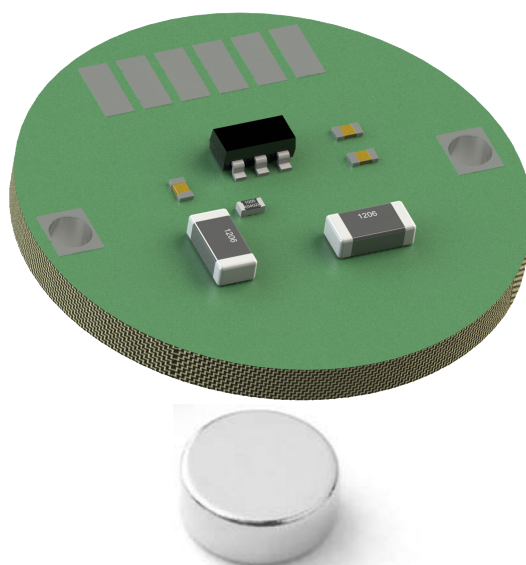


Magnetic kit encoder

Absolute singleturn

SSI / BiSS



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Description

The **WEM20** is a magnetic kit encoder. It detects the absolute singleturn shaft position. It consists of a PCB and an associated magnet..

This encoder module consists an axial quad hall sensing chip for magnetic detecting.

The absolute position can be measured with a suitable diametrical magnet.

It is important to pay attention to the appropriate air gap.

The **WEM20** is for real time encoders with high speed applications and rough environments.

The PCB can be fixed quickly and easily.

The encoder module is ideal for positioning and rotation speed control.

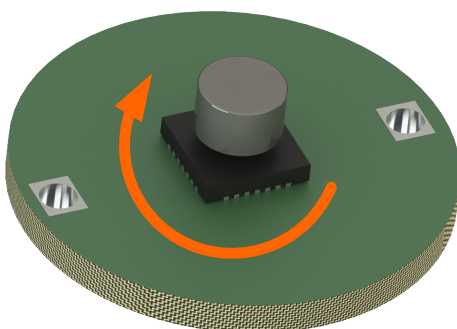
Main characteristics

- Absolute rotary encoder PCB
- Singleturn
- Magnetic sensing
- Interface: SSI (synchron serial interface) or BiSS ® (bidirectional serial synchron)
- Resolution: up to 14 Bit (16,384 steps per revolution)
- RS422 transceiver (differential)
- Operating Temperature: -40°C to +125°C
- High performance in compact size
- Quick and easy assembly
- Lead free
- With a single magnet (Ø 6mm x 2.5mm or Ø 4mm x 2.5mm or Ø 4mm x 4.0mm)
- Pads for soldering wires (by customer)



Direction of rotation

Clockwise (CW) when looking from motor side to the PCB



Rotation direction clockwise
(count up)

Recommended operating conditions

Typical values at 25 °C.

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|----------------------------|-----------|------|---------|--------|----------|----------------------------|
| Supply voltage | U_B | 4.75 | 5.0 | 5.25 | V_{DC} | |
| Supply current | I_{UB} | | | 80 | mA | no load |
| Absolute accuracy | | | +/- 1.2 | | ° | (unselected magnets) |
| | | | +/- 0,5 | | ° | (after calibration via SW) |
| Rotation speed | RPM | | | 10,000 | U/min | up to 14 Bit |
| | | | | 80,000 | U/min | up to 12 Bit |
| Hysteresis | | | 0,35 | | ° | |
| SSI / BiSS | | | | | | |
| Clock frequency | f | 1 | | 10 | MHz | |
| Scan ratio of T | | 40 | 50 | 60 | % | |
| Monoflop time | t_m | | 2 x T | | µs | adaptive timeout |
| High level output voltage | V_{oH} | 2.0 | 3.0 | 5.5 | V_{DC} | $R_L = 120\Omega$ |
| Low level output voltage | V_{oL} | | | 0.8 | V_{DC} | $R_L = 120\Omega$ |
| High level input voltage | V_{iH} | 2.0 | | 5.5 | V_{DC} | |
| Low level input voltage | V_{iL} | | | 0.8 | V_{DC} | |
| Output current per channel | I_{out} | | 30 | 50 | mA | overload protection |
| Time lag | t_v | | 150 | | ns | |
| Environment | | | | | | |
| Operating temperature | T_A | -40 | 25 | 125 | °C | |
| Storage temperature | T_S | -40 | | 125 | °C | |

Description:

