

MODEL S15 Incremental Optical Rotary Encoder



- Up to 200 KHz frequency response all channels
- Small compact size: 1.51" diameter
- 1.00" dia. Bolt circle mount
- Resolutions up to 12,500 cycles / revolution (50,000 counts)
- Available with internal 2x, 5x, 10x interpolation
- Multiple input voltages available. +5Vdc, +12Vdc, +15Vdc, and +5 to +24Vdc

The Model S15 series is a compact incremental optical rotary encoder. The unit offers a wide variety of disk resolutions up to 1250 cycles per shaft revolution to provide a maximum of 50,000 counts per revolution when you utilize external quadrature detection circuitry. The S15 series encoder offers either TTL compatible, Differential Amplified Analog or Differential line driver (RS422) output with up to 200KHz frequency response, all channels. This unit is ideal for applications where a low cost, easy to install totally enclosed optical encoder is required.

ELECTRICAL

Resolution range: Up to 12,500 cycles per shaft revolution, (50,000 counts with internal interpolation and external quadrature).

Light source: Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg's spec).

Light sensor: Monolithic photodiode array.

Excitation voltage: +5Vdc, +12Vdc, +15Vdc ± 5%. Variable voltage, +5 to +24Vdc.

Output format: Two count channels (A & B) in phase quadrature with an optional ZR output.

Quadrature: 90° ± 45° (Through the frequency and temperature range).

Symmetry: 180° ± 18° (at 10 KHz output frequency).

Rise and fall time: 1 microsecond max. into 1,000pf load capacitance. (Square wave units)

Frequency response: DC to 100 KHz max. 200KHz for output circuitry types 1 and 6.

Zero reference width: 1± 1/2 cycle, 1/4 cycle or 1/2 cycle gated, depending on electronic configuration.

ZR alignment: Full cycle: output type 1 no alignment between ZR and count channels.
All other output types: Center of ZR aligns between 90° and 180° of channel A.
1/2 cycle aligns with negative transition of channel B.
1/4 cycle aligns with both A and B high.

Phase sense: Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the cover side of the unit.

Output: See part number table for available output options.

MECHANICAL

Shaft loading: 8 Lbs. Radial; and Axial (Base type style 1, 2, 3).
8 Lbs. Radial; and Axial (Base type style 4).

Shaft run-out: .001 in. radial Max.

Starting torque: 0.15 oz. In. @ 25°C Max

Shaft angular acceleration: 10⁵ radian / sec². (maximum).

Moment of inertia: 0.0004 oz. In. sec. squared.

Bearing type: Stainless steel radial shielded or sealed.

Max. operating speed: 4000 RPM or max. operating frequency, which ever occurs first.

Slew speed: 6,000 RPM (maximum).

Cable description: 28 AWG (7/36, shielded, PVC jacket).

Housing material: Aluminum.

Shaft material: Stainless steel.

ELECTRICAL CONNECTION		
FUNCTION	STD. WIRE COLOR	COVER / BASE STYLE 4
Channel A+	Orange	Brown
Channel A-	Green	Brn / Wht
Channel B+	Yellow	Green
Channel B-	Blue	Grn / Wht
Channel ZR+	Brown	Orange
Channel ZR-	Gray	Org / Wht
Ground	Black	Black
Supply VDC	Red	Red
Case Ground	Violet	
Drain	Bare wire	Bare wire

ENVIRONMENTAL

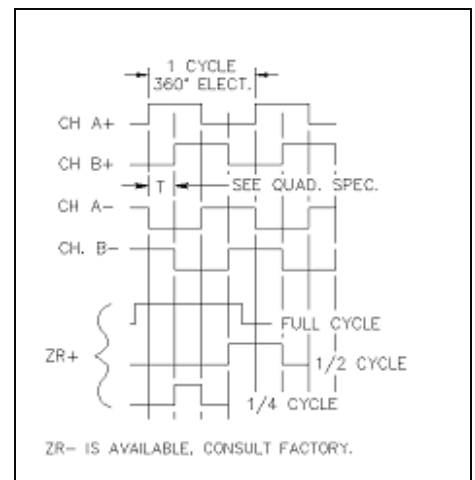
Operating temperature: Standard 0°C to +70°C,
Optional -20°C to +85°C

Storage temperature range: -25°C TO +90°C

Shock: 50 G for 11 millisecond duration.

