Non-contact multiturn angle sensor Type 6000

1. Introduction

The device is based on two magneto-resistive (AMR) sensor chips; each of them converts an angle position of a permanent magnet into two analogue signals (one sine and one cosine signal). A high efficient algorithm allows for estimating the absolute angular position of a drive shaft that is connected to the device.

2. Technical Data

2.1. Angular position

- Range – 780 ° to 780 °
- Resolution 0.1 °
- Accuracy ± 1.4 °

2.2. Angular speed

- Range – 1016 to 1016 °/s
- Resolution 4 °/s

2.3. Data and control interface

- CAN 2.0A (option CAN 2.0B) (see CAN protocol)
- Baud rate 500 kbit/s
- Data rate 10 ms

2.4. Measure data delay **< 10 ms**

2.5. Adjusting a zero position **via CAN bus**

2.6. Calibration control **via CAN bus**

2.7. „On board" software update **via CAN bus**

2.8. Automatic self-test **(see CAN protocol)**

2.9. Power Supply Voltage **+ 8V … 16 V**

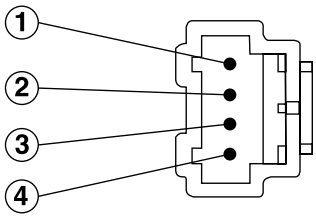
2.10. Supply current **50 mA**

2.11. Ambient temperature **– 40°C to +85 °C**

3. Conector

AMP 0-936119-1 (064 MOS 4P PLUG Assembly)
The mating connector as Pin layout is shown in Table 1:

Table 1 Pin layout



PIN NO.	SIGNAL
1	GND
2	12V
3	CAN HIGH
4	CAN LOW

4. CAN protocol

4.1. CAN protocol

Every 10 msec the device sends a CAN message with the measure data. The Layout of the transmitted message is shown in Table 2.

Table 2 CAN Transmit Message

CAN-ID Kind of message	Byte	Bits	Signal destination	Unit	Measure range	Measure range (digit)	Offset	Resolution (unit/digit)	Comments
0 x 2B0 transmit	0 – 1 (0 – LB 1 – HB)	00 – 15	Absolute angle position	Degree	– 780 … + 780	57735 … 7800	0	0,1	Fault/not calibrated/ default: 0 x 7FFF
	2	16 – 23	Angle speed	Degree/s	– 1016 … + 1016	0 … 254	0	4	Fault default: 0 x FF
	3	24 – 27	Internal status: 111 = Calibrated and OK 101 = Not calibrated 110 = Fault 100 = Fault und not calibrated 000 = Not trimmed		0 … 3	0 … 3	0	1	
	3	28 – 31	Free		0	0			Internal use only
	4	32 – 35	Message counter		0 … 15	0 … 15		1	Should be incremented by each message
	4	36 – 40	Check sum		0 … 15	0 … 15		1	Check sum: see below

Absolute angle position:

- Signed (integer)
- Angle position [degree] = N · 0.1, for 0 < N/ 32767 (N - digital value of the message) = (N-65536) · 0.1, for N > 32767

Angle speed:

- Unsigned (char)
- Rotation speed [degree/s] = S · 0.4

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Rule to build the check sum:
Temp_result = lower byte (Angle position) XOR higher byte (Angle position) XOR (Angle speed) XOR (Internal status)
Check sum = higher nibble (Temp_result) XOR lower nibble (Temp_result) XOR (Message counter)

The device is also able to receive messages.
They are shown in Table 3.

Table 3 CAN Receive Message

CAN-ID Kind of message	Byte	Bits	Signal destination	Unit	Measure range	Measure range (digit)	Offset	Resolution (unit/digit)	Comments
0 x 7C0 receive	0	0–3	Command word						
	0	4–7	SAS transmit identifier (SAS ID) bits 0–3						
	1	8–14	SAS transmit identifier (SAS ID) bits 4–10						
	1	15	Free						

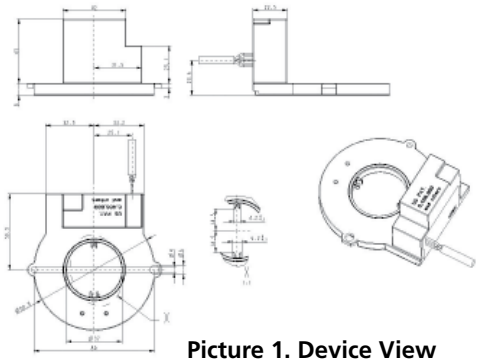
Command Word (CW)

CW bit3	CW bit2	CW bit1	CW bit0	Instruction
0	0	1	1	Set up the zero position
0	1	0	1	Clear the old zero position
	Other combinations			Only for internal use

Remark:
To set up a new zero position it is necessary to delete the old zero position before the new one may be set up

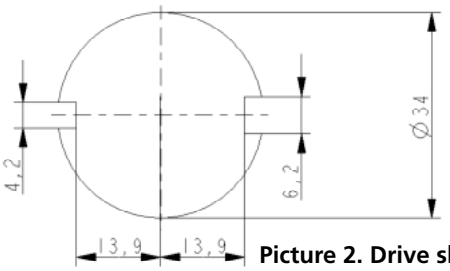
5. Design and mechanical interface

5.1. Housing



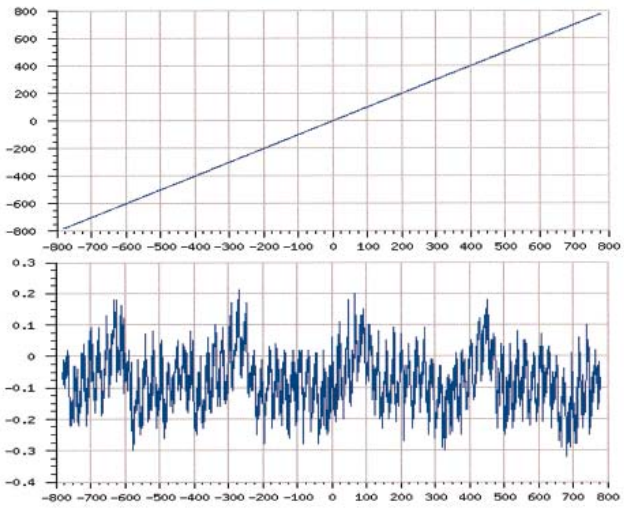
Picture 1. Device View

5.2. Mechanical Interface



Picture 2. Drive shaft dimensions

6. Typical test results @ R. T.



Picture 3. Output code and absolute accuracy

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