HEIDENHAIN

Product Overview

Rotary Encoders with Mitsubishi Interface

June 2014

Rotary encoders with Mitsubishi interface

The rotary encoders described in this Product Overview were conceived specifically for direct connection to Mitsubishi controls with Mitsubishi high speed interface (Generation 2, two pair transmission).

Mechanical designs
These rotary encoders are suitable, for example, for use on servo axes and spindles in machine tools. They are mounted rotary encoders with IP 67 protection on the housing and IP 64 at the shaft inlet.

The ECN/EQN 400 M **rotary encoders with stator coupling** have integrated bearings. Their stator coupling compensates radial runout and alignment errors without significantly reducing the accuracy. The encoder shaft is directly connected with the shaft to be measured. During angular acceleration of the shaft, the stator coupling must absorb only that torque caused by friction in the bearing.

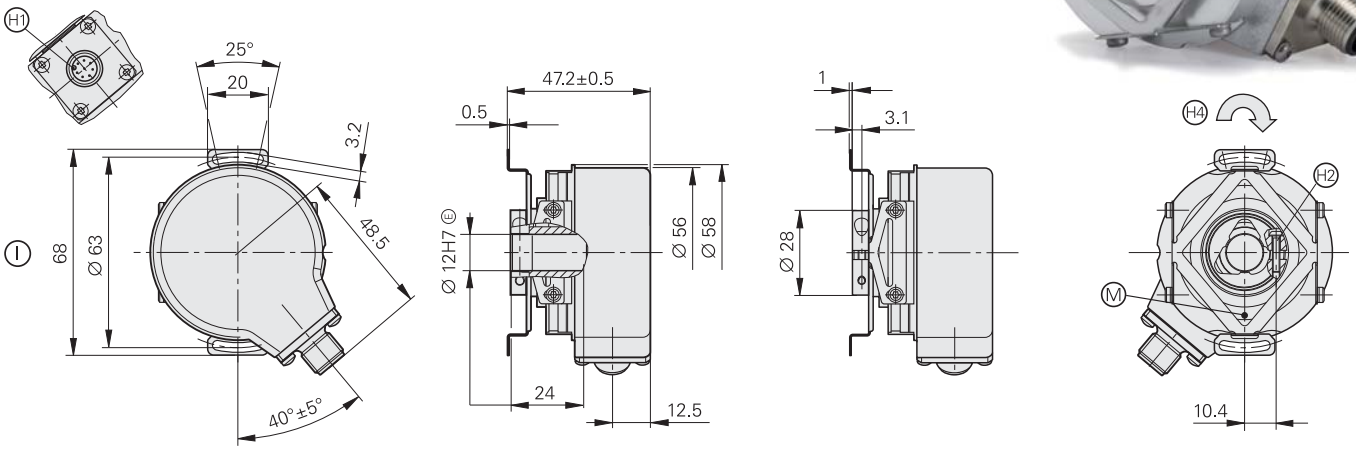
The ROC/ROQ 400 M **rotary encoders for separate shaft coupling** have integral bearings and a solid shaft. The shaft coupling compensates axial motion and misalignment (radial and angular offset) between the encoder shaft and measured shaft. This relieves the encoder bearing of additional external loads that would otherwise shorten its service life. Diaphragm and metal bellows couplings designed to connect the rotor of the ROC/ROQ 400 M encoders are available (see *Shaft couplings* in the *Rotary Encoders* catalog).

