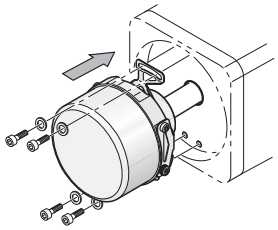
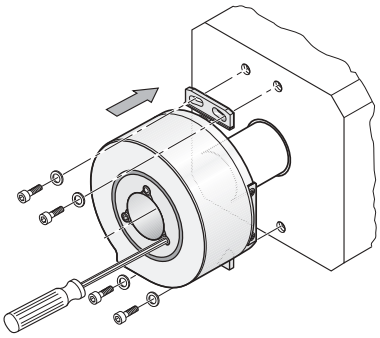
ECN, EQN, ERN Rotary Encoders
with integral bearing and mounted stator coupling
Protection IP 64

HEIDENHAIN **ECN, EQN** and **ERN** rotary encoders with integral bearing and mounted stator coupling are characterized by simple mounting and short overall length. Possible applications range from simple measuring tasks to position and speed control on servo drives. The hollow shaft of these encoders is slid directly onto and fastened to 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. Rotary encoders with stator coupling therefore provide excellent dynamic performance and a high natural frequency.

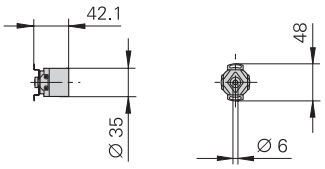


ERN 1000
ECN/EQN/ERN 400

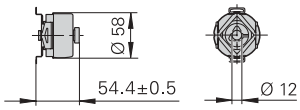


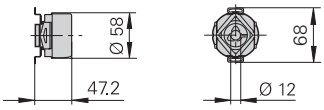
ECN/ERN 100

ERN 1000 Series
- **Miniaturized version**
- Blind hollow shaft with 6-mm inside diameter
- Housing outside diameter 35 mm
- Natural frequency of the encoder stator coupling: ≥ 950 Hz
- Mechanically permissible speed: 10000 min^{-1}

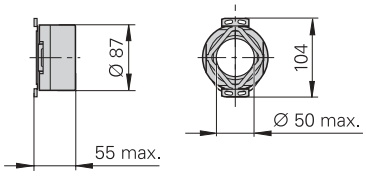


ECN, EQN, ERN 400 Series
- **Compact design**
- Blind hollow shaft or hollow through shaft with 8 or 12 mm inside diameter
- Housing outside diameter 58 mm
- Natural frequency of the encoder stator coupling: ≥ 1400 Hz (cable version)
- Mechanically permissible speed: 12000 min^{-1}





ECN/ERN 100 Series
- **For large shaft diameters**
- Hollow through shaft with: 20 mm, 25 mm, 38 mm, 50 mm inside diameters D
- Housing outside diameter 87 mm
- Natural frequency of the encoder stator coupling: ≥ 1000 Hz
- Mechanically permissible speed: 6000 min^{-1} (D ≤ 30 mm)
  4000 min^{-1} (D > 30 mm)



	Incremental				
	ERN 1020	**ERN 1030**	**ERN 1070**	**ERN 1080**	**ERN 1085**
Incremental signals	⊓⊔ TTL	⊓⊔ HTL	⊓⊔ TTL[1]	∿ 1 V_{PP}	
Line count	100 to 3600		1 000/2 500/ 3 600	100 to 3600	512 or 2048
Commutation signals	–				Z1 track[2]
Power supply	5 V	10 to 30 V	5 V	5 V	
Operating temperature	Max. 100 °C	Max. 70 °C		Max. 100 °C	

[1] Integrated 5/10-fold interpolation
[2] One sine and one cosine signal with one period per revolution of the encoder shaft

