SICK | STEGMANN

Motor Feedback-System

SNS 50-HBA0-S01

Identical in construction with: SinCoder SNS50 6C7 070 011 200

1.024 / 1 sine-/cosine periods

Motor Feedback-Systems

Features

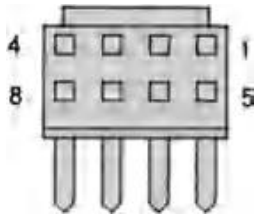
- 1024 Sine-/Cosine periods per revolution
- Absolute track with one sine/cosine period per revolution, selectable
- Offset and amplitude corrections stored in the encoder
- Zero pulse can be activated once or permanently by software
- Electronic type label

HIPERFACE®

PIN- and wire allocation

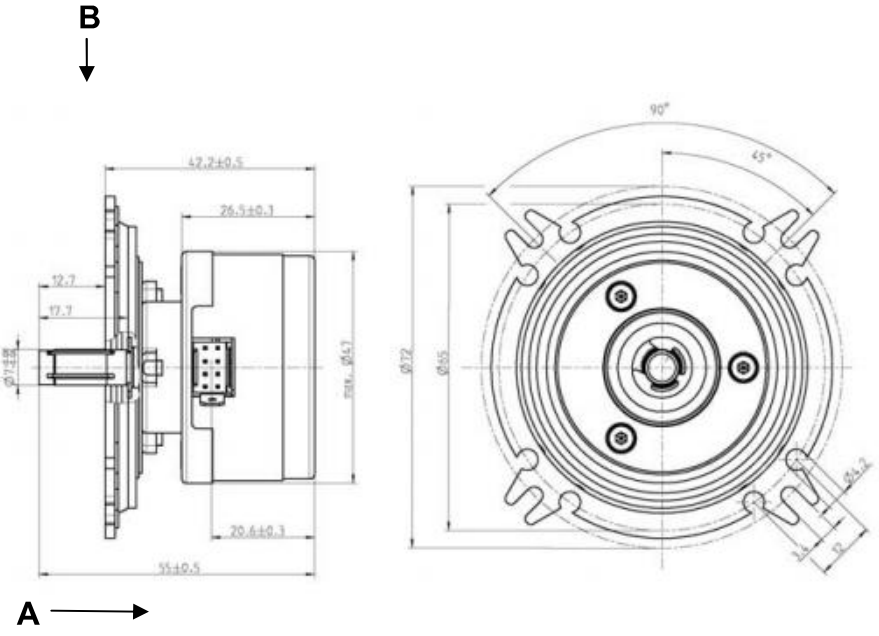
PIN	colour	Signal	Explanation
1	red	+ Us	Supply voltage 7..12 V
2	blue	GND	Ground connection
3	brown	REFSIN	Process data channel
4	black	REFCOS	Process data channel
5	grey	Data+	RS-485- parameter channel
6	green	Data-	RS 485 parameter channel
7	white	+ SIN	Process data channel
8	pink	+ COS	Process data channel

Caution: To ensure proper function, the screen connection strand (200 mm) MUST be connected. It is included in the supply.



Direction of view “B”

Dimensional drawing



Order information

Type	Part no.
SNS50-HBA0-S01	1 034 097

TECHNICAL INFORMATION

Technical Data		Tapered Shaft SNS50-HBA0-S01
Number of sine/cosine periods per revolution		1,024 and 1
Dimensions		mm (see dimensional drawing)
Mass		0.1 kg
Inertial rotor moment		10 gcm^2
Type of code for the absolute value		Binary
Code sequence for clockwise shaft rotation, looking in direction „A“ (see dimensional drawing)		Increasing
Measurement step after generating arctan with 8 bit resolution		5 angular seconds [2]
Error limits on the coarse track (1 cycle/revolution)		± 4 [1] Degrees [2]
Error limits for evaluating the 1.024er signals		
integral non-linearity		± 60 [1] angular seconds [2]
Non-liearity within a sine/cosine period		
differential non-linearity		± 40 [1] angular seconds [2]
Output frequency for sine/cosine signals		100 kHz
Working speed		6000 min^{-1}
Max. operating speed		9000 min^{-1}
Max. angular acceleration		0.2 x 10^6 rad/s^2
Operating torque		0.2 Ncm
Starting torque		0.4 Ncm
Permissible shaft movement		
static	radial/axial	± 0.5 mm/ ± 0.75 mm
dynamic	radial/axial	± 0.05 mm/ ± 0.25 mm
Angular motion, perpendicular to the rotational axis		
static		± 0.005 mm/mm
dynamic		± 0.0025 mm/mm
Life of ball bearings		3.6 x 10^9
Working temperature range		0 … +100 °C
Storage temperature range		-40 … +125 °C
Permissible relative humidity [4]		90 %
Resistance		
to shocks [5]		100/10 g/ms
to vibration [6]		20/0…2000 g/Hz
Protection to IEC 60529 [7]		IP 40
EMC [8]		
Operating voltage range		7-12 V
Recommended supply voltage		8 V
Max. operating current, no load		50/100 [3] mA
Available memory area within EEPROM		160 Byte
Interface signals		
Process data channel	=SIN, REFSIN, COS, REFCOS	Analogue, differential
Parameter channel	= RS 485	Digital

