



### Model Number

IVM78E

### Features

- 4 Bit multiturn
- ATEX approval
- IECEx approval
- Flameproof enclosure
- Removable connection cap
- Analog output
- Surge and reverse polarity protection

### Description

This absolute rotary encoder with internal magnetic sampling provides an analog output. The output current value is corresponding to the shaft setting. The encoder can be easily programmed by means of electrical inputs and pushbuttons.

## Technical data

### General specifications

Detection type	magnetic sampling
Device type	Multiturn absolute encoder
Measurement range	min. 0 ... 22.5 ° max. 16 x 360 °
Resolution	16 Bit (12 bits/revolution)

### Functional safety related parameters

MTTF <sub>d</sub>	566 a at 40 °C
Mission Time (T <sub>M</sub> )	20 a

### Electrical specifications

Operating voltage U <sub>B</sub>	15 ... 30 V DC, PELV
Current consumption	typ. 40 mA

### Input 1

Input type	lower limit of measurement range (Set 1)
Signal voltage	
High	15 ... 30 V DC
Signal duration	≥ 1 s

### Input 2

Input type	upper limit of measurement range (Set 2)
Signal voltage	
High	15 ... 30 V DC
Signal duration	≥ 1 s

### Analog output

Output type	1 analog output, current
Default setting	rising ramp at ccw rotation
Linearity error	≤ 0.15 %
Load resistor	max. 500 Ω ; Max. value for operating voltage 15 V. For higher operating voltage higher load resistance can be used.

### Connection

Terminal compartment	see ordering information
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### Standard conformity

Degree of protection	DIN EN 60529, IP66
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	-40 ... 70 °C (-40 ... 158 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)

### Mechanical specifications

Material	
Combination 1	housing: anodized aluminum flange: aluminum, blank shaft: Stainless steel 1.4401 / AISI 316
Combination 2 (Inox)	housing: stainless steel 1.4404 / AISI 316L flange: stainless steel 1.4404 / AISI 316L shaft: Stainless steel 1.4401 / AISI 316
Housing	nickel-plated steel
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 2600 g (combination 1) approx. 3900 g (combination 2)
Rotational speed	max. 3000 min <sup>-1</sup>
Moment of inertia	180 gcm <sup>2</sup>
Starting torque	≤ 4 Ncm
Shaft load	
Axial	60 N
Radial	80 N

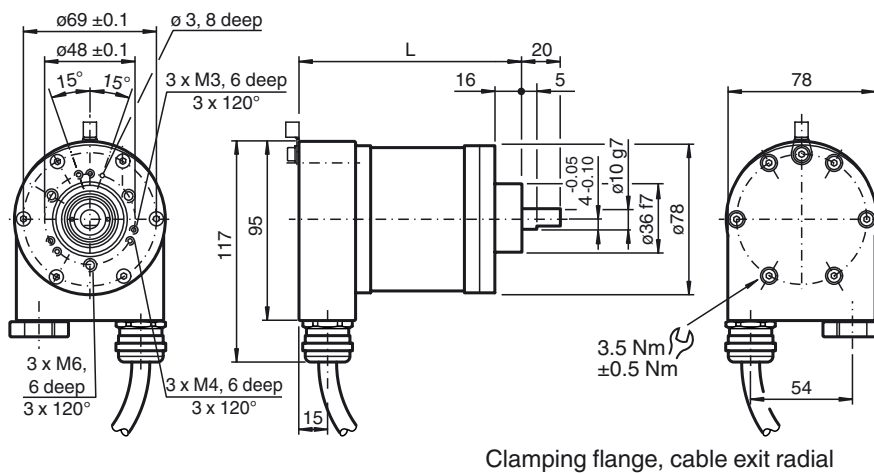
### Data for application in connection with hazardous areas

EU-Type Examination Certificate	ITS 15 ATEX 18372X IECEx ITS 15.0061X
Marking	⊕ II 2G Ex d IIC T5 Gb ⊕ II 2D Ex tb IIIC T100°C Db
Directive conformity	
Directive 94/9/EC	IEC 60079-0:2011 EN 60079-0:2012+A11:2013 IEC 60079-1:2014 EN 60079-1:2014 IEC 60079-31:2013 EN 60079-31:2014