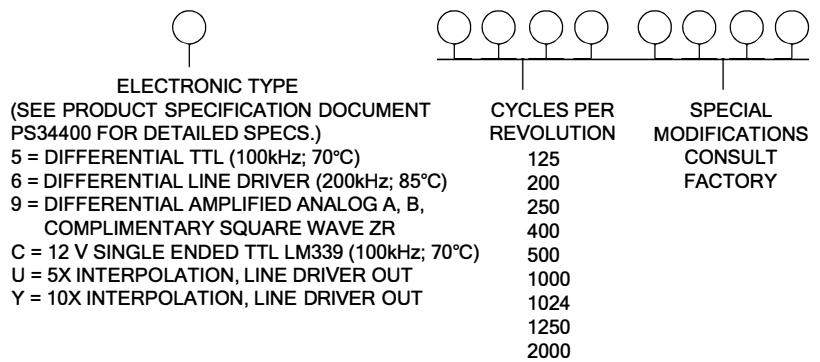
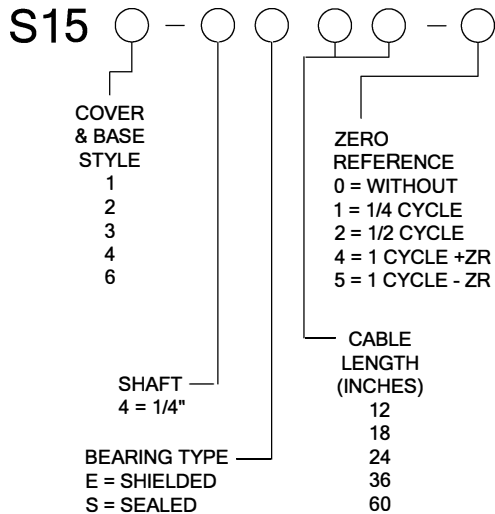
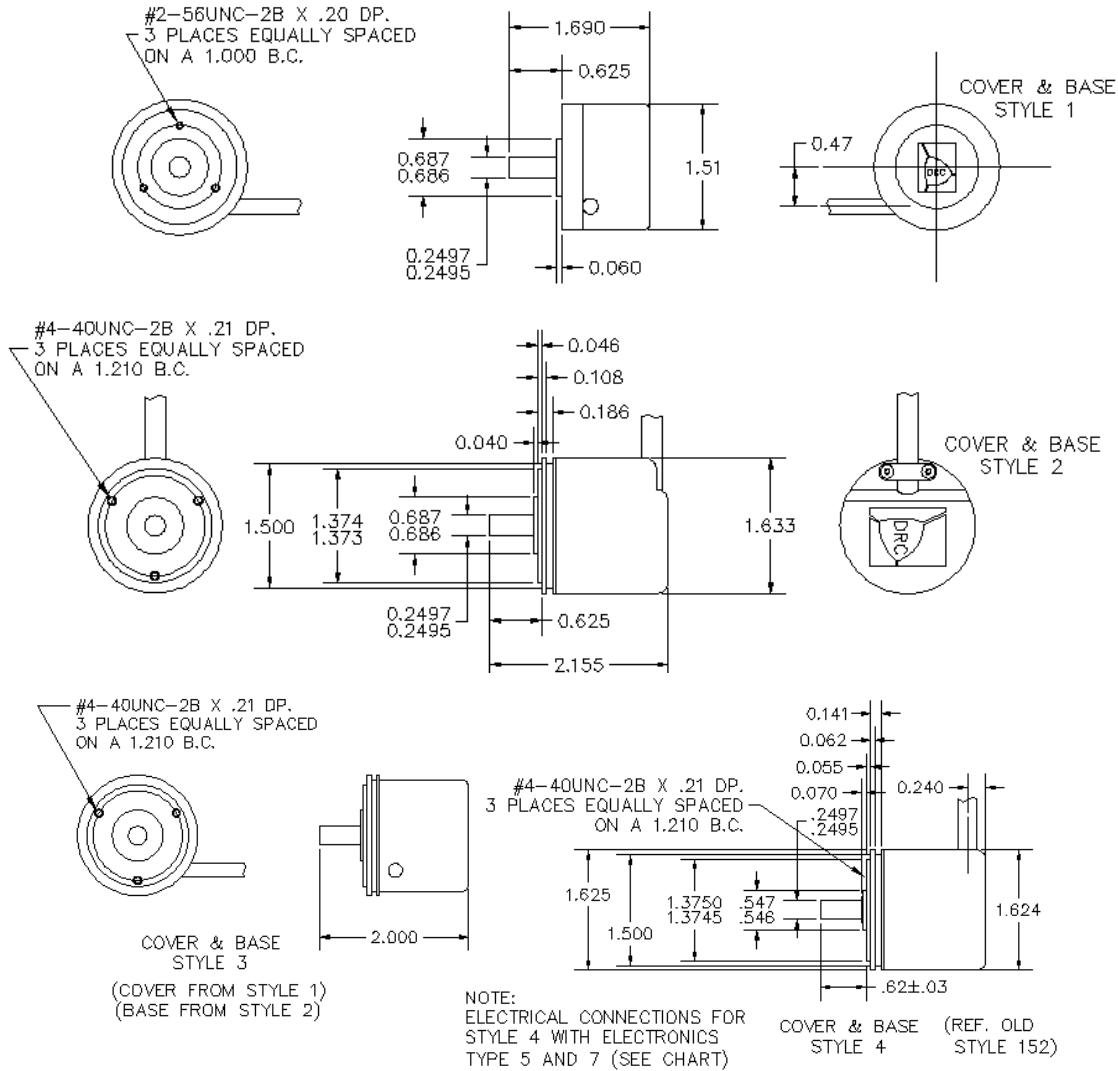
Vibration: 20 Hz to 2000 Hz @ 5 G.

