

## Motor Feedback Systems - Sine-wave Type S21 for AC Synchronous & BLDC Motors



- Wide operating temperature range of  $-15\text{ }^{\circ}\text{C}$  up to  $+120\text{ }^{\circ}\text{C}$ , 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

### GENERAL INFORMATION

The S21 has been constructed in line with the International Standard Resolver dimension 21, i.e. 2.1" (approx. 53 mm) and as a result is also suitable for smaller sized motors. The simplicity of connection rounds off advantages of the S21. The integrated cable plug connector combines the advantages of the plug with those of a cable connection. This leads to a fast, economical and space-saving installation.

### TECHNICAL DATA electrical

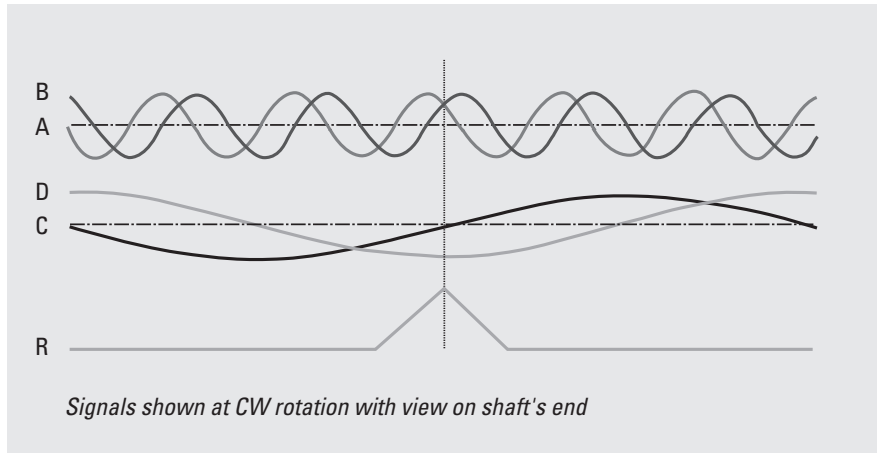
General design	as per DIN EN 61010-1, protection class III, contamination level 2, over voltage class II
Supply voltage	DC 5 V $\pm 10\%$ (SELV)
Max. current w/o load	120 mA
Incremental signals A,B	Sine - Cosine 1 Vpp
Number of pulses	2048
Accuracy	$\pm 35''$
Repeatability	$\pm 7''$
Max frequency output	500 kHz
Reference signal: R	$> 0.4\text{ V}$ (1 pulse per rev.)
Commutation signals: C, D	Sine - Cosine 1 Vpp (1 period per rev.)
Connection	PBC connector with cable

### TECHNICAL DATA mechanical

Shaft form	Cone 1/10
Shaft variations	Tapered solid shaft (Tapered hollow shaft on request)
Shaft diameter	10 mm
Shaft load tapered solid shaft	radial 90 N, axial 20 N
Compensation	axial $\pm 0.5\text{ mm}$ , radial $\pm 0.1\text{ mm}$
Nominal speed	$12\,000\text{ min}^{-1}$
Max. speed	$15\,000\text{ min}^{-1}$ ( $< 1\text{ s}$ )
Torque	$\leq 1\text{ Ncm}$
Protection class	IP40
Operating temperature	$-15\text{ }^{\circ}\text{C}$ ... $+120\text{ }^{\circ}\text{C}$
Storage temperature	$-20$ ... $+80\text{ }^{\circ}\text{C}$
Vibration resistance (IEC 68-2-6)	$\leq 100\text{ m/s}^2$ (10 ... 2000 Hz)
Shock resistance (IEC 68-2-27)	$\leq 1\,000\text{ m/s}^2$ (6 ms)
Material housing	Aluminium

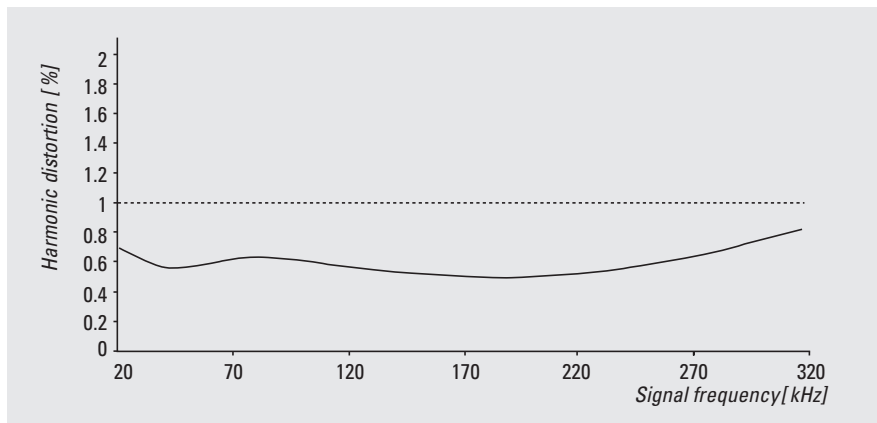
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## S21 SIGNALS



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.

