HENGSTLER

TECHNICAL DATASHEET

Stainless Steel Encoders AC 59 - BiSS/SSI

Version AC 59 with cable outlet

- Compact design
- Protection class IP67
- High corrosion resistance
- Robust design
- Resolution up to 29 Bit (17 Bit ST, 12 Bit MT)
- Versions with cable
- Applications: packaging machine for food and beverage, ship equipment (e.g. cranes, winches, cable laying ships), offshore applications

GENERAL INFORMATION

The absolute stainless steel encoders are available in the Versions AC 59 and AC 61

- AC 59: drawn stainless steel housing, only together with cable outlet, no access to control elements
- AC 61: machined housing, possible with cable or bus cover, access to control elements (DIP switch, Reset switch)

TECHNICAL DATA mechanical

Housing diameter	58 mm
Shaft diameter	9.52 mm / 10 mm (Solid shaft)
Flange (Mounting of housing)	Square flange 63.5 mm
Protection class shaft input (EN 60529)	IP67
Protection class housing (EN 60529)	IP67
Shaft load axial / radial	40 N / 60 N
Max. speed	max. 6000 rpm (continuous), max. 10 000 rpm (short term)
Torque	≤ 1 Ncm
Moment of inertia	approx. 20 gcm²
Vibration resistance (DIN EN 60068-2-6)	100 m/s² (10 ... 500 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s² (6 ms)
Operating temperature	-40 °C ... +100 °C
Storage temperature	-40 °C ... +85 °C
Material shaft	Stainless Steel
Material housing	Stainless Steel
Weight	approx. 700 g with 1.5 m cable
Connection	Cable, axial or radial

TECHNICAL DATA electrical

Supply voltage	± 10% DC 5 V or DC 10 - 30 V
Max. current w/o load	50 mA (ST), 100 mA (MT)
Resolution singleturn	10 - 17 Bit Gray Excess: 360, 720 increments
Resolution multiturn	12 Bit
Output code	Binary, Gray

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TECHNICAL DATA
electrical (continued)

Drives	Clock and Data / RS422
Linearity	± ½ LSB (± 1 LSB for resolution > 13 Bit)
Incremental signals optional	Sinus-Cosinus 1 Vpp
Number of pulses	2048
3dB limiting frequency	500 kHz
Absolute accuracy	±35"
Repeatability	±7"
Parametrization	Code type, Direction, Warning, Alarm
Control inputs	$\overline{\text{Direction}}$
Reset key	Disable via parameterization
Alarm output	Alarm bit (SSI Option), warning and alarm bit (BiSS)
Status LED	Green = ok, red = alarm

RECOMMENDED DATA TRANSFER RATE
bei SSI

The max. data transfer rate depends on the cable length. For Clock / $\overline{\text{Clock}}$ and Data / $\overline{\text{Data}}$ please use twisted pairs. Use shielded cable.

Cable length	Frequency
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

DATA FORMAT Singleturn

Resolution	**Data Bits**										
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
9 Bit [1]	S8 ... S0	0	0	0	0	0	W [2]				
10 Bit [1]	S9 ... S1	S0	0	0	0	0	W [2]				
11 Bit [1]	S10 ... S2	S1	S0	0	0	0	W [2]				
12 Bit [1]	S11... S3	S2	S1	S0	0	0	W [2]				
13 Bit [1]	S12 ... S4	S3	S2	S1	S0	0	W [2]				
14 Bit [1]	S13 ... S5	S4	S3	S2	S1	S0	0	W [2]			
15 Bit [1]	S14 ... S6	S5	S4	S3	S2	S1	S0	0	W [2]		
16 Bit [1]	S15 ... S7	S6	S5	S4	S3	S2	S1	S0	0	W [2]	
17 Bit [1]	S16 ... S8	S7	S6	S5	S4	S3	S2	S1	S0	0	W [2]

Examples for data format 9 Bit and 13 Bit with the optional bits alarm und parity

Resolution	**Data Bits**										
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
9 Bit + P [3]	S8 ... S0	0	0	0	P	0	W [2]				
9 Bit + A [4]	S8 ... S0	0	0	0	A	0	W [2]				
9 Bit + P [3] + A [4]	S8 ... S0	0	0	0	A	P	0	W [2]			
9 Bit + P [3]	S12 ... S4	S3	S2	S1	S0	P	0	W [2]			
9 Bit + A [4]	S12 ... S4	S3	S2	S1	S0	A	0	W [2]			
9 Bit + P [3] + A [4]	S12 ... S4	S3	S2	S1	S0	A	P	0	W [2]		

