



Model Number

ENA36IL-R***-Analog

Features

- Very small housing
- High climatic resistance
- 4 Bit multiturn
- Models with analog voltage or current output
- Surge and reverse polarity protection

Description

This absolute encoder with internal magnetic sampling is available with an analog voltage output or an analog current output. Depending on the model, the analog output provides a voltage value or a current value corresponding to the shaft setting. The encoder can be easily programmed by means of electrical inputs and push buttons.

Technical data

General specifications

| | |
|-------------------|---|
| Detection type | magnetic sampling |
| Device type | Absolute encoders |
| Measurement range | min. 0 ... 22.5 ° max. 65566 x 360 ° factory setting: 16 x 360° |
| Resolution | 17 Bit (13 bits/revolution) |
| UL File Number | E223176 "For use in NFPA 79 Applications only", if UL marking is marked on the product. |

Electrical specifications

| | |
|-------------------------|--|
| Operating voltage U_B | 8 ... 32 V DC |
| Current consumption | typ. 15 mA (with voltage output) typ. 20 mA (with current output) |

Input 1

| | |
|-----------------|----------------------------------|
| Input type | lower limit of measurement range |
| Signal voltage | |
| High | 8 ... 32 V DC |
| Signal duration | ≥ 1 s |

Input 2

| | |
|-----------------|----------------------------------|
| Input type | upper limit of measurement range |
| Signal voltage | |
| High | 8 ... 32 V DC |
| Signal duration | ≥ 1 s |

Analog output

| | |
|-----------------|--|
| Output type | analog voltage output or analog current output (see type code) |
| Default setting | rising ramp at ccw rotation |
| Linearity error | ≤ 0.15 % |
| Load resistor | min. 5000 Ω (with voltage output) , min. 500 Ω (with current output) ; Max. value for supply voltage 8 V. For higher supply voltage lower load resistance can be used. |

Connection

| | |
|-----------|---|
| Connector | M12 connector, 5 pin |
| Cable | Ø6 mm, 4 x 2 x 0.14 mm ² , 1 m |

Standard conformity

| | |
|----------------------|--|
| Degree of protection | acc. DIN EN 60529 |
| Connection side | cable models: IP54 connector models: IP65 |
| Shaft side | IP65 |
| Climatic testing | DIN EN 60068-2-3, no moisture condensation |
| Emitted interference | EN 61000-6-4:2007 |
| Noise immunity | EN 61000-6-2:2005 |
| Shock resistance | DIN EN 60068-2-27, 100 g, 6 ms |
| Vibration resistance | DIN EN 60068-2-6, 10 g, 10 ... 1000 Hz |

Ambient conditions

| | |
|-----------------------|---|
| Operating temperature | cable, flexing: -5 ... 70 °C (23 ... 158 °F), cable, fixed: -30 ... 70 °C (-22 ... 158 °F) connector models: -40 ... 85 °C (-40 ... 185 °F) |
| Storage temperature | cable models: -30 ... 70 °C (-22 ... 158 °F) connector models: -30 ... 85 °C (-22 ... 185 °F) |
| Relative humidity | 98 % , no moisture condensation |

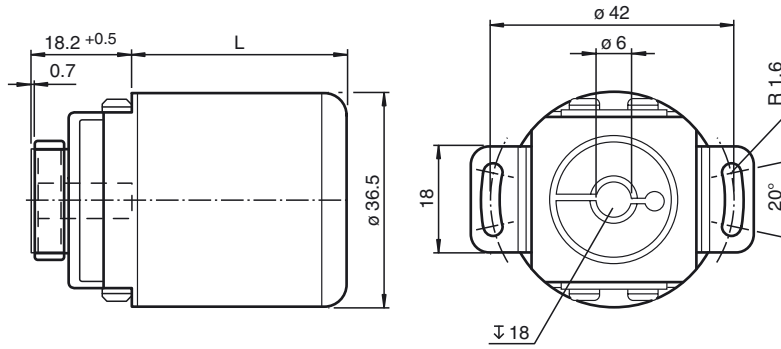
Mechanical specifications

| | |
|-------------------|------------------------------|
| Material | |
| Housing | nickel-plated steel |
| Flange | Aluminum |
| Shaft | Stainless steel |
| Mass | approx. 150 g , with cable |
| Rotational speed | max. 12000 min ⁻¹ |
| Moment of inertia | 30 gcm ² |
| Starting torque | < 3 Ncm |
| Shaft load | |
| Axial offset | ± 0.3 mm static |
| Radial offset | ± 0.5 mm static |

