

Absolute multi-turn hollow shaft encoder

BOMH – Digitalizer

SSI

features

- high resolution multi-turn encoder up to
 - 18 bit single-turn
 - 18 bit multi-turn
- SSI interface programmable
- permanent self-test
- reference point programmable



general data

voltage supply	5 VDC (05C) 10 - 30 VDC (24C)
supply current no load	typ. 120 mA (at 5 VDC) (05C) typ. 50 mA (at 24 VDC) (24C)
output circuit	SSI, complementary RS 422 binary or Gray code
max. resolution single-turn	18 bit (1 step = 5")
multi-turn	18 bit (262'144 revolutions)
max. clock frequency	1.1 MHz
repeatability	0,012°
direction of rotation	looking at the flange, position counts up as the shaft rotates clockwise (CW), programmable

mechanical data

max. revolutions	mech. 6'000 rpm electr. 6'000 rpm
moment of inertia	typ. $18,4 \times 10^{-7}$ kgm ²
torque	typ. 1,75 cNm (3'000 rpm / 20 °C / IP 42)
product life	depending on ambient conditions (typ. 10 ⁹ revolutions)
max. protection class	IP 65
material	housing: aluminum
weight	approx. 370 g

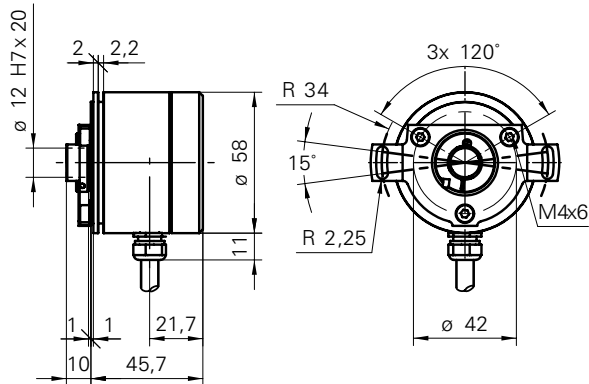
ambient conditions

temperature range	-20...+85 °C
relative humidity	max. 95% non condensing
vibration (sine)	IEC 60068-2-6 (≤ 100 m/s ² / 10 - 2'000 Hz) 150 min per axis
vibration (random)	IEC 60068-2-64 ($\leq 0,1$ g ² /Hz / 20 - 1'000 Hz) 30 min per axis
shock	IEC 60068-2-27 (≤ 500 m/s ² / 11 ms) 10 pulses per axis and direction
noise immunity	EN 61000-6-2
emitted interference	EN 61000-6-3

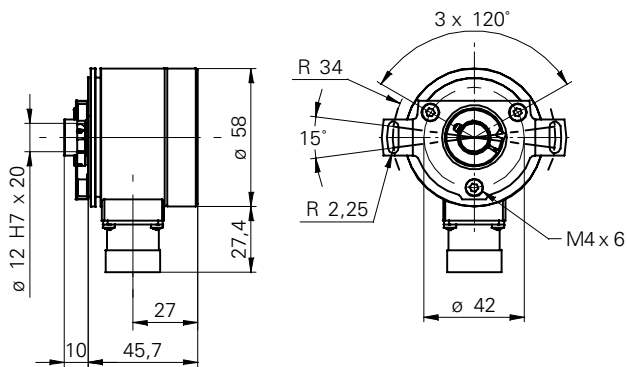


dimensions and connection dimensions

-5



-A



Note

Mounting drawings see end of chapter.

3

Absolute multi-turn hollow shaft encoder

BOMH – Digitalizer

SSI

features

- high resolution multi-turn encoder up to
 - 18 bit single-turn
 - 18 bit multi-turn
- SSI interface programmable
- permanent self-test
- reference point programmable



general data

voltage supply	5 VDC (05C) 10 - 30 VDC (24C)
supply current no load	typ. 120 mA (at 5 VDC) (05C) typ. 50 mA (at 24 VDC) (24C)
output circuit	SSI, complementary RS 422 binary or Gray code
max. resolution single-turn	18 bit (1 step = 5")
multi-turn	18 bit (262'144 revolutions)
max. clock frequency	1.1 MHz
repeatability	0,012°
direction of rotation	looking at the flange, position counts up as the shaft rotates clockwise (CW), programmable

mechanical data

max. revolutions	mech. 6'000 rpm electr. 6'000 rpm
moment of inertia	typ. $18,4 \times 10^{-7}$ kgm ²
torque	typ. 1,75 cNm (3'000 rpm / 20 °C / IP 42)
product life	depending on ambient conditions (typ. 10 ⁹ revolutions)
max. protection class	IP 65
material	housing: aluminum
weight	approx. 370 g