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DATA FORMAT Multiturn

Resolution	Data bits									
	T1 ... T12	T13 ... T21	T22	T23	T24	T25				
24 Bit [1]	M11 ... M0	S11 ... S2	S1	S0	0	W [2]				
25 Bit [1]	M11 ... M0	S12 ... S3	S2	S1	S0	0	W [2]			
26 Bit [1]	M11 ... M0	S13 ... S4	S3	S2	S1	S0	0	W [2]		
Example for data format 24 Bit with the optional bits alarm und parity										
24 Bit + P [3]	M11 ... M0	S11 ... S2	S1	S0	P	0	W [2]			
24 Bit + A [4]	M11 ... M0	S11 ... S2	S1	S0	A	0	W [2]			
24 Bit + P [3] + A [4]	M11 ... M0	S11 ... S2	S1	S0	A	P	0	W [2]		

S0 ... S16 Data bits for resolution per revolution

M0 ... M11 Data bits for number of revolutions (only for multiturn)

[1] Options (Parity bit, alarm and parity bit, zero bit) on request

[2] W: from this data bit on the data iteration for multiplex starts

[3] Parity bit: Even Parity (The parity bit expands the data bits to an even nummber of 1-bits).
(Option)

[4] Alarm bit: is set to "1" when over temperature, under temperature, disc breakage and defect LED

SYNCHRONOUS-SERAL TRANSFER (SSI)

Synchronous readout of the encoder data is according to the clock rate given by the SSI-counterpart.
The number of clock rates is determined by the type of encoder (singleturn resp. multiturn) and the configuration of the special Bits as defined.
For multiple transactions (the stored value is readout several times successively) a fixed clock rate per transaction must be kept (for singleturn 13 resp. 14 clocks, for multiturn 25 resp. 26 clocks).

- In the rest position, when the last clock brush has passed by more than 30µs, the data output is logically at "1".
- With the first descending clock edge the encoder data and the special bits are loaded in the shift register of the encoder interface.
- With each ascending clock edge the data bits are serially readout, beginning with the MSB.
- At the end of the data transfer the data output is set to logically "0" for approx. 20µs. If within these 20µs a further clock brush reaches the encoder interface, the already transferred data is readout once again. This multiple transfer of the same data makes it possible to recognize transfer errors.
- After the 20µs the data output goes to its rest position, logically "1". Subsequently new encoder data can be readout.

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ELECTRICAL CONNECTIONS
12 pole / cable
Interface SC, BC

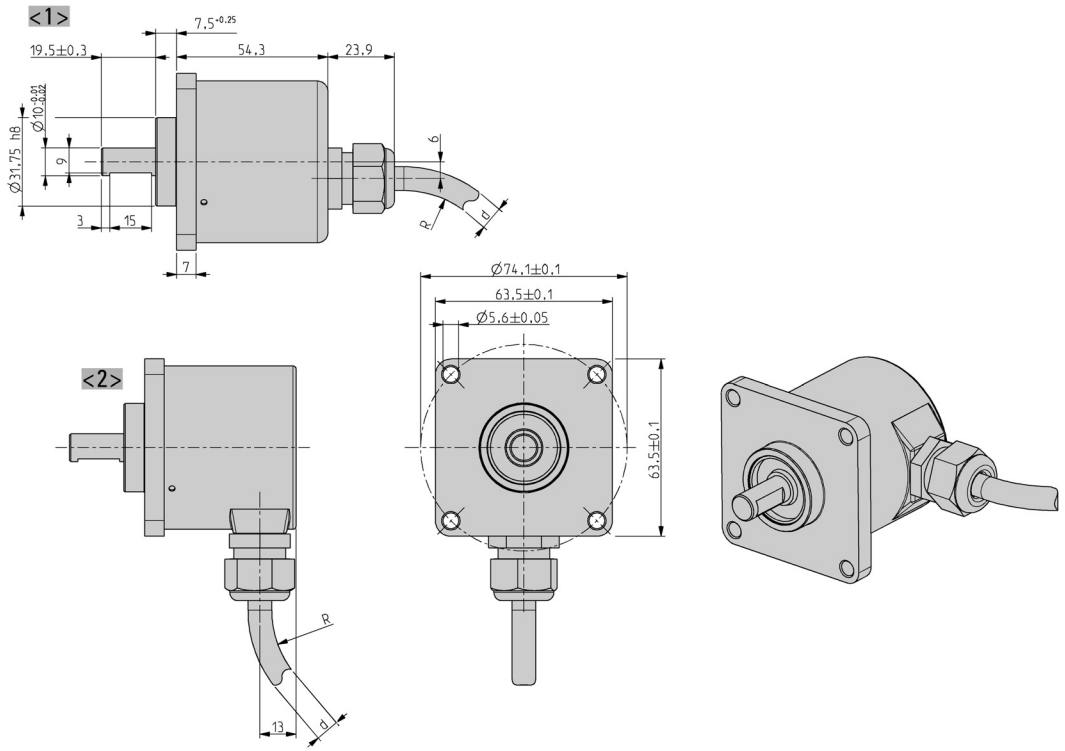
Cable	Signal
brown [2]	0 V (supply voltage)
pink	Data
yellow	Clock
white/green	A+
blue	$\overline{\text{Direction}}$ [1]
red/blue	B+
brown/green	A-
white [2]	DC 5/10 - 30 V
grey/pink	B-
grey	$\overline{\text{Data}}$
green	$\overline{\text{Clock}}$
black	Sense

