

# Absolute encoders – multiturn

## Standard

Motor-Line, electronic multiturn, optical

Sendix F5888M (hollow shaft)

CANopen



The optical Sendix F5888 multiturn encoder in the Motor-Line version stands out particularly because of its reduced overall depth of only 43 mm with a through hollow shaft up to 15 mm.

This opens up new possibilities when dimensioning the motors and for installation in tight mounting spaces. Its technical features make the F5888 Motor-Line the ideal device for use in geared motors.



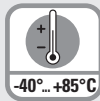
16 bit MT  
Multiturn resolution



Safety-Lock™



High rotational speed



Temperature range



High protection level



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



Intelligent Scan Technology™

## Compact and robust

- Suitable for restricted mounting spaces thanks to its small construction depth of 43 mm and its tangential cable outlet.
- Sturdy bearing construction in Safety-Lock™ design for resistance against vibration and installation errors.
- Patented Intelligent Scan Technology™ with all singleturn and multiturn functions on one single OptoASIC - offering the highest reliability, a very high resolution and 100 % magnetic field insensitivity.

## Up-to-the-minute Fieldbus performance

- CANopen with current encoder profile.
- LSS services for configuration of the node address and baud rate.
- Variable PDO mapping.
- Universal scaling function.
- 43 bits total resolution (19 bit MT + 24 bit ST).

## Order code Hollow shaft

8.F5888M  
Type

.XXXX.212X  
a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



### a Flange

- 1 = with spring element, long  
5 = with stator coupling, ø 63 mm [2.48"]  
9 = with torque stop, flexible

### b Through hollow shaft

Clamping on the flange side

- 3 = ø 10 mm [0.39"]  
4 = ø 12 mm [0.47"]  
5 = ø 14 mm [0.55"]  
6 = ø 15 mm [0.59"]  
9 = ø 1/2"

Clamping on the cover side

- A = ø 12 mm [0.39"]  
B = ø 14 mm [0.55"]  
C = ø 15 mm [0.59"]

### c Interface / supply voltage

- 2 = CANopen DS301 V4.2 / 10 ... 30 V DC  
5 = CANopen DS301 V4.2, 10 ... 30 V DC  
with 2048 ppr incremental track (TTL compatible)  
7 = CANopen DS301 V4.2, 10 ... 30 V DC  
with 2048 ppr incremental track (HTL compatible)

### d Type of connection

- L = tangential cable, 1 m [3.28'] PVC  
M = tangential cable, special length PVC \*)

\*) Available special lengths (connection type M):  
2, 3, 5, 8, 10, 15 m [6.56, 9.84, 16.40, 26.25, 32.80, 49.21']  
order code expansion .XXXX = length in dm  
ex.: 8.F5888M.542M.2123.0030 (for cable length 3 m)

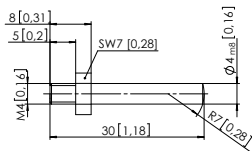
### e Fieldbus profile

- 21 = CANopen

### f Options (service)

- 2 = no option  
3 = SET button

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|---|------------------------------|------------------|
| Mounting accessory for hollow shaft encoders                                      |                              | Order no.        |
| Torque pin, ø 4 mm<br>for flange with spring element<br>(flange type 1)           |                              | 8.0010.4700.0000 |
| Dimensions in mm [inch]<br>with fixing thread                                     |                              |                  |
|  |                              |                  |

Further accessories can be found in the accessories section or in the accessories area of our website at: [kuebler.com/accessories](http://kuebler.com/accessories).  
Suitable connectors can be found in the connection technology section or in the connection technology area of our website at: [kuebler.com/connection\\_technology](http://kuebler.com/connection_technology).

## Technical data

| Mechanical characteristics                        |  |  |
|---|--|--|
| Maximum speed                                     | 9000 min <sup>-1</sup> , 6000 min <sup>-1</sup> (continuous) |  |
| Starting torque at 20 °C [68 °F]                  | < 0.01 Nm  |  |
| Mass moment of inertia                            | 6.0 x 10 <sup>-6</sup> kgm <sup>2</sup>                      |  |
| Weight  | approx. 0.45 kg [15.87 oz]                                   |  |
| Protection  | IP65   |  |
| Working temperature range                         | -40 °C ... +85 °C [-40 °F ... +185 °F] <sup>1)</sup>         |  |
| Material  | hollow shaft<br>flange<br>housing<br>cable                   | stainless steel<br>aluminum<br>zinc die-cast<br>PVC                |
| Shock resistance acc. to EN 60068-2-27            | 2500 m/s <sup>2</sup> , 6 ms                                 |  |
| Vibration resistance acc. to EN 60068-2-6         | 100 m/s <sup>2</sup> , 55 ... 2000 Hz                        |  |
|   |  |  |
| Electrical characteristics                        |  |  |
| Supply voltage                                    | 10 ... 30 V DC   |  |
| Power consumption (no load)                       | max. 100 mA  |  |
| Reverse polarity protection of the supply voltage | yes  |  |
|   |  |  |
| Incremental track characteristics                 |  |  |
| Output driver                                     | RS422 (TTL-compatible)                                       | Push-pull (HTL-compatible)   |
| Permissible load / channel                        | max. +/- 20 mA   | max. +/- 40 mA   |
| Signal level                                      | HIGH<br>LOW  | typ. 3.8 V<br>typ. 1.3 V<br>typ. U <sub>B</sub> -2 V<br>max. 0.5 V |
| Short circuit proof outputs                       | yes <sup>2)</sup>  | yes <sup>2)</sup>  |
| Resolution  | 2048 ppr   | 2048 ppr   |
|   |  |  |
| Diagnostic LED (two-color, red/green)             |  |  |
| LED ON or blinking                                | red<br>green<br>combination red / green                      | error display<br>status display<br>error code                      |

