

# Installation Instructions

## 847H 2.5 in. Diameter Solid Shaft Incremental Encoders

**IMPORTANT: SAVE THESE INSTRUCTIONS FOR FUTURE USE.**

### Selection Guide

**847**  $\frac{H}{a}$   $\frac{D}{b}$   $\frac{M}{c}$   $\frac{1}{d}$   $\frac{4}{e}$   $\frac{R}{f}$   $\frac{B}{g}$   $\frac{01024}{h}$

**a**

Code	Encoder Diameter/Type
H	2.5-in. diameter solid shaft

**b**

Code	Mounting Configuration
D	Standard square flange
E	70 mm diameter servo mount (64 mm bolt circle)
I	90 mm diameter servo mount (70 mm bolt circle)
G	65 mm diameter servo mount (48 mm bolt circle)
H	Standard servo mount
J	65 mm diameter servo mount (42 mm bolt circle)

**c**

Code	Shaft Size
K	6 mm diameter shaft with flat
L	10 mm diameter shaft with flat
M	1/4 in. diameter shaft with flat
N	3/8 in. diameter shaft with flat

**d**

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

### Accessories

Description	Part Number
High-performance flexible coupling	845-FC-*.*
Measuring wheels	845-MW-A-*
Servo clamps	845-SC
Mounting plates	845-MB-*
Pre-wired cables	845-CA-*.*
Mating connectors	845-6P 845-7P 845-7P-RT 845-10P 845-10P-RT
Differential encoder buffer board	845-BB*
M12 cable	889D-F8FB-*

\* See Sensor Catalog for selection

**e**

Code	Output Configuration
<b>Signal phasing A-leads-B clockwise rotation viewed from shaft end, Z gated A</b>	
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
<b>Signal phasing B-leads-A clockwise rotation viewed from shaft end, Z gated BN</b>	
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, and C cannot be ordered with option 1 from table d.

**f**

Code	Connector/Cable Exit
A	Axial exit
R	Radial exit

**g**

Code	Connector/Cable Type
A	M12 connector, 8-pin with mating connector
B	M12 connector, 8-pin
C	MS connector, 6-pin with mating connector
D	MS connector, 6-pin
E	MS connector, 7-pin with mating connector
F	MS connector, 7-pin
G	MS connector, 10-pin with mating connector
H	MS connector, 10-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
1...65536	00001...65536 pulses/revolution



## Specifications

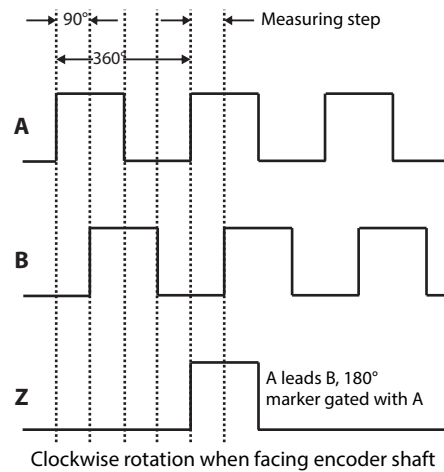
Electrical	
Code format	Incremental 2 channels with zero index
Signal options, clockwise rotation viewed from shaft end	A-leads-B, 180° marker gated with A or B-leads-A, 180° marker gated with BN
Signal phase relation	90° ± 22° channels
Symmetry	50% ± 10%
Zero index channel	Gated 1/2 cycle
Supply current	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	9,000 RPM
Angular acceleration	500,000 radians/s <sup>2</sup>
Moment of inertia	15 g·cm <sup>2</sup>
Startup torque at 20 °C (68 °F)	0.8 N·cm
Operating torque at 20 °C (68 °F)	0.6 N·cm
Approximate weight [kg (lb)]	0.28 (0.61) with M12 connector
MTTFd (EN ISO 13849-1)	330 years
Shaft loading	80 N radial (20 mm from front bearing) and 40 N axial provide L10 life of 3.6 x 10 <sup>9</sup> revolutions at 9,000 RPM and 80° C ambient temperature.
Shaft diameter [mm (in.)]	6 (0.24), 10 (0.39), 6.4 (1/4), 9.5 (3/8)
Environmental	
Enclosure rating per IEC 60529	Shaft: IP 65 Housing, connector version with mating connector installed: IP67 Housing, cable version: IP67
Temperature	-30...80 °C (-22...176 °F) operating -40...100 °C (-4...212 °F) storage
Relative humidity	90% non-condensing
Shock	100G/11ms duration

Environmental (continued)	
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	RoHS compliant CE marked for all applicable directives UL listing valid only for encoders with cable and M12 connections

