

Multiturn absolute encoder CVM42H

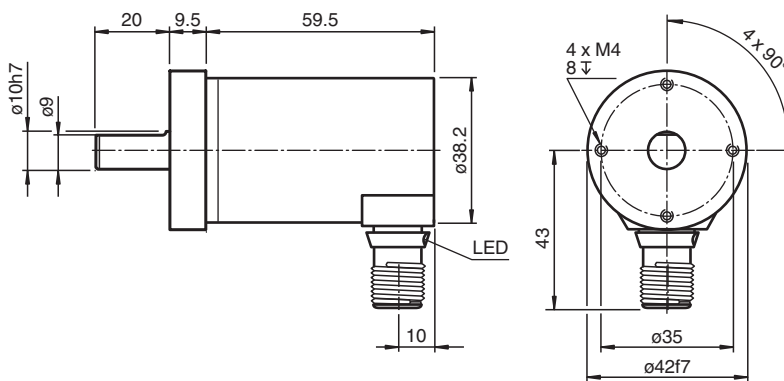
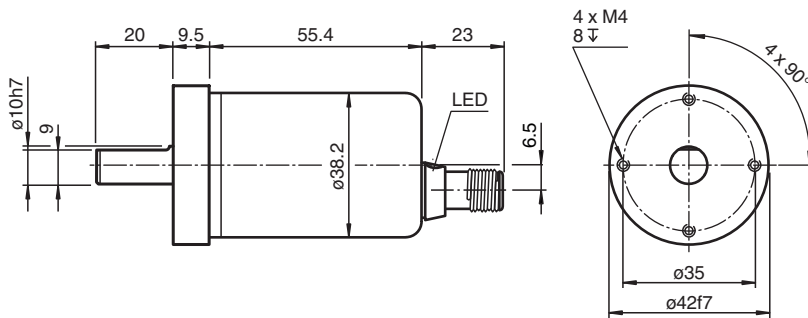


- Sturdy construction
- Highly shock / vibration and soiling resistant
- Increased shaft load capacity
- Stainless steel housing
- IP69K
- Very small housing

Heavy-duty encoder



Dimensions



Release date: 2022-04-21 Date of issue: 2022-12-12 Filename: t49295_eng.pdf

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

Pepperl+Fuchs Group
www.pepperl-fuchs.com

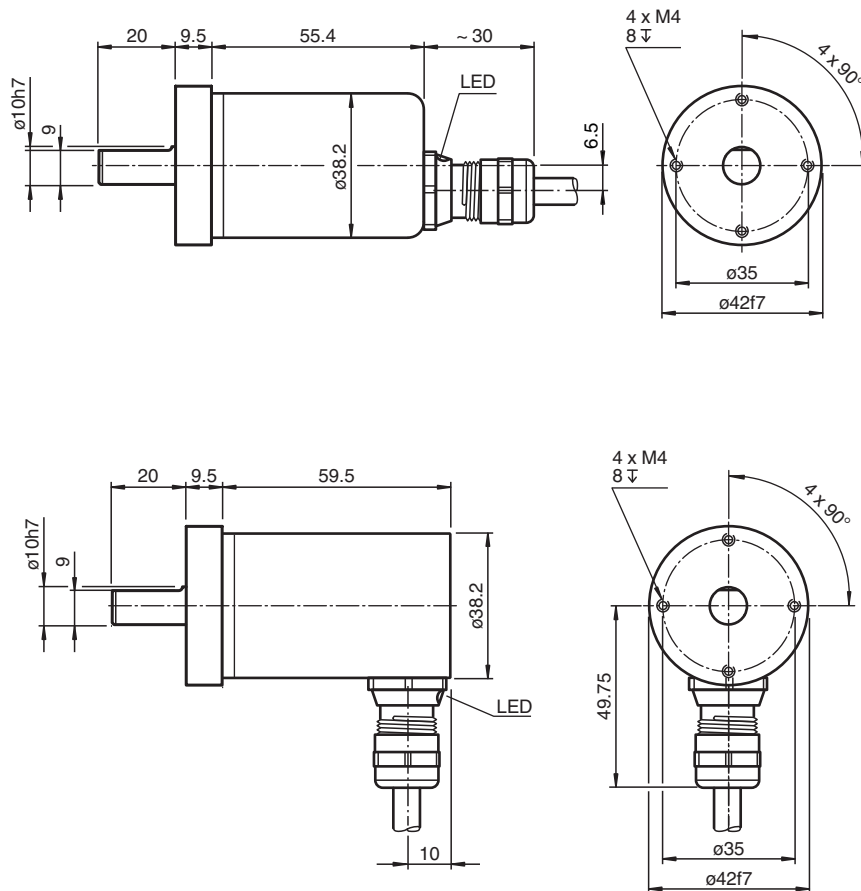
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Dimensions