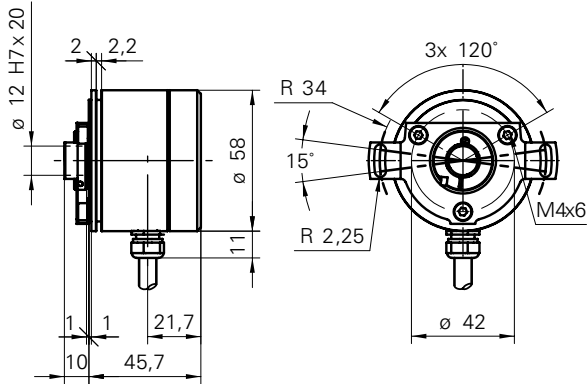
ambient conditions

temperature range	-20...+85 °C
relative humidity	max. 95% non condensing
vibration (sine)	IEC 60068-2-6 (≤ 100 m/s ² / 10 - 2'000 Hz) 150 min per axis
vibration (random)	IEC 60068-2-64 ($\leq 0,1$ g ² /Hz / 20 - 1'000 Hz) 30 min per axis
shock	IEC 60068-2-27 (≤ 500 m/s ² / 11 ms) 10 pulses per axis and direction
noise immunity	EN 61000-6-2
emitted interference	EN 61000-6-3

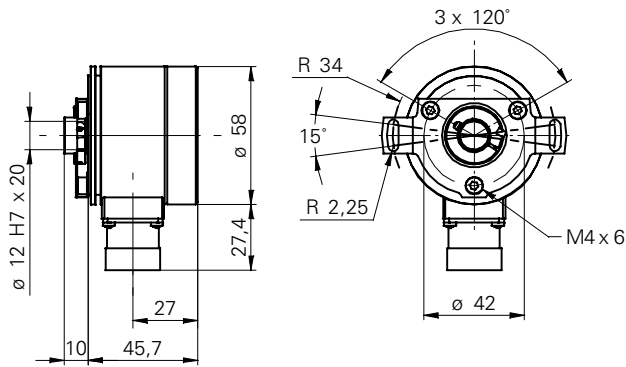


dimensions and connection dimensions

-5



-A



Note

Mounting drawings see end of chapter.

3

Absolute multi-turn hollow shaft encoder

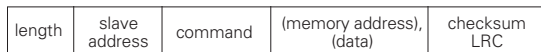
BOMH – Digitalizer

SSI

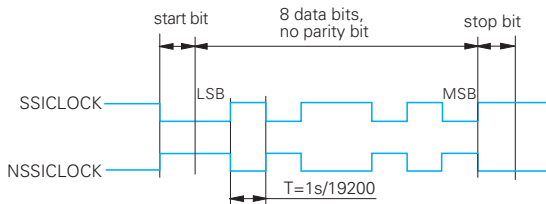
commands to encoder and setting of parameters

Multibyte commands* and parameters can be sent by asynchronous protocol with parameterized baud rate.

The multibyte protocol consists of length byte, address byte, command byte, data bytes and LRC byte.



The 8 data bits have are embedded between a start bit (LOW) and a stop bit (HIGH).



Setting of parameters

It is always possible to set parameter over the SSI interface, even if the encoder is in operation.

For example:

- SSI bit format (position resolution)
- direction of rotation CW/CCW
- monoflop time
- interface mode
- compensation of propagation time
- baud rate for parameter setting and programming
- signal code (binary, Gray)

Additional features:

- efficient error handling
- memory for operating time
- incremental totalisator (number of rotations)
- preset function

The response on commands (data/„acknowledge“/„negative acknowledge“) has to be read out at the SSI interface before reading the next position value.

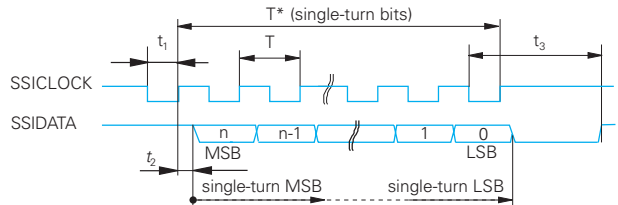
Reading out of position values and programmable of *Digitalizer* is also possible via PCI-board.

See chapter accessories.

* With end shaft mounting, commands and parameter setting by singlebyte protocol. Description on request.

read out of position values

The SSI interface can be used especially for real time signal processing. It is possible to precisely scan the angle information with the first negative clock.



