

CANopen

## Model Number

CVM78E Mining

## Features

- Up to 30 Bit multiturn
- ATEX-approval for mining
- IECEx approval
- Flameproof enclosure
- Removable connection cap

## Description

Absolute encoders deliver an absolute step value for each angle setting. All these values are represented by code samples on one or more code disks which are sampled by a photoelectric array.

The absolute encoder has a maximum basic resolution of 65536 steps per revolution (16 Bits). In the multiturn design, additional up to 16384 revolutions (14 Bits) can be resolved. This results in a total maximum resolution of 1073741824 steps (30 Bits).

The encoders integrated CAN bus interface supports all CANopen functions. The following operating modes can be programmed, and can be selectively turned on or off:

- Polled mode
- Cyclic mode
- Sync mode

The device is designed for shaft assembly and is available in servo flange or clamping flange design. The bus electronics module is integrated into the removable housing cover. This makes it possible to mount or replace the encoder and the bus electronics separately during installation or service.

## Technical data

### General specifications

Detection type	photoelectric sampling
Device type	Multiturn absolute encoder

### Functional safety related parameters

MTTF <sub>d</sub>	25 a
Mission Time (T <sub>M</sub> )	20 a
L <sub>10h</sub>	7.7 E+9 at 3000 rpm
Diagnostic Coverage (DC)	0 %

### Electrical specifications

Operating voltage U <sub>B</sub>	10 ... 30 V DC
No-load supply current I <sub>0</sub>	max. 350 mA
Linearity	± 2 LSB at 16 Bit, ± 1 LSB at 13 Bit, ± 0,5 LSB at 12 Bit
Output code	binary code
Code course (counting direction)	cw ascending (clockwise rotation, code course ascending) cw descending (clockwise rotation, code course descending)

### Interface

Interface type	CANopen
Resolution	
Single turn	up to 16 Bit
Multiturn	14 Bit
Overall resolution	up to 30 Bit
Transfer rate	max. 1 MBit/s
Standard conformity	communication profile: DS 301 device profiles: DS 406 and DS 417, programmable according to class 2

### Connection

Cable	Ø 10.2 mm, Radox 9 x 0.5 mm <sup>2</sup>
Terminal compartment	see ordering information

### 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, 3 ms
Vibration resistance	DIN EN 60068-2-6, 10 g, 10 ... 2000 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: Stainless steel 1.4305 / AISI 303 flange: Stainless steel 1.4305 / AISI 303 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
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

