

## TECHNICAL DATASHEET

### Incremental Encoder M 9



#### GENERAL INFORMATION

- Ideal for position and speed sensing in small machines and actuators
- Max. output frequency: 200 kHz
- Resolution to 512 lines/rev



With a total length less than 15mm and a very low mass, the type M9 incremental optical encoder is ideally suited for use on the moving heads of pick-and-place type machines.

The M9 may be used as direct replacements for most Hewlett Packard HEDS-5XXX encoders with no changes to the motor or cable.

The M9 provides high performance feedback for precision motion control in a very small package. Its small envelope makes it ideal for instrument axes for position and speed control in mechanisms too small to accept standard encoders.

Its high performance, advanced features, and competitive pricing make it the encoder of choice for a broad range of applications.

It utilizes an ASIC that integrates all encoder electronics, including the optoelectronics sensors, which enhances reliability and accuracy.

Outputs are single-ended quadrature A and B channels with up to 512 lines per rev plus an index pulse.

#### TECHNICAL DATA mechanical

|                                            |                                                                                       |
|--------------------------------------------|---------------------------------------------------------------------------------------|
| Housing diameter                           | 22 mm                                                                                 |
| Mounting depth                             | 14.8 mm                                                                               |
| Shaft diameter                             | 1.5 mm / 2 mm / 2.5 mm / 3 mm / 4 mm / 1/8" / 0.156" (Hub shaft)                      |
| Hollow shaft tolerance                     | +0.010 / -0.000 mm                                                                    |
| Axial endplay of mounting shaft (hubshaft) | ± 0.076 mm<br>+ 0.127 mm / - 0.076 mm<br>+ 0.178 mm / - 0.076 mm                      |
| Radial runout of mating shaft (hubshaft)   | ± 0.0125 mm                                                                           |
| Max. speed                                 | max. 12 000 rpm                                                                       |
| Moment of inertia                          | approx. 0.11 gcm <sup>2</sup>                                                         |
| Operating temperature                      | -40 °C ... +100 °C                                                                    |
| Storage temperature                        | -50 °C ... +125 °C                                                                    |
| Relative humidity                          | 90 %, non-condensing                                                                  |
| Weight                                     | 4.14 g                                                                                |
| Connection                                 | 5 pole header (Accessory: 30 cm ribbon cable with connector, ordering code CA0050012) |
| Recommended mating connector               | AMP, ordering code 103675-4 (on request)                                              |

#### TECHNICAL DATA electrical

|                       |              |
|-----------------------|--------------|
| Supply voltage        | DC 5 V ±10 % |
| Max. current w/o load | 10 mA        |

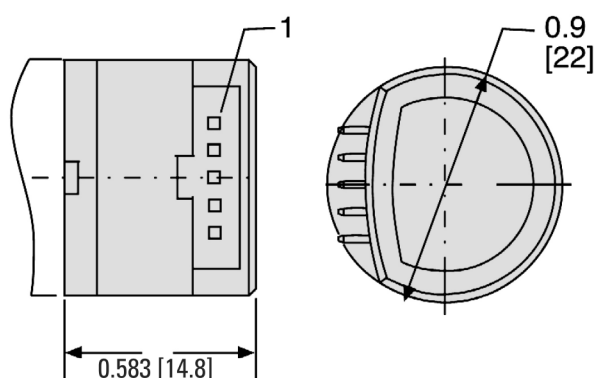
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#### TECHNICAL DATA electrical (continued)

|                       |                                 |
|-----------------------|---------------------------------|
| Code                  | Incremental, optical            |
| Max. pulse frequency  | 200 kHz                         |
| Index pulse width (N) | 90° ± 36° electrical            |
| Phasing               | 90° ± 18° electrical            |
| Symmetry              | 180° ± 18° electrical           |
| Number of pulses      | 100 ... 512                     |
| Output signals        | min. 2.5 V high, max. 0.5 V low |
| Output current        | 6 mA (25°C), 4 mA (100°C)       |

#### DIMENSIONED DRAWINGS



Dimensions in inch [mm]

#### OUTPUT WAVEFORMS AND CONNECTIONS (Direction viewing encoder cover)

| PIN | FUNCTION        |  | CABLE WIRE |
|-----|-----------------|--|------------|
| 1   | GND             |  | BLACK      |
| 2   | CH N            |  | BLUE       |
| 3   | CH A            |  | WHITE      |
| 4   | +U <sub>B</sub> |  | RED        |
| 5   | CH B            |  | BROWN      |

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#### ORDERING INFORMATION

| Type                     | Number of pulses / poles                                                                     | Mounting <sup>1</sup>                                                                                                                                                                                                             | Shaft Ø                                                                                                                                  | Connection                                      |
|--------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/>                                                                     | <input type="checkbox"/>                                                                                                                                                                                                          | <input type="checkbox"/>                                                                                                                 | <input type="checkbox"/>                        |
| <b>M9</b>                | 0100 / 0<br>0144 / 0<br>0200 / 0<br>0256 / 0<br>0300 / 0<br>0360 / 0<br>0500 / 0<br>0512 / 0 | <b>0</b> No mounting base<br><b>A</b> 4 x M1,6 on 18,5 mm (0,728")<br>B.C.<br><b>C</b> 2 x #2-56 on 19,05 mm (0,75")<br>B.C.<br><b>D</b> 3 x #0-80 on 20,9 mm (0,823")<br>B.C.<br><b>E</b> 2 x #2-56 on 46,02 mm (1,812")<br>B.C. | <b>1,5</b> 1.5 mm<br><b>2,0</b> 2.0 mm<br><b>2,5</b><br><b>3,0</b> 3.0 mm<br><b>4,0</b> 4.0 mm<br><b>125</b> 0.125"<br><b>156</b> 0.156" | <b>2</b> Flying leads<br><b>1</b> 5 pole header |

<sup>1</sup> Further information (drawings and mounting) see homepage [www.hengstler.com](http://www.hengstler.com)

#### Important:

To properly install type M9, a specialized **mounting kit** must be purchased.  
Only one kit is required to install any number of encoders with the same hub shaft size.

**MK M9** ☐

Please designate  
hub shaft diameter.

Hub shaft  
**1.5** 1.5 mm  
**2.0** 2.0 mm  
**2.5** 2.5 mm  
**3.0** 3.0 mm  
**125** 0.125 inch  
**156** 0.156 inch

Example: Kit for installing encoders with 3.0 mm hub shaft = MK M9 3.0

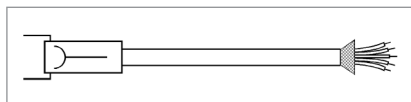
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### Incremental Encoder M 9 Accessories

#### MOUNTING

|                    | Ordering code        |
|--------------------|----------------------|
| Mounting kit (M 9) | MK M9 + Hohlwellen-Ø |

#### CONNECTING CABLES



| Connecting cables with plug (socket) on one end | Ordering code |
|-------------------------------------------------|---------------|
| 30 cm ribbon cable with connector               | CA 0 050 012  |