	Absolute				Incremental			
	ECN 413	**EQN 425**	**ECN 425[2]**	**EQN 437[2]**	**ERN 420**	**ERN 430**	**ERN 460**	**ERN 480**
Incremental signals	∿ 1 V_{PP}		–		⊓⊔ TTL	⊓⊔ HTL	⊓⊔ TTL	∿ 1 V_{PP}
Line count	512 or 2048		–		250 to 5000			1000 to 5000
Absolute position values	EnDat 2.2[1] or SSI		EnDat 2.2[1]		–			
Position values per rev	8 192 (13 bits)		33 554 432 (25 bits)		–			
Distinguishable revolutions	–	4 096 (12 bits)	–	4 096 (12 bits)	–			
Power supply	*EnDat:* 3.6 to 14 V *SSI:* 5 V or 10 to 30 V		3.6 to 14 V		5 V	10 to 30 V		5 V
Operating temperature	*5 V:* Max. 100 °C *10 to 30 V:* Max. 85 °C		Max. 100 °C		Max. 100 °C		Max. 70 °C	Max. 100 °C

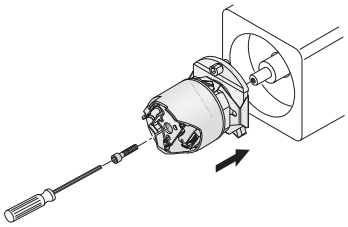
[1] Includes EnDat 2.1 command set; PROFIBUS-DP via Gateway
[2] Functional Safety version upon request

	Absolute		Incremental		
	ECN 113	**ECN 125**	**ERN 120**	**ERN 130**	**ERN 180**
Incremental signals	∿ 1 V_{PP}	–	⊓⊔ TTL	⊓⊔ HTL	∿ 1 V_{PP}
Line count	2048	–	1000 to 5000		
Absolute position values	EnDat 2.2[1] or SSI	EnDat 2.2[1]	–		
Position values per rev	8 192 (13 bits)	33 554 432 (25 bits)	–		
Power supply	5 V[2]	3.6 to 5.25 V	5 V	10 to 30 V	5 V
Operating temperature	Max. 100 °C		Max. 100 °C	Max. 100 °C ($U_P \leq 15$ V) Max. 85 °C ($U_P \leq 30$ V)	Max. 100 °C

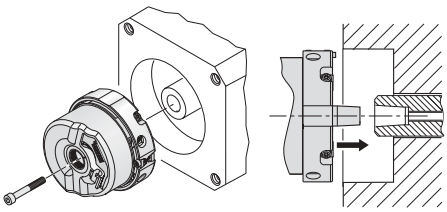
[1] Includes EnDat 2.1 command set; PROFIBUS-DP via gateway
[2] 10 to 30 V via connecting cable with voltage converter (only SSI)

ECN, EQN, ERN Rotary Encoders
with integral bearing and mounted stator coupling
Protection IP 40

The HEIDENHAIN **ECN, EQN** and **ERN** rotary encoders with IP 40 degree of protection are specially designed for integration in motors. Bearings and mounted stator coupling are integrated. Absolute rotary encoders and versions with commutation tracks are available for synchronous motors. The taper shaft or the blind hollow shaft is fastened directly to the shaft to be measured. This ensures an extremely stiff coupling that permits exceptionally high dynamic performance of the drive. The stator coupling is designed to be fastened in a location bore and permits fast, simple mounting while enabling a mechanical fine adjustment of the commutation.



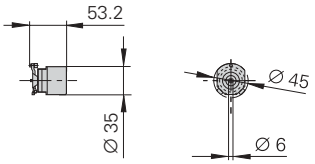
ERN/ECN/EQN 1100



ERN/ECN/EQN 1300

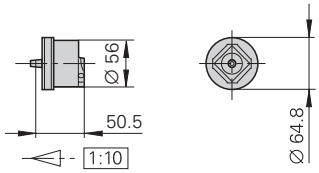
ECN, EQN, ERN 1100 Series

- **Miniaturized version**
- Blind hollow shaft Ø 6 mm
- Housing outside diameter 35 mm
- Stator coupling for location holes with inside diameter **45 mm**
- Natural frequency of the encoder stator coupling: ≥ 1500 Hz
- Mech. permissible speed: 12 000 min^{-1}