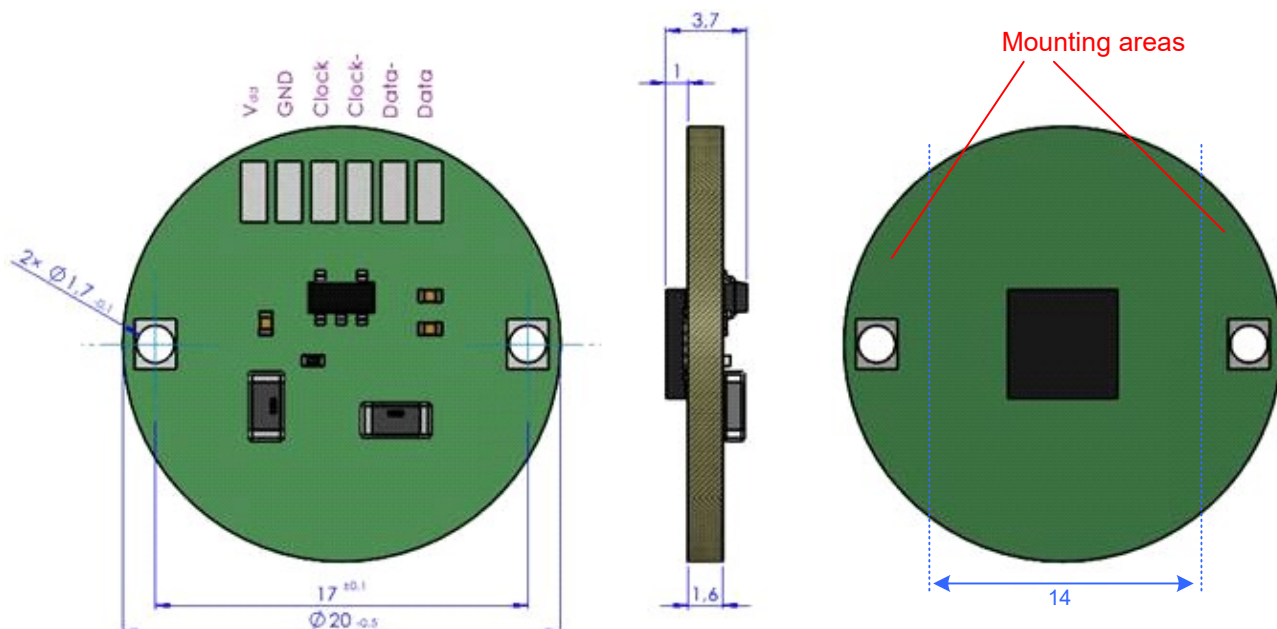
For communication with the WEM20, a USB converter box is available from PWB encoders. The software can be downloaded from the website. This can help for the first use and for visualization of the position data. It is not necessary for operation in the customer application with the customer control.

The angular accuracy can calibrate after the mechanical assembly (with the Software and the USB converter box).

Mechanical characteristics and drawings

| Parameter | Value | Tolerance | Unit |
|-------------------------------|---------|-----------|------|
| PCB diameter | 20 | - 0.5 | mm |
| PCB height | 1.6 | ± 0.2 | mm |
| Sensor chip height | 0.9 | ± 0.1 | mm |
| Weight | 6 | ± 2 | g |
| Magnet diameter \varnothing | 4 / 6 | ± 0.1 | mm |
| Magnet height | 2.5 / 4 | ± 0.05 | mm |
| Air gap (magnet - chip) | 0.6 | ± 0.25 | mm |
| Space under PCB | 2 | | mm |
| Protection class | IP00 | | |

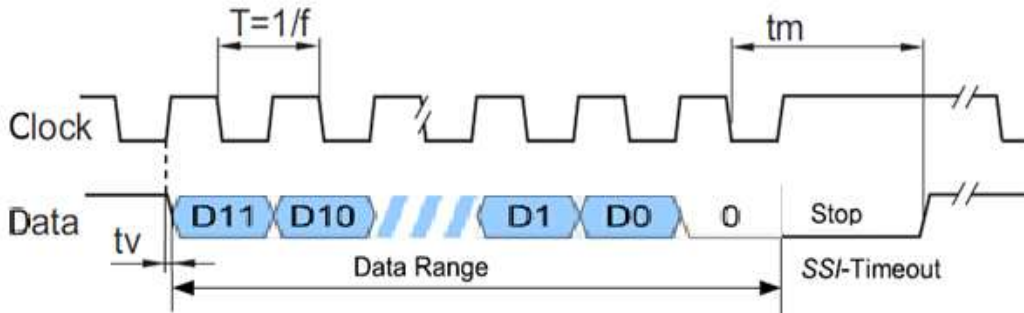
Dimensions and Pin out description:



ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.