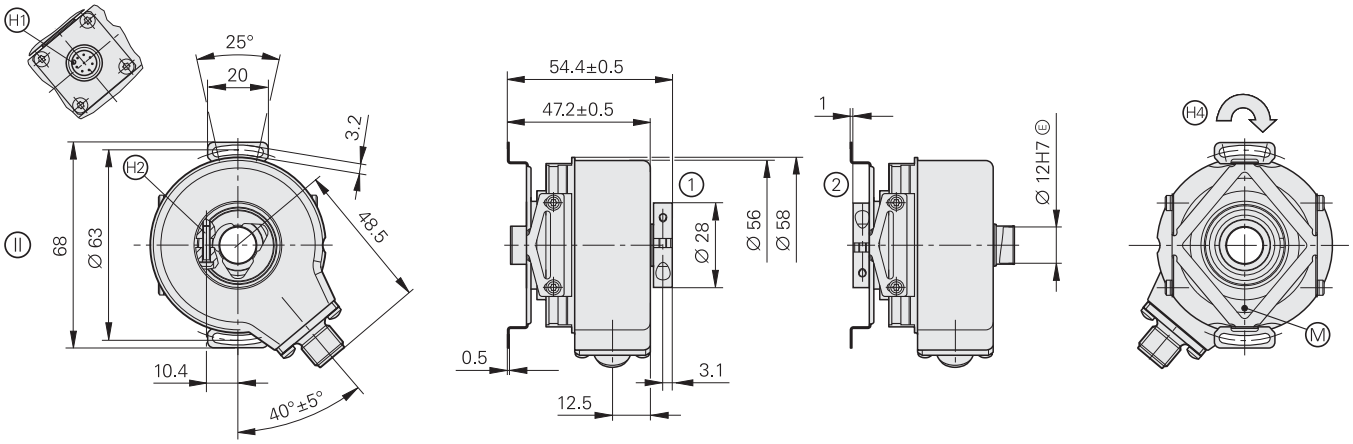
Further Information
For further information on the mechanical design of rotary encoders, please refer to the *Rotary Encoders* catalog.

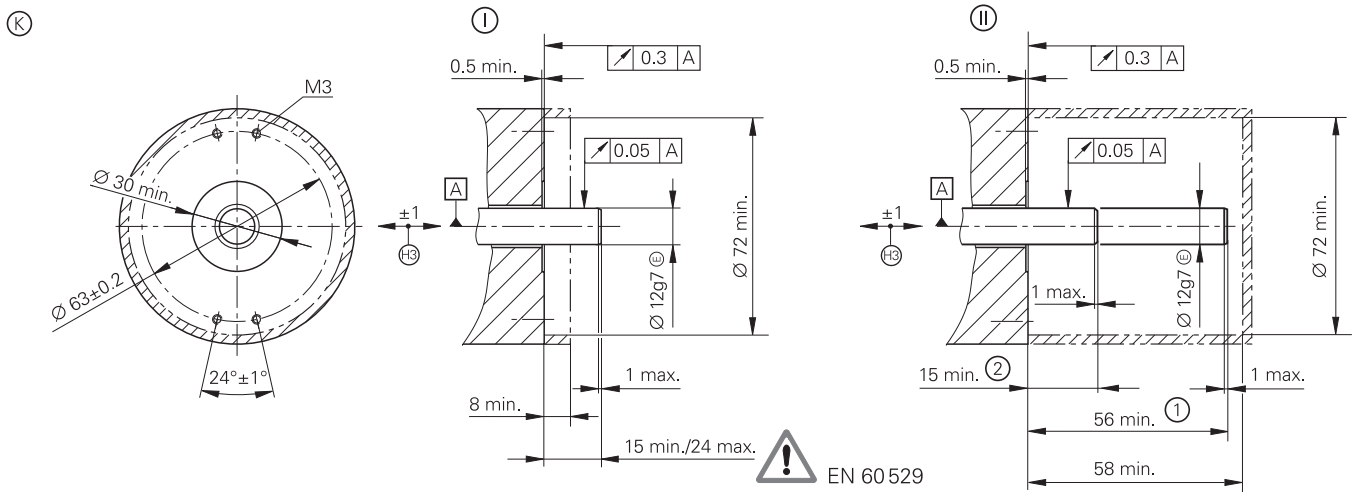
Contents

ECN/EQN 400M series

- **Absolute rotary encoders with mounted stator coupling**
- **Blind hollow shaft or hollow through shaft**
- **Mitsubishi interface**







mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

A = Bearing of mating shaft
K = Required mating dimensions
M = Measuring point for operating temperature
H1 = Connector coding
H2 = Clamping screw with hexalobular socket X8, tightening torque 1.1 ± 0.1 Nm
H3 = Compensation of mounting tolerances and thermal expansion, no dynamic motion permitted
H4 = Direction of shaft rotation for output signals as per the interface description
① = Clamping ring on housing side (status upon delivery)
② = Clamping ring on coupling side (optionally mountable)