ECN, EQN, ERN 1300 Series

- **Compact dimensions**
- 1:10 taper shaft with 9.25 mm functional diameter for extremely stiff connection
- Housing outside diameter 56 mm. The stator coupling is suited for location holes with 65 mm inside diameter
- Natural frequency of the encoder stator coupling: ≥ 1800 Hz
- Mech. permissible speed
  – ERN/ECN: 15 000 min^{-1}
  – EQN: 12 000 min^{-1}
- IP 40 protection when mounted



	Absolute				Incremental		
	ECN 1113	**EQN 1125**	**ECN 1123**[3]	**EQN 1135**[3]	**ERN 1120**	**ERN 1180**	**ERN 1185**
Incremental signals	~ 1 V_{PP}		–		⊓⊔ TTL	~ 1 V_{PP}	
Line count	512		–		250, 512, 1 024, 2 048, 3 600		512 or 2048
Commutation signals	–		–		–		Z1 track[2]
Absolute position values	EnDat 2.2[1]				–		
Position values per rev	8 192 (13 bits)		8 388 608 (23 bits)		–		
Distinguishable revolutions	–	4096 (12 bits)	–	4096 (12 bits)	–		
Power supply	3.6 to 14 V				5 V		
Operating temperature	Max. 115 °C				Max. 100 °C		Max. 115 °C

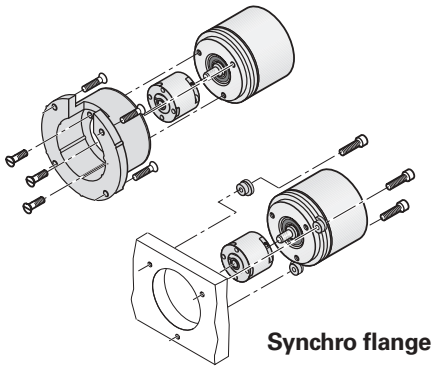
[1] Includes EnDat 2.1 command set; PROFIBUS-DP via Gateway
[2] One sine and one cosine signal with one period per revolution of the encoder shaft
[3] Functional Safety version upon request

	Absolute				Incremental			
	ECN 1313	**EQN 1325**	**ECN 1325**[4]	**EQN 1337**[4]	**ERN 1321**	**ERN 1326**	**ERN 1381**	**ERN 1387**
Incremental signals	~ 1 V_{PP}		–		⊓⊔ TTL		~ 1 V_{PP}	
Line count	512 or 2048		–		1 024 2 048 4 096		512 2 048 4 096	2 048
Commutation signals	–		–		–	Block commutation[2]	–	Z1 track[3]
Absolute position values	EnDat 2.2[1]		EnDat 2.2[1]		–			
Position values per rev	8 192 (13 bits)		33 554 432 (25 bits)		–			
Distinguishable revolutions	–	4 096 (12 bits)	–	4 096 (12 bits)	–			
Power supply	5 V		3.6 to 14 V		5 V			
Operating temperature	Max. 115 °C		Max. 115 °C		Max. 120 °C; *4096 lines*: max. 100 °C			

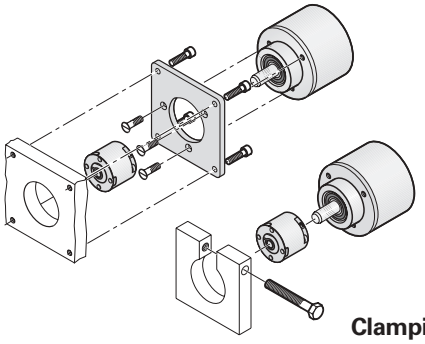
[1] Includes EnDat 2.1 command set; PROFIBUS-DP via Gateway
[2] 3 block commutation tracks with 90° or 120° mech. phase shift
[3] One sine and one cosine signal with one period per revolution of the encoder shaft
[4] Functional Safety version upon request

ROC, ROQ, ROD and RIC, RIQ Rotary Encoders
with integral bearing, for separate shaft coupling

The optical encoders **ROC, ROQ** and **ROD,** as well as the inductive **RIC** and **RIQ** from HEIDENHAIN have integrated bearings and are sealed. They provide IP 64 to IP 67 protection, depending on the version. They are robust and compact. These encoders are coupled by the rotor to the measured shaft through a separate coupling that compensates axial motion and misalignment between the encoder shaft and measured shaft.