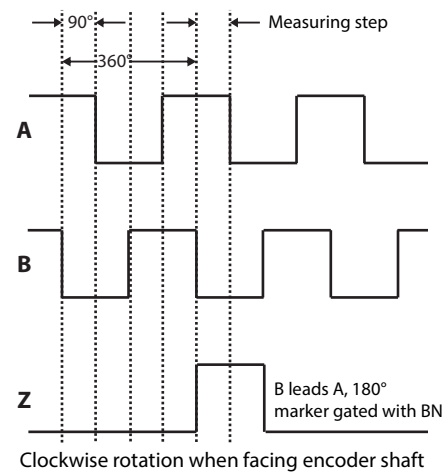
## Output Waveforms

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

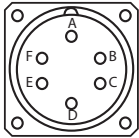
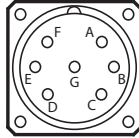
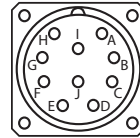
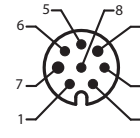
### Signals and marker option - A leads B (CW rotation)



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



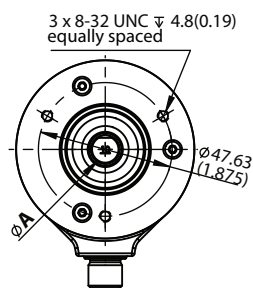
## Connector Pins and Signal Availability

Signal Name	MS 6-pin	MS 7-pin	MS 10-pin	M12 8-pin	Cable Wire Colors
V DC	B	D	D	8	Red
Common	A	F	F	7	Black with red band
A output	E	A	A	2	White
AN output	-	-	H	1	Black with white band
B output	D	B	B	4	Blue
BN output	-	-	I	3	Black with blue band
Z output	C	C	C	6	Green
ZN output	-	-	J	5	Black with green band
Zero set input	-	E	E	-	Yellow
Case	F	G	G	-	Black
Encoder connectors/ cable view					-
Recommended mating cable part number	845-CA-A-*	845-CA-B-*	845-CA-C-*	889D-F8FB-*	(Attached to encoder)

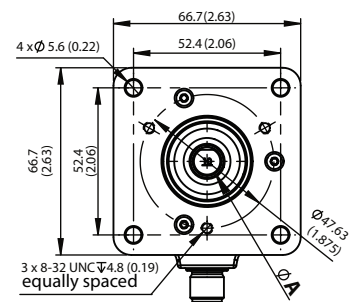
## Dimensions [mm (in.)]

Shaft dimensions		
Nominal dia.	Shaft $\varnothing$ A	Flat dim., B
1/4 in.	6.237/6.312 (0.2491/0.2485)	5.5 (0.22)
6 mm	6.000/5.988 (0.2362/0.2357)	5.5 (0.22)
3/8 in.	9.507/9.492 (0.3743/0.3737)	8.5 (0.33)
10 mm	9.977/9.962 (0.3928/0.3922)	9.0 (0.35)

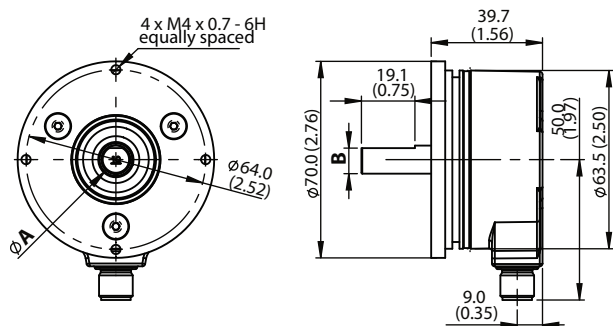
Standard Servo Mount Encoder with Radial M12 Connector



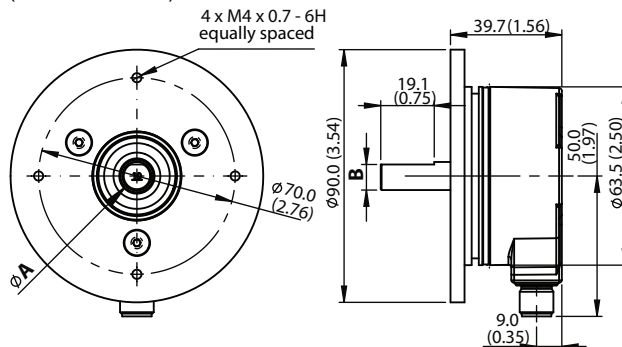
Standard Square Flange Encoder with Radial M12 Connector



70mm Diameter Servo Mount Encoder with Radial M12 Connector (64 mm bolt circle)

