ENCODERS

Sensors, Encoders and Elevator Products
Smart Sensing Solutions Since 1954
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<td>MB-ST.312</td>
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<td>MB-ST.375</td>
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<td>MB-ST.5</td>
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<tr>
<td>MB-ST.5A</td>
<td>31</td>
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</table>
ENCODERS

Digital position and motion information is needed for a wide range of applications. Optical position technology offers the highest resolution of all the technologies. Accuracy and reliability are key. Photocraft optical rotary encoders have stood the test of time with proven service in harsh applications for more than 40 years. Encoders with precision measuring wheels designed for conveyor and web applications solve a host of linear measuring needs. Our shaft, hollow-shaft incremental and absolute rotary encoders are used in a variety of industries. Our encoders can be user configured to deliver a number of CPR settings and custom features to meet the needs of different applications. With our large selection of accessories and custom cables we are a one stop shop for all your encoder needs. Check out our selection of encoder products.

Shaft Encoders
Provides excellent speed and distance feedback for a rotating shaft.

Hollow Shaft Encoders
Mounts directly on a shaft, eliminating the need for couplings and brackets.

Wheel Encoders
Uses precision measuring wheels to track and measure the movement of a conveyor belt or a moving web.

Absolute Encoders
Single-turn resolutions up to 10-bits in low cost miniature, modular, and industrial configurations.

Accessories
Measuring wheels, shaft couplings, mounting brackets, mounting adapters, cables assemblies, and more.

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support@logicbus.com
Shaft Encoders
Shaft encoders direct couple to a device shaft and generate a specific pulse output for each revolution. Select from a wide offering of body sizes and styles. Once you have decided on a style, you can configure your encoder to your specific needs with our configuration center.

**RB20**
BlueCoder size 20 up to 10,000 CPR. Servo ring, face mount options.

**R20**
Size 20 up to 1200 CPR. Servo ring, face mount and IP66 seal options.

**R20-P**
Size 20 w/user selectable CPR. Servo ring and face mount options.

**RG**
Size 22.5 up to 2400 CPR. General purpose and economical

**RJ**
Size 22.5 up to 2400 CPR. General purpose and environmentally sealed

**RBL**
BlueCoder size 30 up to 1344 CPR

**RL**
Size 30 up to 1344 CPR

**RL-P**
Size 30 w/user selectable CPR

**RBS**
BlueCoder Cube style up to 10000 CPR

**RS**
Cube style up to 1200 CPR

**RS-P**
Cube style w/user selectable CPR

**RBX**
3” square face mount configuration
**Hollow Shaft**

Hollow shaft encoders are designed with either a through-bore or blind-bored shaft which mounts to a rotating shaft. They "float" on the shaft eliminating the need for a shaft-to-shaft coupling and mounting adapter saving space and cost. A tether or flexible mounting bracket prevents the encoder from turning and absorbs shaft-to-shaft misalignment increasing bearing life. Select from a wide offering of body sizes and styles. Once you have decided on a style you can configure your encoder to your needs using our configuration center.

- **HSB20** BlueCoder Size 20 up to 10,000 CPR & 16mm bore
- **HS20** Size 20 up to 720 CPR & 16mm bore
- **HS20-P** Size 20 w/user selectable CPR & up to 16mm bore
- **HS25** Size 25 up to 1200 CPR & 10mm bore
- **HS25-P** Size 25 w/user selectable CPR & up to 10mm bore
- **HS30** Size 30 up to 1200 CPR & 30mm bore
- **HRL** Size 30 up to 1344 CPR & 25mm bore
- **HRL-P** Size 30 w/user selectable CPR & up to 25mm bore
Wheel
Wheel encoders ride directly on the moving material, use a wheel tread having a high coefficient of friction, and have a very low starting torque resulting in virtually no slippage of the wheels on the belt. In addition, the wheels are precision ground with exacting tolerances, versus a roller which has a much larger tolerance and its circumference seldom translates into an integral number of encoder pulses per unit of linear movement.

Our single and dual wheel encoders offer additional advantages:

- Integrated mounting arm for easy installation
- Accessories for mounting above or below a conveyor or moving web
- Rugged construction for continuous duty in industrial applications
- "Anti-Jitter" feature eliminated measuring and tracking problems and the resulting missorts often encountered when a conveyor or web stop or restarts
- Circuit protection that eliminates failure caused by the significant levels of static electricity often associated with conveyors
- "Programmable" versions that enables selection of various features at installation time, such as the pulses per revolution and the output circuit type, resulting in maximum flexibility with minimum inventory

Select the body size and wheel configuration. You can then configure your encoder to your needs using our configuration center.
Absolute

Absolute encoders generate a digital code indicating the angular position of the shaft. Each increment of one shaft rotation is given a unique digital code for a single-turn encoder. When power is first applied, shaft position is immediately known without having to home the encoder. Even if the shaft is moved when power is off, shaft position is not lost. Select from a wide offering of body sizes and styles. Once you have decided on a style you can configure your encoder to your needs using our configuration center.
Accessories

We offer a wide variety of accessories to help you solve your application. Precision ground Measuring Wheels, Shaft Couplings, Shaft Stubs, Mounting Options, and Cable Assemblies can be fitted to most any of our encoders.

