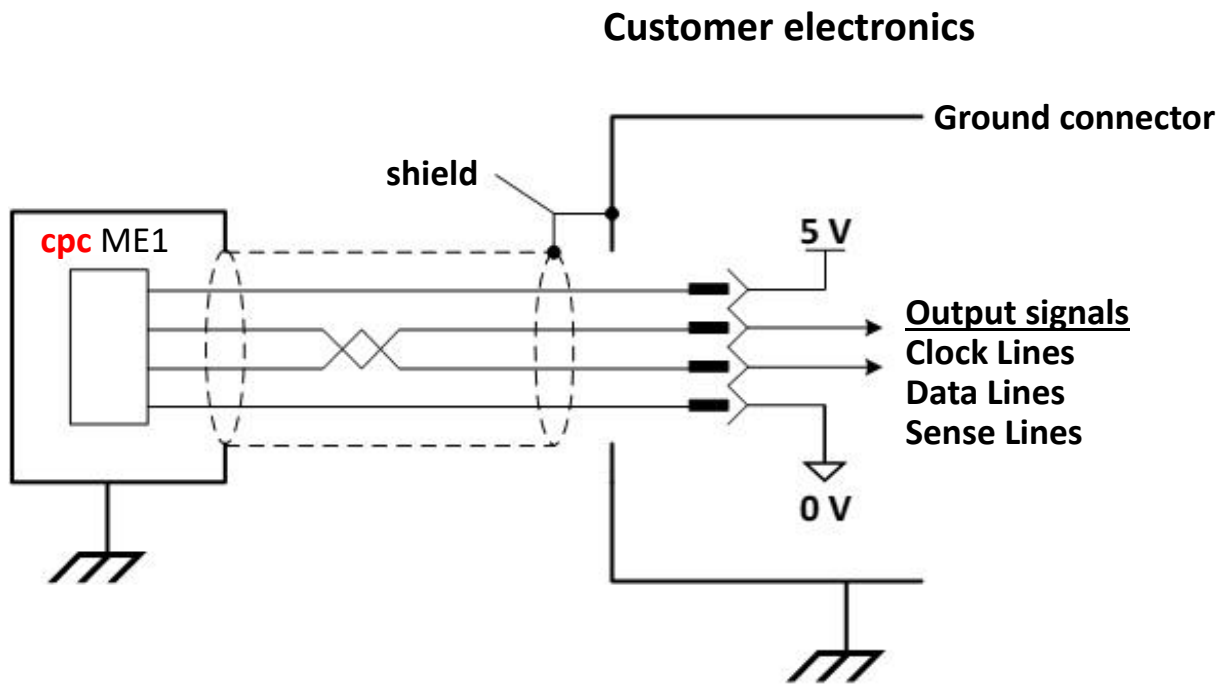
*Do not pour liquids onto the scale.



Warning:

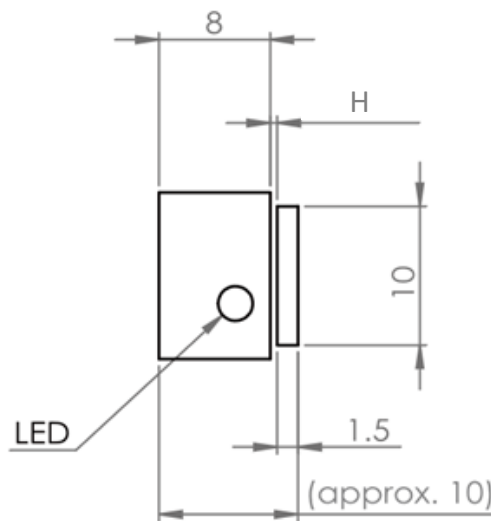
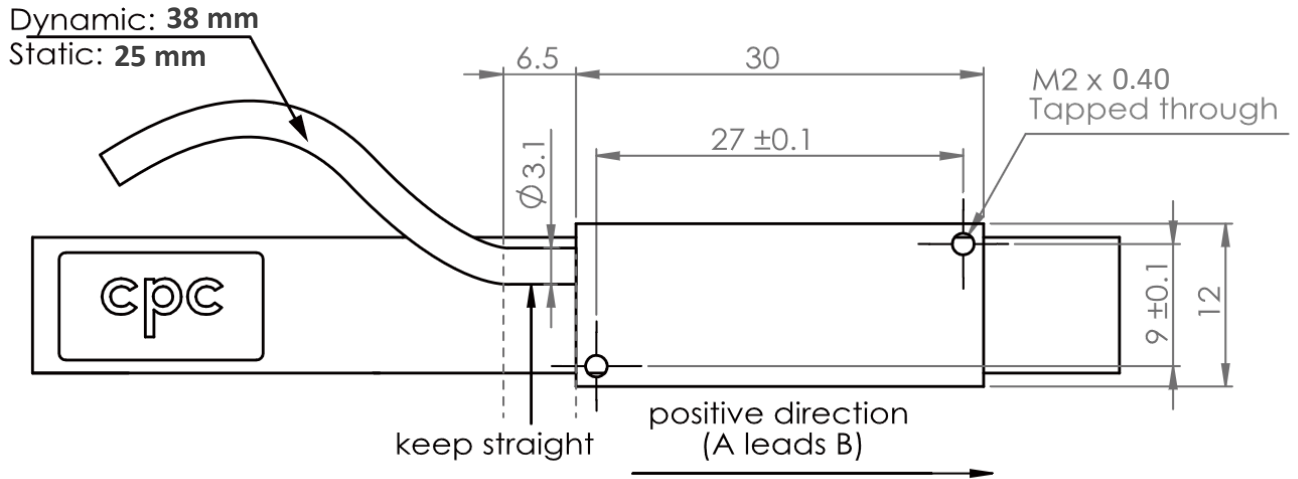
The **cpc** magnetic scale should not be exposed to magnetic field densities higher than 5 mT on its surface. Magnetic fields higher than 5 mT can damage the scale.

3. Electrical Connections



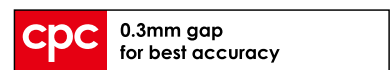
4. Dimensions

- Readhead and Scale



Unit: mm

- A 0.3 mm thick label is included with the product.