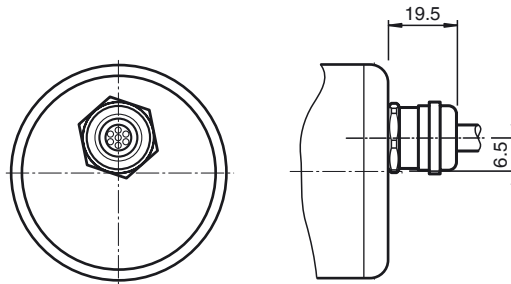
Approvals and certificates

| | |
|-------------|---|
| UL approval | cULus Listed, General Purpose, Class 2 Power Source , if UL marking is marked on the product. |
|-------------|---|

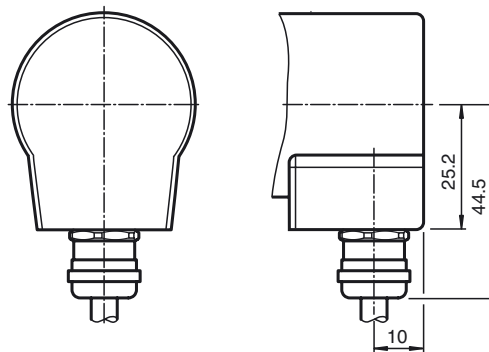
Dimensions



| Degree of protection | L [mm] | |
|----------------------|--------------|---------------|
| | Axial output | Radial output |
| IP54 | 36 | |
| IP64/IP65 | 36 | 32 |

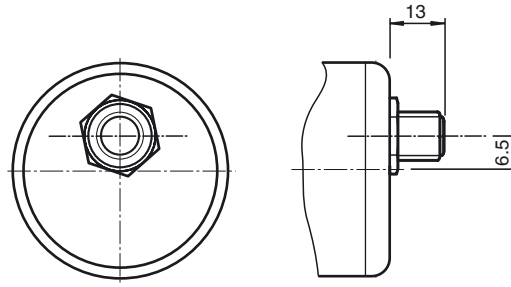


Output, axial, IP64/IP65

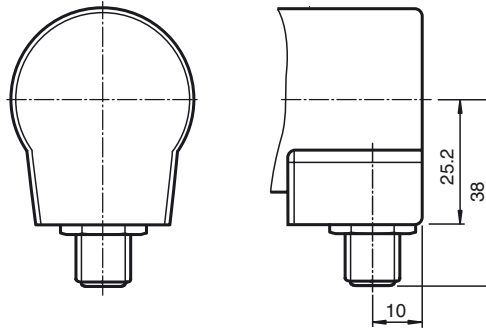


Output, radial, IP64/IP65

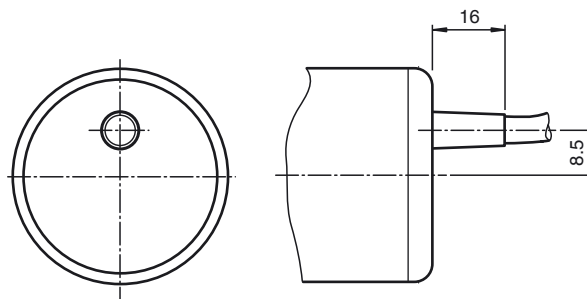
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Output, axial, IP64/IP65

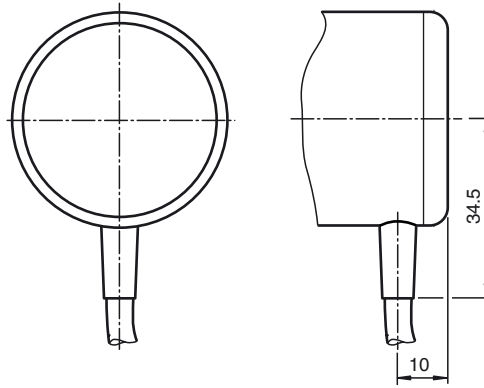


Output, radial, IP64/IP65



Output, axial, IP54

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Output, radial, IP54

Electrical connection

| Signal | Wire end | M12 connector |
|---------------------------|----------|---------------|
| Analog output | Green | 1 |
| +V _s (encoder) | Red | 2 |
| GND (encoder) | Yellow | 3 |
| Set 2 | White | 4 |
| Set 1 | Brown | 5 |
| Shielding | Screen | Housing |
| Pinout | - | |

Description of rotary encoder functions

Default Settings

| | Lower measuring range limit | Mid measuring range | Upper measuring range limit |
|------------------------------------|-----------------------------|---------------------|-----------------------------|
| Singleturn absolute rotary encoder | 0 | 180° | 360° |
| Multiturn absolute rotary encoder | 0 | 8 x 360° | 16 x 360° |

Programming Encoders with No Operating Buttons

Scaling the measuring range

Use signal inputs "Set 1" and "Set 2" to scale the measuring range (minimum measuring range: 22.5°).