**M12.4-3-10 RC**
12mm, 4-pin, 3 wire, 10ft cable assembly

**MB-ST.375A**
Shaft stub, 3/8" diameter, 1-3/4" stub length, #10-24 thread

**MB-ST.375B**
Shaft stub, 3/8" diameter, 1-3/4" stub length, 3/8-16 thread

**M12.4-3-20 RC**
12mm, 4-pin, 3 wire, 20ft cable assembly

**M12.4-3-3M RC**
12mm, 4-pin, 3 wire, 3M cable assembly

**M12.4-3-6M RC**
12mm, 4-pin, 3 wire, 6M cable assembly

**M12.4-4-10 RC**
12mm, 4-pin, 4 wire, 10ft cable assembly

**M12.4-4-20 RC**
12mm, 4-pin, 4 wire, 20ft cable assembly

**M12.4-4-3M RC**
12mm, 4-pin, 4 wire, 3M cable assembly

**M12.4-4-6M RC**
12mm, 4-pin, 4 wire, 6M cable assembly

**D6-3-10**
16mm, 6-pin, 3 wire, 10ft cable assembly

**D6-3-20**
16mm, 6-pin, 3 wire, 20ft cable assembly
D8-6-3M
16mm, 8-pin, 6 wire, 3M cable assembly

D8-6-6M
16mm, 8-pin, 6 wire, 6M cable assembly

D8-8-10
16mm, 8-pin, 8 wire, 10ft cable assembly

D8-8-20
16mm, 8-pin, 8 wire, 20ft cable assembly

C3-3-3M RC
MS, 3-pin, 3 conductor, 3M cable assembly

C3-3-6M RC
MS, 3-pin, 3 conductor, 6M cable assembly

C3-2P-10 RC M148
MS, 3-pin, 2 pair braided, 10ft cable assembly

C3-2P-20 RC M148
MS, 3-pin, 2 pair braided, 20ft cable assembly

C3-2P-3M RC M148
MS, 3-pin, 2 pair braided, 3M cable assembly

C3-2P-6M RC M148
MS, 3-pin, 2 pair braided, 6M cable assembly

C5-3-10 RC
MS, 5-pin, 3 wire, 10ft cable assembly

C5-3-20 RC
MS, 5-pin, 3 wire, 20ft cable assembly
**C6-3-3M RC**
MS, 6-pin, 3 wire, 3M cable assembly

**C6-3-6M RC**
MS, 6-pin, 3 wire, 6M cable assembly

**C6-4-10 RC**
MS, 6-pin, 4 wire, 10ft cable assembly

**C6-4-20 RC**
MS, 6-pin, 4 wire, 20ft cable assembly

**C6-4-3M RC**
MS, 6-pin, 4 wire, 3M cable assembly

**C6-4-6M RC**
MS, 6-pin, 4 wire, 6M cable assembly

**C6-4-10 RCLD**
MS, 6-pin, 4 wire, 10ft, line driver cable assembly

**C6-4-20 RCLD**
MS, 6-pin, 4 wire, 20ft, line driver cable assembly

**C6-4Z-3M RC**
MS, 6-pin, 4 wire, pulse/index outputs, 3M cable assembly

**C6-4Z-6M RC**
MS, 6-pin, 4 wire, pulse/index outputs, 6M cable assembly

**C6-4Z-10 RC**
MS, 6-pin, 4 wire, pulse/index outputs, 10ft cable assembly

**C6-4Z-20 RC**
MS, 6-pin, 4 wire, pulse/index outputs, 20ft cable assembly

**C6-5-10 RC**
MS, 6-pin, 5 wire, 10ft cable assembly

**C6-5-20 RC**
MS, 6-pin, 5 wire, 20ft cable assembly
C6-5-3M RC
MS, 6-pin, 5 wire, 3M cable assembly

C6-5-6M RC
MS, 6-pin, 5 wire, 6M cable assembly

C6-6-10 RC
MS, 6-pin, 6 wire, 10ft cable assembly

C6-6-20 RC
MS, 6-pin, 6 wire, 20ft cable assembly

C6-6-3M RC
MS, 6-pin, 6 wire, 3M cable assembly

C6-6-6M RC
MS, 6-pin, 6 wire, 6M cable assembly

C6-6-10 RCLD
MS, 6-pin, 6 wire, 6M cable assembly

C6-6-20 RCLD
MS, 6-pin, 6 wire, 20ft, line driver cable assembly

C6-6-3M RCLD
MS, 6-pin, 6 wire, 3M, line driver cable assembly

C6-6-6M RCLD
MS, 6-pin, 6 wire, 6M, line driver cable assembly

C10-4-10 RCLD
MS, 10 pin, 4 wire, 10ft, line driver cable assembly

C10-4-20 RCLD
MS, 10 pin, 4 wire, 20ft, line driver cable assembly

C10-4-3M RCLD
MS, 10 pin, 4 wire, 3M, line driver cable assembly

C10-4-6M RCLD
MS, 10 pin, 4 wire, 6M, line driver cable assembly

C10-6-10 RC M226
MS, 10 pin, 6 wire, 10ft Cable Assembly

C10-6-20 RC M226
MS, 10 pin, 6 wire, 20ft Cable Assembly
DB9-8-3M LD
DB9-pin, 8 wire, 3M, line driver, cable assembly

DB9-8-6M LD
DB9-pin, 8 wire, 3M, line driver, cable assembly

MW-8-B
8" circumference measuring wheel, 3/8" bore

MW-10-B
10" circumference measuring wheel, 3/8" bore

MW-1-6MM
12" circumference measuring wheel, 6mm bore

MW-1-8MM
12" circumference measuring wheel, 8mm bore

MW-1-.5
12" circumference measuring wheel, 1/2" bore

MW-1-A
12" circumference measuring wheel, 5/16" bore

MW-1-B
12" circumference measuring wheel, 3/8" bore

MW-1-C
12" circumference measuring wheel, 1/4" bore

MW-1R-A
12" circumference measuring wheel, 5/16" bore, replaceable O-ring

MW-1R-B
12" circumference measuring wheel, 3/8" bore, replaceable O-ring
MW-1R-C
12” circumference measuring wheel, 1/4” bore, replaceable O-ring

MW-1W-6MM
12” circumference measuring wheel, 1” wide, 6mm bore

MW-1W-8MM
12” circumference measuring wheel, 1” wide, 8mm bore

MW-1W-.5
12” circumference measuring wheel, 1” wide, .5” bore

MW-1W-A
12” circumference measuring wheel, 1” wide, 5/16” bore

MW-1W-B
12” circumference measuring wheel, 1” wide, 3/8” bore

MW-1W-C
12” circumference measuring wheel, 1” wide, 1/4” bore

MW-20-B
20cm. circumference measuring wheel, 3/8” bore

MW-30-6MM
30cm. circumference measuring wheel, 6mm bore

MW-30-8MM
30cm. circumference measuring wheel, 8mm bore

MW-30-10MM
30cm. circumference measuring wheel, 10mm bore

MW-30-A
30cm. circumference measuring wheel, 5/16” bore

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MW-30-B
30cm. circumference measuring wheel, 3/8” bore