Humidity: To 98% R.H. (non-condensing).



CIRCUITRY TYPE	AVAILABLE ZR OPTIONS
1, 8, 9, B, C, D	0, 4
V	0, 4, 5
5, 7	0, 1, 2, 4
6	0, 1, 4
A, U, Y	0, 1

DRC Encoder



MODEL H15 Incremental Optical FLEXIBLE Mount Rotary Encoder

- **Up to 200 KHz frequency response all channels**
- **Small compact size: 1.51" diameter**
- **Flexible mount offers easy installation**
- **1.812" dia. Bolt circle mount allows for direct replacement of kit style encoders**
- **Available with internal 2x, 5x, 10x interpolation**
- **Multiple input voltages available. +5Vdc, +12Vdc, +15Vdc, and +5 to +24Vdc**

The Model H15 series is a compact incremental optical FLEXIBLE mount rotary encoder. The unit offers a wide variety of disk resolutions up to 1250 cycles per shaft revolution to provide a maximum of 50,000 counts per revolution when you utilize external quadrature detection circuitry. The standard unit offers a hollow shaft configuration. The units unique flexible mount design eliminates the problems associated with shaft run-out and the installation problems of KIT style encoders. The H15 series encoder offers either TTL compatible, Differential Amplified Analog or Differential line driver (RS422) output with up to 200KHz frequency response, all channels. This unit is ideal for applications where a low cost, easy to install totally enclosed optical encoder is required.

ELECTRICAL

Resolution range: Up to 12,500 cycles per shaft revolution, (50,000 counts with internal interpolation and external quadrature).

Light source: Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg's spec).

Light sensor: Monolithic photodiode array.

Excitation voltage: +5Vdc, +12Vdc, +15Vdc \pm 5%. Variable voltage, +5 to +24Vdc.

Output format: Two count channels (A & B) in phase quadrature with an optional ZR output.

Quadrature: $90^\circ \pm 45^\circ$ (Through the frequency and temperature range).

Symmetry: $180^\circ \pm 18^\circ$ (at 10 KHz output frequency).

Rise and fall time: 1 microsecond max. into 1,000pf load capacitance. (Square wave units)

Frequency response: DC to 100 KHz max. 200KHz for output circuitry types 1 and 6.

Zero reference width: $1 \pm 1/2$ cycle, 1/4 cycle or 1/2 cycle gated, depending on electronic configuration.

ZR alignment: Full cycle: output type 1 no alignment between ZR and count channels.
All other output types: Center of ZR aligns between 90° and 180° of channel A.
1/2 cycle aligns with negative transition of channel B.
1/4 cycle aligns with both A and B high.

Phase sense: Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the cover side of the unit.

Output: See part number table for available output options.

MECHANICAL

Shaft run-out: .005 in. Radial Max; and .010 in. Axial Max.

Starting torque: 0.15 oz In. @ 25°C Max.

Shaft angular acceleration: 10^5 radian / sec². (maximum).

Moment of inertia: 4 X 10 to the -4 oz. In. sec. Sq.

Bearing type: S.S. Radial, Shielded.

Max. operating speed: 4000 RPM or max. operating frequency, which ever occurs first.

Slew speed: 6,000 RPM (maximum).

Cable description: 28 AWG (7/36, shielded, PVC jacket).

Housing material: Aluminum.

Shaft material: Stainless Steel.

