

TECHNICAL DATASHEET

Sine-wave Encoder S 21



- Wide operating temperature range of -15 °C up to $+120\text{ °C}$, therefore optimum use of motor capacity
- High limiting frequency with excellent signal quality, allowing highest peak speeds and reduced non-productive time wastage
- Excellent immunity to interference (EN 61000-4-4, Class 4)
- High functional safety due to signal control and system monitoring (under-voltage, pollution, disc damage, end of LED service life)
- High signal quality through control and error compensation



TECHNICAL DATA mechanical

| | |
|--|--|
| Housing diameter | 53 mm |
| Shaft diameter | Cone 1/10 |
| Protection class shaft input (EN 60529) | IP40 |
| Protection class housing (EN 60529) | IP40 |
| Shaft load axial / radial | for tapered solid shaft: 20 N / 90 N |
| Axial endplay of mounting shaft (hubshaft) | $\pm 0.5\text{ mm}$ |
| Radial runout of mating shaft (hubshaft) | $\pm 0.1\text{ mm}$ |
| Max. speed | max. 12 000 rpm (continuous), max. 15 000 rpm (short term) |
| Torque | $\leq 1\text{ Ncm}$ |
| Vibration resistance (DIN EN 60068-2-6) | $\leq 100\text{ m/s}^2$ (10 ... 2,000 Hz) |
| Shock resistance (DIN EN 60068-2-27) | $\leq 1,000\text{ m/s}^2$ (6 ms) |
| Operating temperature | $-15\text{ °C} \dots +120\text{ °C}$ |
| Storage temperature | $-20\text{ °C} \dots +80\text{ °C}$ |
| Material housing | Aluminum |
| Weight | approx. 170 g |
| Connection | PCB connector and cable |

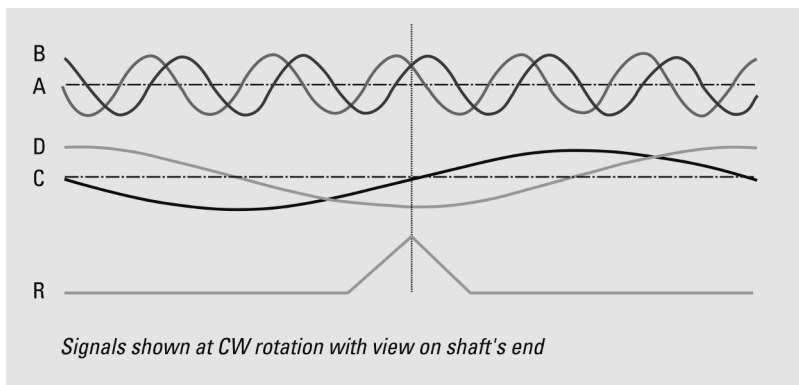
TECHNICAL DATA electrical

| | |
|------------------------------|--|
| General design | as per DIN EN 61010-1, protection class III, contamination level 2, overvoltage class II |
| Supply voltage | DC 5 V $\pm 10\%$ |
| Max. current w/o load | 120 mA |
| Reference signal R | $> 0.4\text{ V}$ (1 pulse per revolution) |
| Commutation signals C, D | Sine - Cosine 1 Vpp (1 period per rev.) |
| Incremental signals optional | Sinus-Cosinus 1 Vpp |
| Number of pulses | 2048 |
| 3dB limiting frequency | 500 kHz |
| Absolute accuracy | $\pm 35''$ |
| Repeatability | $\pm 7''$ |

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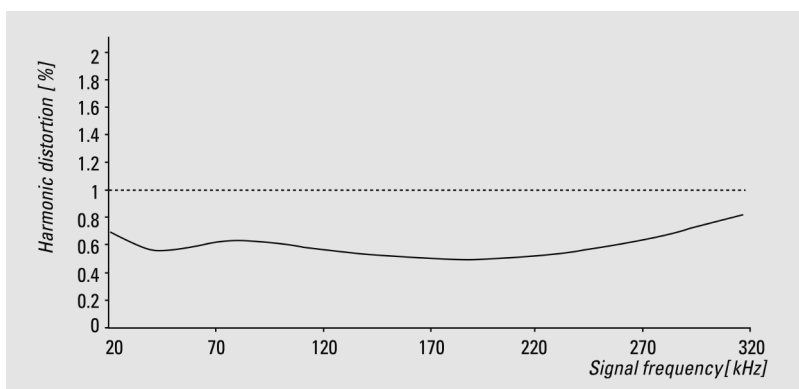
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S 21 SIGNALS



The incremental signals A and B and the zero signal R are differential voltage signals. The differential signal level is 1 Vpp. The zero signal appears once per revolution and reaches its maximum value at the angle where the amplitudes of A and B Signals are equal. The coarse tracks C and D deliver one sinewave period per revolution and are utilized to determine the absolute rotor position of Brushless DC motors for startup commutation. All signals have a DC offset of 2.5 V.