MW-30-C
30cm. circumference measuring wheel, 1/4” bore

MW-30R-A
30cm. circumference measuring wheel, 5/16" bore, replaceable O-ring

MW-30R-B
30cm. circumference measuring wheel, 3/8" bore, replaceable O-ring

MW-30R-C
30cm. circumference measuring wheel, 1/4" bore, replaceable O-ring

MW-30R-10MM
30cm. circumference measuring wheel, 10mm bore, replaceable O-ring

MW-30W-6MM
30cm. circumference measuring wheel, 25mm wide, 6mm bore

MW-30W-10MM
30cm. circumference measuring wheel, 25mm wide, 10mm bore

MW-30W-A
30cm. circumference measuring wheel, 25mm wide, 5/16” bore

MW-30W-B
30cm. circumference measuring wheel, 25mm wide, 3/8” bore

MW-30W-C
30cm. circumference measuring wheel, 25mm wide, 1/4” bore

MW-30W-8MM
30cm. circumference measuring wheel, 25mm wide, 8mm bore
550-SCR808 Anti-rotation pin
MB-56C 56C Protective Cover
MB-FB1 Flexible mounting bracket
MB-FB2 Flexible mounting tether for C-face motor mount, 3.4" to 5.9" bolt circle
MB-FB2A Flexible mounting tether for C-face motor mount, 3.4" to 5.9" bolt circle, flattened
MB-FL5 L-shaped mounting bracket
MB-FB2B Rigid mounting tether
MB-FB3 Flexible mounting bracket, .015" (.38mm) thick
MB-FB5 Flexible mounting tether for C-face motor mount, 5" to 8" bolt circle
MB-FB5C Flexible Tether, Conveyor bearing kit
MB-UB6 Rigid under-belt wheeled encoder mounting "L" bracket
MB-5PY 5PY adapter
MB-75 Face mounting adapter, servo
MB-76 Face mounting adapter, 1.46" bolt circle
MB-78 Face mounting adapter
MB-FL Flange adapter, 2.5 inch square
MB-FL2
Flange adapter, 2.5" square; 10mm, 1/2 shaft

MB-FL3
Flange adapter, 2.25" x 3.25"

MB-FL4
Flange adapter, 2.25" x 2.25"

MB-FL6
Flange adapter, 2.5" square with 1.25" male pilot

MB-KOYO
Face mounting adapter for Koyo, 40mm BC

MB-RD
Measuring wheel arm

MB-RD2
Measuring wheel arm for Y-1G, Y-2G, Y-3G or MB-UB2

MB-UB2
Offset mounting bracket - 7" arm, for R21, R22 and RH Encoders

MB-UB2A
Offset mounting bracket - 11.25" arm, for R21, R22 and RH encoders

MB-UB2AG
Offset mounting bracket - 11.25" arm, for R20, RJ and RG encoders

MB-UB2AS
Offset mounting bracket - 11-1/4" arm, for RS

MB-UB2G
Offset mounting bracket - 7" arm, for R20, RJ and RG encoders

MB-UB2S
Offset mounting bracket - 7" arm, for RS

MB-UB3
Spring loaded, under-belt mounting assembly

MB-UB3G
Under-belt mounting bracket, spring loaded

MB-UB4
Spring loaded, under-belt mounting assembly
Spring loaded, under-belt mounting assembly, with shims

Yoke assembly with 1/4"-28 bolt

Wheeled encoder mounting yoke, 1/4-28 cap screw

Yoke assembly for MB-UB1 mounting bracket

Yoke assembly, 3.25" length, 3/8"-16 bolt

Wheeled encoder mounting yoke, under belt

Yoke assembly 3/8"-16 bolt

Wheeled encoder mounting yoke, 3/8-16 cap screw

Torsion Spring Mounting Bracket
Torsion spring wheeled encoder mounting assembly.

MB-T
Torsion Spring Mounting Bracket, Universal Kit

MB-FB2C
Conveyor bearing mounting kit for a flange bearing with 1/2-13 bolts

MB-FB2C-1
Conveyor bearing mounting kit for a flange bearing with 3/8-16 bolts
**MB-FB2D**
Conveyor bearing mounting kit with 1/2-13 coupling nut

**MB-FB2D-1**
Conveyor bearing mounting kit with 3/8-16 coupling nut

**MB-FL8**
Mounting adapter kit for conveyor roller bearing

**MB-FL8A**
Mounting adapter kit for conveyor roller bearing with shaft guards

**MB-UB1**
Under-belt counter-weight mounting assembly

**MB-UB1 M185**
Under-belt counter-weight mounting assembly with 2 weights, no rod

**MB-UB1A**
Under-belt counter-weight mounting assembly, 2 weights

**MB-UB1M**
Under-belt counter-weight mounting assembly for wheeled encoders (metric)

**AE087-10-10**
Flexible shaft coupling, 3/4"D x 1"L, 5/16" bore

**AE087-12-10**
Flexible shaft coupling, 3/4"D x 1"L, 3/8" bore and 5/16" bore

**AE087-8MM-8MM**
Flexible shaft coupling, 3/4"D x 1"L, 8mm bore

**AE100-12-12**
Flexible shaft coupling, 1"D x 1.25"L, 3/8" bore
AE100-12-10MM
Flexible shaft coupling, 1"D x 1.25"L, 3/8" and 10mm bore

AE100-10MM-10MM
Flexible shaft coupling, 1"D x 1.25"L, 10mm bore

AE100-12MM-10MM
Flexible shaft coupling, 1"D x 1.25"L, 12mm and 10mm bore

AE100-12MM-12MM
Flexible shaft coupling, 1"D x 1.25"L, 12mm bore

MB-085
Rigid shaft coupling, 3/8"D to 1"D

MB-085-.375
Rigid shaft coupling, 3/8"D to 3/8"D

MB-085-.75
Rigid shaft coupling, 3/8"D to 3/4"D

MB-085-M30
Rigid shaft coupling, 3/8"D to 30mm

MB-SR.375
Roll pin shaft stub, 3/8" diameter x 2.25"

