

Installation Instructions

847A and 847B Hollow Shaft Incremental Encoders

IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.

Selection Guide

847 $\frac{A}{a}$ $\frac{Q}{b}$ $\frac{3}{c}$ $\frac{1}{d}$ $\frac{4}{e}$ $\frac{R}{f}$ $\frac{B}{g}$ $\frac{65536}{h}$

a

Code	Encoder Diameter/Type
A	2 in. diameter, blind hollow shaft
B	2 in. diameter, through hollow shaft

b

Code	Mounting Configuration
Q	3-point mounting
R	2-point mounting

c

Code	Shaft Size
3	3/8 in. diameter metal hollow shaft
4	1/2 in. diameter metal hollow shaft

d

Code	Power Supply
1	4.5...5.5V DC
2	8...30V DC

Accessories

Description	Part Number
Differential encoder buffer board	845-BB*
M12 cable	889D-F8FB-*

* See Sensor Catalog for selection

e

Code	Output Configuration
Signal Phasing A-leads-B clockwise rotation viewed from shaft end, Z gated A	
4	4.5...5.5V line driver outputs (TTL)
5	4.5...5.5V open collector outputs ❶
6	8...30V line driver outputs (HTL) ❷
7	8...30V open collector outputs ❷
Signal Phasing B-leads-A clockwise rotation viewed from shaft end, Z gated BN	
A	4.5...5.5V line driver outputs (TTL)
B	4.5...5.5V open collector outputs ❶
C	8...30V line driver outputs (HTL) ❷
D	8...30V open collector outputs ❷

❶ Options 5 and B cannot be ordered with option 2 from Table d.

❷ Options 6, 7, C, and D cannot be ordered with option 1 from Table d.

f

Code	Connector/Cable Exit
R	Radial exit

g

Code	Connector/Cable Type
A	M12 connector, 8-pin with mating connector
B	M12 connector, 8-pin
P	1.5 m (4.9 ft) cable
Q	5 m (16.4 ft) cable
R	10 m (32.8 ft) cable

h

Code	Resolution
00001... 65536	00001...65536 pulses/revolution

Specifications

Electrical	
Code format	Incremental Two channels with zero index
Signal options, clockwise rotation viewed from shaft end	A-leads-B, 180° marker gated with A or B-leads-A, 180° marker gated with BN
Signal phase relation	90° ± 22° channels
Symmetry	40...60%
Supply current	50 mA
Frequency response	4.5...5.5V line driver output: 820 kHz 8...30V line driver output: 820 kHz Open collector: 150 kHz
Resolution	1...65536 pulses/revolution
Load current	30 mA for all output types
Output drivers	4.5...5.5V line driver - IC HD2 8...30V line driver - IC HD2 Open collector - 7406
Electrical protection	Reverse polarity and short circuit for all output types
Cable outer diameter	0.25 in (6.2 mm)
Cable type	300V, 105 °C, 26 AWG, 9-conductor with overall braided shield, UL AWM type 20327 for use in fixed (non-flexing) installations; RoHS compliant.
Cable bend radius	Minimum 5x outer diameter
Mechanical	
Maximum operating speed	6,000 RPM
Angular acceleration	500,000 radians/s ²
Moment of inertia	40 g·cm ²
Startup torque at 20 °C (68 °F)	0.8 N·cm
Operating torque at 20 °C (68 °F)	0.6 N·cm
Permissible shaft movement [mm (in.)]	Radial Static: ± 0.3 (0.012) Dynamic: ± 0.05 (0.002) Axial Static: ± 0.5 (0.02) Dynamic: ± 0.1 (0.004)
Hollow shaft diameter	3/8 in. (9.5 mm) or 1/2 in. (12.7 mm)
Approximate weight [kg (lb)]	0.16 (0.35) with M12 connector
MTTFd (EN ISO 13849-1)	330 years

Environmental

Enclosure rating per IEC 60529	Shaft: IP 65 Housing, connector version with mating connector installed: with blind hollow shaft: IP67 with through hollow shaft: IP65 Housing, cable version: with blind hollow shaft: IP67 with through hollow shaft: IP65
Temperature	-30...80 °C (-22...176 °F) operating -40...100 °C (-40...212 °F) storage
Relative humidity	90% non-condensing
Shock	100 G/11 ms duration
Vibration	30 G/10...2,000 Hz
EMC	EN 61000-6-2 and EN 61000-6-3 (M12 connector)
Housing material	EN AC-47100 die-cast aluminium
Housing finish	Powder coat paint, color RAL 9005, Pantone black C (jet black)
Flange material	6061-T6 aluminium
Shaft material	SAE 303 stainless steel
Certifications	UL Listed, RoHS compliant CE Marked for all applicable directives

Mounting Instructions

IMPORTANT Make sure mating shaft is chamfered and grease-free.