	Absolute	
	Singleturn	**Multiturn**
	ECN 425M	**EQN 435M**
Absolute position values	Mitsubishi high speed interface	
Ordering designation	Mit03-4	
Positions per revolution	33554432 (25 bits)	8388608 (23 bits)
Revolutions	–	4096
Code	Pure binary	
Elec. permissible speed	≤ 15000 min^{-1} for continuous position value	
Calculation time t_{cal}	≤ 5 µs	
System accuracy	± 20"	
Electrical connection	M12 flange socket (male) 8-pin, radial	
Cable length	≤ 30 m	
Voltage supply	3.6 V to 14 V DC	
Power consumption (max.)	*5 V:* ≤ 700 mW *14 V:* ≤ 800 mW	*5 V:* ≤ 750 mW *14 V:* ≤ 850 mW
Current consumption (typical)	*5 V:* 90 mA (without load)	*5 V:* 100 mA (without load)
Shaft*	Blind hollow shaft or hollow through shaft, D = 12 mm	
Mech. permiss. speed n[1)]	≤ 6000 min^{-1}/≤ 12000 min^{-1} [2)]	
Starting torque At 20 °C Below –20 °C	*Blind hollow shaft:* ≤ 0.01 Nm *Hollow through shaft:* ≤ 0.025 Nm ≤ 1 Nm	
Moment of inertia of rotor	≤ 4.6 · 10^{-6} kgm^2	
Permissible axial motion of measured shaft	± 1 mm	
Vibration 55 to 2000 Hz **Shock** 6 ms	≤ 150 m/s^2 (EN 60068-2-6) ≤ 2000 m/s^2 (EN 60068-2-27)	
Max. operating temp. [1)]	100 °C	
Min. operating temp.	–30 °C	
Protection EN 60529	*At housing:* IP 67 (IP 66 for hollow through shaft) *At shaft inlet:* IP 64	
Weight	≈ 0.3 kg	

***** Please select when ordering

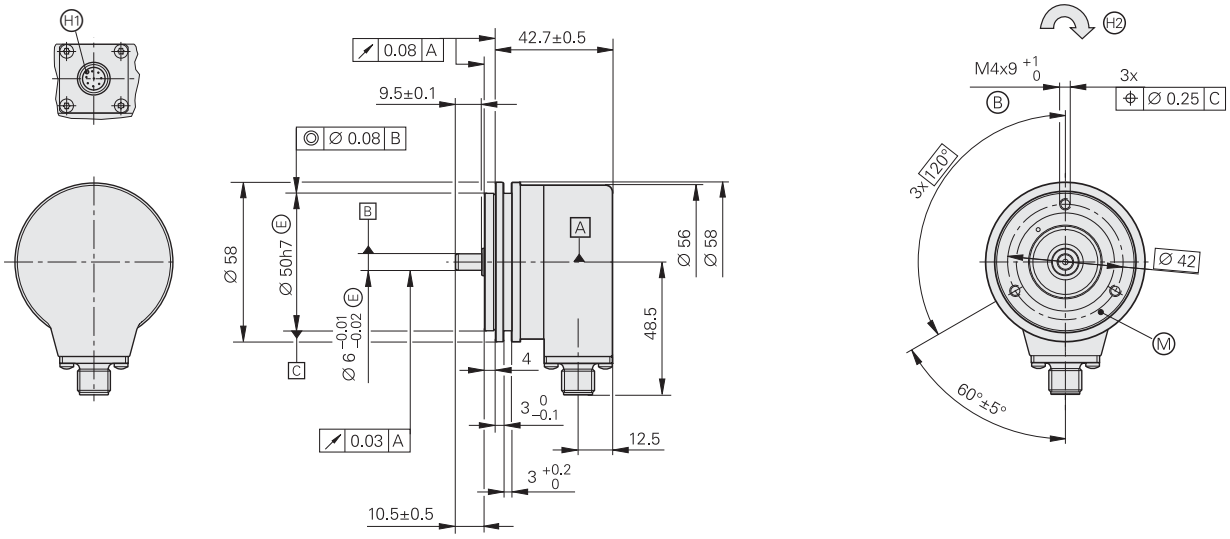
1) For the correlation between the operating temperature and the shaft speed or supply voltage, see *General Mechanical Information* in the *Rotary Encoders* catalog.