MB-ST-M10
Shaft stub, 10mm diameter, 27mm stub length, M8 x 1.25 thread

MB-ST-M12
Shaft stub, 12mm diameter, 44mm stub length, M10 x 1.5 thread

MB-ST-M12A
Shaft stub, 12mm diameter, 25mm length, M10 x 1.5 thread

MB-ST.250
Shaft stub, 1/4" diameter, 1.7" stub length, 10-24 thread

MB-ST.250A
Shaft stub, 1/4" diameter, .94" stub length, 10-24 thread

MB-ST.312
Shaft stub, 5/16" diameter, 1.72" stub length, 1/4-20 thread

MB-ST.375
Shaft stub, 3/8" diameter, 1-3/4" stub length, 5/16-18 thread

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**MB-ST.5**
Shaft stub, 1/2" diameter, 1.8" stub length, 3/8-16 thread

**MB-ST.5A**
Shaft stub, 1/2" diameter, 1.1" stub length, 3/8-16 thread
The BlueCoder model RB20 is an optical incremental encoder that use the benefits of blue LED light. It is housed in a 2" diameter x 1-3/4" long enclosure that can be face mounted using three 6-32 x .25" deep mounting holes on a 1.75" diameter bolt circle. Electrical connection is through a 16mm circular connector or an attached cable.

- High-Definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up 10,000 CPR
- Unbreakable code disk
- Low-Lag Time. Excellent for motor regulation
- IP65 environmental seal

**DIMENSIONS**

(Shown with 16mm Din connector)

- Ø 2.00"
- 3 x #6-32 UNC x .250" deep
- Ø 1.75" bolt circle

**SPECIFICATIONS**

**Mechanical**
- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial: -50 lbs. for life of 4.1 x 109 revolutions
  - Axial: -50 lbs. for life of 4.1 x 109 revolutions
- Note: A flexible shaft coupling is recommended to increase bearing life.
- Bearing Life: 32 x 1,000,000/rpm = hours
- Materials: Case - Aluminum, anodized
  - Shaft - 303 Stainless steel
- Weight: 10 oz. (285 grams)

**Electrical Connections**

**Differential Line Driver Outputs:**

- 16mm Din
- M12
- 4-pin Function Color
  - 1: Output A White
  - 2: Output B Green
  - 3: Output Z Red
  - 4: Supply voltage Red
  - 5: Common Black
  - 6: Output A Blue or Green
  - 7: Output B Brown
  - 8: Output Z Orange

**Single Ended Outputs:**

- 16mm Din
- M12
- 4-pin Function Color
  - 1: Common Black
  - 2: Output Z Brown
  - 3: Output A White
  - 4: Output B Green

6-pin connector is Amphenol T3402000 or equivalent
M12 4-pin is Turck FS4.4/18.25 or equivalent

**Power Connections:**

- M12 4-pin connector
- 50 mA max source or sink
- 7272 differential line driver

**Accessories**

- Optional complimentary outputs (-A,-B,-Z).
- Optional index (Z).
- Two channel quadrature square waves (A,B)
- Optional complimentary outputs (-A,-B,-Z).
- Note: Output A leads B by 90° for clockwise rotation when viewed from shaft end.

**Electrical Connections**

- Single Ended Outputs:
  - 16mm Din
  - M12
  - 4-pin Function Color
    - 1: Common Black
    - 2: Output Z Brown
    - 3: Output A White
    - 4: Output B Green

- 6-pin connector is Amphenol T3402000 or equivalent
- M12 4-pin is Turck FS4.4/18.25 or equivalent

**Differential Line Driver Outputs:**

- 16mm Din
- M12
- 4-pin Function Color
  - 1: Output A White
  - 2: Output B Green
  - 3: Output Z Red
  - 4: Supply voltage Red
  - 5: Common Black
  - 6: Output A Blue or Green
  - 7: Output B Brown
  - 8: Output Z Orange

- 8-pin connector is Amphenol T3506000 or equivalent

**Counts per Revolution:**

- (Specify when ordering)
- Single Ended:
  - 7273 open collector
  - (30 VDC max, 50 mA max)
  - 7272 Push-Pull
  - (50 mA max source or sink)

- Differential Line Driver:
  - 7272 differential line driver
  - (output level same as supply voltage)
  - RS422 differential line driver
  - (with regulated 5vdc output level)

- Connections:
  - Optional index (Z).

**Accessories**

- See our website or contact us for more information about cables, flexible couplings, and measuring wheels.
**FEATURES**

- Heavy Duty bearings
- Size 20 housing
- Short circuit and ESD protected
- Up to 1200 pulses per revolution
- Attached cable, or 16mm or M12 connector
- Hollow shaft model available - see Model HS20
- Wheeled version available - see Models R21 and R22
- Programmable model available - see Model R20-P

**DIMENSIONS**

(shown with optional 16mm connector)

**SERIES 20 HEAVY DUTY ENCODER**

**SPECIFICATIONS**

**Electrical**

Supply Voltages: (specify when ordering)
- 5 VDC or 8-30 VDC

Current: 50 mA max (no load)
- 100 mA max (line driver)

Pulse Rate: 0 - 30 kHz

Pulses per Revolution: (specify when ordering)
- 1 to 1200

Operating Temperature: 0° to 70° C

Output Circuit: (specify when ordering)

- Single Ended:
  - 7273 open collector
  - 7272 Push-Pull

- Differential Line Driver:
  - 7272 differential line driver
    - (output level same as supply voltage)
  - RS422 differential line driver
    - (with regulated 5Vdc output level)

Output Format: Two channel quadrature square waves (A,B) with optional index (Z).