- Using a 5/64-in. Allen wrench, loosen the screw on the clamping ring.
- Slide the encoder onto the mating shaft until the flex mount rests on the machine surface.
The encoder should slide freely onto the shaft; if not, do not force. Check the shaft for interferences such as gouges, burrs, rust, or size.
If mounting holes already exist, proceed to step 6.
- Hold encoder firmly and mark the mounting holes.
- Mount the encoder with #4-40 (or equivalent) screws.
- Slide the encoder back onto the shaft until the flex mount rests on the machine surface.
- Attach the encoder with #4-40 (or equivalent) screws.

IMPORTANT Do not stress the flex mount while tightening the screws.

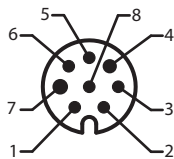
- Tighten the clamping ring screw to 8 in-lb.

8. Make the electrical connections according to the Connector Pins and Signal Availability table.

IMPORTANT Wiring must be in accordance with the National Electric Code and applicable local codes and regulations.

Connector Pins and Signal Availability

Signal Name	Wire color attached cable	Pin number M12 8-pin connector
V DC	Red	8
Common	Black with red band	7
A output	White	2
AN output	Black with white band	1
B output	Blue	4
BN output	Black with blue band	3
Z output	Green	6
ZN output	Black with green band	5
Zero set input	Yellow	-
Case	Black	-
Recommended mating cable	(Attached to encoder)	889D-F8FB-*

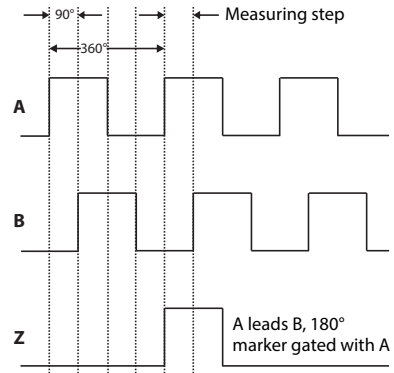


M12 pins on encoder connector

Output Waveforms

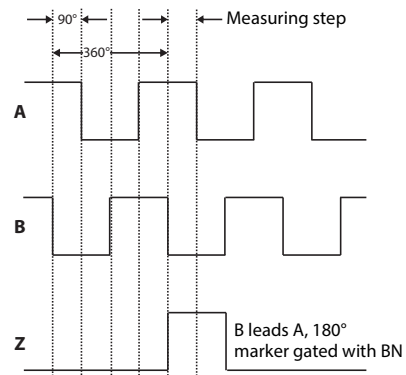
Complementary signals AN, BN, and ZN are supplied only on units with line driver outputs.

Signals and marker option - A leads B (CW rotation)



Clockwise rotation when facing encoder shaft

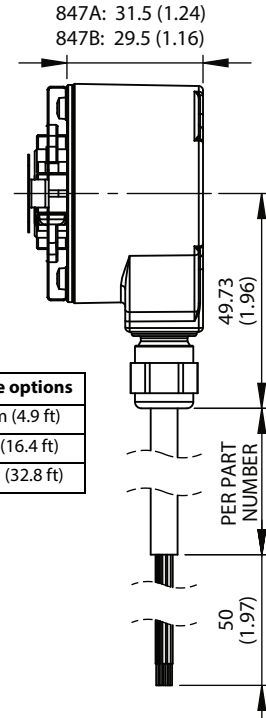
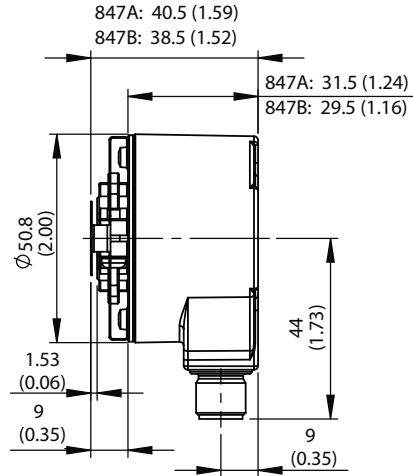
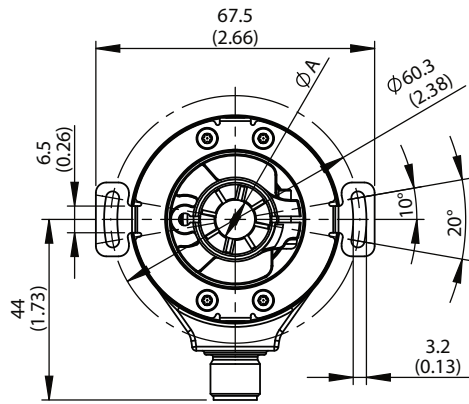
Signals and marker option - B leads A (CW rotation)