Important: The SSI protocol does not start with zeros. NSSICLOCK and NSSIDATA are not symbolized.

$$T = 0,9 \text{ to } 14 \mu\text{s} \quad t_2 \geq 0,6 \mu\text{s}$$

$$0,45 \mu\text{s} < t_1 < t_3 \quad t_3 = 2, 5, 10 \text{ or } 20 \mu\text{s}$$

The monoflop-time (t_3) is programmable (Default 20 μs). Please keep the condition $t_3 \geq 1,4 * T$.

I/O description

- V/R*** Input to set direction of rotation. Input is normally HIGH. V/R*-HIGH corresponds to increasing position values while looking at flange and shaft rotation in clockwise direction (CW). V/R*-LOW corresponds to increasing position values while looking at flange and shaft rotation in counter-clockwise direction (CCW). Read-in of V/R* voltage occurs during encoder power-on.
- ZERO** Input to set position to zero. Input is normally LOW. Zero setting procedure is initiated by a HIGH-pulse (pulse length $\geq 100 \text{ ms}$). For maximum disturbance immunity, connect input to 0 V.
- DV*** Output for error (data valid). Output is LOW-active, it indicates an error with LOW-voltage.

inputs and outputs

Control signals to V/R* and ZERO

Level HIGH $> 0,8 * +V_s$

Level LOW $< 0,2 * +V_s$

Connection V/R*-input with 15 kOhms against +Vs, ZERO-input with 15 kOhms against 0 V

Output signal from DV* and DVMT*

Connection DV*-output push-pull max. 30 mA

DVMT*-output push-pull max. 30mA

Absolute multi-turn hollow shaft encoder

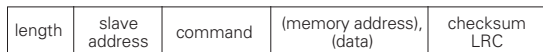
BOMH – Digitalizer

SSI

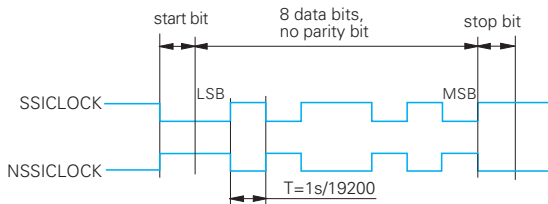
commands to encoder and setting of parameters

Multibyte commands* and parameters can be sent by asynchronous protocol with parameterized baud rate.

The multibyte protocol consists of length byte, address byte, command byte, data bytes and LRC byte.



The 8 data bits have are embedded between a start bit (LOW) and a stop bit (HIGH).



Setting of parameters

It is always possible to set parameter over the SSI interface, even if the encoder is in operation.

For example:

- SSI bit format (position resolution)
- direction of rotation CW/CCW
- monoflop time
- interface mode
- compensation of propagation time
- baud rate for parameter setting and programming
- signal code (binary, Gray)

Additional features:

- efficient error handling
- memory for operating time
- incremental totalisator (number of rotations)
- preset function

The response on commands (data/„acknowledge“/„negative acknowledge“) has to be read out at the SSI interface before reading the next position value.

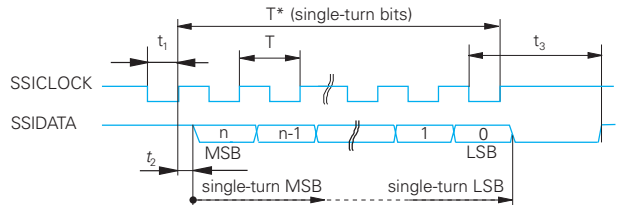
Reading out of position values and programmable of *Digitalizer* is also possible via PCI-board.

See chapter accessories.

* With end shaft mounting, commands and parameter setting by singlebyte protocol. Description on request.

read out of position values

The SSI interface can be used especially for real time signal processing. It is possible to precisely scan the angle information with the first negative clock.



Important: The SSI protocol does not start with zeros. NSSICLOCK and NSSIDATA are not symbolized.

$$T = 0,9 \text{ to } 14 \mu\text{s} \quad t_2 \geq 0,6 \mu\text{s}$$

$$0,45 \mu\text{s} < t_1 < t_3 \quad t_3 = 2, 5, 10 \text{ or } 20 \mu\text{s}$$

The monoflop-time (t_3) is programmable (Default 20 μs). Please keep the condition $t_3 \geq 1,4 * T$.