[1] $\overline{\text{Direction}}$: +UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

[2] use only the thin wires (∅ = 0,14 mm)

DIMENSIONED DRAWINGS

AC 59 Connection cable "A"/ "B"
Dimensions in mm



<1> Connection cable "A"
<2> Connection cable "B"
Cable bending radius R for flexible installation ≥ 15 x cable diameter

Cable bending radius R for fixed installation ≥ 7.5 x cable diameter
Cable Ø d BiSS/SSI/SSI-P: 7,1 $^{+1,2}$
Cable Ø d ST-P: 7,8 $^{+0,9}$

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Stainless Steel Encoders AC 59 - BiSS/SSI

ORDERING INFORMATION

Type	Resolution [1, 2]	Supply voltage	Flange, Protection, Shaft	Interface	Connection
☐	☐	☐	☐	☐	☐
AC59	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0360** 360 increments ST **0720** 720 increments ST **1212** 12 Bit MT + 12 Bit ST **1213** 12 Bit MT + 13 Bit ST **1214** 12 Bit MT + 14 Bit ST (BiSS) **1217** 12 Bit MT + 17 Bit ST (BiSS)	**A** DC 5 V **E** DC 10 - 30 V	**Q.76** Square, IP67, 9.52 mm **Q.72** Square, IP67, 10 mm	**BI** BiSS **BC** BiSS (+SinCos 1Vpp) **SB** SSI binary **SG** SSI Gray **SC** SSI Gray (+SinCos 1Vpp)	**A** Cable, axial **B** Cable, radial

[1] Resolution 360 increments ST with Offset 76 (value range 76...435)
[2] Resolution 720 increments ST with Offset 152 (value range 152...871)

ORDERING INFORMATION
Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

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Stainless Steel Encoders AC 59 - BiSS/SSI Accessories

FLEXIBLE COUPLINGS

Bellows coupling

Helical coupling

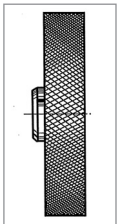
Isolated disk coupling

		Ordering code
Bellows coupling	10 mm / 10 mm	3 520 037
Bellows coupling	8 mm / 10 mm	3 520 077
Helical coupling 25/32	6 mm / 10 mm	3 520 066
Helical coupling 25/32	10 mm / 12 mm	3 520 065
Helical coupling 25/32	10 mm / 10 mm	3 520 074
Isolated disk coupling	6 mm / 10 mm	3 520 082
Isolated disk coupling	10 mm / 10 mm	3 520 088

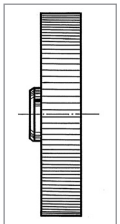
CONNECTING CABLES

Cable not made up with connectors	Ordering code
TPE cable, 12-core + screen	3 280 220 + length

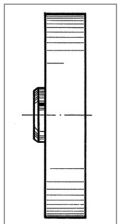
MEASURING WHEELS



Tread 2 + 3



Tread 4



Tread 6

Tread 2 B
with glued-on rubber profile B = low-wear rubber surface with good grip (white)
Applications such as paper and cardboard, measuring cables, nongreasy metals, fleece, undressed or surface-treated wood, soft and hard plastics

Tread 3
vulcanized rubber surface with parallel knurl
Applications such as rubber, leather, fabrics, flooring and glass

Tread 4
Aluminum with parallel knurl
Applications such as rubber, soft plastics, wood with rough surface, and to a limited extent for fabrics

Tread 6
plastic surface
Applications such as wire, greasy metals and steel sections

Material	Bore diameter (mm) fitting to encoder shaft	Circumference	Tread	Width of bearing surface	Ordering code
Aluminum	10 mm	0.2 m	2 B	12 mm	0 601 049
Aluminum	10 mm	0.5 m	2 B	25 mm	0 601 151
Aluminum	10 mm	0.5 m	3	25 mm	0 601 156
Aluminum	12 mm	0.5 m	3	25 mm	0 601 159

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Stainless Steel Encoders AC 59 - BiSS/SSI Accessories

MEASURING WHEELS (continued)

Material	Bore diameter (mm) fitting to encoder shaft	Circumference	Tread	Width of bearing surface	**Ordering code**
Aluminum	10 mm	0.5 m	6	25 mm	0 601 163
Aluminum	10 mm	0.5 yd	4	25 mm	0 601 157