Synchro flange



Clamping flange

ROD 1000 Series
- **Miniaturized dimensions** for installation in small devices or in limited installation space
- Mounting by synchro flange
- Shaft diameter 4 mm

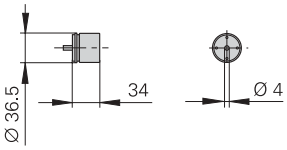
ROC, ROQ, ROD 400 Series
- **Industrial standard** for dimensions and output signals
- Protection
  IP 67 at housing
  IP 64 at shaft inlet (IP 66 upon request)
- Mounting by synchro flange or clamping flange
- Shaft diameter
  6 mm with synchro flange
  10 mm with clamping flange
- Preferred types with fast delivery (see *Rotary Encoders* brochure or ask HEIDENHAIN)

RIC/RIQ 400 Series
- Inductive scanning principle
- For reduced accuracy requirements up to ± 480"
- Mechanical design same as ROC/ROQ 400

	Absolute						
	Singleturn					**Multiturn**	
Synchro flange	**RIC 416**	**ROC 413**			**ROC 425**	**RIQ 428**	**ROQ 425**
Clamping flange	**RIC 416**	**ROC 413**			**ROC 425**	**RIQ 428**	**ROQ 425**
Incremental signals	–	~ 1 V_{PP}		–		–	~ 1 V_{PP}
Line count/ Signal periods	–	512		–		–	512
Absolute position values	EnDat 2.1	EnDat 2.2[1)]	SSI	PROFIBUS-DP V0	EnDat 2.2[1)]	EnDat 2.1	EnDat 2.2[1)]
Positions per rev	65536 (16 bits)	8192 (13 bits)			33554432 (25 bits)	65536 (16 bits)	8192 (13 bits)
Distinguishable revolutions	–					4096 (12 bits)	
Power supply	5 V		5 V or 10 to 30 V	9 to 36 V	3.6 to 5.25 V	5 V	
Max. operating temperature	100 °C		*5 V:* 100 °C *10 to 30 V:* 85 °C	70 °C	100 °C	100 °C	

[1)] Includes EnDat 2.1 command set; PROFIBUS-DP via Gateway

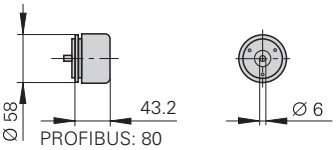
Series 1000



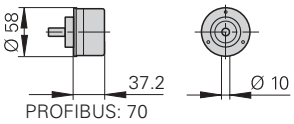
	Incremental			
	ROD 1020	**ROD 1030**	**ROD 1070**	**ROD 1080**
Incremental signals	⊓⊔ TTL	⊓⊔ HTL	⊓⊔ TTL[1]	∿ 1 V_{PP}
Line count	100 to 3600		1 000/2 500 3 600	100 to 3600
Mech. perm. speed	10 000 min^{-1}			
Power supply	5 V	10 to 30 V	5 V	5 V
Operating temperature	Max. 100 °C	Max. 70 °C		Max. 100 °C

[1] Integrated 5/10-fold interpolation

Series 400
With synchro flange



With clamping flange



PROFIBUS DP

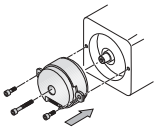
				Incremental			
			ROQ 437	**ROD 426**	**ROD 466**	**ROD 436**	**ROD 486**
			ROQ 437	**ROD 420**	–	**ROD 430**	**ROD 480**
		–		⊓⊔ TTL		⊓⊔ HTL	∿ 1 V_{PP}
		–		50 to 5000 *ROD 426/466:* up to 10 000[2]			1000 to 5000
	SSI	PROFIBUS-DP V0	EnDat 2.2[1]	–			
			33 554 432 (25 bits)	–			
				–			
	5 V or 10 to 30 V	9 to 36 V	3.6 to 5.25 V	5 V	10 to 30 V		5 V
	5 V: 100 °C *10 to 30 V:* 85 °C	70 °C	100 °C	100 °C	70 °C	100 °C	

[2] Signal periods over 5000 are generated through signal doubling in the encoder

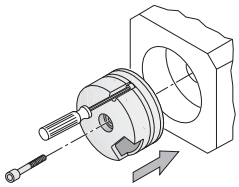
ECI, EQI, ERO Rotary Encoders
without integral bearing

The **ECI/EQI** inductive rotary encoders are mechanically compatible with the photoelectric encoders ExN: the shaft is fastened with a central screw. The stator of the encoder is clamped in a location hole.