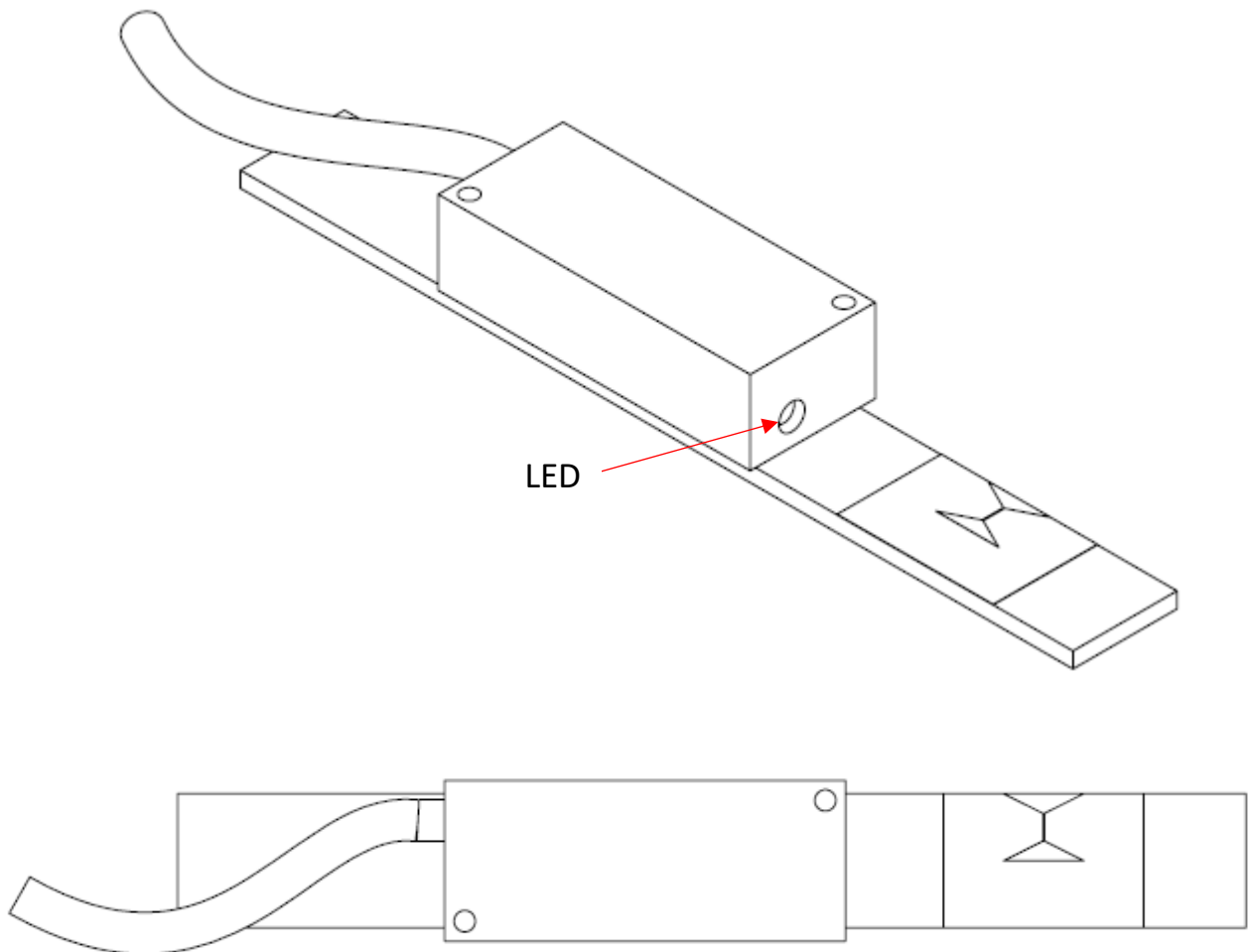


Magnetic Stick-on Reference Mark	Scale Thickness	H (Recommended Ride Height)
O	1.5 ± 0.15 mm	0.3 ~ 0.8 mm
X	1.5 ± 0.15 mm	0.1 ~ 0.8 mm

5. Installation

5.1 Direction of the Stick-on Reference Mark

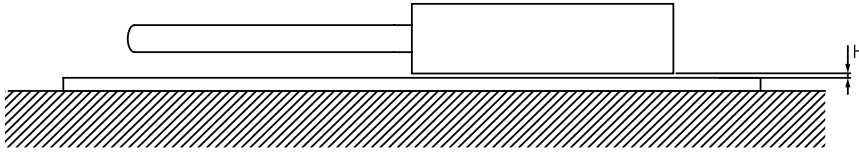
When applying the magnetic stick-on reference mark to the scale, the arrow sign of the reference mark should be oriented on the opposite side of the LED. **Please refer to the illustration below.**



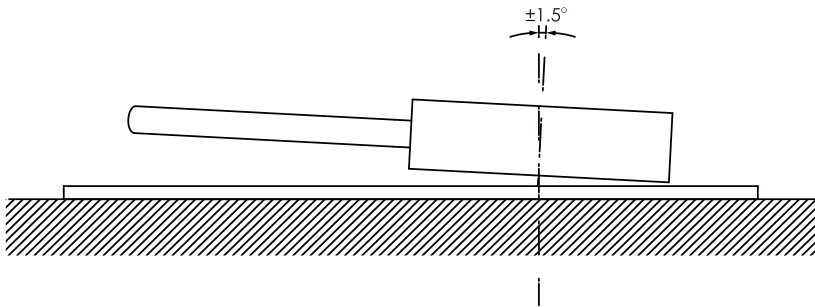
5.2 Tolerances

Please confirm that the center of the readhead is aligned with the surface and the edge. Shown below are the installation tolerances.

