

# Rotary Measuring Technology

## Absolute shaft encoder, Singleturn, SSI/BiSS

**MICRONOR**  
automation components

### Absolute, Singleturn ESAX 58 , SSI/BiSS



Safety-Lock™



High rotational speed



Temperature



High IP



High shaft load capacity



Shock/vibration resistant



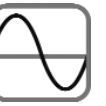
Magnetic field proof



Short-circuit proof



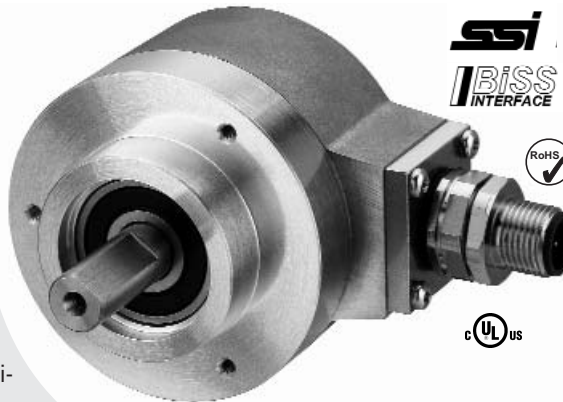
Reverse polarity protection



SIN/COS

#### Reliable

- **Increased ability to withstand vibration installation errors. Eliminates machine downtime and repairs**  
Sturdy "Safety-Lock™ Design" bearing structure
- **Few components and connection points increase the operational reliability**  
OptoASIC technology with highest integration density (Chip-on-Board)
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field. Ideal for use outdoors.**  
Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional charge**  
wide temperature range (-40°C...+90°C)
- **Easy diagnostic in case of trouble**  
Status indication by means of LED, sensor, voltage and temperature monitoring.



#### Fast

- **Can achieve particularly high accuracy in the applications**  
Update rate of the whole position value above 100 kHz for a max. jitter of 1 μs (real-time)
- **Allows high productivity thanks to very short control cycles**  
Clock rate with SSI up to 2 MHz, with BiSS up to 10 MHz
- **High-resolution feedback system achievable in real-time**  
SinCos incremental outputs.

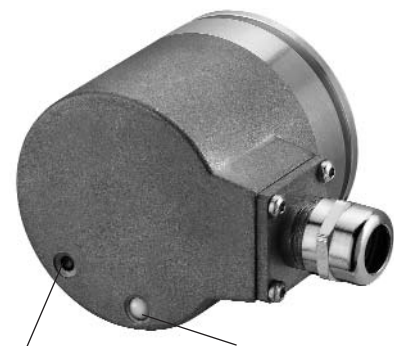
#### Versatile

- **The right type of connector to suit every application**  
Cable, M23 connector or M12 connector
- **Open interfaces ensure flexibility and independence**  
SSI or BiSS with Sine-Cosine-Option
- **Reliable installation in a wide diversity of mounting situations**  
Extensive choice of proven mounting options
- **Only the functionality really needed by the user is implemented**  
Status LED and Set key available as options
- **Quick, simple on-site start-up**  
Set key or Preset by means of a control input

#### Mechanical characteristics:

Max. speed without shaft sealing (IP 65) up to 70 °C:	12 000 min <sup>-1</sup> , continuous 10 000 min <sup>-1</sup>
Max. speed without shaft sealing (IP 65) up to T <sub>max</sub> :	8 000 min <sup>-1</sup> , continuous 5 000 min <sup>-1</sup>
Max. speed with shaft sealing (IP 67) up to 70 °C:	11 000 min <sup>-1</sup> , continuous 9 000 min <sup>-1</sup>
Max. speed with shaft sealing (IP 67) up to T <sub>max</sub> :	8 000 min <sup>-1</sup> , continuous 5 000 min <sup>-1</sup>
Starting torque without shaft sealing (IP65):	< 0.01 Nm
Starting torque with shaft sealing (IP67):	< 0.05 Nm
Moment of inertia:	3,0 x 10 <sup>-6</sup> kgm <sup>2</sup>
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	appr. 0.35 kg
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
Working temperature:	-40° C ... +90 °C <sup>1)</sup>
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s <sup>2</sup> , 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s <sup>2</sup> , 55 ... 2000 Hz

