Rotary Measuring Technology
Absolute shaft encoder, Singleturn, CANopen

MICRONOR
automation components

Absolute, Singleturn ESFX 58 , CANopen

|							
Safety-Lock™	High rotational speed	Temperature −40° +80°	High IP	High shaft load capacity	Shock/vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection

Reliable

- **Increased resistance against vibrations and installation mistakes. Avoids machine stops and repair work**
  Sturdy "Safety-Lock™ Design" bearing structure

- **Few components and connection points increase the operational reliability**
  OptoASIC technology with highest integration density (Chip-on-Board)

- **Remains tight, even in roughest environments, ensures highest safety against field breakdowns**
  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...+80°C)
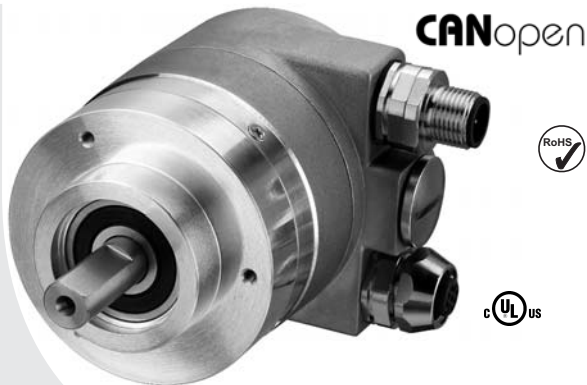
Fast

- **Really synchronous position acquisition of several axes**
  Extended CAN Sync Mode with real-time position acquisition

- **Fast data availability while reducing the load on the bus and the control**
  Intelligent functions like the transmission of speed, acceleration or exiting a working area

Versatile

- **Latest field bus performance for the applications**
  CANopen, with the latest profiles

- **The suitable connection variant for every specific case**
  Bus terminal cover with M12 connector or cable connection or fixed connection with M12, M23 or D-Sub connector, also easy point-to-point connections

- **Position, Speed, acceleration, working area - The user decides which information is to be available in real-time**
  Variable PDO mapping in the memory

- **Quick and error-free start-up, without setting any switches**
  Node address, baud rate and termination can be programmed via the bus

- **Reliable mounting in the most various installation cases**
  Comprehensive and proven mounting possibilities

Mechanical characteristics:

Max. speed without shaft sealing (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft sealing (IP 65) up to Tmax:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
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^{-6} kgm^2
Weight:	appr. 0.53 kg with bus terminal cover appr. 0.50 kg with fixed connection
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
Working temperature:	−40° C ... +80 °C[1]
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

SET key:
for a fast and comfortable start-up on site.

Green, red and yellow LEDs:
Failure-free operation immediately visible on the bus.

[1] cable versions: -30 °C ... + 75 °C

Absolute, Singleturn ESFX 58 , CANopen

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 60 mA
Reverse polarity protection at power supply (Ub):	Yes
Conforms to CE requirements acc. to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3	

SET control button (zero or defined value, option)

Protected against accidental activation, can only be pushed in with the tip of a ball pen or similar.

Diagnostic LED (yellow)

LED on at:
optical sensor path faulty (code error, LED error), low voltage and overtemperature

Interface characteristics CANopen:

Singleturn resolution (max, scaleable):	1 ... 65536 (16 bits), default scale value is set to 8192 (13 bits)
Code:	Binary
Interface:	CAN High-Speed according ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B

Protocol:	CANopen profile DS 406 V3.1 with manufacturer-specific add-ons
Baud rate:	10 ... 1000 kbit/s (set by DIP switches/software configurable)
Node address:	1 ... 127 (set by rotary switches / software configurable)
Termination switchable:	Set by DIP switches Software configurable

General information about CANopen

The CANopen encoders of the ESFX 58 series support the latest CANopen communication profile according to DS 301 V4.02 . In addition, device-specific profiles like the encoder profile DS 406 V3.1 are available.
The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.
The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration**, as well as the status of the working area.

As a price-effective variant, encoders with a connector or a cable connection are available, for which the device address and baud rate are modified by means of software. The models with bus terminal cover and integrated T-shaped coupler allow a particularly easy installation: bus and power supply are connected very simply thanks to M12 connectors; the device address is set by means of two hexadecimal rotary switches. Furthermore, another DIP switch allows setting the baud rate and switching on a termination resistor. Three LED's located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

CANopen Communication Profile V4.02
Among others, the following functionality is integrated:
Class C2 functionality
• NMT Slave
• Heartbeat Protocol
• High Resolution Sync Protocol
  Identity Object
• Error Behaviour Object
• Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
• 1 receiving PDO for synchronous preset operation with minimal jitter
• Knot address, baud rate and CANbus
• Programmable termination