I/O description

- V/R*** Input to set direction of rotation. Input is normally HIGH. V/R*-HIGH corresponds to increasing position values while looking at flange and shaft rotation in clockwise direction (CW). V/R*-LOW corresponds to increasing position values while looking at flange and shaft rotation in counter-clockwise direction (CCW). Read-in of V/R* voltage occurs during encoder power-on.
- ZERO** Input to set position to zero. Input is normally LOW. Zero setting procedure is initiated by a HIGH-pulse (pulse length $\geq 100 \text{ ms}$). For maximum disturbance immunity, connect input to 0 V.
- DV*** Output for error (data valid). Output is LOW-active, it indicates an error with LOW-voltage.

inputs and outputs

Control signals to V/R* and ZERO

Level HIGH $> 0,8 * +V_s$

Level LOW $< 0,2 * +V_s$

Connection V/R*-input with 15 kOhms against +Vs, ZERO-input with 15 kOhms against 0 V

Output signal from DV* and DVMT*

Connection DV*-output push-pull max. 30 mA

DVMT*-output push-pull max. 30mA

SSI



assignment connector M23 male

for connection reference **-A**



view to
encoder

pin number	signals
1	NSSICLOCK
2	SSICLOCK
3	SSIDATA
4	NSSIDATA
5	ZERO
6	DV*
7	V/R*
8	DVMT*
9	n.c.
10	n.c.
11	+Vs
12	0 V

order designation

BOMH 58S1

<p>connection</p> <p>5 cable 2 m radial</p> <p>A connector radial M23</p> <p>shaft</p> <p>B2 hollow shaft 12 mm IP 42 with clamping ring</p> <p>E2 hollow shaft 12 mm IP 65 with clamping ring</p> <p>I2 hollow shaft 12 mm IP 42 with clamping ring and spring plate</p> <p>M2 hollow shaft 12 mm IP 65 with clamping ring and spring plate</p> <p>resolution</p> <p>single-turn / multi-turn 18 / 18 bit</p> <p>other resolutions programmable</p> <p>supply voltage, output signals</p> <p>05C 5 VDC SSI interface</p> <p>24C 10 - 30 VDC SSI interface</p> <p>signal code</p> <p>N binary code</p> <p>G Gray code</p>	<p>connection</p> <p>shaft</p> <p>resolution</p> <p>supply voltage, output signals</p> <p>signal code</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------

Other versions on request.

assignment cable

for connection reference **-5**

cable color	signals
brown	+Vs
green	SSICLOCK
yellow	NSSICLOCK
pink	SSIDATA
grey	NSSIDATA
black	ZERO
red	DV*
blue	V/R*
violet	DVMT*
cable data	10 x 0,14 mm ² , PVC, screened

accessories

connector 12-pin	part nr. 116717
spring plate set	part nr. 136635
clamp set	part nr. 110616
see chapter accessories	
PCI-board with galvanic isolation	part nr. 139338

Absolute multi-turn hollow shaft encoder

BOMH – Digitalizer

CANopen

features

- high resolution multi-turn encoder up to
 - 18 bit single-turn
 - 14 bit multi-turn
- integrated CANopen interface
- programmable bus parameter
- programmable scaling and preset values



general data

voltage supply	10 - 30 VDC
supply current no load	typ. 150 mA (at 24 VDC)
output circuit ISO/DIS 11898	CAN-bus, standard
specification	CAN 2.0B
protocol/profile	CANopen/CIA, DS-301 V4.01, DSP-305 V1.0 (LSS), DS-406 V3.0
signal coding	natural binary code
max. resolution single-turn	18 bit (1 step = 5")
multi-turn	14 bit (16'384 revolutions)
repeatability	0,012°
max. baud rate	1 Mbits/s
counter buffering	with Lithium cell typ. 19 years
direction of rotation	programmable, standard rising position values at view on the floor and clockwise rotation of the shaft (CW)

mechanical data

max. revolutions	mech. 6'000 rpm electr. 6'000 rpm
moment of inertia	typ. $18,4 \times 10^{-7}$ kgm ²
torque	typ. 1,75 cNm (3'000 rpm / 20 °C / IP 42)
product life	depending on ambient conditions (typ. 10 ⁹ revolutions)
max. protection class	IP 65
material	housing: aluminum
weight	approx. 300 g

ambient conditions

temperature range	-20...+85 °C
relative humidity	max. 95% non condensing
vibration (sine)	IEC 60068-2-6 (≤ 100 m/s ² / 10 - 2'000 Hz) 150 min per axis
vibration (random)	IEC 60068-2-64 ($\leq 0,1$ g ² /Hz / 20 - 1'000 Hz) 30 min per axis
shock	IEC 60068-2-27 (≤ 500 m/s ² / 11 ms) 10 pulses per axis and direction
noise immunity	EN 61000-6-2
emitted interference	EN 61000-6-3