<sup>1)</sup>cable versions: -30 °C ... + 75°C



**SET key:**  
for quick, simple on-site start-up

**LED:**  
Status indication for sensor, voltage and temperature monitoring.

### Absolute, Singleturn ESAX 58 , SSI/BiSS

#### General electrical characteristics:

Supply voltage:	5 V DC $\pm$ 5% or 10 ... 30 V DC
Current consumption (w/o output load):	5 V DC: max. 70 mA, 24 V DC: max. 20 mA
Reverse polarity protection at power supply (U <sub>b</sub> ):	Yes
Conforms to CE requirements acc. to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3	

#### General Interface characteristics:

Output driver:	RS 485 Transceiver type
Permissible load/channel:	max. $\pm$ 20 mA
Signal level high:	typ. 3.8 V
Signal level low at I <sub>load</sub> = 20 mA:	typ. 1.3 V
Short circuit proof outputs:	Yes <sup>2)</sup>

#### Interface characteristics SSI:

Singleturn resolution:	10 ... 14 bits and 17 bits <sup>3)</sup>
Code:	Binary or Gray
SSI clock rate:	$\leq$ 14 bits: 50 kHz ... 2 MHz
Monoflop time:	$\geq$ 15 $\mu$ s <sup>3)</sup>
Note:	If clock starts cycling within monoflop time a second data transfer starts with the same data, useful for data verification. If clock starts cycling after monoflop time the data transfer starts with updated values. Max. update rate is depending on clock speed, data length and monoflop-time.
Time jitter (data request to position latch):	$<$ 1 $\mu$ s up to 14 bits, $\leq$ 4 $\mu$ s at 15 ... 17 bits
Status and Parity bit:	optional on request

#### Interface characteristics BiSS:

Singleturn resolution:	10...14 bits and 17 bits, customer programmable <sup>3)</sup>
Code:	Binary
Interfaces:	RS 485
Clock rate:	up to 10 MHz
Max. update rate:	$<$ 10 $\mu$ s, depending on clock speed and data length
Time jitter (data request to position latch):	$\leq$ 1 $\mu$ s
Note:	– Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings – Multicycle data output, e.g. for temperature – CRC data verification

<sup>2)</sup> Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied

<sup>3)</sup> Other options upon request

#### SET (zero or defined value) and DIRrection (CW/CCW) control inputs

Input characteristics:	High active
Receiver type:	<b>Comparator</b>
Signal level high:	min. 60 % of V <sub>+</sub> (Supply voltage), max: V <sub>+</sub>
Signal level low:	max. 25% of V <sub>+</sub> (Supply voltage)
Input current:	$\leq$ 0.5 mA
Min. pulse duration (SET):	10 ms
Timeout after SET input:	14 ms
Reaction Time (DIR input):	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET key. Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON and the status output is at LOW.

#### Status output and LED

Output driver:	Open collector, internal pull up resistor 22 kOhm
Permissible load:	-20 mA
Signal level high:	+V
Signal level low:	$<$ 1 V
Active at:	Low
Note:	The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (open-collector with int. pull-up 22k). If the LED is ON (status output LOW) this indicates: – Sensor error, singleturn or multiturn (soiling, glass breakage etc.) – LED error, failure or ageing – Over- or under-temperature – Undervoltage In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

#### DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

#### Option incremental output (A/B), 2048 ppr

	Sin/Cos	RS422 (TTL compatible)
-3dB frequency:	400 kHz	400 kHz
Signal level:	1 V <sub>pp</sub> ( $\pm$ 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof:	Yes <sup>2)</sup>	Yes <sup>2)</sup>

#### Power-on delay

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

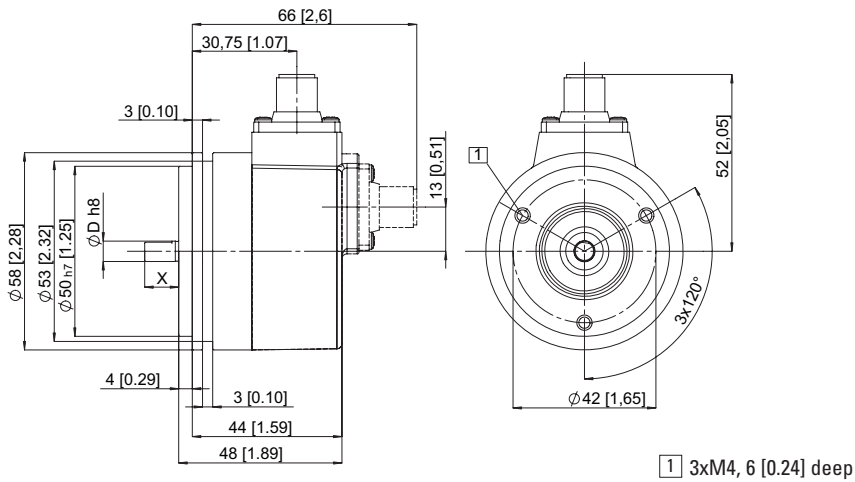
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## Absolute shaft encoder, Singleturn, SSI/BiSS