2) With two shaft clamps (only for hollow through shaft)

ROC/ROQ 400 M series

With synchro flange

- **Absolute rotary encoders for separate shaft coupling**
- **Mitsubishi interface**



mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

A = Bearing
B = Threaded mounting hole
M = Measuring point for operating temperature
H1 = Connector coding
H2 = Direction of shaft rotation for output signals as per interface description

	Absolute	
	Singleturn	**Multiturn**
	ROC 425M	**ROQ 435M**
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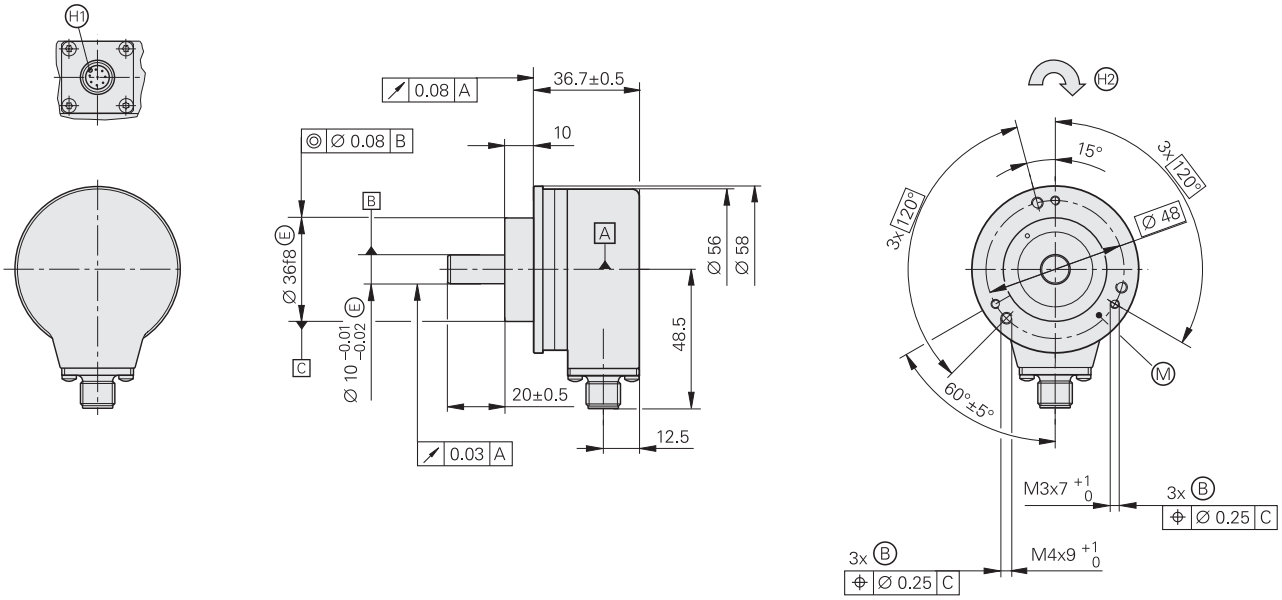
Voltage supply	3.6 V to 14 V DC	
Power consumption (max.)	*5 V:* ≤ 700 mW *14 V:* ≤ 800 mW	*5 V:* ≤ 750 mW *14 V:* ≤ 850 mW
Current consumption (typical)	*5 V:* 90 mA (without load)	*5 V:* 100 mA (without load)
Shaft	Solid shaft D = 6 mm	
Mech. permiss. speed n[1)]	≤ 15000 min^{-1}	≤ 12000 min^{-1}
Starting torque	≤ 0.01 Nm (at 20 °C)	
Moment of inertia of rotor	≤ 2.9 · 10^{-6} kgm^2	
Shaft load	*Axial:* 40 N *Radial:* 60 N at shaft end	
Vibration 55 to 2000 Hz **Shock** 6 ms	≤ 300 m/s^2 (EN 60068-2-6) ≤ 2000 m/s^2 (EN 60068-2-27)	
Max. operating temp. [1)]	100 °C	
Min. operating temp.	–30 °C	
Protection EN 60529	*At housing:* IP 67 *At shaft inlet:* IP 64 (IP 66 available on request)	
Weight	Approx. 0.35 kg	

[1)] For the correlation between the operating temperature and the shaft speed or supply voltage, see *General Mechanical Information* in the *Rotary Encoders* catalog.