## S21 SIGNAL QUALITY



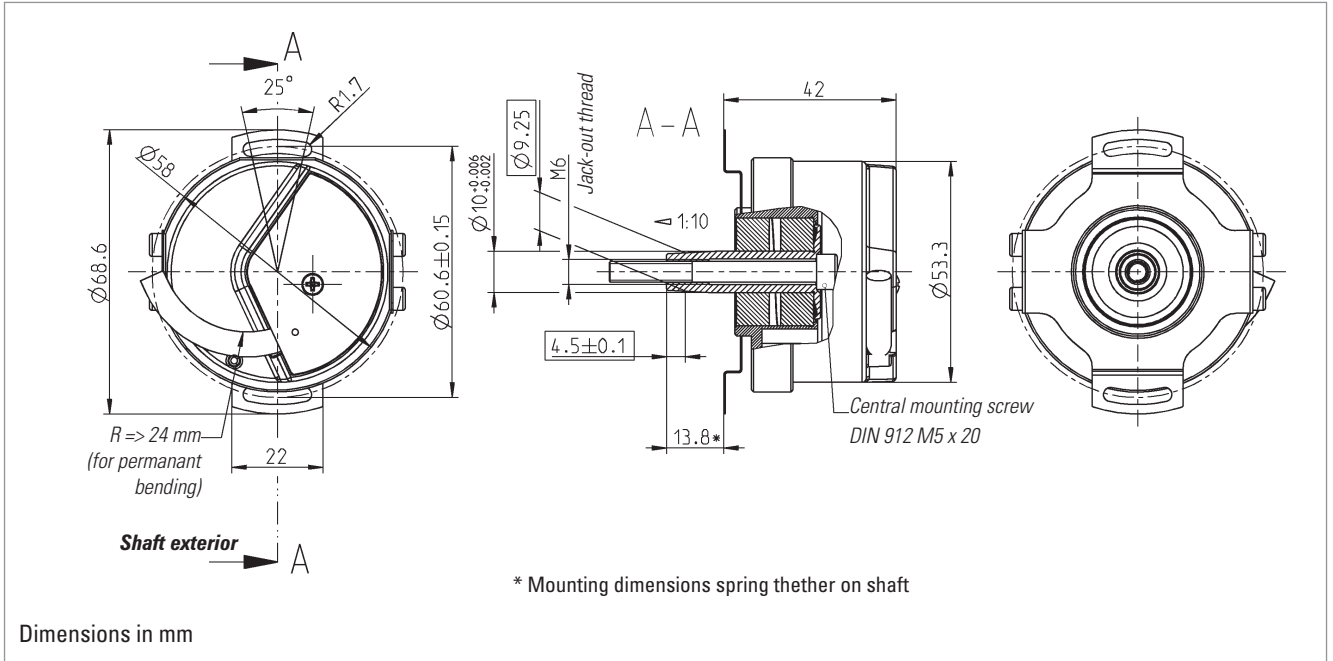
The quality of the servo loop is determined to a large extent by the absence of harmonics in the encoder's sinewave signals, particularly at low speed. In order to achieve high interpolation factors in the sequencing control, the incremental sinewave signals A and B are available with a harmonic distortion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

## PCB-CONNECTOR PIN OUT

Row a	5 V Sense rd/bl	D- vio	B- rd	R- pk	0 V Sense gn/br	A- ye	C- br
Row b	wt C+	gn A+	wt/gn GND	gr R+	bl B+	bk D+	gr/pk U <sub>B</sub>
Pin	7	6	5	4	3	2	1

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## DIMENSIONAL DRAWINGS TAPERED SOLID SHAFT



## ORDERING INFORMATION

	Ordering code
Tapered solid shaft with mounting support	0 548 011
Tapered hollow shaft	on request