**Differential Line Driver Outputs:**

Optional 8-Pin Connector

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output +A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Output +B</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Output +Z</td>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Supply voltage</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Output -A</td>
<td>Blue</td>
<td>Green</td>
</tr>
<tr>
<td>7</td>
<td>Output -B</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Output -Z</td>
<td>Orange</td>
<td></td>
</tr>
</tbody>
</table>

6-pin connector is Amphenol T3402000 or equivalent

M12 4-pin is Turck FS4.4/18.25 or equivalent

**DIMENSIONS**

(shown with optional 16mm connector)

**MODEL NUMBER**

**INDUSTRIAL ENCODERS**

FOR OVER 35 YEARS

602 E. North Street  T: 630-365-7148
Elburn, IL 60119, USA  F: 630-365-7149
**FEATURES**

- DIP switch selectable features (see our website)
- Up to 1200 pulses per revolution
- Heavy Duty bearings
- Size 20 housing
- Attached cable, or 16mm or M12 connector
- Short circuit and ESD protected
- Hollow shaft model available - see Model HS20
- Wheel version available - see Models R21 and R22

**DIMENSIONS**

(shown with 16mm connector, 3/8" diameter shaft)

**MECHANICAL**

- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 32 x 1,000,000 rpm = hours
- Materials:
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- Weight: 10 oz. (285 grams)

**ELECTRICAL CONNEC TIONS**

**SPECIFICATIONS**

**Electrical**

**Programmable Features:** The encoder is factory configured with a program that offers one or more of the following features. DIP switches are used to set program parameters.

- Selectable Pulses per revolution
- Quadrature (A/B) outputs
- Direction outputs
- Anti-Jitter feature
- Other enhanced features

**Supply Voltages:** (specify when ordering)
- 5 VDC, or 8-30 VDC

**Current:**
- 50 mA max (no load)
- 100 mA max (line driver)

**Operating Temperature:** 0° to 70° C

**Output Circuit:** (specify when ordering)

- Single Ended:
  - 7273 open collector
  - 7272 Push-Pull
- Differential Line Driver:
  - 7277 differential line driver
  - RS422 differential line driver

**Output Waveshape:**

- Square wave, 50/50 duty cycle nominal. Type and number of outputs depends on the programmable features provided with the encoder.
- Call or see the model specific datasheet for more information.

**Accessories**

Call or see our website about the following:
- Adapters, Cables, Flexible Couplings, Measuring Wheels, Mounting Brackets

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Shaft Diameter: leave blank for 3/8&quot; A = 5/16&quot;, C = 1/4&quot;, M = 4-7 mm, MB = 8-10 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>R20</td>
<td>P = programmable encoder, see program specific datasheet for feature descriptions and DIP-switch settings.</td>
</tr>
<tr>
<td>Supply Voltage:</td>
<td>5 or 8-30</td>
</tr>
<tr>
<td>Output Circuit:</td>
<td>leave blank for 7272 Push/Pull, C = 7273 open collector, D = 7272 line driver, DI = RS422 line driver with 5Vdc output level</td>
</tr>
<tr>
<td>Cable Connector:</td>
<td>leave blank for attached cable, S = 16mm connector, $S = S1$ = M12 connector</td>
</tr>
<tr>
<td>Modification Number:</td>
<td>optional modification or special feature ID. Call or see our website.</td>
</tr>
<tr>
<td>Accessories:</td>
<td>leave blank for no accessories, Call or see our website.</td>
</tr>
</tbody>
</table>
SPECIFICATIONS

Mechanical
Shaft dia.: (specify when ordering)
  5/16" = .3120" diameter with flat
  3/8" = .3745" diameter with flat
  1/4" = .2495" diameter with flat
Weight (without connector): 7 oz. (198 grams)
Maximum speed: 6,000 rpm
Shaft Loading: Radial: 25 lb. (11.3 kg.) max.
  Axial: 10 lb. (4.5 kg.) max.
Bearing Life (L10): 36 x 10^6/RPM = hours
  Note: to allow for axial and angular misalignment, a flexible shaft coupling is recommended.
Materials: Case: Aluminum, anodized
  Shaft: 303 Stainless steel
Cable: Pre-wired 10' (3m) shielded cable, or
  optional connector with cable.
  (other lengths are available)
Optional Connector* (Specify when ordering):

<table>
<thead>
<tr>
<th>No. of Pins</th>
<th>Encoder Connector</th>
<th>Mating Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>MS3102E-14S-6P</td>
<td>MS3106A-14S-6S</td>
</tr>
<tr>
<td>10</td>
<td>MS3102E-18-1P</td>
<td>MS3106A-18-1P</td>
</tr>
</tbody>
</table>
  1. Only available with 3/8" shaft, and
  must be purchased separately,
  2. Not available as a side connector.

Electrical
Power Input (specify voltage when ordering):

<table>
<thead>
<tr>
<th>Supply (Vdc)</th>
<th>R Values* (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>12 or 15</td>
<td>2.2</td>
</tr>
<tr>
<td>24</td>
<td>3.3</td>
</tr>
<tr>
<td>7 to 20 (*5R&quot; supply voltage)</td>
<td>2.2</td>
</tr>
<tr>
<td>12 to 27 (*12R&quot; supply voltage)</td>
<td>3.3</td>
</tr>
<tr>
<td>8 to 30 (*30&quot; supply voltage)</td>
<td>3.3</td>
</tr>
</tbody>
</table>

(1) Others available on special order
(2) See output circuit figure 1 below
(3) R is removed for open collector
  — Current: 50 ma max (no load)
  100 ma max (line driver)
  — Ripple: 2% max
  — Regulation: ±5%
  — Reverse polarity protected

Operating temperature: 0°C to 70°C
Pulse rate: 0 to 30 kHz
Pulses per Revolution: 1 to 1200
(Specify when ordering)

Output Circuit (Figure 1; specify when ordering):
  — Current sinking NPN transistor
    with pull-up resistor (50 ma max)
  — Current sinking NPN open
    collector (50 ma, 30 vdc max)
  — Current sourcing PNP with
    pull-down resistor (50 ma max)
  — RS422 differential line driver
    (MC3487 device; must be ordered
    with 5, 5R or 8-30 Supply Voltage)

Output Waveshape: (See Figure 2)
  Square wave; outputs A and B are
  50/50 duty cycle nominal; output Z
  (index output) is approximately the
  width of one cycle on outputs A or B
  — Pulse symmetry (A): 180°±30%
  — Pulse interval jitter (B): 30% max
  — Quadrature (C): 90°±30% max
  — Phase jitter (D): 30% max
  — Index pulse (E)

Electrical Connections
NPN or PNP transistor outputs:

<table>
<thead>
<tr>
<th>6-Pin</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output Z</td>
<td>Brown*</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>E</td>
<td>Output B</td>
<td>Green</td>
</tr>
</tbody>
</table>

* Output Z is green if Output B is not used.