CANopen Encoder Profile V3.1
The following parameters can be programmed:
• Event mode
• Units for speed selectable (Steps/Sec or RPM)
• Factor for speed calculation (e.g. measuring wheel periphery) Integration time for speed value of 1...32
• 2 work areas with 2 upper and lower limits and the corresponding output states
• Variable PDO mapping for position, speed, acceleration, work area status
• Extended failure management for position sensing with integrated temperature control
• User interface with visual display of bus and failure status - 3 LED's
• Optional - 32 CAM's programmable
• Customer-specific memory - 16 Bytes
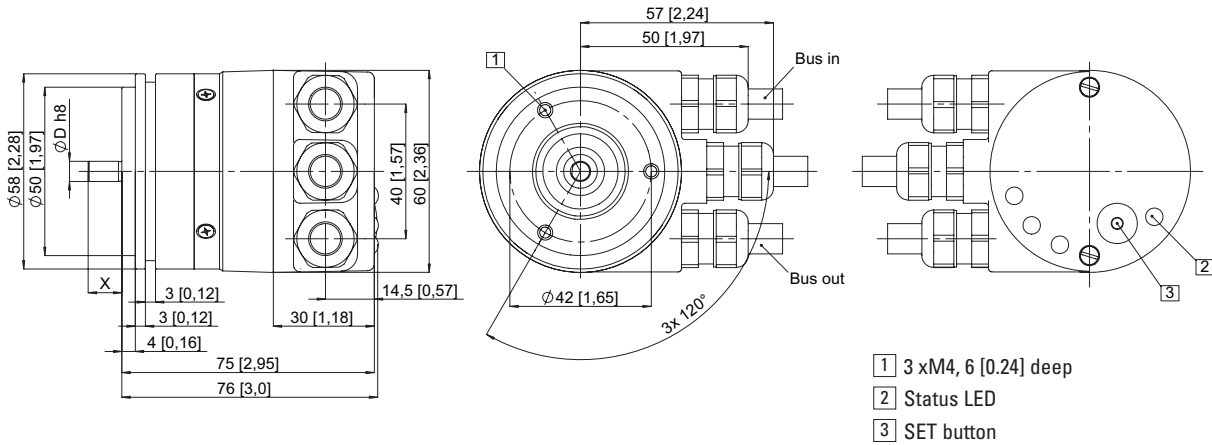
All profiles stated here: **Key-features**
The object 6003h "Preset" is assigned to an integrated key, accessible from the outside
"Watchdog-controlled" device

Absolute, Singleturn ESFX 58 , CANopen
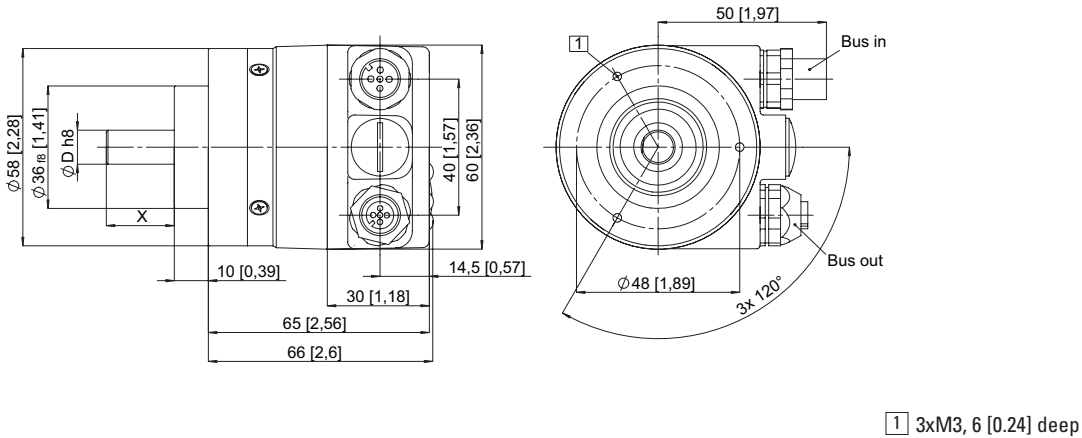
With removable bus terminal cover