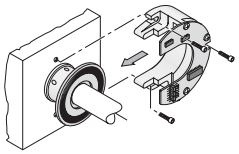
The photoelectric **ERO** modular rotary encoders from HEIDENHAIN consist of a graduated disk with hub and a scanning unit. They are particularly well suited for **limited installation space** or for applications for which there must be **no friction.**



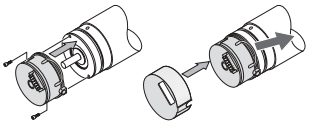
ECI/EQI 1100



ECI/EQI 1300



ERO 1200/1300



ERO 1400

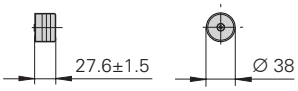
ECI/EQI 1100 Series
- **Mechanically compatible with ECN/EQN 1100**
- Easy mounting without adjustment
- Blind hollow shaft Ø 6 mm

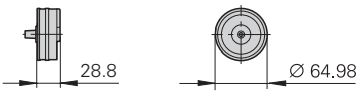
ECI/EQI 1300 Series
- **Mechanically compatible with ECN/EQN 1300**
- Taper shaft or blind hollow shaft

ERO 1200 Series
- **Compact design**
- For shaft diameters up to 12 mm

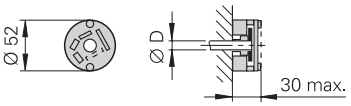
ERO 1300 Series
- For **large shaft diameters** Up to 30 mm
- Lateral mounting of scanning unit possible with through shaft

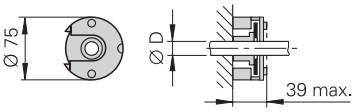
ERO 1400 Series
- **Miniaturized modular rotary encoders** for shafts up to Ø 8 mm
- Special integral mounting aid
- With cover cap



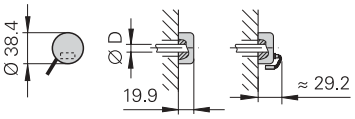


	Absolute			
	ECI 1118	**EQI 1130**	**ECI 1319**	**EQI 1331**
Incremental signals	∿ 1 V_{PP}; 16 lines		∿ 1 V_{PP}; 32 lines	
Absolute position values	EnDat 2.1			
Position values per rev	262 144 (18 bits)		524 288 (19 bits)	
Distinguishable revolutions	–	4096 (12 bits)	–	4096 (12 bits)
Mech. perm. speed	15 000 min^{-1}	12 000 min^{-1}	15 000 min^{-1}	12 000 min^{-1}
Shaft	Blind hollow shaft		Taper shaft or blind hollow shaft	





	Incremental			
	ERO 1225	**ERO 1285**	**ERO 1324**	**ERO 1384**
Incremental signals	⊓⊔ TTL	∿ 1 V_{PP}	⊓⊔ TTL	∿ 1 V_{PP}
Line count	1 024 2 048		1 024 2 048 5 000	
Mech. perm. speed	25 000 min^{-1}		16 000 min^{-1}	
Shaft diameter D	Ø 10, 12 mm		Ø 20, 30 mm	



	Incremental		
	ERO 1420	**ERO 1470**	**ERO 1480**
Incremental signals	⊓⊔ TTL	⊓⊔ TTL [1]	∿ 1 V_{PP}
Line count	512 1 000 1 024	1 000 1 500	512 1 000 1 024
Mech. perm. speed	30 000 min^{-1}		
Shaft diameter D	Ø 4, 6, 8 mm		

[1] Integrated 5/10/20/25-fold interpolation