### Absolute, Singleturn ESAX 58 , SSI/BiSS

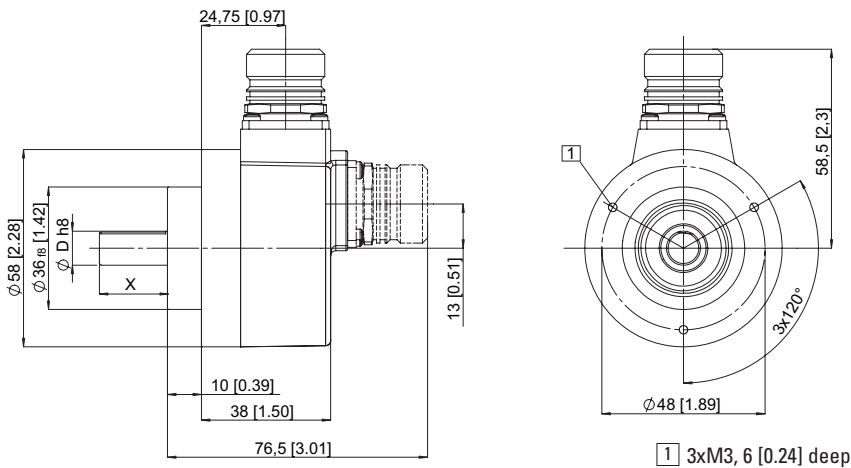
#### Synchro flange

ø 58 mm, M12, M23 connector, cable versions  
Flange type 2 and 4 (Drawing with M12 connector)



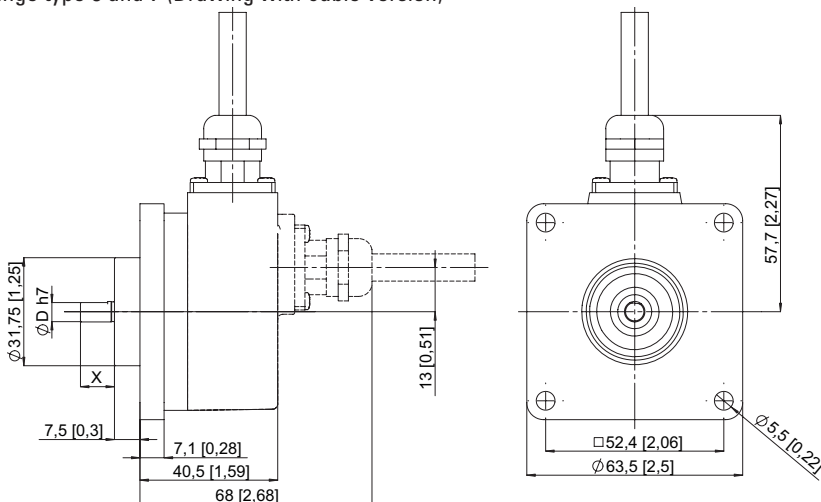
#### Clamping flange

ø 58 mm, M12, M23 connector, cable versions  
Flange type 1 and 3 (Drawing with M23 connector)



#### Square flange

63.5 mm □, M12, M23 connector, cable versions  
Flange type 5 and 7 (Drawing with cable version)



### Absolute, Singleturn ESAX 58 , SSI, BiSS

#### Terminal assignment:

for output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	N/C	N/C	PE
Cable color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 5 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output, voltage sense outputs)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	0 V Sens	+Ub Sens	PE
Cable Color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs or incremental track, sine/cosine)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (Sine/cosine or incremental track, voltage sense outputs)

Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	0V Sens	+Ub Sens	PE
Cable color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 1 or 2 and type of connection 5 or 6 (2 control inputs)