ROC/ROQ 400 M series

With clamping flange

- **Absolute rotary encoders for separate shaft coupling**
- **Mitsubishi interface**



mm

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Cable length	≤ 30 m	
Voltage supply	3.6 V to 14 V DC	
Power consumption (max.)	*5 V:* ≤ 700 mW *14 V:* ≤ 800 mW	*5 V:* ≤ 750 mW *14 V:* ≤ 850 mW
Current consumption (typical)	*5 V:* 90 mA (without load)	*5 V:* 100 mA (without load)
Shaft	Solid shaft D = 10 mm	
Mech. permiss. speed n[1)]	≤ 15000 min^{-1}	≤ 12000 min^{-1}
Starting torque	≤ 0.01 Nm (at 20 °C)	
Moment of inertia of rotor	≤ 2.9 · 10^{-6} kgm^2	
Shaft load	*Axial:* 40 N *Radial:* 60 N at shaft end	
Vibration 55 to 2000 Hz **Shock** 6 ms	≤ 300 m/s^2 (EN 60068-2-6) ≤ 2000 m/s^2 (EN 60068-2-27)	
Max. operating temp. [1)]	100 °C	
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Protection EN 60529	*At housing:* IP 67 *At shaft inlet:* IP 64 (IP 66 available on request)	
Weight	Approx. 0.35 kg	

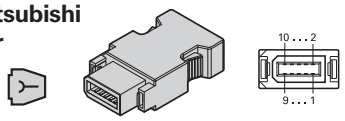
[1)] For the correlation between the operating temperature and the shaft speed or supply voltage, see *General Mechanical Information* in the *Rotary Encoders* catalog.

Interfaces
Mitsubishi pin layout

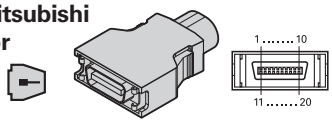
Mitsubishi pin layout
HEIDENHAIN encoders with the code letter M after the model designation are suited for connection to Mitsubishi controls with

Mitsubishi high speed interface
- Ordering designation: Mitsu01
  Two-pair transmission
- Ordering designation: Mit02-4
  Generation 1, two-pair transmission
- Ordering designation: Mit02-2
  Generation 1, one-pair transmission
- Ordering designation: Mit03-4
  Generation 2, two-pair transmission

10-pin Mitsubishi connector



20-pin Mitsubishi connector



8-pin flange socket, M12

	Voltage supply				Position values			
10-pin	**1**	**–**	**2**	**–**	**7**	**8**	**3**	**4**
20-pin	**20**	**19**	**1**	**11**	**6**	**16**	**7**	**17**
	8	**2**	**5**	**1**	**3**	**4**	**7**	**6**
	U_P	**Sensor** U_P	**0 V**	**Sensor** 0 V	**Serial Data**	**$\overline{\text{Serial Data}}$**	**Request Frame**	**$\overline{\text{Request Frame}}$**
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

Cable shield connected to housing; **U_P** = Power supply voltage
Sensor: The sensor line is connected in the encoder with the corresponding power line.
Vacant pins or wires must not be used!

Mitsubishi connecting cables

PUR connecting cable	[4 × 2 × 0.09 mm^2]; A_P = 0.09 mm^2		
PUR connecting cable	[(4 × 0.14 mm^2) + (4 × 0.34 mm^2)]; A_P = 0.34 mm^2	Ø 6 mm	Ø 3.7 mm
Complete With M12 connector (female) and M12 coupling (male), 8 pins each		368330-xx	801142-xx[1)]
Complete With M12 right-angle connector (female) and M12 coupling (male), 8 pins each		373289-xx	801149-xx[1)]
With one connector With 8-pin M12 connector (female)		634265-xx	–
With one connector With 8-pin M12 right-angle connector (female)		606317-xx	–

[1)] Maximum cable length 6 m
A_P: Cross section of power supply lines

		Cable	**Mitsubishi**
PUR connecting cable for M12 connecting elements [(1 x 4 x 0.14 mm^2) + (4 x 0.34 mm^2)]; A_V = 0.34 mm^2			
Complete With 8-pin M12 connector (female) and 20-pin Mitsubishi connector	 Mitsubishi 20-pin	Ø 6 mm	646806-xx
Complete With 8-pin M12 connector (female) and 10-pin Mitsubishi connector	 Mitsubishi 10-pin	Ø 6 mm	647314-xx

A_P: Cross section of power supply lines

HEIDENHAIN

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This Product Overview supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Overview valid when the contract is made.

Further Information
- Catalog: *Rotary Encoders*
- Catalog: *Interfaces*

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