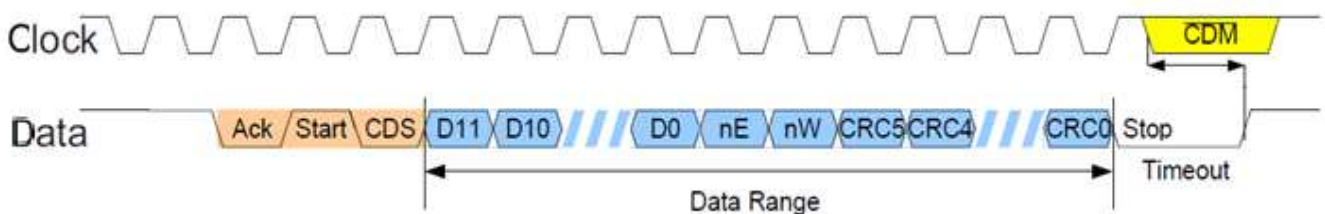
Interface:

Data transfer: SSI Gray-Code



The position data increases when the shaft rotates in the direction of clockwise

Data transfer: BiSS (C-Mode) Binary-Code

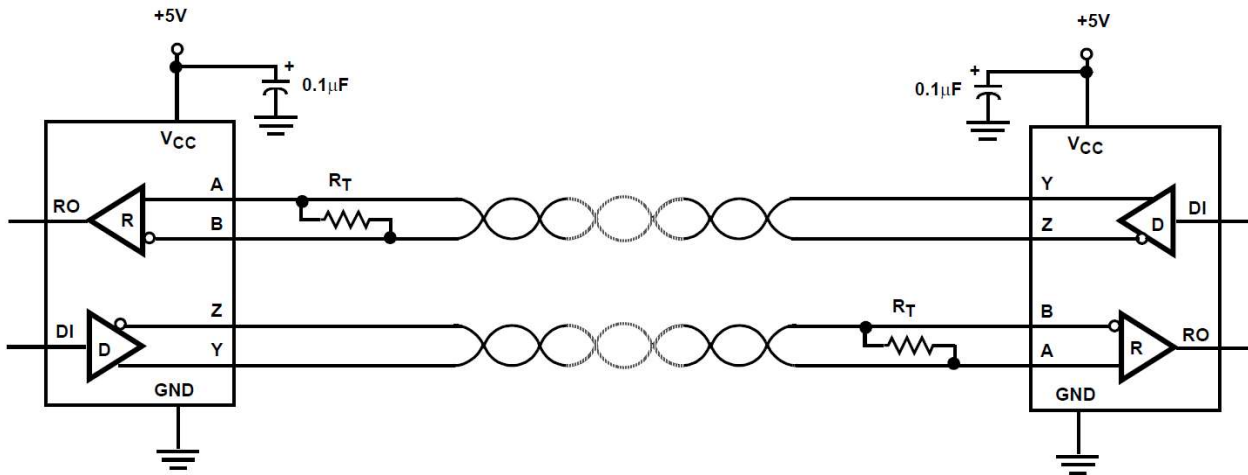


The position data increases when the shaft rotates in the direction of clockwise

| Serial interface protocol | Definition |
|---------------------------|------------------------|
| Cycle start sequence | Ack/Start/CDS |
| Length of sensor data | 12 Bit + ERR + WARN |
| CRC Polynom | 0b1000011 |
| CRC Mode | Inverted |
| Ack | Acknowledge-Bit |
| Start | Start-Bit |
| CDS | Control-Bit |
| D0 - D11 | Position-Data |
| nE | Low activ error |
| nW | Low activ warning |
| CRC0 - CRC5 | Cyclic redundancy code |
| Stop | Stop-Bit |
| CDM | Control data master |

For a detailed description of the protocol, see separate interface specification.

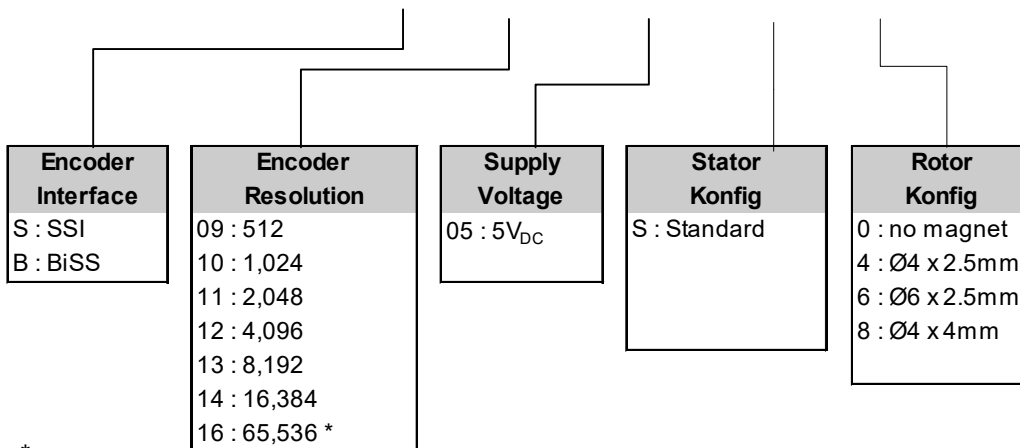
Typical application connection



Ordering information

Ordering code:

WEM 20 - X - XX - XX - X - X



* Selecting 16 bits increases noise in the signal. To compensate for this, filters are used that limit the maximum speed (to 7,000 rpm) and result in latency in the position data (2.3µs). The recommended resolution is therefore 14 bits.

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