S 21 SIGNAL QUALITY



The quality of the servo loop is determined to a large extent by the absence of harmonics in the encoder's sinewave signals, particularly at low speed. In order to achieve high interpolation factors in the sequencing control, the incremental sinewave signals A and B are available with a harmonic distortion significantly under 1% throughout the specified temperature range. This delivers excellent synchronism and a high level of positional accuracy with servo axes.

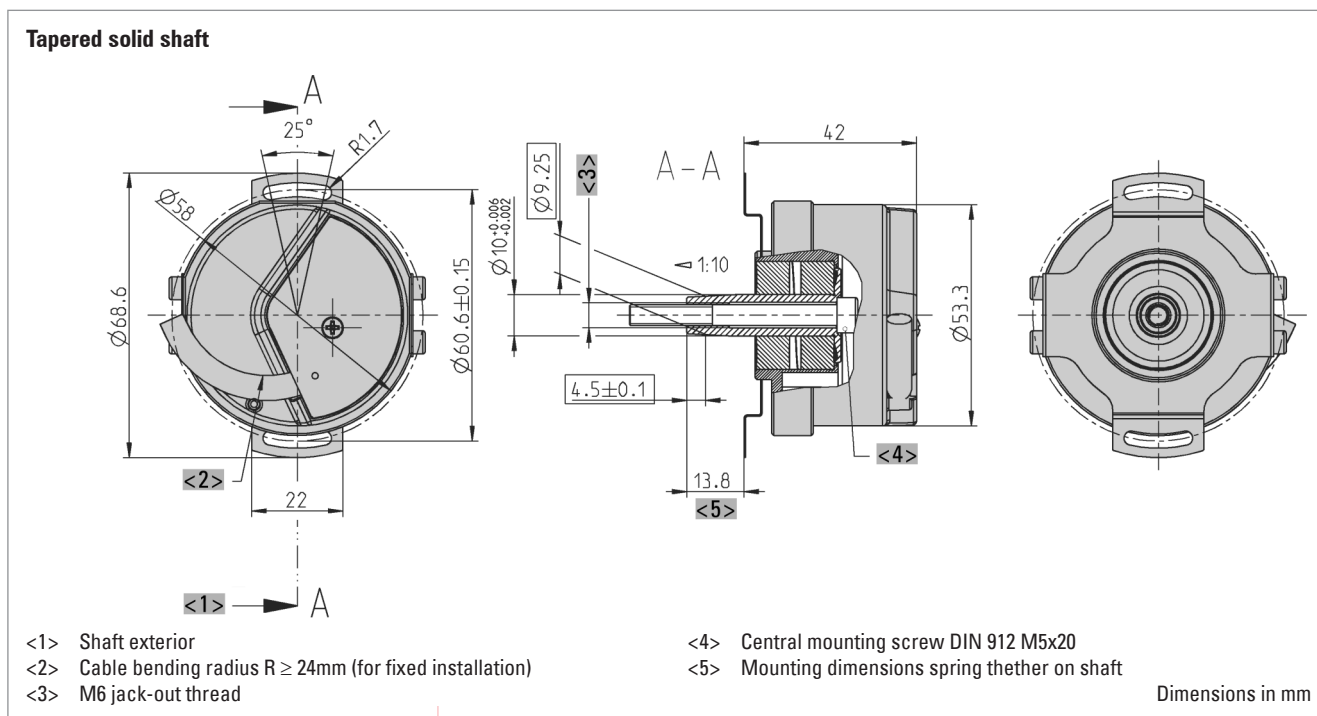
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ELECTRICAL CONNECTIONS PCB connector

| Colour | PIN | Signals |
|-------------|-----|----------------|
| brown | 1a | C- |
| grey/pink | 1b | U _B |
| yellow | 2a | A- |
| black | 2b | D+ |
| green/brown | 3a | 0 V Sense |
| blue | 3b | B+ |
| pink | 4a | R- |
| grey | 4b | R+ |
| red | 5a | B- |
| white/green | 5b | GND |
| violet | 6a | D- |
| green | 6b | A+ |
| red/blue | 7a | DC 5 V Sense |
| white | 7b | C+ |

DIMENSIONED DRAWINGS



ORDERING INFORMATION

| | Ordering code |
|---|---------------|
| Tapered solid shaft with mounting support | 0 548 011 |

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**Sine-wave Encoder S 21
Accessories**