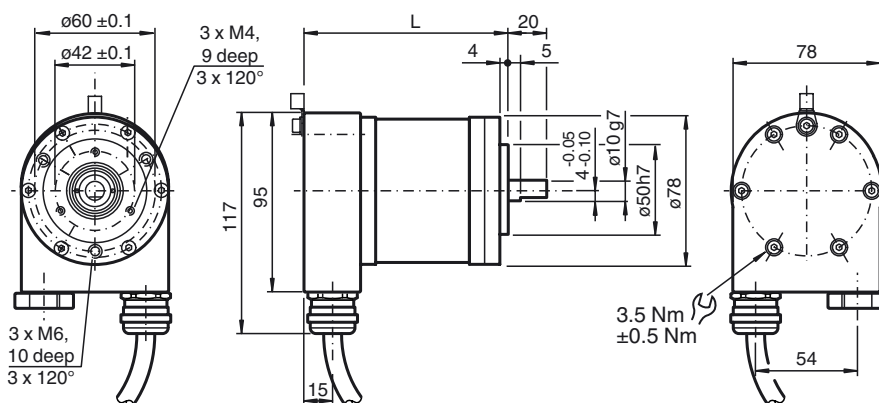
Dimensions

Encoder length L

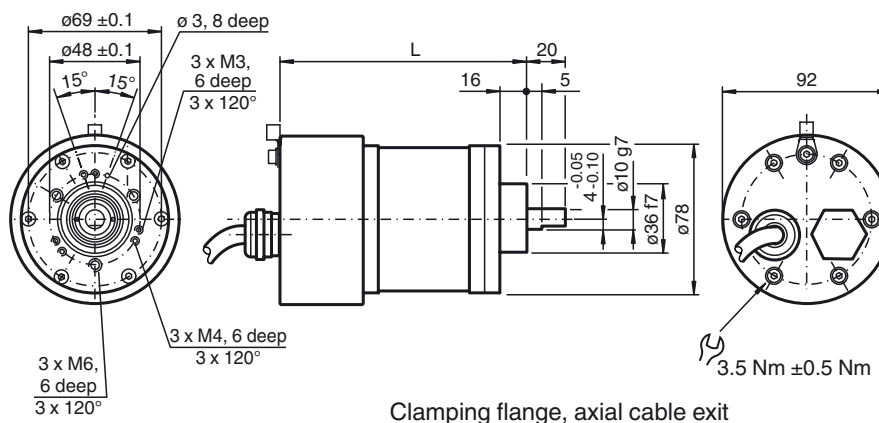
Version		Length L
Radial cable exit	Clamping flange	134 mm
	Servo flange	134 mm
Axial cable exit	Clamping flange	150 mm
	Servo flange	150 mm



Clamping flange, cable exit radial

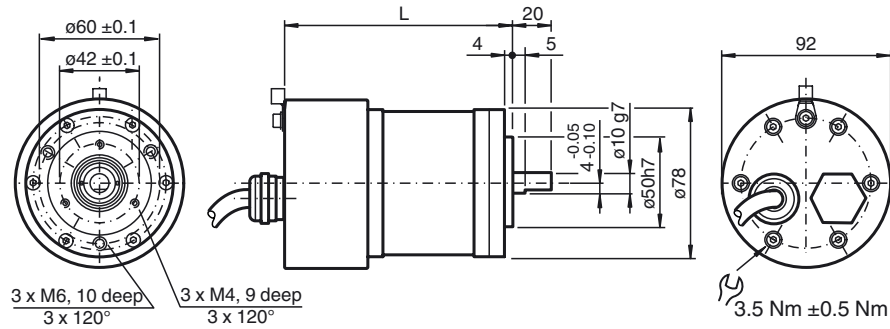


Servo flange, radial cable exit



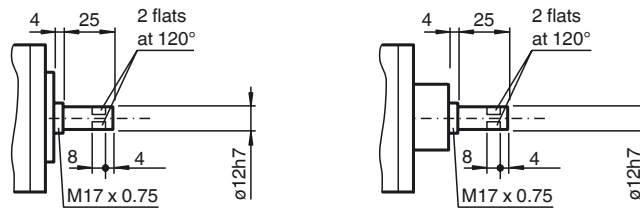
Clamping flange, axial cable exit

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Servo flange, axial cable exit

Shaft 12 mm



**Electrical connection**

Signal	Terminal compartment
Ground wire	Grounding terminal
GND (rotary encoder)	1
+U <sub>B</sub> (rotary encoder)	2
Not connected	3
SET 2	4
Not connected	5
Not connected	6
SET 1	7
Analog output	8

**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°

**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<sub>B</sub> 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 (12 VDC ≤ high potential ≤ +U<sub>B</sub>) 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 (12 VDC ≤ high potential ≤ +U<sub>B</sub>) 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**

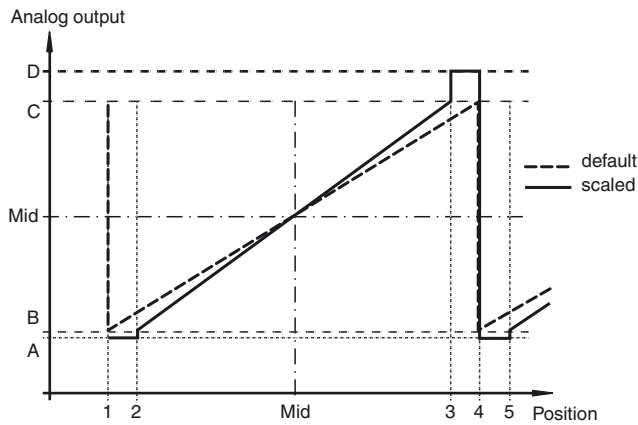
1. Connect the two signal inputs ("Set 1" and "Set 2") to a high-potential source (12 VDC ≤ high potential ≤ +U<sub>B</sub>) for 1 second.

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The measuring range is then reset to the default setting.

**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 <sup>1)</sup>		Angular position					
		1	2	Mid	3	4	5
Singleturn	Default settings	0°	-	180°	-	360°	-
	Scaled	0°	Lower measuring range limit	-	Upper measuring range limit	360°	Lower measuring range limit
Multiturn	Default settings	0°	-	2 <sup>n</sup> x 180°	-	2 <sup>n</sup> x 360°	-
	Scaled <sup>2)</sup>	0°	Lower measuring range limit	-	Upper measuring range limit	2 <sup>n</sup> 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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