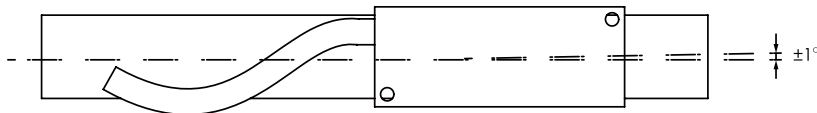
Ride Height



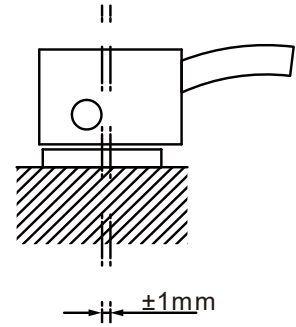
Pitch



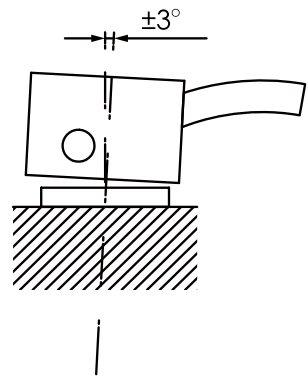
Yaw



Lateral Offset



Roll



6. Technical Specifications

Specifications	ME1 Series																																							
System Data																																								
Maximum Length	50 m																																							
Incremental Pole Length	2 mm / 1 mm																																							
Sinusoidal Period Length	2 mm / 1 mm																																							
Available Resolutions and Maximum Speed	<p>*For analog output type, resolution code is 000.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">1 mm scale</th> </tr> <tr> <th style="background-color: #d3d3d3;">Resolution (µm)</th> <th style="background-color: #d3d3d3;">max. travel speed (m/s)</th> <th style="background-color: #d3d3d3;">resolution code</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0.5</td> <td style="text-align: center;">3</td> <td style="text-align: center;">005</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">6</td> <td style="text-align: center;">010</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">13</td> <td style="text-align: center;">020</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">20</td> <td style="text-align: center;">050</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">20</td> <td style="text-align: center;">100</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">2 mm scale (standard)</th> </tr> <tr> <th style="background-color: #d3d3d3;">Resolution (µm)</th> <th style="background-color: #d3d3d3;">max. travel speed (m/s)</th> <th style="background-color: #d3d3d3;">resolution code</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">6</td> <td style="text-align: center;">010</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">13</td> <td style="text-align: center;">020</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">20</td> <td style="text-align: center;">050</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">20</td> <td style="text-align: center;">100</td> </tr> </tbody> </table>	1 mm scale			Resolution (µm)	max. travel speed (m/s)	resolution code	0.5	3	005	1	6	010	2	13	020	5	20	050	10	20	100	2 mm scale (standard)			Resolution (µm)	max. travel speed (m/s)	resolution code	1	6	010	2	13	020	5	20	050	10	20	100
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Coefficient of Linear Expansion	~ 17 x 10 ⁻⁶ /K																																							
System Accuracy	±20 µm/m																																							
Repeatability	Less than 1.5 unit of resolution while moving in the same direction.																																							
Mass	<ul style="list-style-type: none"> ● Readhead only without connector: 5.92 g ● 1meter cable: 16 g 																																							
Electrical Data																																								
Voltage drop over cable	~ 50 mV/m – with 120 Ω load																																							
Cable	<ul style="list-style-type: none"> ● Ø3.10 ± 0.2 mm. ● Shielded; temperature resistance up to +105 °C. ● 8-wire cable: 8 x 30 AWG (26 x 0.05 mm strands). 																																							
Environmental Data																																								
Operating Temperature	-40 ~ 85° C																																							