ø 58 mm, Synchro flange
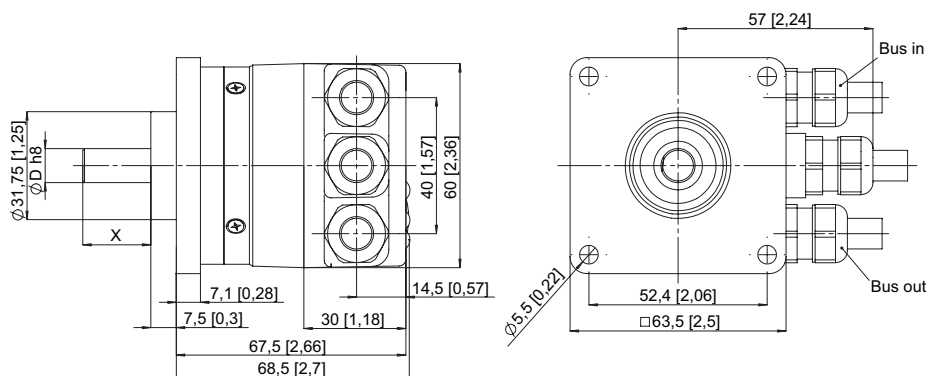Flange type 2 and 4 (Drawing with cable version)

57 [2,24]
50 [1,97]
Bus in

ø 58 [2,28]
ø 50 [1,97]
ø D h8
40 [1,57]
60 [2,36]
X
3 [0,12]
3 [0,12]
4 [0,16]
30 [1,18]
14,5 [0,57]
75 [2,95]
76 [3,0]

ø 42 [1,65]
3x 120°
Bus out

1 3 xM4, 6 [0.24] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 2 x M12 connector)

50 [1,97]
Bus in

ø 58 [2,28]
ø 36 f8 [1,41]
ø D h8
40 [1,57]
60 [2,36]
X
10 [0,39]
30 [1,18]
14,5 [0,57]
65 [2,56]
66 [2,6]

ø 48 [1,89]
3x 120°
Bus out

1 3xM3, 6 [0.24] deep

63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with cable version)

57 [2,24]
Bus in

ø 31,75 [1,25]
ø D h8
40 [1,57]
60 [2,36]
X
7,1 [0,28]
7,5 [0,3]
30 [1,18]
14,5 [0,57]
67,5 [2,66]
68,5 [2,7]

ø 5,5 [0,22]
52,4 [2,06]
□63,5 [2,5]
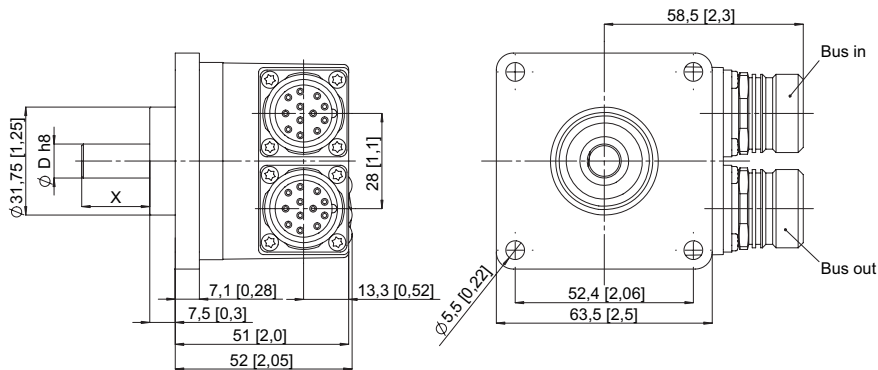Bus out

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With fixed connection

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with M23 connector)

58,5 [2,3]

1

∅ 58 [2,28]
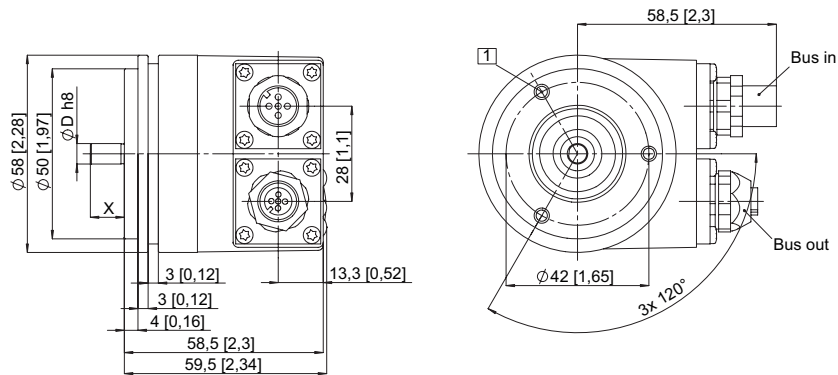∅ 50 [1,97]
∅ D h8

X

3 [0,12]
3 [0,12]
4 [0,16]
58,5 [2,3]
59,5 [2,34]

13,3 [0,52]