1) Calculated with corrected value, as described on page 3
2) Referred to one shaft revolution
3) Reference pulse output continuously
4) Condensation not permissible
5) According to DIN EN 60068-2-27
6) According to DIN EN 60068-2-6
7) With mating connector inserted
8) According to DIN EN 61000-6-2 and DIN EN 61000-6-3

Read correction data

Read offset and amplitude correction values
The accuracy of the tracks can be increased by calculating the offset and amplitude errors. Production-included offset and amplitude fluctuations are stored in the EEPROM.

The data are stored in the integer format in **data field** 5. The offset correction values are measured during the production process by comparing the difference between the reference signal and the average value of the sine/cosine signal. These correction values can be used to increase the accuracy of the encoder by adding them to the actual signal obtained following differential detection.

Description of the data in data field 5

Address				**Integer**
0 **1**	SINE 1024er	L- byte H- byte		Offset correction in mV
2 **3**	COSINE 1024er	L- byte H- byte		
4 **5**	Amplitude standardization SINE 1024 cycles	L- byte H- byte	Dividend	
6 **7**		L- byte H- byte	Divisor	
8 **9**	SINE 1er	L- byte H- byte		Offset correction in mV
10 **11**	COSINE 1er	L- byte H- byte		
12 **13** **14** **15**	Amplitude standardization SINE 1 cycles	L- byte H- byte L- byte H- byte	Dividend Divisor	
16 **17**	Number of zero pulses	L- byte H- byte		
18 **19**	Number of periods of the commutation track	L- byte H- byte		
20-29	Undefined			
30 **31**	Checksum *	L- byte H- byte		

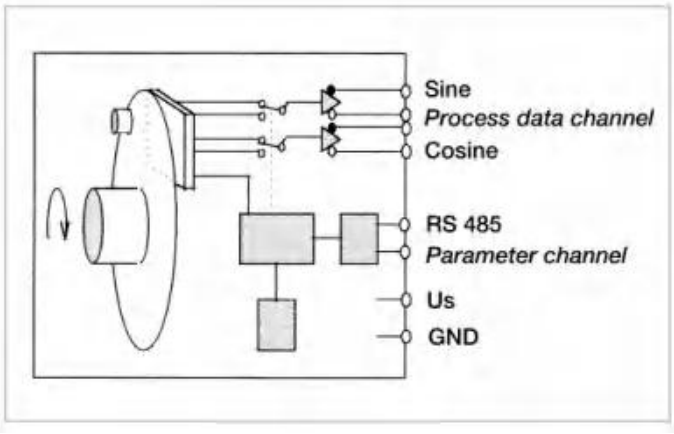
* The checksum is formed by the addition of all 2-byte words.

Calculation formula:

SINE = (SINE + offset adjustment sine) x Dividend / Divisor
COSINE = (COSINE + offset adjustment cosine) x 1

System description

SNS 50 / SNS 60
SinCoder® block diagram



The novel features

Well known optical rotary encoders include so-called incremental encoders or absoute encoders. Because of their great complexity, absolute encoders are relatively expensive to produce in the conventional manner.

This conventional manner consists of reading binary information coded on a glass disc. Each binary position requires appropriate optical scanning. All these scanning operations must be coordinated with one another under all conditions in such a way that there can be no read errors. In addition, the interface of such absolute encoders transmits the complete absolute value constantly.