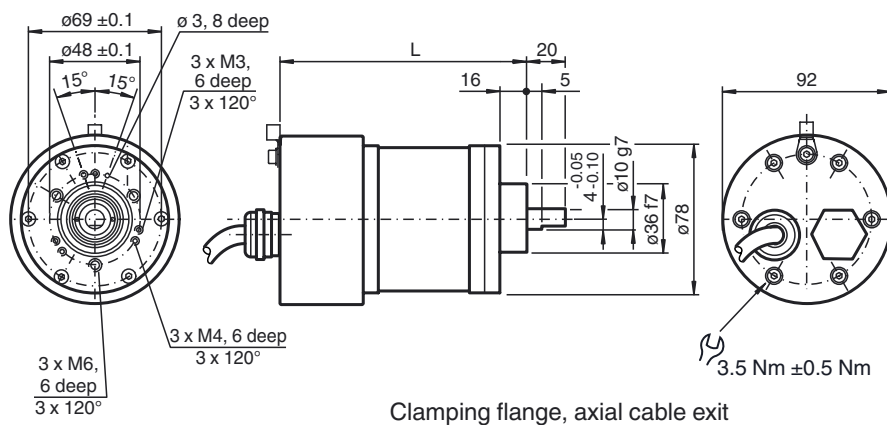
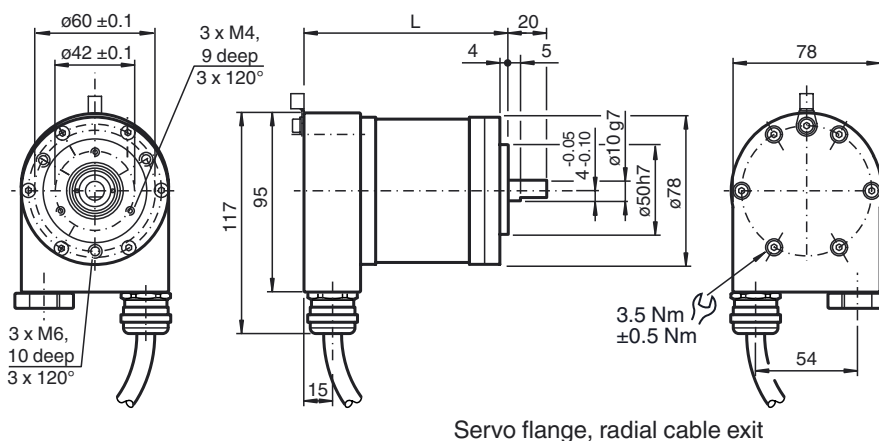
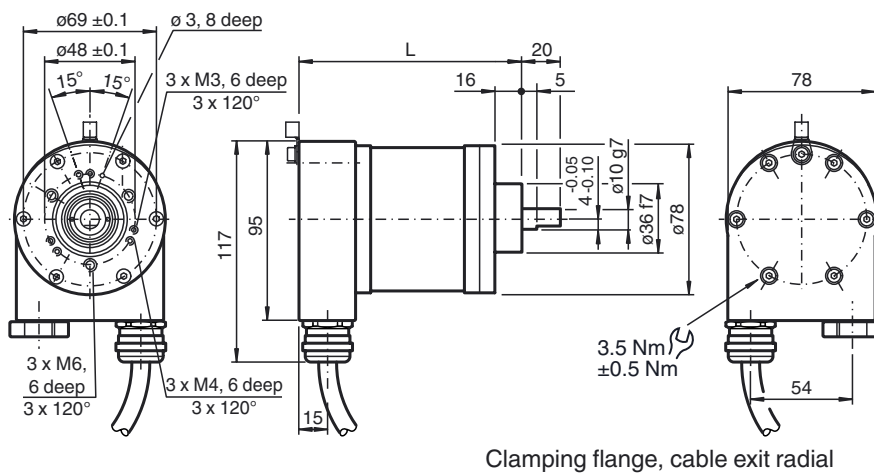
#### Ex-areas

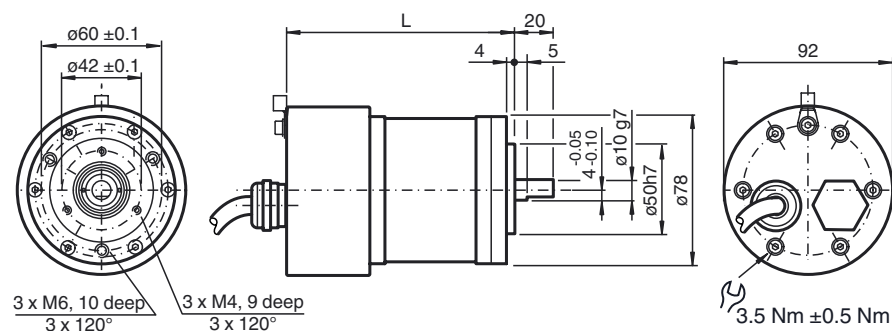
EC-Type Examination Certificate	TÜV 11 ATEX 086158X IECEx TUN 11.0020X
Group, category, type of protection	Ex I M2 Ex db I/IIC T5
Directive conformity	
Directive 94/9/EC	IEC 60079-0:2007 EN 60079-0:2009 IEC 60079-1:2007 EN 60079-1:2007 IEC 60079-31:2008 EN 60079-31:2009

## Dimensions

## Encoder length L

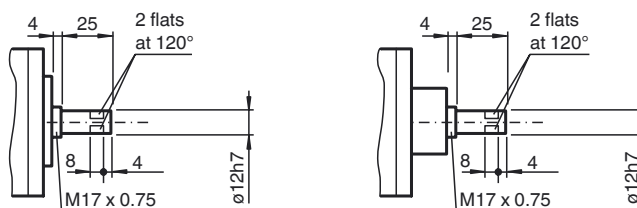
Version		Length L
Radial cable exit	Clamping flange	109 mm
	Servo flange	109 mm
Axial cable exit	Clamping flange	125 mm
	Servo flange	125 mm