| Interface characteristics CANopen |                                  |   |
|-----------------------------------|----------------------------------|---|
| Resolution singleturn (MUR)       |                                  |   |
|                                   | raw value<br>scalable<br>default | max. 524 288 (19 bit)<br>1 ... 65 536 (16 bit)<br>8 192 (13 bit)  |
| Number of revolutions (NDR)       |                                  | 1 ... 16 777 215 (24 bit)<br>scalable only via the total resolution   |
| Total resolution (TMR)            |                                  |   |
|                                   | raw value<br>scalable<br>default | max. 8 796 093 022 208 (43 bit)<br>1 ... 4 294 967 296 (32 bit)<br>33 554 432 (25 bit)  |
| Interface                         |                                  | CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B  |
| Protocol                          |                                  | CANopen CiA 301 version 4.2.0<br>Encoder Profil CiA 406 version 4.1.0<br>Encoder Class 2  |
| Baud rate                         |                                  | 10 ... 1000 kbit/s<br>software configurable   |
| Node address                      |                                  | 1 ... 127<br>software configurable<br>Default 63  |
| Termination switchable            |                                  | software configurable<br>Default termination = ON   |
| LSS protocol                      |                                  | CIA LSS protocol DS305, global command support for node address and baud rate, selective commands via attributes of the identity object |
|                                   |                                  |   |
| Approvals                         |                                  |   |
| UL compliant in accordance with   |                                  | File no. E224618  |
| CE compliant in accordance with   |                                  |   |
|                                   | EMC Directive<br>RoHS Directive  | 2014/30/EU<br>2011/65/EU  |

1) Temperature measured on the flange – max. 80 °C allowable on the cable (fixed installation).  
2) Short circuit to 0 V or to output, only one channel at a time, supply voltage correctly applied.

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|---|------------------------------|---------|
|---|------------------------------|---------|

## General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.2. In addition, device specific profiles such as encoder profile V4.1.0 Encoder Class 2 and DS305 (LSS) are available.

The following operating modes may be selected: Event mode in case of a value change, 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, temperature** as well as the **status of the working area**.

The encoders are available with a connector or a cable connection.

The device address and baud rate can be set/modified by means of the software.

The two-color LED located on the back indicates the operating or fault status of the CAN bus, as well as the status of the internal diagnostics.

## Universal scaling function

At the end of the physical resolution of an encoder, **when scaling is active**, an error appears if the division of the physical limit (GP\_U) by the programmed total resolution (TMR) does not produce an integer.

The universal scaling function remedies this problem.

## CANopen Communication Profile DS301 V4.2

Among others, the following functionality is integrated. Class C2 functionality:

- NMT slave.
- Identity object.
- Error behavior object.
- Variable PDO mapping self-start programmable (power on to operational), 4 sending PDO's.
- Node address, baud rate and CANbus / programmable termination.
- Producer / consumer heartbeat.

## CANopen encoder profile DS406 V4.1

The following parameters can be programmed:

- Event mode: value change and/or event timer.
- 2 working areas with 2 upper and lower limits and the corresponding output states.
- Variable PDO mapping for position, speed and acceleration, work area status, error message, raw data.
- User interface with visual display of bus and failure status.
- Universal Scaling Function (USF).

## LSS layer setting services DS305 V2.0

- Global support of node-ID and baud rate
- Selective protocol via identity object (1018h)
- Firmware update possible via CANopen CiA 302-3.

## Terminal assignment

| Interface | Type of connection | Features | Cable (isolate unused cores individually before initial start-up) |                       |                      |       |       |         |
|-----------|--------------------|----------|---|-----------------------|----------------------|-------|-------|---------|
| 2         | L, M               | Bus IN   | Signal:   | 0 V<br>supply voltage | +V<br>supply voltage | CAN_L | CAN_H | CAN_GND |
|           |                    |          | Core color:   | WH                    | BN                   | YE    | GN    | GY      |

| Interface | Type of connection | Features | Cable (isolate unused cores individually before initial start-up) |                       |                      |       |       |         |    |           |       |           |
|-----------|--------------------|----------|---|-----------------------|----------------------|-------|-------|---------|----|-----------|-------|-----------|
| 5, 7      | L, M               | Bus IN   | Signal:   | 0 V<br>supply voltage | +V<br>supply voltage | CAN_L | CAN_H | CAN_GND | A  | $\bar{A}$ | B     | $\bar{B}$ |
|           |                    |          | Core color:   | WH                    | BN                   | YE    | GN    | GY      | BK | VT        | GY-PK | RD-BU     |