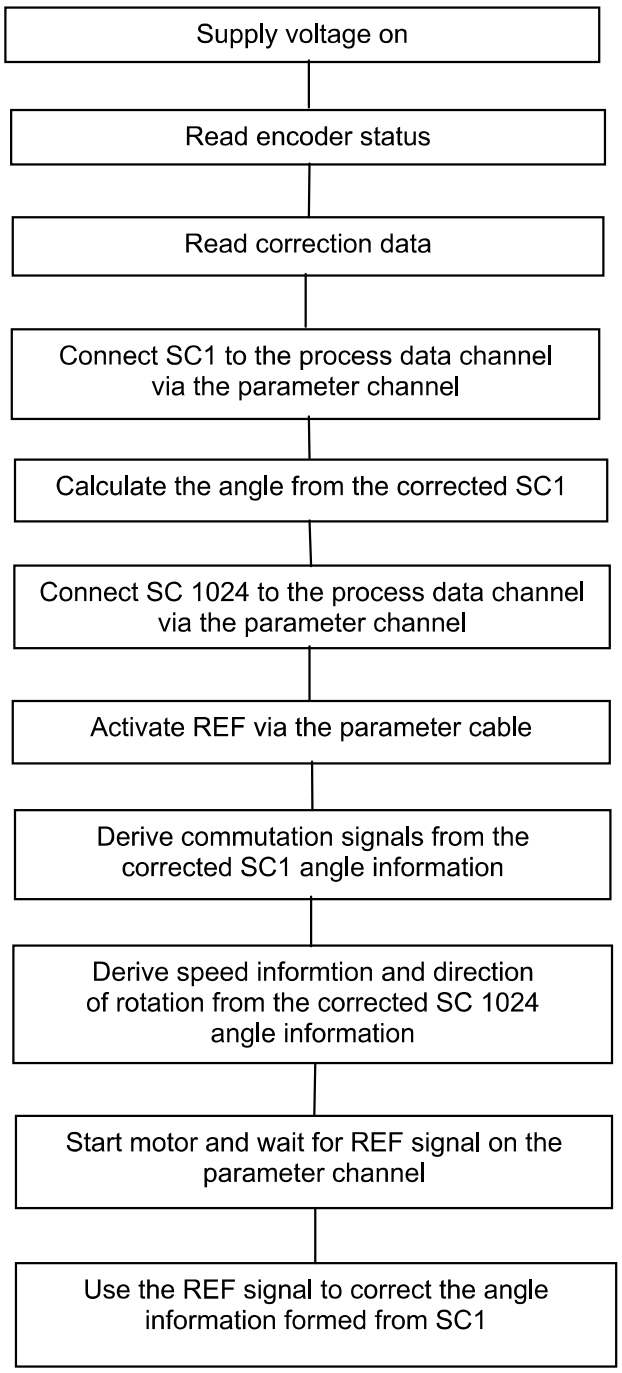
The SinCoder® system is an mixture between an incremental encoder and an absolute encoder. As in the SinCos® encoder the interface (HIPERFACE®) to the motor controller consists of a process data channel and a parameter channel.
The SinCoder® is provided internally with the following basic information:

1. A sine-/cosine signal with 1024 cycles per revolution (SC1024).

2. A sine-/cosine signal with one cycle per revolution (SC1).

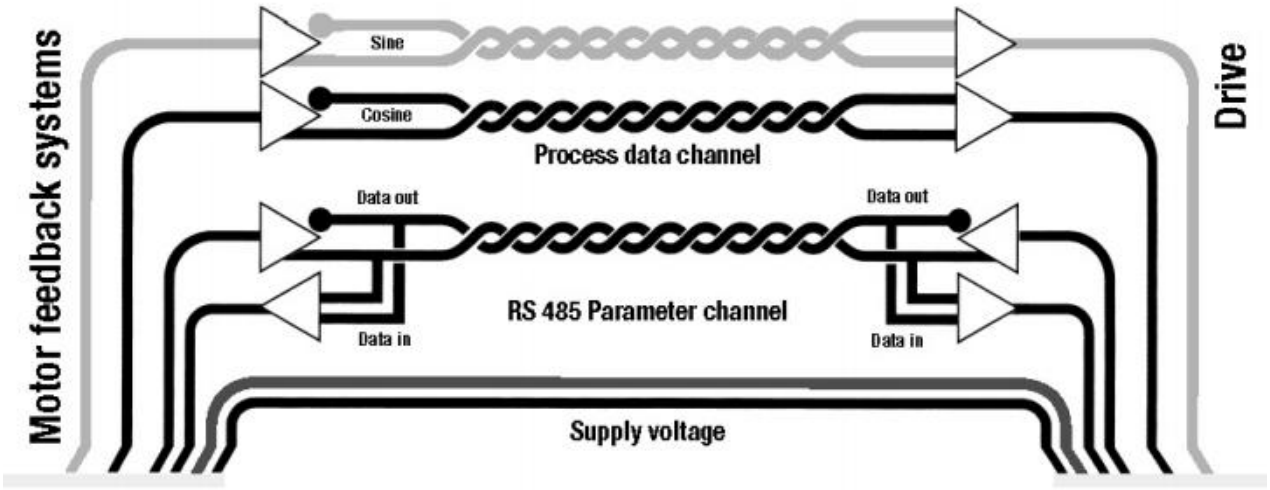
3. A reference signal (REF), which appears once per revolution.

Position finding sequence in the SinCoder®



Electrical interface

- Safe data transmission
- High information content
- Electronic type label
- Only 8 leads
- Bus enabled parameter channel
- Prozess data channel in real time



Signal specification of the process data channel

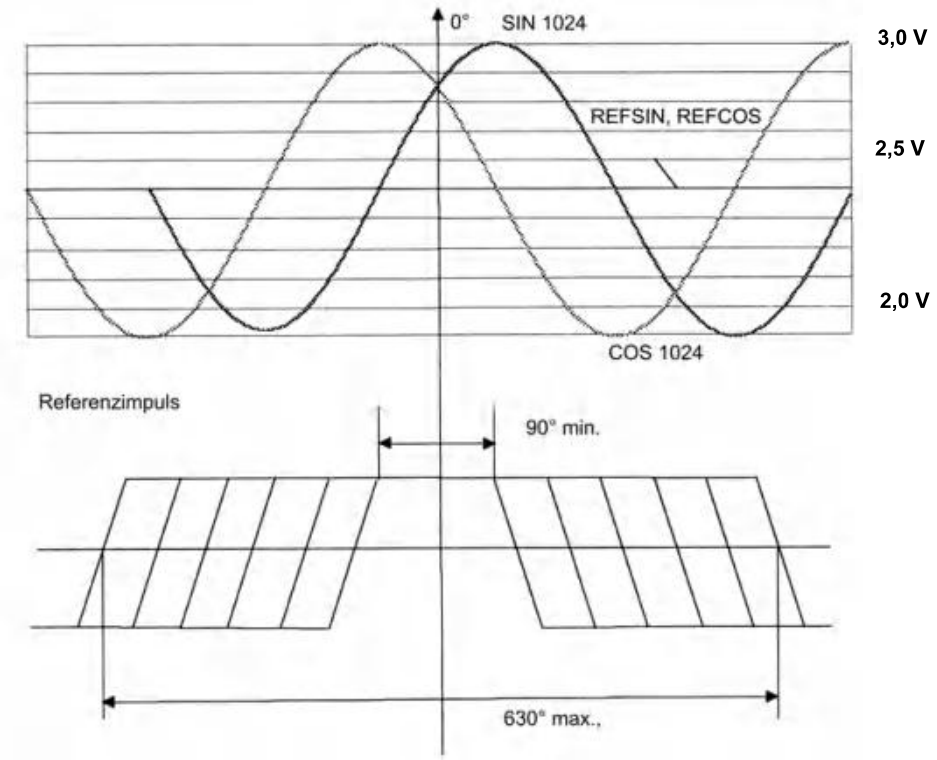
Signal specification of the process data channel

Access to the process data used for speed control, i.e. to the sine and cosine signals, is practically always “online”. When the supply voltage is applied, the speed controller has access to this information at any time.

Signal specification of the reference pulse

The reference signal can be output once or continuously on the RS 485 lines. The reference signal is output only when requested.