7. Electrical Specifications

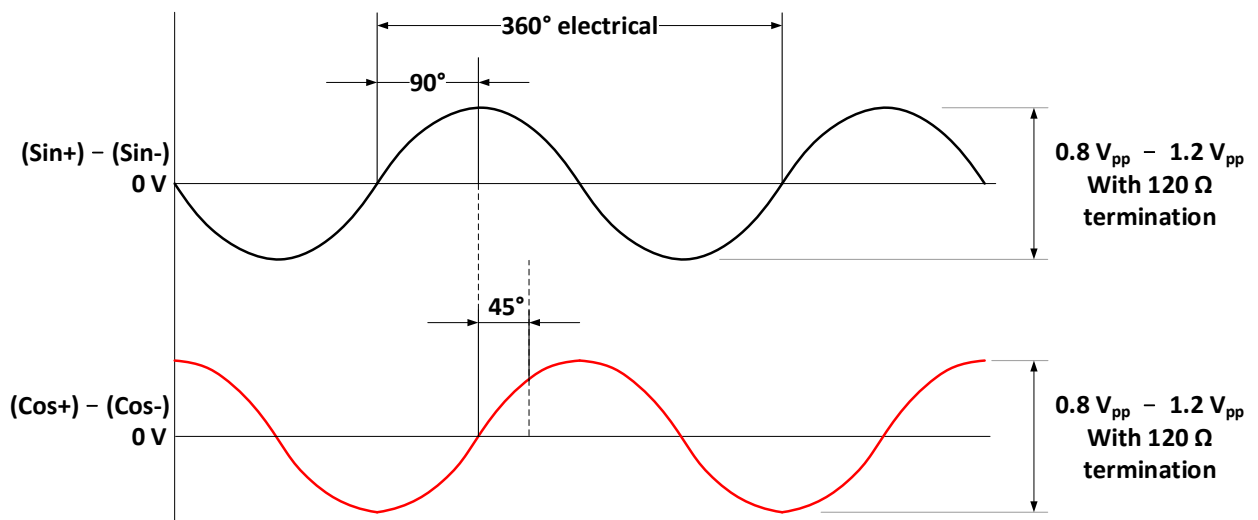
7.1 Analog Output Signals

7.1.1 Electrical specifications

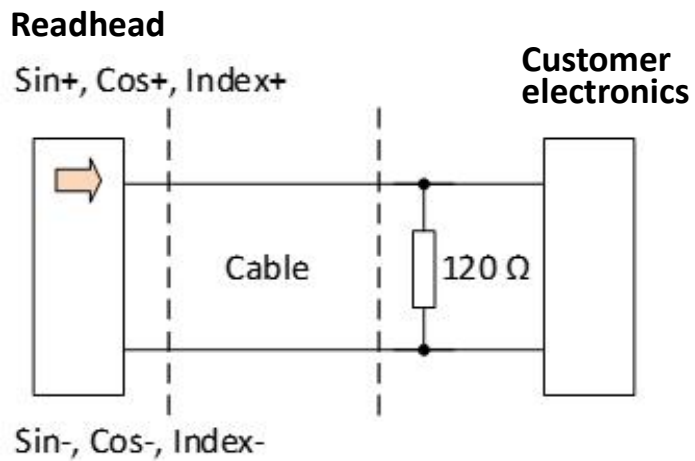
Electrical Specifications	Analog Output Signals
Power Supply	4.5 V ~ 5.5 V
Power Consumption	< 40 mA
Voltage drop over cable	~ 50 mV/m – with 120 Ω load
Output Signals	Sin, Cos, Index
Sine / Cosine Signals	0.8 V _{pp} ~ 1.2 V _{pp}
Reference Signal	0.8 V _{pp} ~ 1.2 V _{pp}
Termination	Z ₀ = 120 Ω
Cable length	100 m

*Please take Voltage drop over cable under consideration.

Timing diagram



Suggestion for signal termination



7.1.2 Connections

Color	Signal
Blue	GND
Red	5 V
Brown	Cos+
Green	Cos-
Grey	Sin+
Yellow	Sin-
Pink	Index+
White	Index-