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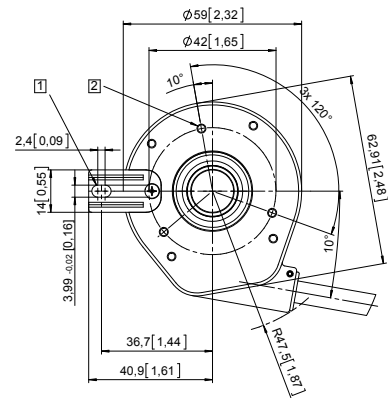
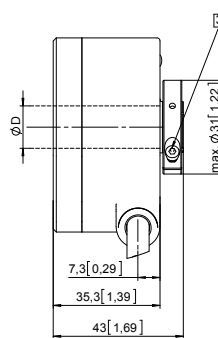
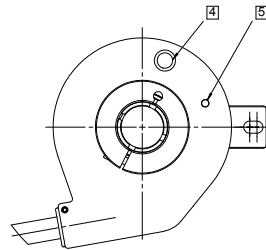
## CANopen

### Dimensions

Dimensions in mm [inch]

#### Flange with spring element, long Flange type 1

- 1 Slot spring element, recommendation: torque pin DIN 7,  $\varnothing$  4 [0.16]
- 2 3 x M3, 6 [0.24] deep
- 3 Recommended torque for the clamping ring 0.6 Nm
- 4 Status-LED
- 5 SET button



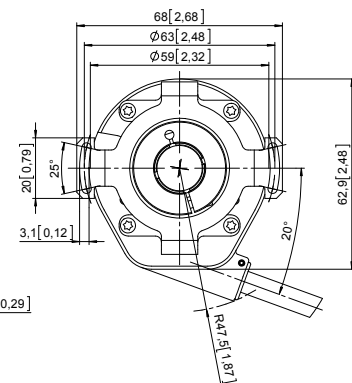
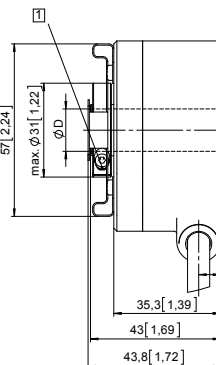
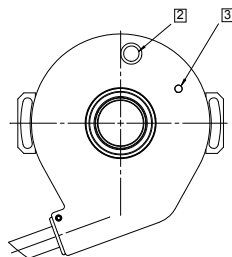
| D         | Fit |
|-----------|-----|
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/2 "     | H7  |

#### Flange with stator coupling, $\varnothing$ 63 [2.48]

##### Flange type 5

Pitch circle diameter for fixing screws  
63 mm [2.48]

- 1 Recommended torque for the clamping ring 0.6 Nm
- 2 Status-LED
- 3 SET button

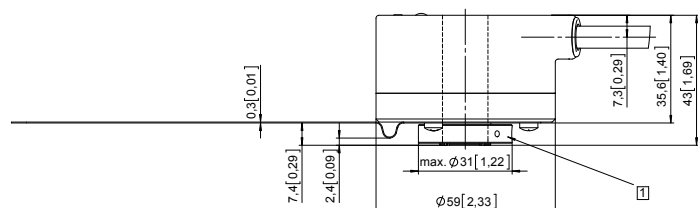
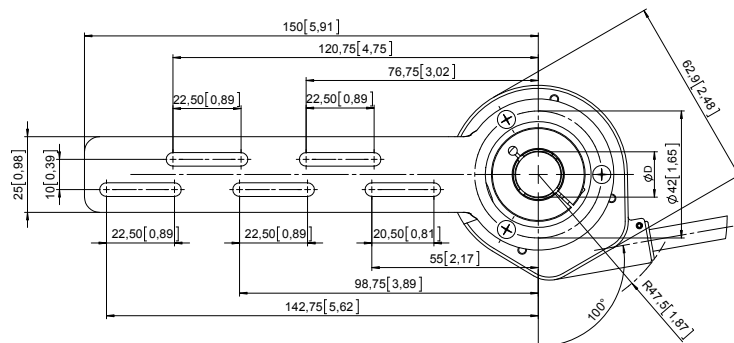
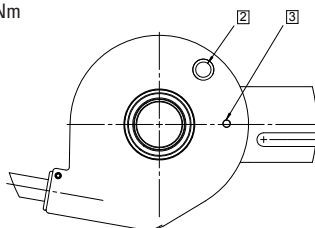


| D         | Fit |
|-----------|-----|
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/2 "     | H7  |

#### Flange with torque stop, flexible

##### Flange type 9

- 1 Recommended torque for the clamping ring 0.6 Nm
- 2 Status-LED
- 3 SET button



| D         | Fit |
|-----------|-----|
| 10 [0.39] | H7  |
| 12 [0.47] | H7  |
| 14 [0.55] | H7  |
| 15 [0.59] | H7  |
| 1/2 "     | H7  |