Technical Data

General specifications	
Detection type	magnetic sampling
Device type	Multiturn absolute encoder
Nominal ratings	
Linearity error	$\pm 0.36^\circ$
Indicators/operating means	
LED ERR	dual-LED, red
LED RUN	dual-LED, green
Electrical specifications	
Operating voltage	U_B 10 ... 30 V DC
Power consumption	P_0 ≤ 1.5 W
Time delay before availability	t_v < 250 ms
Output code	binary code
Code course (counting direction)	adjustable
Interface	
Interface type	CANopen
Resolution	
Single turn	12 Bit
Multiturn	12 Bit
Overall resolution	24 Bit
Transfer rate	max. 1 MBit/s
Cycle time	500 μ s

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Technical Data

Standard conformity		ISO 11898
Connection		
Connector		M12 connector, 5 pin
Cable		2 m fixed cable , 5-wire , screened
Standard conformity		
Degree of protection		IEC/EN 60529
Climatic testing		DIN EN 60068-2-3 , 95 % , no moisture condensation
Emitted interference		EN 61000-6-4:2007
Noise immunity		EN 61000-6-2:2005
Shock resistance		DIN EN 60068-2-27, 300 g, 6 ms
Vibration resistance		DIN EN 60068-2-6, 30 g, 55 ... 2000 Hz
Ambient conditions		
Operating temperature		-40 ... 85 °C (-40 ... 185 °F)
Storage temperature		-40 ... 85 °C (-40 ... 185 °F)
Relative humidity		98 % , no moisture condensation
Mechanical specifications		
Flange		servo flange 42 mm with 4 x Threading M4
Shaft dimensions	Ø x l	10 mm x 20 mm
Degree of protection		IP65 / IP67 / IP68 / IP69k
Material		
Housing		stainless steel 1.4404 / AISI 316L
Flange		stainless steel 1.4404 / AISI 316L
Shaft		Stainless steel 1.4412 / AISI 440B
Mass		approx. 350 g
Rotational speed		max. 6000 min ⁻¹
Moment of inertia		30 gcm ²
Starting torque		< 5 Ncm
Shaft load		
Axial		270 N
Radial		270 N

Function

This absolute rotary encoder with magnetic sampling provides a position value corresponding to the shaft position on its integrated CAN bus interface.


The very sturdy design of this encoder has been dimensioned for use in harsh environmental conditions and high mechanical stress.

The integrated CAN-bus interface supports all CANopen functions. Thus the following modes can be programmed to either enabled or disabled:

- Polled Mode
- Cyclic Mode
- Sync Mode

Connection

Electrical connection

Signal	Connector	Cable
CAN GND	1	green
V _S (10 ... 30 V DC)	2	red
GND	3	yellow
CAN-High	4	white
CAN-Low	5	brown
Shielding	Housing	screen
Pinout		

Programming

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.
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.
Min. and max. limit switch	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.
Cam	8 freely programmable cams can be set within the overall resolution. This produces the functionality of a mechanical cam shifting mechanism.

Additional Information

Status LED

The rotary encoder is equipped with a two-color status LED. The LED lights up both red and green, and displays the physical bus status and the status of the CANopen state machine. The following statuses are defined:

- LED on
- LED off
- Led flickers (rapid flashing at approx. 10 Hz)
- Led flashes (slow flashing at approx. 2.5 Hz)

- Single flash (LED flashes once briefly, followed by a pause of approx. 1 s)
- Double flash (LED flashes twice briefly, followed by a pause of approx. 1 s)
- Triple flash (LED flashes three times briefly, followed by a pause of approx. 1 s)
- Quadruple flash (LED flashes four times briefly, followed by a pause of approx. 1 s)

If there is any conflict as to whether the red or the green LED should be activated, only the red LED is activated. In all other instances, the two-color LED will combine the behavior of the CAN Error LED (red) and the CAN Run LED (green).