Line Driver outputs:

<table>
<thead>
<tr>
<th>6-Pin</th>
<th>10-Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
</tr>
<tr>
<td>B</td>
<td>+vdc</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
</tr>
<tr>
<td>E</td>
<td>Output B</td>
</tr>
<tr>
<td>F</td>
<td>Output B</td>
</tr>
<tr>
<td>C</td>
<td>Output Z</td>
</tr>
<tr>
<td>J</td>
<td>Output Z</td>
</tr>
</tbody>
</table>

² Output Z is green and Z is brown if
  outputs B and Z are not used.
³ These are Outputs Z/1 if B/1 are not used.

DIMENSIONS

| 6-32 x .25" deep |
| 1.75"D bolt circle |

ORDERING INFORMATION

RG | - | -

Model
Shaft Diameter:
A = 5/16"  
B = 3/8"  
C = 1/4"

DC supply voltage:
5, 12, or 24;
or 5R (7-20;)
or 12R (12-27;)
or 8-30

Output circuit:
NPN is standard
C = NPN open collector
P = PNP
D = Differential line driver

No index is standard:
Z = Index output
NZ = Inverted index

No connector is standard:
E = End connector*
S = Side connector*

* Only available with 3/8" shaft dia.
SPECIFICATIONS

Mechanical

Shaft dia.: .3745" dia. with flat

Weight: 10 oz. (284 grams)

Maximum speed: 6,000 rpm

Shaft Loading: Radial: 25 lb. (11.3 kg) max.
Axial: 10 lb. (4.5 kg) max.

Bearing Life (L10): 36 x 10^9 RPM = hours

Note: to allow for axial and angular misalignment, a flexible shaft coupling is recommended.

Materials:

— Case: Aluminum, anodized
— Shaft: 303 Stainless steel

Connectors:

<table>
<thead>
<tr>
<th>No. of Pins</th>
<th>Encoder(s)</th>
<th>Mating Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>97-3102E14S-6P</td>
<td>97-3106A14S-6S</td>
</tr>
<tr>
<td>10</td>
<td>97-3102E18-1P</td>
<td>97-3106A18-1P</td>
</tr>
</tbody>
</table>

1. A mating connector with cable must be purchased separately.
2. Other connectors are available.
3. Not available as side connector.

Electrical

Power Input: (specify voltage when ordering)

<table>
<thead>
<tr>
<th>Supply (Vdc)</th>
<th>R Values (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>12 or 15</td>
<td>2.2</td>
</tr>
<tr>
<td>24</td>
<td>3.3</td>
</tr>
<tr>
<td>7 to 20 (~5R supply voltage)</td>
<td>2.2</td>
</tr>
<tr>
<td>12 to 27 (~12R supply voltage)</td>
<td>3.3</td>
</tr>
<tr>
<td>8 to 30 (~8-30 supply voltage)</td>
<td>3.3</td>
</tr>
</tbody>
</table>

(1) Others available on special order
(2) See output circuit figure 1 below
(3) R is removed for open collector
— Current: 50 ma max (no load)
— Ripple: 2% max
— Regulation: ±5%
— Reverse polarity protected (except for 5 vdc)

Operating temperature: 0°C to 70°C
Pulse rate: 0 to 30 kHz
Pulses per Revolution: 1 to 1200.
(Specify when ordering)

Output Circuit (Figure 1, specify when ordering):

— Current sinking NPN transistor with pull-up resistor (50 ma max)
— Current sinking NPN open collector (50 ma, 30 vdc max)
— Current sourcing PNP with pull-down resistor (50 ma max)
— RS422 differential line driver (MC3487 device; must be ordered with 5, 5R or 8-30 Supply Voltage)

Output Waveshape: (See Figure 2)

Square wave; outputs A and B are 50/50 duty cycle nominal; output Z (index output) is approximately the width of one cycle on outputs A or B

— Pulse symmetry(A): 180°±30°
— Pulse interval jitter(B): 30% max
— Quadrature(C): 90°±30% max
— Phase jitter (D): 30% max
— Index pulse (E) / Clockwise rotation when viewed from shaft end

Electrical Connections

NPN or PNP transistor outputs:

<table>
<thead>
<tr>
<th>6-Pin Function</th>
<th>WireColor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Common</td>
<td>Black</td>
</tr>
<tr>
<td>B +vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C Output Z</td>
<td>Brown*</td>
</tr>
<tr>
<td>D Output A</td>
<td>White</td>
</tr>
<tr>
<td>E Output B</td>
<td>Green</td>
</tr>
</tbody>
</table>

* Output Z is green if Output B is not used.

Output Circuit:

Output Z is green if Outputs B and Z are used.

Line Driver outputs:

<table>
<thead>
<tr>
<th>6-Pin Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A F Common</td>
<td>Black</td>
</tr>
<tr>
<td>B +vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C Output A</td>
<td>White</td>
</tr>
<tr>
<td>D Output B</td>
<td>Green</td>
</tr>
<tr>
<td>E C Output Z</td>
<td>Yellow*</td>
</tr>
<tr>
<td>J Output Z</td>
<td>Orange*</td>
</tr>
</tbody>
</table>

* Only used if A, B, and Z are required.

Output Circuit:

Output Z is green if Outputs B and Z are used.

These are Outputs Z if B/B are not used.