7.2 Digital Output Signals

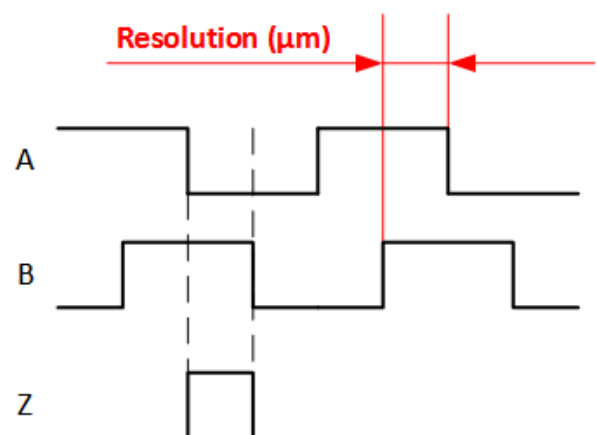
7.2.1 Electrical specifications

Electrical Specifications	Digital output signals
Power supply	4.5 V ~ 5.5 V
Power consumption	< 35 mA (without load)
Voltage drop over cable	~ 50 mV/m – with 120 Ω load
Output signals	3 square-wave differential signals A and B and their inverted signals A- and B-.
Reference signal	1 or more square-wave pulse differential signals Z and Z-.
Maximum load	$I_L < 100$ mA max. for each output
Cable length	100 m (please use a cpc Boost Module when more than 10 m)

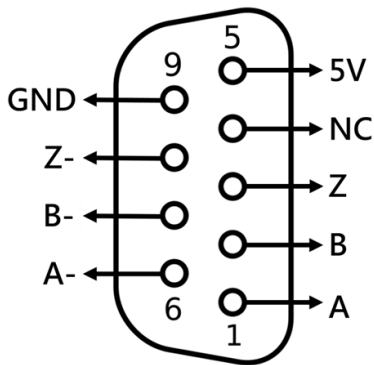
7.2.2 Connections

Color	Signal
Blue	GND
Red	5 V
Brown	A
Green	A-
Grey	B
Yellow	B-
Pink	Z
White	Z-

Timing diagram

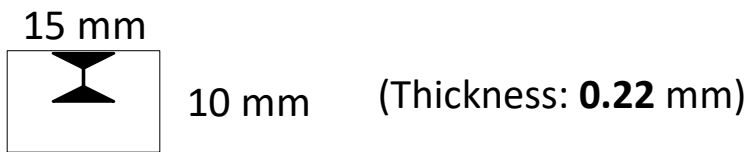


D-Sub9 Pin definitions



DM: D-Sub9 male

8. Magnetic Stick-on Reference Mark



9. Status LEDs

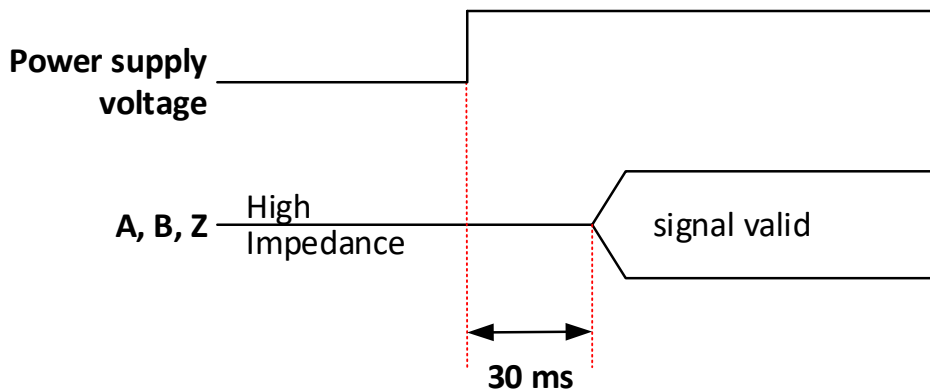
LED	Status	Possible reason
Green	Signal strength is valid.	-
Red flashing	<ol style="list-style-type: none"> Poor signal strength. Input signal frequency is too high. 	<ul style="list-style-type: none"> Incorrect direction of readhead. Readhead installation has deviated from the tolerances. The scale is demagnetized. Power supply voltage is too low. Input signal frequency is too high.