1. Connect signal inputs "Set 1" and "Set 2" simultaneously to +U_B for 15 seconds. The programming mode is activated now.
2. Turn the rotary encoder shaft to position 1 (lower measuring range limit).
3. Connect signal input "Set 1" to a high-potential source (+U_{B min} ≤ high potential ≤ +U_{B max}) for 1 second.
4. Connect signal input "Set 1" to ground
5. Turn the rotary encoder shaft to position 2 (upper measuring range limit).
6. Connect signal input "Set 2" to a high-potential source (+U_{B min} ≤ high potential ≤ +U_{B max}) for 1 second.
7. Connect signal input "Set 2" to ground

The analog output is now scaled to the programmed measuring range and the rotary encoder will operate in normal mode.

Resetting to the Default Setting

1. Connect the two signal inputs ("Set 1" and "Set 2") to a high-potential source (+U_{B min} ≤ high potential ≤ +U_{B max}) for 1 second.

The measuring range is then reset to the default setting.

Programming Encoders with Operating Buttons

Scaling the measuring range

Use operating buttons "Lim1" and "Lim2" to scale the measuring range (minimum measuring range: 22.5°).

1. Press the two operating buttons ("Lim1" and "Lim2") simultaneously. Both LEDs will light up. Press and hold the operating buttons for 15 seconds until the two LEDs start to flash. The rotary encoder is now in programming mode.
2. Turn the rotary encoder shaft to position 1 (lower measuring range limit).
3. Press and hold operating button "Lim1" for 1 second. The green LED will now light up permanently.
4. Turn the rotary encoder shaft to position 2 (upper measuring range limit).
5. Press and hold operating button "Lim2" for 1 second.

The analog output is now scaled to the programmed measuring range and the rotary encoder will operate in normal mode. Only the green LED will light up.

Resetting to the Default Setting

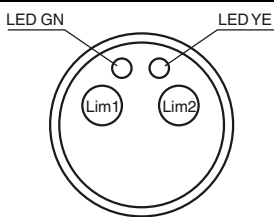
1. Press the two operating buttons ("Lim1" and "Lim2") simultaneously. Both LEDs will light up. Press and hold the operating buttons for 30 seconds. After 15 seconds, the two LEDs will start to flash.

When the green LED goes out and the yellow LED lights up permanently, the measuring range is reset to the default setting.

Status LEDs

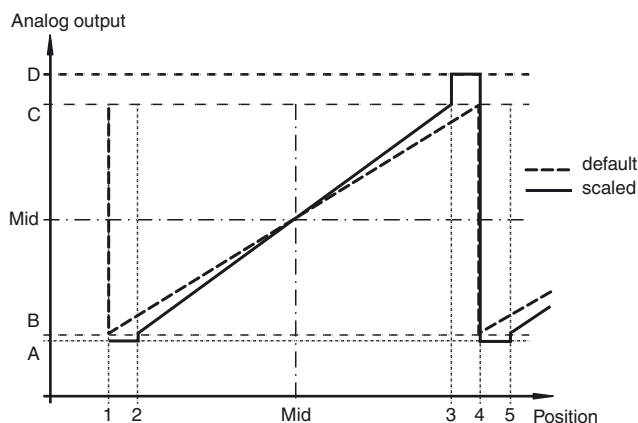
The rotary encoder is equipped with two status LEDs. These LEDs have three possible states: off, flashing, or on. The LEDs use different combinations of these states to indicate the status of the rotary encoder.

| Yellow LED | Green LED | Description |
|------------|-----------|---|
| On | Off | Rotary encoder operation using default settings |
| Off | On | Rotary encoder operation using scaled measuring range (customer-specific setting) |
| On | On | Programming mode initiated (temporary state) |
| Flashes | Flashes | Rotary encoder in programming mode |
| On | Flashes | Position 2 set, waiting for position 1 |
| Flashes | On | Position 1 set, waiting for position 2 |



Analog Output Properties

Depending on its design, the rotary encoder projects the current angular position of the rotary encoder shaft in an analog current or voltage value. The following graphic shows the values the output accepts at the various angular positions:



Legend:

| Encoder type ¹⁾ | | Angular position | | | | | |
|----------------------------|-------------------------|------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|
| | | 1 | 2 | Mid | 3 | 4 | 5 |
| Singleturn | Factory default setting | 0° | - | 180° | - | 360° | - |
| | Scaled | 0° | Lower measuring range limit | - | Upper measuring range limit | 360° | Lower measuring range limit |
| Multiturn | Factory default setting | 0° | - | 2 ⁴ x 180° | - | 2 ⁴ x 360° | - |
| | Scaled ²⁾ | 0° | Lower measuring range limit | - | Upper measuring range limit | 2 ⁿ x 360° | Lower measuring range limit |