ELECTRICAL CONNECTION		
FUNCTION	STD. WIRE COLOR	COVER / BASE STYLE 4
Channel A+	Orange	Brown
Channel A-	Green	Brn / Wht
Channel B+	Yellow	Green
Channel B-	Blue	Grn / Wht
Channel ZR+	Brown	Orange
Channel ZR-	Gray	Org / Wht
Ground	Black	Black
Supply VDC	Red	Red
Case Ground	Violet	
Drain	Bare wire	Bare wire

ENVIRONMENTAL

Operating temperature: Standard 0°C to +70°C
Optional -20°C to +85°C

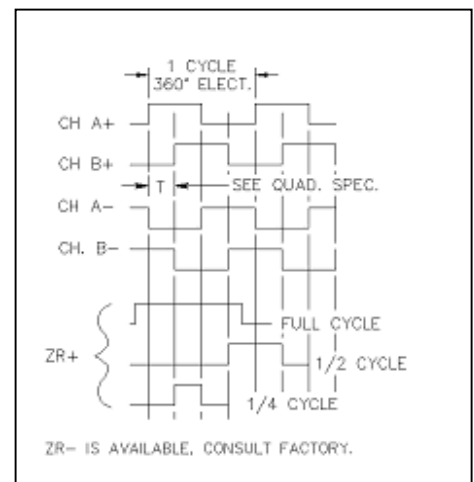
Storage temperature range: -25°C TO +90°C

Shock: 50 G for 11 millisecond duration.

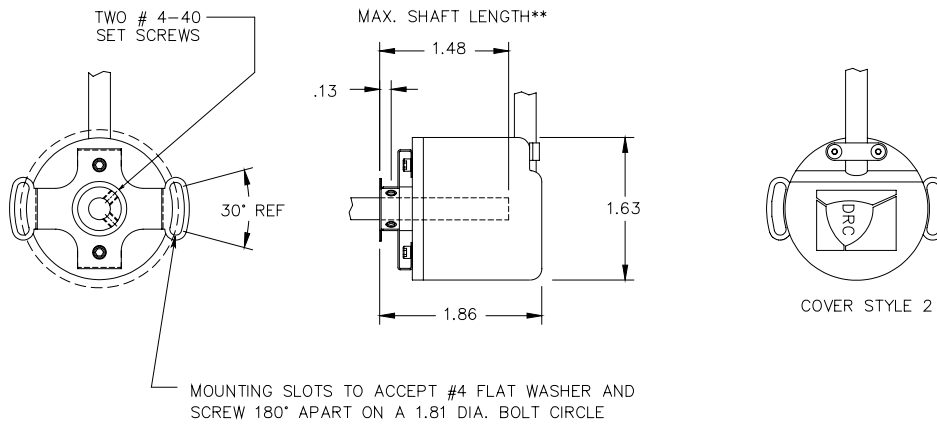
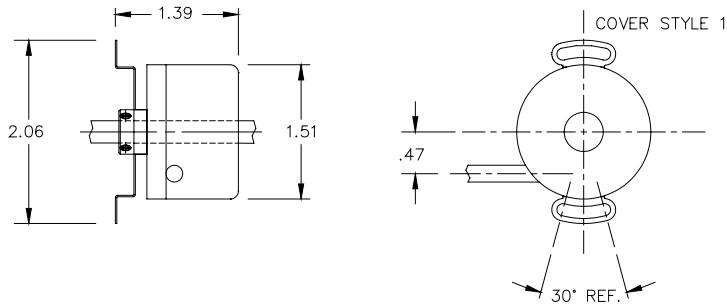
Vibration: 20 Hz to 2000 Hz @ 5 G.

Humidity: To 98% R.H. (non-condensing).

CIRCUITRY TYPE	AVAILABLE ZR OPTIONS
1, 8, 9, B, C, D	0, 4
V	0, 4, 5
5, 7	0, 1, 2, 4
6	0, 1, 4
A, U, Y	0, 1



DRC Encoder



H15

CUSTOMER
SHAFT
DIAMETER
3E = 3/16"
4E = 1/4"
5E = 5/16"
04 = 4MM
06 = 6MM
08 = 8MM

COVER STYLE
1 = MIN. SIZE
2 = EMF SHIELDED

ZERO REFERENCE
0 = WITHOUT
1 = 1/4 CYCLE
2 = 1/2 CYCLE
4 = 1 CYCLE +ZR
5 = 1 CYCLE - ZR

CABLE LENGTH
(INCHES)
12
18
24
36
60
(MAX. LENGTH)