10. Response Time

	ME1
Set-up time	≤ 30 ms
Conversion time	< 250 ns

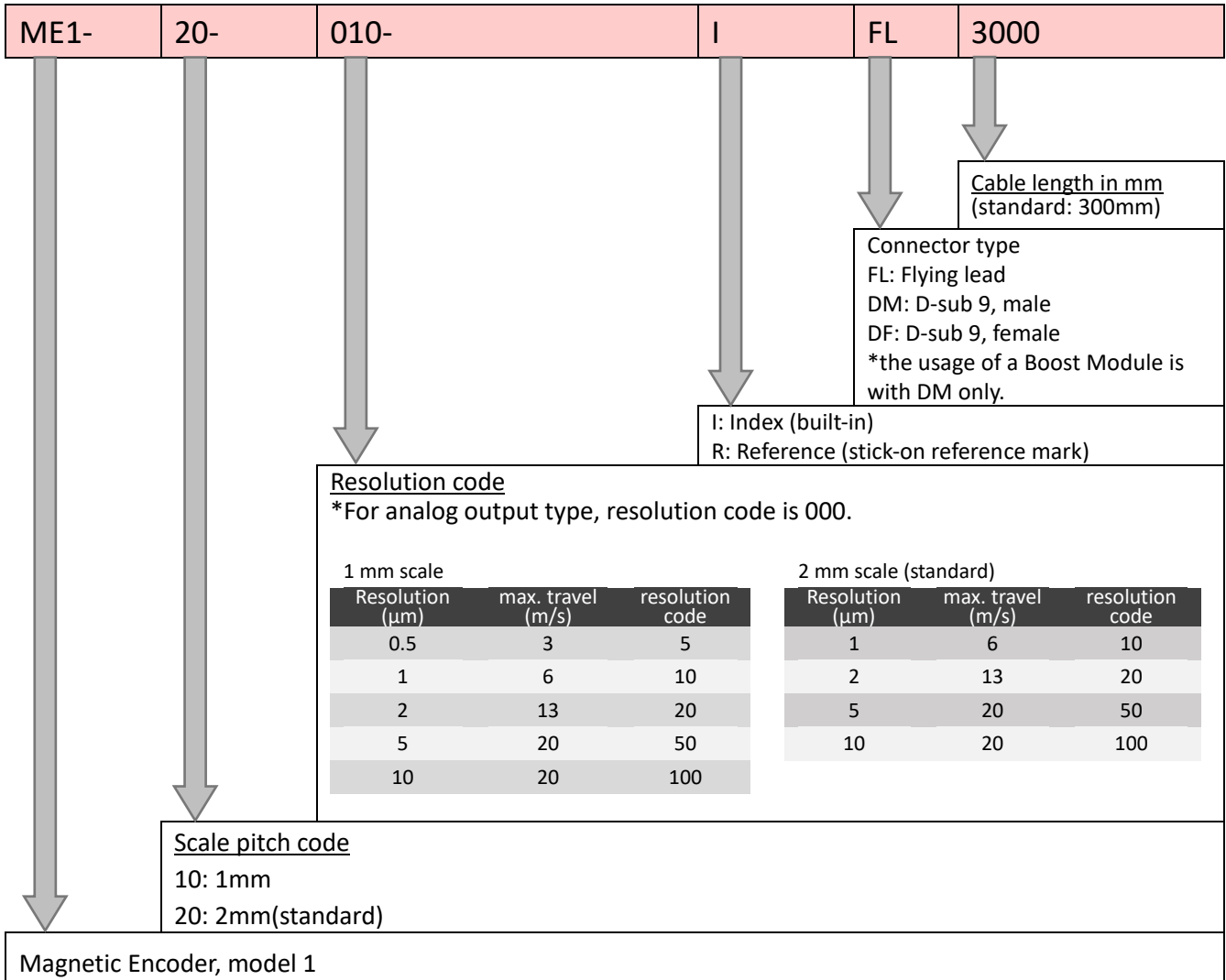
- **Set-up time:**
The time duration required for the readhead to begin generating the position data after power-on.
- **Conversion time:**
The time duration required for the readhead to convert the position data into an output signal.