DIMENSIONS

6-32 x .25" deep
1.75"D bolt circle

Circular Connector

Optional Side Connector

ORDERING INFORMATION

Model

Pulses per revolution

DC Supply voltage: 5, 12, 15, or 24;
5R (7-20); 12R (12-27); or 8-30

No Index is standard
Z = Index output
NZ = Inverted index

S = Side Connector

ModificationNumber: refers to special order features (consult factory)

Over 25 Years of Material Handling
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Your automation site!
The BlueCoder model RBL is an optical incremental encoder that uses the benefits of blue LED light. It is housed in a 3" diameter x 2-3/8 long ultra rugged enclosure. Multiple face mounting options are available. The MS circular electrical connector is either 5-pin, 6-pin or 10-pin depending on model.

- Heavy duty bearings
- High-Definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up to 10,000 CPR
- Unbreakable code disk
- IP50 environmental seal

Mechanical
- Maximum Speed: 6,000 rpm
- Shaft Loading:
<table>
<thead>
<tr>
<th>Shaft Diameter</th>
<th>Radial</th>
<th>Axial</th>
<th>Factor (BL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; / 8mm</td>
<td>40 (18.1)</td>
<td>30 (13.6)</td>
<td>32</td>
</tr>
<tr>
<td>1/2&quot; / 10mm</td>
<td>45 (20.4)</td>
<td>35 (15.9)</td>
<td>37</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>50 (22.7)</td>
<td>40 (18.1)</td>
<td>41</td>
</tr>
</tbody>
</table>

Note: A flexible shaft coupling is recommended to increase bearing life.

Bearing Life: BL x 1,000,000/rpm = hours

Materials:
- Case - Aluminum, anodized
- Shaft - 303 Stainless steel

Weight: 10 oz. (285 grams)

Electrical Connections
- Single Ended Outputs:
<table>
<thead>
<tr>
<th>5-Pin Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+Vdc</td>
<td>Red</td>
</tr>
<tr>
<td>B</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>E</td>
<td>Output Z</td>
<td>Brown</td>
</tr>
</tbody>
</table>

- Differential Line Driver Outputs:
<table>
<thead>
<tr>
<th>6-Pin Connector 10-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>F</td>
<td>Common Black</td>
</tr>
<tr>
<td>B</td>
<td>+Vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>E</td>
<td>Output Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>F</td>
<td>Output B</td>
<td>Brown</td>
</tr>
<tr>
<td>G</td>
<td>Output Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>H</td>
<td>Output A</td>
<td>White</td>
</tr>
</tbody>
</table>

Electrical
- Supply Voltages: 4.5 Vdc to 30 Vdc
  (6.0 Vdc to 30 Vdc for RS422 differential line driver)
- Current: 65 mA max exclusive of load
- Short circuit and ESD protected
- Operating Temperature: 0° to 70° C
- Pulse Symmetry: 180°±36° @ maxRPM
- Quadrature Phase Error: 90°±36° @ maxRPM
- Phase jitter: 27°
- Maximum Frequency: up to 1.4 Mhz
- Noise Immunity: Tested to EN61000-6-2

Counts per Revolution: (specify when ordering)
- 360, 720, 100, 1024, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000
- 5-pin, 6-pin, 10-pin MS

Model Number
- Choose one number:
  - 360, 720, 100, 1024, 1200, 1250, 1440, 1500,
  - 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000,
  - 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000

Output Circuit:
- Single Ended:
  - 7273 open collector
  - 7272 Push-Pull
- Differential Line Driver:
  - 7272 differential line driver
  - RS422 differential line driver
- Output Type:
  - Two channel quadrature square waves (A,B)
  - Optional index (Z)
  - Optional complimentary outputs (-A,-B,-Z)

Noise Immunity:
- Tested to EN61000-6-2

Output Type:
- (specify when ordering)
  - Two channel quadrature square waves (A,B)
  - Optional index (Z)
  - Optional complimentary outputs (-A,-B,-Z)

Example: RBLQ-10240DH - 3/8" shaft, quadrature outputs, 1024 ppr, differential line driver output

Build Encoder

Support:
support@logicbus.com
www.logicbus.com

Photocraft™ by Tri-Tronics®

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**FEATURES**

- 3/8", 1/2", 5/8", or Metric Shaft Diameters
- Double ended 3/8" Shaft Option
- Hollow Shaft Available - see Model HRL
- Programmable Model Available - see Model RL-P
- Exclusive "Anti-Jitter" Circuit for Conveyor Applications
- DC or AC Supply Voltages Available
- Single (A), Quadrature (A, B), and Index (Z) Outputs
- Dual or Triple output Models with different pulses per revolution on each output
- Short Circuit / ESD Protection on Most Models
- Custom Models Available

*CE marking requires Photocraft cable, and surge protection option if cable exceeds 100' (30m) or leaves the building.

**DIMENSIONS**

MDL RL Heavy Duty Shaft Encoder

**SPECIFICATIONS**

**Mechanical**

- Maximum speed: 6,000 rpm
- Shaft Loading:
  - Diameter: 3/8" / 8mm
  - Radial Load: 40 (13.8)
  - Axial Load: 30 (13.8)
  - RU
  - 1/2" / 10mm
  - Radial Load: 45 (20.4)
  - Axial Load: 35 (15.9)
  - RU
  - 5/8" / 16mm
  - Radial Load: 50 (22.7)
  - Axial Load: 40 (18.1)
  - RU

  Note: 120AC power requires 3/8" shaft, and shaft loading is reduced to 25 radial, 10 axial, BL=36.

- Bearing Life: BL x 1,000,000 rpm = hours

- Materials:
  - Case: ¼" Aluminum, anodized
  - Shaft: 303 Stainless steel

**Electrical Connections**

- NPN or PNP Transistor Outputs:
  - 5-Pin Connector: +vdc, A, B, C, D, E
  - 6-Pin Connector: +vdc, A, B, C, D, E
  - 10-Pin Connector: +vdc, A, B, C, D, E

- Electrical Connections:
  - Output Z is green if Output B is not used.
  - Output Z is orange if Output B is used.

- Output Circuit:
  - Leave blank for NPN, PNP, Triac
  - Leave blank for no anti-jitter, 4 - 30V
  - Leave blank for no accessories.