n = whole number from 1 to 16

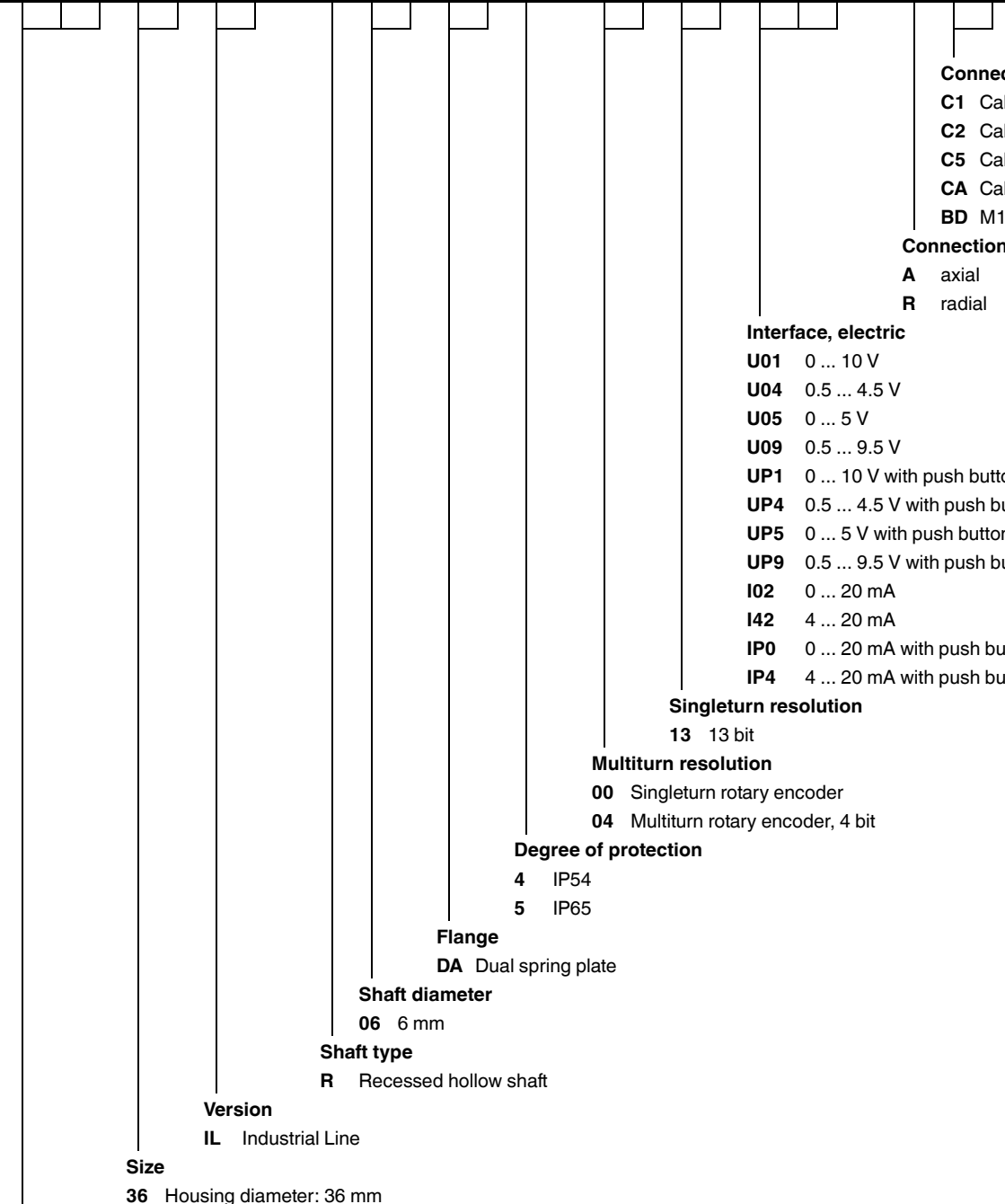
- 1) See model number
- 2) Overflow at 360°, 720°, 1440°, 2880°, 5760°, etc. depending on the scale set.

| Encoder output type | Analog output value | | | | |
|---------------------|---------------------|-------|-------|-------|--------|
| | A | B | Mid | C | D |
| 0 V ... 5 V | - | 0 V | 2.5 V | 5 V | - |
| 0.5 V ... 4.5 V | 0.25 V | 0.5 V | 2.5 V | 4.5 V | 4.75 V |
| 0 V ... 10 V | - | 0 V | 5 V | 10 V | - |
| 0.5 V ... 9.5 V | 0.25 V | 0.5 V | 5 V | 9.5 V | 9.75 V |
| 4 mA ... 20 mA | 3.6 mA | 4 mA | 12 mA | 20 mA | 22 mA |
| 0 mA ... 20 mA | - | 0 mA | 10 mA | 20 mA | - |

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Model number

E N A 3 6 I L - R 0 6 D A - 1 3 - - -



Device type
ENA Absolute rotary encoder

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