Diagram of set-up time

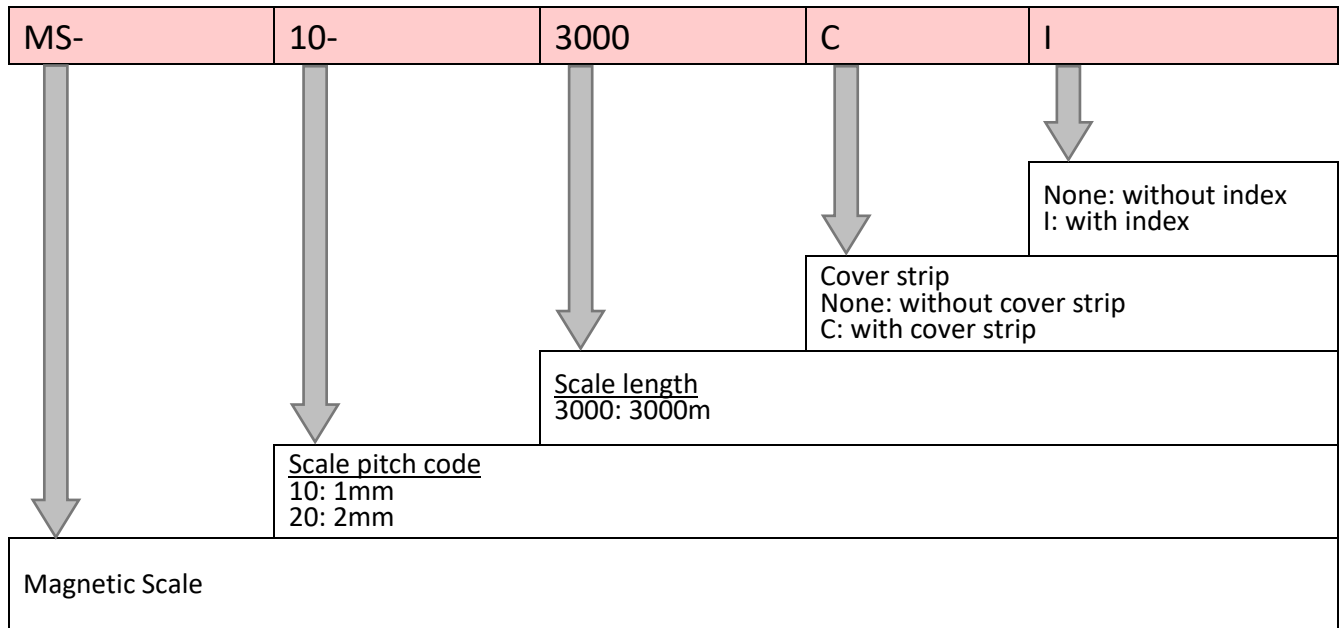


11. Part Numbering

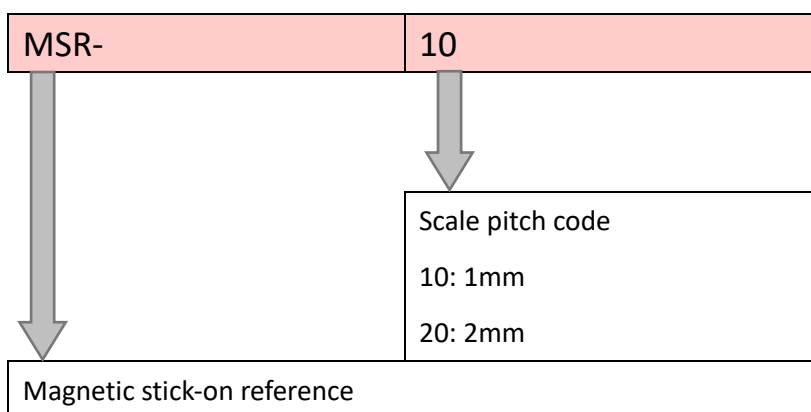
11.1 Readhead Part Numbering



11.2 Magnetic Scale Part Numbering



11.3 Magnetic Stick-on Reference Mark Part Numbering



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