Clockwise rotation when facing encoder shaft

Dimensions [mm (in.)]

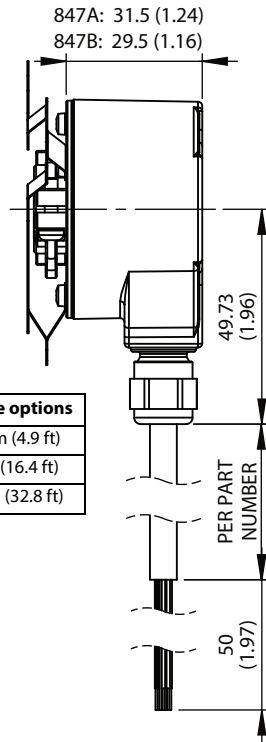
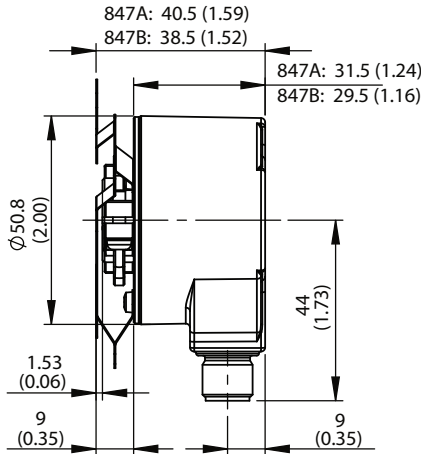
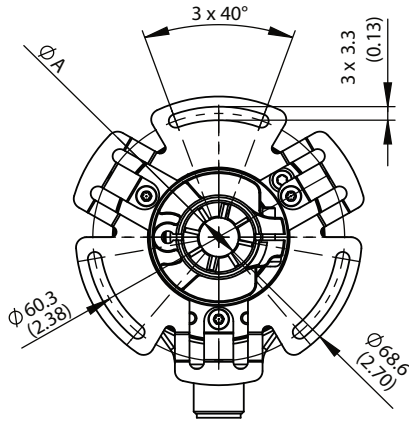
2-Point Mounting



Cable options	
1.5 m (4.9 ft)	
5 m (16.4 ft)	
10 m (32.8 ft)	

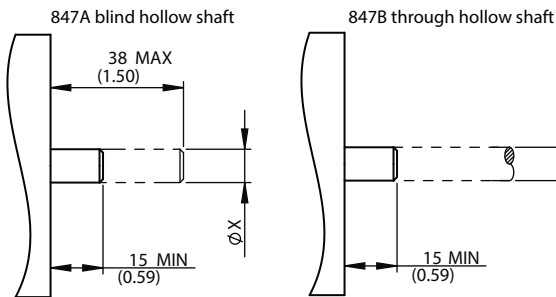
847A and 847B bore diameter options	
Nominal, in.	Bore ϕ A
3/8	9.543...9.558 (0.3757...0.3763)
1/2	12.716...12.734 (0.5006...0.5013)

3-Point Mounting



Cable options	
1.5 m (4.9 ft)	
5 m (16.4 ft)	
10 m (32.8 ft)	

Customer Shafts



847A and 847B customer shaft diameter	
Nominal, in.	Shaft ϕ X
3/8	9.535...9.520 (0.3754...0.3748)
1/2	12.712...12.694 (0.5005...0.4998)

Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>

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