SL = SPECIAL LENGTH, SEE MOD

ELECTRONIC TYPE
(SEE PRODUCT SPECIFICATION DOCUMENT
PS34400 FOR DETAILED SPECS.)
5 = DIFFERENTIAL TTL (100kHz; 70°C)
6 = DIFFERENTIAL LINE DRIVER (200kHz; 85°C)
9 = DIFFERENTIAL AMPLIFIED ANALOG A, B,
COMPLIMENTRY SQUARE WAVE ZR
U = 5X INTERPOLATION, LINE DRIVER OUT
Y = 10X INTERPOLATION, LINE DRIVER OUT

CYCLES PER REVOLUTION	SPECIAL MODIFICATIONS CONSULT FACTORY
200	
250	
400	
500	
1000	
1024	
1250	
2000	

MODEL F15 Incremental Optical FLEXIBLE Mount Rotary Encoder



- Up to 200 KHz frequency response all channels
- Small compact size: 1.51" diameter
- Low Profile. Only .90 inch high
- Flexible mount offers easy installation with a 1.750" dia. Bolt circle mount
- Available with internal 2x, 5x, 10x interpolation
- Multiple input voltages available. +5Vdc, +12Vdc, +15Vdc, and +5 to +24Vdc

The Model F15 series is a compact incremental optical FLEXIBLE mount rotary encoder. The unit offers a wide variety of disk resolutions up to 1250 cycles per shaft revolution to provide a maximum of 50,000 counts per revolution when you utilize external quadrature detection circuitry. The standard unit offers a hollow shaft configuration. The unit's unique flexible mount design eliminates the problems associated with shaft run-out and the installation problems of KIT style encoders. The F15 series encoder offers either TTL compatible, Differential Amplified Analog or Differential line driver (RS422) output with up to 200KHz frequency response, all channels. This unit is ideal for applications where a low cost, easy to install totally enclosed optical encoder is required.

ELECTRICAL

Resolution range: Up to 12,500 cycles per shaft revolution, (50,000 counts with internal interpolation and external quadrature).

Light source: Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg's spec).

Light sensor: Monolithic photodiode array.

Excitation voltage: +5Vdc, +12Vdc, +15Vdc ± 5%. Variable voltage, +5 to +24Vdc.

Output format: Two count channels (A & B) in phase quadrature with an optional ZR output.

Quadrature: 90° ± 45° (Through the frequency and temperature range).

Symmetry: 180° ± 18° (at 10 KHz output frequency).

Rise and fall time: 1 microsecond max. into 1,000pf load capacitance. (Square wave units)

Frequency response: DC to 100 KHz max. 200KHz for output circuitry types 1 and 6.

Zero reference width: 1± 1/2 cycle, 1/4 cycle or 1/2 cycle gated, depending on electronic configuration.

ZR alignment: Full cycle: output type 1 no alignment between ZR and count channels.
All other output types: Center of ZR aligns between 90° and 180° of channel A.
1/2 cycle aligns with negative transition of channel B.
1/4 cycle aligns with both A and B high.

Phase sense: Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the cover side of the unit.

Output: See part number table for available output options.

MECHANICAL

Shaft run-out: +/- .002 in. Radial; and +/- .008 in. Axial.

Starting torque: 0.15 oz In. @ 25°C Max.

Shaft angular acceleration: 10⁵ radian / sec². (maximum).

Shaft perpendicularity to mounting surface: .005 in. per in. max.

Moment of inertia: 4 X 10 to the -4 oz. In. sec. Sq.

Bearing type: S.S. Radial, Shielded.

Max. operating speed: 4000 RPM or max. operating frequency, which ever occurs first.

Slew speed: 6,000 RPM (maximum).

Cable description: 28 AWG (7/36, shielded, PVC jacket).

Housing material: Aluminum.

Shaft material: Stainless Steel.

ELECTRICAL CONNECTION		
FUNCTION	STD. WIRE COLOR	COVER / BASE STYLE 4
Channel A+	Orange	Brown
Channel A-	Green	Brn / Wht
Channel B+	Yellow	Green
Channel B-	Blue	Grn / Wht
Channel ZR+	Brown	Orange
Channel ZR-	Gray	Org / Wht
Ground	Black	Black
Supply VDC	Red	Red
Case Ground	Violet	
Drain	Bare wire	Bare wire

ENVIRONMENTAL

Operating temperature: Standard 0°C to +70°C
Optional -20°C to +85°C

Storage temperature range: -25°C TO +90°C

Shock: 50 G for 11 millisecond duration.

Vibration: 20 Hz to 2000 Hz @ 5 G.

Humidity: To 98% R.H. (non-condensing).

CIRCUITRY TYPE	AVAILABLE ZR OPTIONS
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