Servo flange, axial cable exit

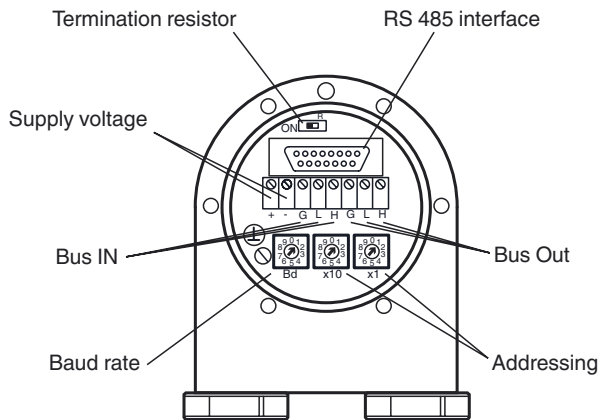
Shaft 12 mm



### Electrical connection

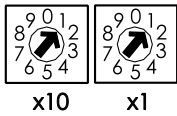
Terminal	Cable	Explanation
(-)	1	- Power supply
(+)	2	+ Power supply
L	3	CAN low
H	4	CAN high
G	5	CAN ground
L	6	CAN low
H	7	CAN high
G	8	CAN ground
⊥	green / yellow	Ground connection of encoder housing

## Indicating and operating elements



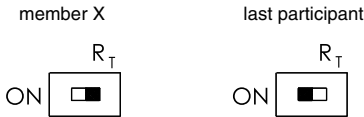
### Adjusting the participant address

The participant address can be adjusted with the rotary switches. The address can be defined between 1 and 96, and may only be assigned once. The addresses 97 ... 99 are reserved.



### Adjusting the termination resistor

The terminating resistor  $R_T$  (121  $\Omega$ ) can be connected to the circuit by means of the switch:



### Baud rate adjustment

Baud rate [kBit/s]	Switch position	Baud rate [kBit/s]	Switch position
20	0	500	5
50	1	800	6
100	2	1000	7
125	3	reserved	8
250	4	set baud rate by SDO message and LSS	9

**Programmable CAN operating modes**

Mode	Explanation
Polled mode	The connected host requests the current actual position value via a remote transmission request telegram. The absolute encoder reads in the current position, calculates all parameters that have been set and sends back the process actual value through the same CAN identifier.
Cyclic mode	The absolute encoder sends the current actual process value cyclically, without being prompted by the host. The cycle time can be programmed in milliseconds for values between 1 ms and 65536 ms.
Sync mode	After the sync telegram has been received by the host, the absolute encoder sends the current actual process value. If multiple nodes should respond to the sync telegram, the individual nodes report one after the other according to their CAN identifier. There is no programming of an offset time. The sync counter can be programmed so that the rotary encoder does not transmit until after a defined number of sync telegrams.

**Programmable rotary encoder parameters**

Parameter	Explanation
Operating parameter	The direction of rotation (complement) can be specified by parameter as the operating parameter. This parameter determines the direction of rotation in which the output code will ascend or descend.
Resolution per revolution	The "Resolution" parameter is used to program the rotary encoder so that a desired number of steps can be implemented in reference to one revolution.
Overall resolution	This parameter indicates the desired number of measurement units of the entire travel length. This value must not exceed the overall resolution of the absolute encoder.
Preset value	The preset value is the desired position value that must be achieved for a specific physical setting of the axis. The preset value parameter is used to set the actual position value to the desired actual process value.
2 limit switches	A total of two positions can be programmed. The absolute encoder sets one bit to high state in the 32 Bit actual process value if a value falls outside the range between these two positions.
8 cam switches	Up to 8 position values can be programmed as cams. By reaching these values bits in object 6300h Cam state register are set.

# Ordering information

C	V	M	7	8	E	-	0					0	B	-				
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## Number of singleturn bits

12	4096
13	8192
16	65536

## Number of multiturn bits

12	4096
14	16384

## Housing material

2	Stainless steel 1.4305 / AISI 303
4	Stainless steel 1.4404 / AISI 316L

## Output code

B	Binary
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## Option

0	None
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## Exit position

A	Axial
R	Radial

## Connection type

K2	Cable, 9-wire, 2 m
K5	Cable, 9-wire, 5 m
DR	Terminal compartment, 2 cable glands
KR	Terminal compartment, 1 cable gland, 1 stopping plug

## Flange version

1	Clamping flange
2	Servo flange

## Shaft dimension

01	Shaft Ø10 mm x 20 mm
02	Shaft Ø12 mm x 25 mm

## Option 1

E	Explosion-proof, standard IP66
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## Functional principle

M	Multiturn
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## Shaft version

V	Solid shaft
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## Data format

C	CANopen
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