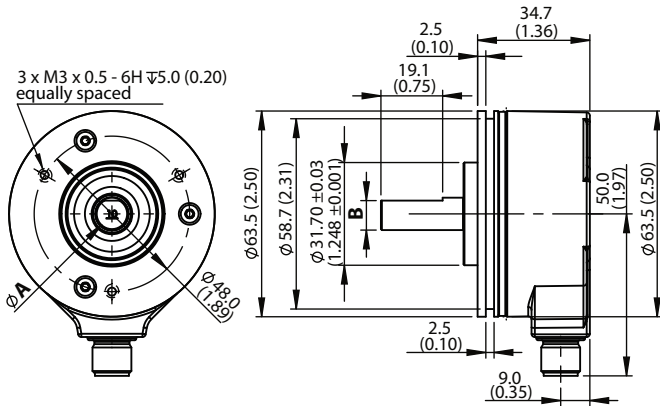


90 mm Diameter Servo Mount Encoder with Radial M12 Connector (70 mm bolt circle)

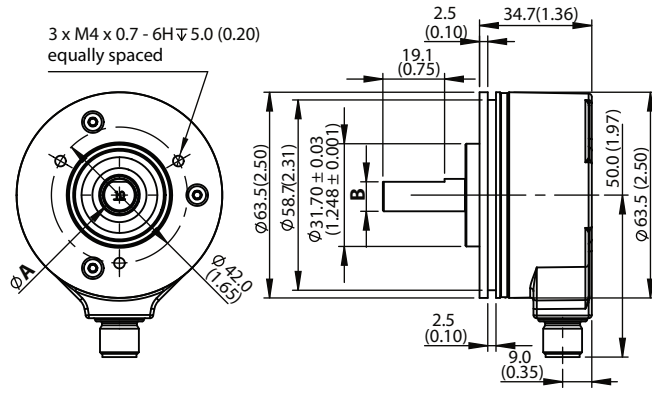


## Dimensions [mm (in.)] (continued)

### 65 mm Diameter Servo Mount Encoder with Radial M12 Connector (48 mm bolt circle)



### 65 mm Diameter Servo Mount Encoder with Radial M12 Connector (42 mm bolt circle)



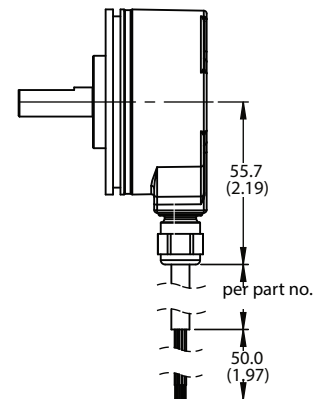
Shaft dimensions

Nominal dia.	Shaft $\phi$ A	Flat dim., B
1/4 in.	6.237/6.312 (0.2491/0.2485)	5.5 (0.22)
6 mm	6.000/5.988 (0.2362/0.2357)	5.5 (0.22)
3/8	9.507/9.492 (0.3743/0.3737)	8.5 (0.33)
10 mm	9.977/9.962 (0.3928/0.3922)	9.0 (0.35)

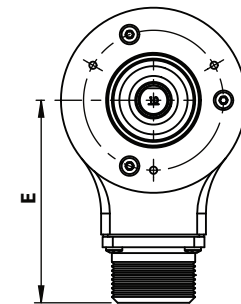
Cable options

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

Encoder with Radial Cable



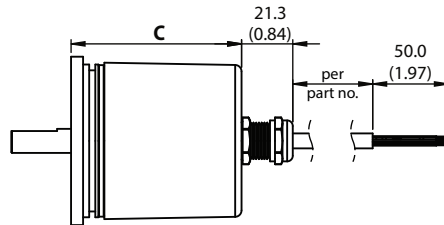
Encoder with Radial MS Connector



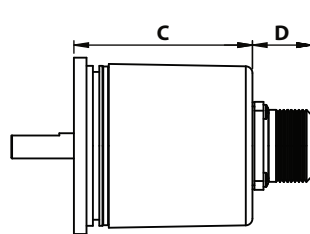
Dimensions with Axial Cable or Axial Connector

Encoders	C
70 and 90 mm diameter servo mount	70.9 (2.79)
Other mounting configurations	65.9 (2.59)

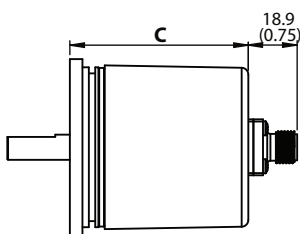
Encoder with Axial Cable



Encoder with Axial MS Connector



Encoder with Axial M12 Connector



Dimensions with Axial MS Connector

Type	D
6-pin	17.8 [0.70]
7-pin	17.8 [0.70]
10-pin	23.4 [0.92]

Dimensions with Radial MS Connector

Type	E
6-pin	63.9 (2.52)
7-pin	63.9 (2.52)
10-pin	69.4 (2.73)

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

[www.rockwellautomation.com](http://www.rockwellautomation.com)

### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Copyright © 2014 Rockwell Automation, Inc. All rights reserved.

10001065809 Ver 00 July 2014  
847H-IN001A-EN-P  
Printed in USA