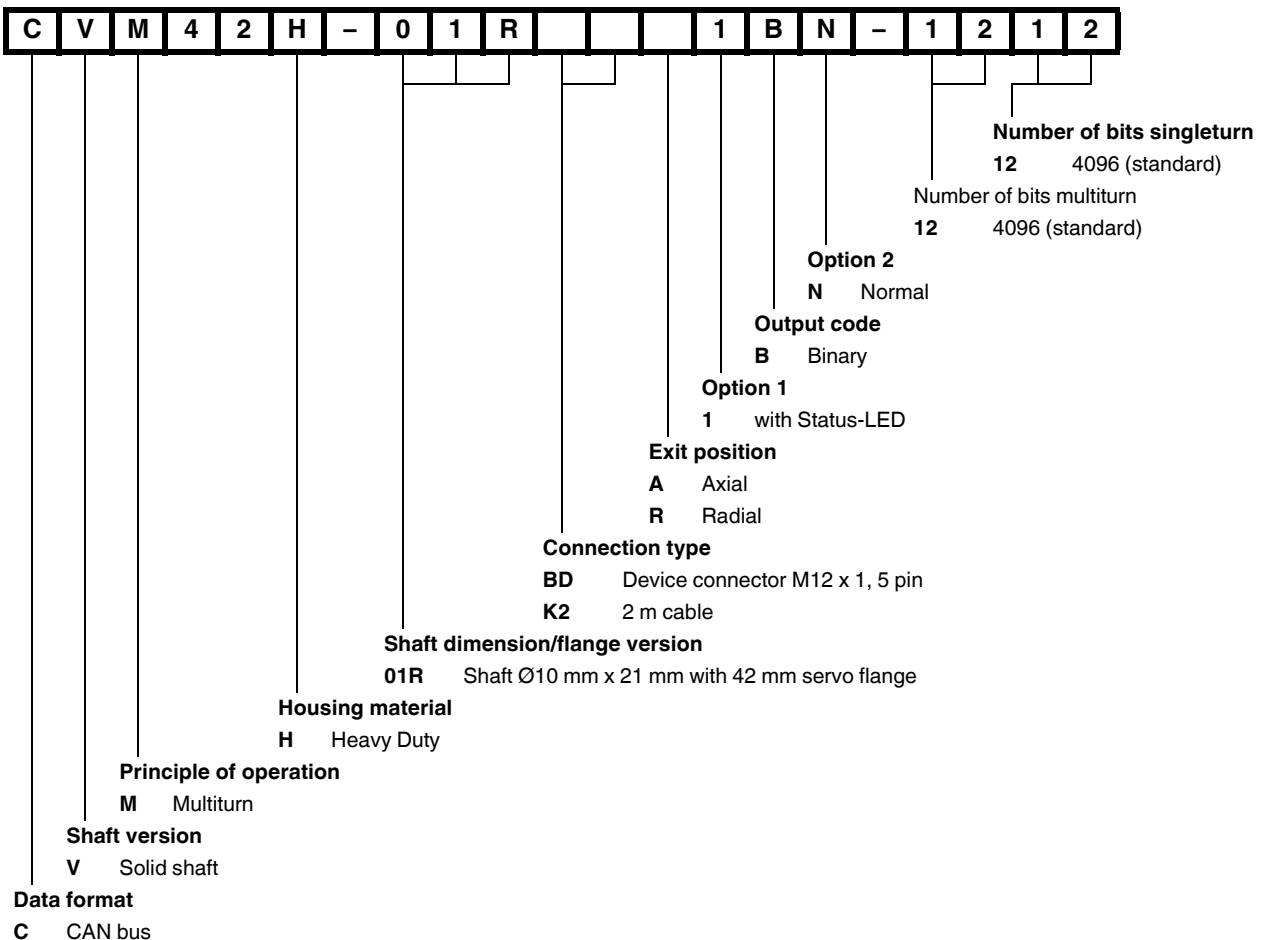
Description of the CANopen Error LED (red)

Error LED (red)	CANopen status	Description
LED off	No error	Normal operating mode.
LED flickers	Auto bit rate/LSS	Automatic bit rate detection or LSS service in operation (alternating with Run LED).
LED flashes	Faulty configuration	General configuration error.
Single flash	Warning limit has been reached	At least one of the CAN controller error counters has reached or exceeded the warning limit (too many error frames).
Double flash	Error event	A guard event (NMT slave or NMT master) or a heartbeat event (heartbeat consumer) has occurred.
Triple flash	Sync error	The sync message was not received within the configured communication time-out. See object 1006h.
Quadruple flash	Event timer error	An anticipated PDO (process data object) was not received before the event timer expired.
On	No bus signal	The CAN controller has no connection to the bus.

Description of the CANopen Run LED (green)

Run LED (green)	CANopen status	Description
LED flickers	Auto bit rate/LSS	Automatic bit rate detection or LSS service in operation (alternating with Error LED).
LED flashes	PREOPERATIONAL	The device is in PREOPERATIONAL status.
Single flash	STOPPED	The device is in STOPPED status.
Double flash	-	Reserved
Triple flash	Program/firmware upload	Software is being uploaded to the device.
On	OPERATIONAL	The device is in OPERATIONAL status.

Order code



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Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

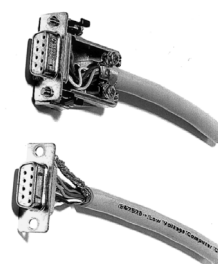
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
	clamped with the strain relief
	clamp
Disadvantage:	soldering shield on



Safety instructions

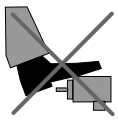
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

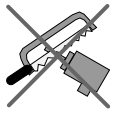
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!