∅ 42 [1,65]
3x 120°

1 3xM4, 6 [0.24] deep
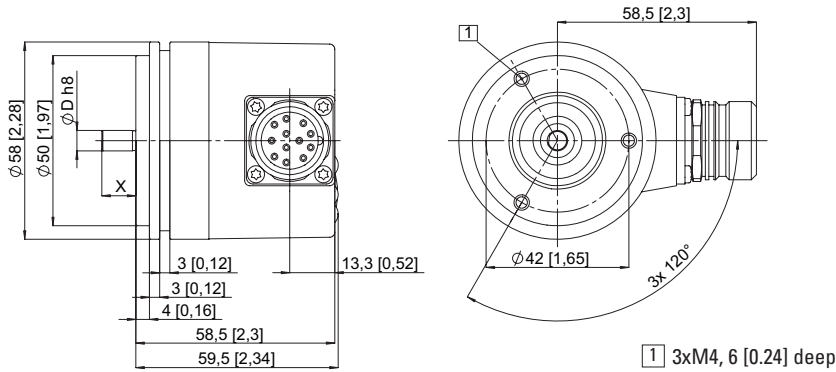
63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with 2 x M23 connector)

58,5 [2,3]
Bus in

∅ 31,75 [1,25]
∅ D h8
28 [1,1]

X

7,1 [0,28]
7,5 [0,3]
51 [2,0]
52 [2,05]

13,3 [0,52]
∅ 5,5 [0,22]

52,4 [2,06]
63,5 [2,5]

Bus out

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 1 x M12 connector)

58,5 [2,3]

1

∅ 58 [2,28]
∅ 36 I8 [1,41]
∅ D h8

X

10 [0,39]
48,5 [1,91]
49,5 [1,95]

13,3 [0,52]

∅ 48 [1,89]
3x 120°

Absolute, Singleturn ESFX 58 , CANopen

With fixed connection

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with 2 x M12 connector)

Bus in

Bus out

58,5 [2,3]

ø 58 [2,28]
ø 50 [1,97]
ø D h8
28 [1,1]
X
3 [0,12]
3 [0,12]
4 [0,16]
13,3 [0,52]
58,5 [2,3]
59,5 [2,34]

ø 42 [1,65]
3x 120°

1 3 xM4, 6 [0.24] deep

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with cable version)

59,7 [2,35]

ø 58 [2,28]
ø 36 [1,41]
ø D h8
X
10 [0,39]
48,5 [1,91]
49,5 [1,95]
13,3 [0,52]

ø 48 [1,89]
3x 120°

1 3xM3, 6 [0.24] deep

Terminal assignment:
Bus terminal cover with terminal box (type of connection 1)

Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

Terminal assignment:
Cable connection (type of connection A)

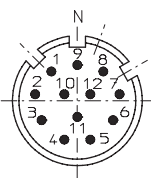| Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation :	0 V	+V	CL	CH	CG
Cable color:	BK	RD	BL	WH	GY

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Terminal assignment:

Bus terminal cover with 2 x M12 connector (type of connection 2, F or J)

Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG
M23 PIN assignment:	3	2	7	10	12	10	12	2	7	3
M12 PIN assignment:	1	5	4	3	2	3	2	5	4	1

Bus in and out M23:

Bus out:
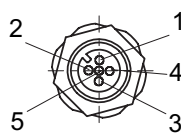
Bus in:
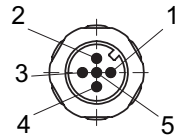
Terminal assignment::

M23 (type of connection I) or M12 (type of connection E) connector

Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	0 V	+V	CL	CH	CG
M23 PIN assignment:	10	12	2	7	3
M12 PIN assignment:	3	2	5	4	1

Bus in M23:
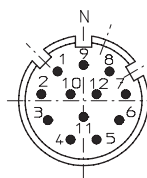
Bus in M12:
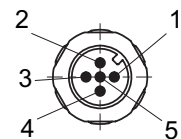
Order code:

ESFX 58 . X X X X . X X 1 X

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63,5 mm, IP 65
- 7 = Square flange 2,5" / 63,5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **2 = CANopen DS 301 V4.0 10 ... 30 V DC**

Ex-proof zone 2, 22 on request
[1] Preferred type with flange type 2
[2] Preferred type with flange type 1

Preferred types are indicated in bold

Options (service)
- 2 = no Option
- **3 = SET**

Field bus profile[3]
- **21 = CANopen Encoder-Profile DS 406 V3.1**

Type of connection
- 1 = with removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 2 x M12 connector**
- A = Fixed connection without bus terminal cover, with radial cable (2 m PVC)
- E = Fixed connection without bus terminal cover, with 1 x M12 radial connector
- F = Fixed connection without bus terminal cover, with 2 x M12 radial connector
- I = Fixed connection without bus terminal cover, with 1 x M23 radial connector
- J = Fixed connection without bus terminal cover, with 2 x M23 radial connector

[3] CAN parameters can also be factory-preset