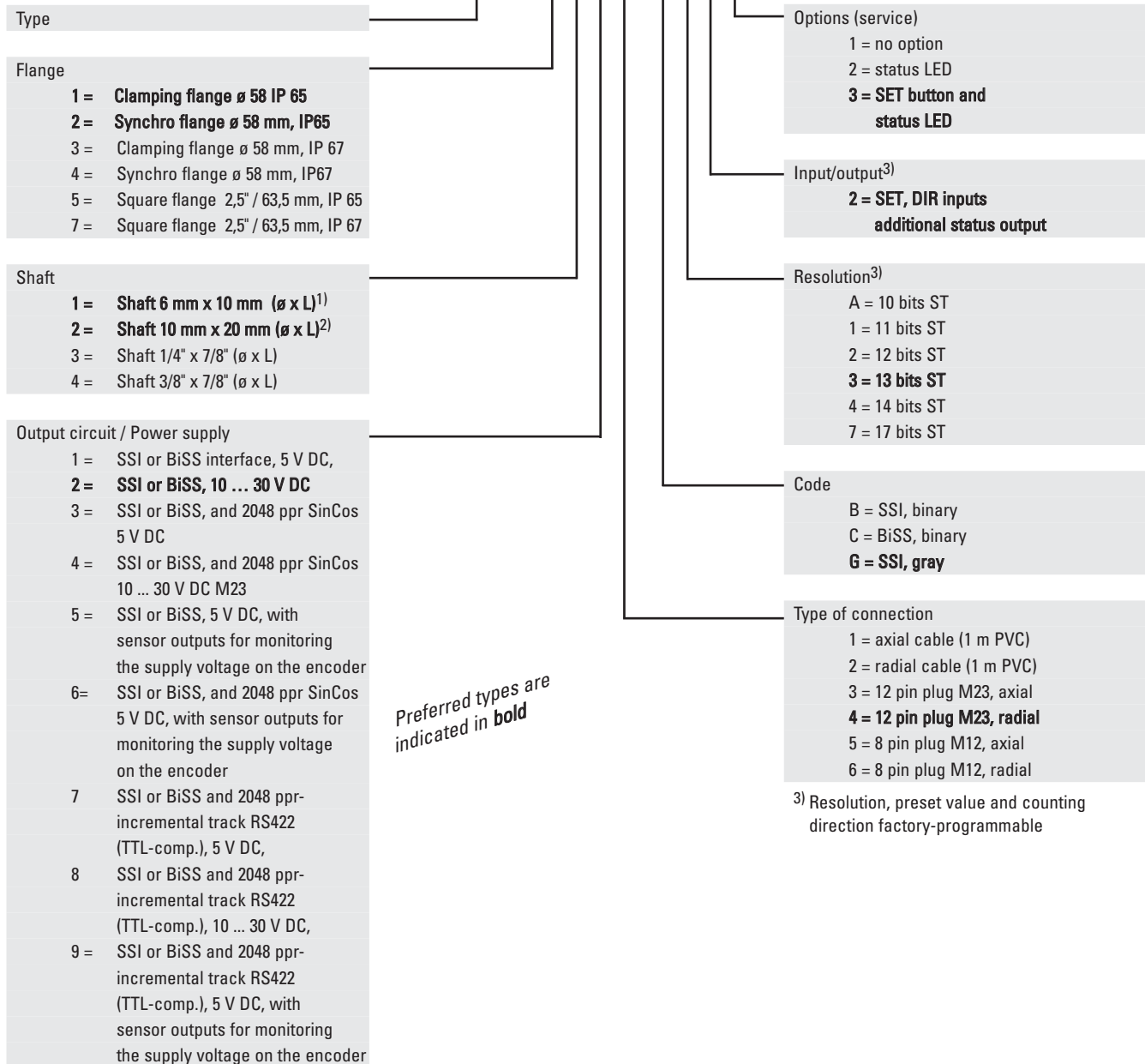
Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M12 PIN out:	1	2	3	4	5	6	7	8	PH

- |         |  |          |                             |
|---------|--|----------|-----------------------------|
| +V:     | Encoder Power Supply +V DC   | Stat:    | Status output               |
| GND:    | Encoder Power Supply Ground (0V)   | PE:      | Protective earth            |
| +C, -C: | Clock signal   | PH:      | Plug housing (shield)       |
| +D, -D: | Data signal  | A, Ainv: | Sine output (incremental)   |
| SET:    | Set input. The current position becomes defined as zero position                                       | B, Binv: | Cosine output (incremental) |
| DIR:    | Direction input: If this input is active, output values are decreasing when shaft is turned clockwise. |          |                             |

### Absolute, Singleturn ESAX 58 , SSI, BiSS

Order code:

ESAX 58 . X X X X . X X X X



Ex-proof zone 2, 22 on request

<sup>1)</sup> Preferred type with flange type 2

<sup>2)</sup> Preferred type with flange type 1

<sup>3)</sup> Resolution, preset value and counting direction factory-programmable