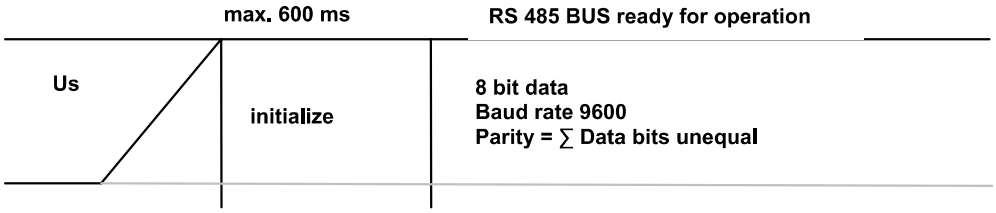
Signal diagram for cockwise rotation of the shaft, looking in direction A.



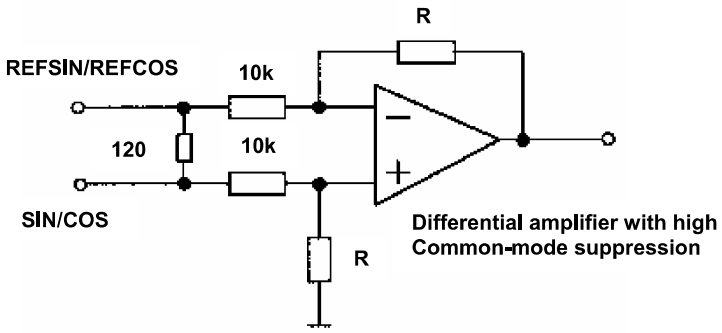
Characteristics applicable to all permissible environmental conditions signal

Signal	Values / Units
Signal peak, peak V_{ss} of SIN, COS	0,6 … 1,2 V
Signal offset REFSIN, REFCOS	2,2 … 2,8 V

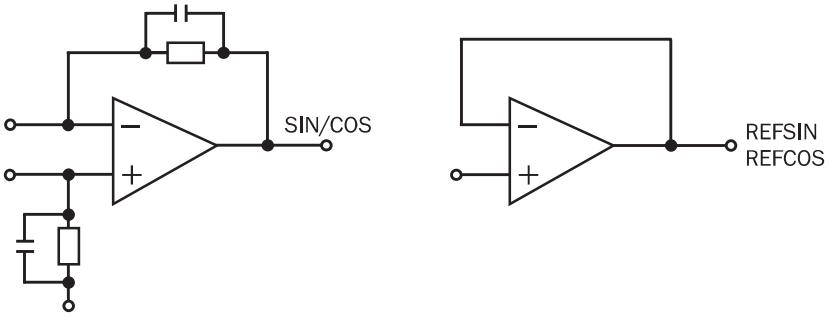
Power on



Recommended receiver circuit for sine and cosine signals



The output circuit of the process data channel within the SinCoder



Type specific settings

Type – ID (command 52h)	12h
Free EEPROM (bytes)	5 x 32
Data field status 0 … 4	C9h
Address	40h
Mode_485	E4h
Codes 0 … 3	55h
Counter	-

Type specific settings

Command byte	Function	Code0	Comments
4Ah	Read data		
4Bh	Save data		
50h	Read encoder status		
51h	One reference pulse		Output the reference signal once on the RS 485 line
52h	Read out name plate		
53h	Encoder reset		
54h	Analogsignal auswählen		Channel number 00h 1024er Sin/Cos Channel number 01h 1er Sin/Cos
55h	Allocate encoder address	•	
56h	Read serial number and program version		
5Fh	Incremental mode (continuously ouput) at RS 485	•	Output the reference signal continuously on the RS 485 line. Note: the RS 485 line is free for the user after switch off the power supply.

Overview of status messages

Error type	Status code	Description
	00h	The encoder has recognised no error
Initialisisation	05h	Internal I²C-bus not operational
	06h	Internal checksum error
Protocol	09h	Parity error
	0Ah	Cecksum of the data transmitted is incorrect
	0Bh	Unknown command code
	0Ch	Number of data transmitted is incorrect
	0Dh	Command argument transmitted is not allowed
Data	0Eh	The selected data field must not be written to
	0Fh	Incorrect access code
	10h	Size of data field stated cannot be changed
	11h	Word address stated, is outside data field
	12h	Access to non-existent data field

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