**Electrical Connections**

- Output Wave Shape:
  - Square wave: outputs A and B
  - Triac (see 120ACT datasheet)

- Output Voltage:
  - DC Supply Voltages: 5 to 15V
  - AC Supply Voltages: 120Vac (see 120ACTdatasheet)

- Model Number:
  - RL: 0806

**Over 30 Years of Material Handling and Industrial Experience**
**MODEL RL-P**

**Programmable Heavy Duty Shaft Encoder**

**FEATURES**
- 3/8", 1/2", or Metric Shaft Diameters
- Double ended 3/8" Shaft Option
- Hollow Shaft Available - see Model HRL
- Programmable via DIP switches at installation time
- User selectable pulses per revolution
- Exclusive "Anti-Jitter" Circuit for Conveyor Applications
- 5 vdc or 8-30 vdc supply voltages
- Single (A), Quadrature (A, B), and Index (Z) Outputs
- Short Circuit / ESD Protection on Most Models
- Custom Models Available

* CE marking requires Photocraft cable, and surge protection option if cable exceeds 100' (30m) or leaves the building.

**DIMENSIONS**

Configuration Switches

**SPECIFICATIONS**

**Mechanical**
- Maximum speed: 6,000 rpm
- Shaft Loading:
  - Radial (lbs): 40 (18.1) 30 (13.6) 32
  - Axial (lbs): 45 (20.4) 35 (15.9) 37
  - Factor: 5/8" / 40 (18.1) 41

**Bearing Life**: BL x 1,000,000/rpm = hours

**Materials**:
- Case: 1/4" Aluminum, anodized
- Shaft: 303 Stainless steel
- Switch cover: ABS plastic

**Weight**: 16.8 oz. (475 grams)

**Programs**
- The RL-P is preconfigured at the factory with one of many predefined programs. Program options are selected at installation time by setting configuration switches. Call or see our website for program information.

**Typical Program Features**
- **Selecteable Pulses per Revolution**: pulses per revolution on one, two, or three outputs can be selected from a predefined set.
- **Anti-jitter**: Increases the pulse hysteresis to ½ of a pulse width, eliminating the effects of mechanical vibration and the possible dither that results in false output pulses. For example a 10 pulse per revolution output would have 18° hysteresis (i.e. 360° / 10 x ½).
- **Direction Indicator**: Indicates direction of shaft rotation.
- **Fractional Pulses per Revolution**: for example 2.5 pulses per revolution.
- **Speed Indicator**: Sets the output when a predefined rotational speed is attained.

**Electrical**
- **Supply Voltages (Vin)**: (specify when ordering)
  - 5 ± 5% vdc
  - 8 to 30 vdc
- **Supply Current**: 50 ma maximum (no load)
- **Output Current (Io)**: 50 ma max source/sink
- **Output Circuits**:
  - Push/Pull (combined sourcing/sinking)
  - Current sinking NPN transistor with pull-up resistor* (50 ma max)
  - Current sinking NPN open collector (50 max, 30 vdc max)
  - Current sourcing PNP with pull-down resistor* (50 ma max)
- **Output Waveshape**: 50/50 squarewave
  - Pulse On-Off Ratio: 50% ± 10%
  - Pulse interval jitter: ±10%
  - Quadrature Deviation: 30° (max)
  - Pulse rise time: 2μsec (max)
  - Pulse fall time: 5μsec (max)
  - Voltage (high): Vin - 2.5 vdc (min)
  - Voltage (low): 1.5 vdc (max)
- **Index Pulse**: approximately the width of 1 pulse on output A or B (600 rpm, Vin=24vdc, 10ma < Io < 50ma, 25°C)

**Operating Temperature**: 0° to 70°C
- **Pulse Rate**: 0 - 30 kHz
- **Output Protection**:
  - Short Circuit
  - ESD to 8KV direct and 25KV air

**Electrical Connections**

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>B</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>E</td>
<td>Output C or Z</td>
<td>Brown</td>
</tr>
</tbody>
</table>

**OVER 30 YEARS OF MATERIAL HANDLING AND INDUSTRIAL EXPERIENCE**

HOTOCRAFT INC

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Elburn, IL 60119, USA Fax: 630-365-7149

www.photocraftencoders.com

support@logicbus.com
The BlueCoder model RBS is an optical incremental encoder that uses the benefits of blue LED light. It is housed in a 2.25" cubed ultra rugged enclosure. Available shaft diameters: 1/4", 5/16", 3/8", and 1/2". Multiple face mounting options are available. The MS circular electrical connector is either 6-pin or 10-pin depending on model.

- Heavy-duty bearings
- High-definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up to 10,000 CPR
- Unbreakable code disk
- IP50 environmental seal

**Mechanical**

- Maximum Speed: 6,000 rpm
- Shaft Loading:
<table>
<thead>
<tr>
<th>Shaft Diameter</th>
<th>Radial Lbs (kg)</th>
<th>Axial Lbs (kg)</th>
<th>Factor (BL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4, 5/16, 3/8&quot;</td>
<td>25 (11.3)</td>
<td>15 (6.8)</td>
<td>36</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>45 (20.4)</td>
<td>35 (15.9)</td>
<td>37</td>
</tr>
</tbody>
</table>

Note: A flexible shaft coupling is recommended to increase bearing life.

- Bearing Life: BL x 1,000,000/rpm = hours
- Materials: Case - 1/4" Aluminum, anodized, Shaft - 303 Stainless steel
- Weight: 13 oz. (370 grams)
- Sealing: IP50

**Electrical Connections**

**Single Ended Outputs:**

<table>
<thead>
<tr>
<th>6-Pin Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>+ Vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output Z</td>
<td>Brown</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>E</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>F</td>
<td>not used</td>
<td>-</td>
</tr>
</tbody>
</table>

**Differential Line Driver Outputs:**

<table>
<thead>
<tr>
<th>6-Pin Connector 10-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>+ Vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>E</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>F</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>I</td>
<td>Output B</td>
<td>Brown</td>
</tr>
<tr>
<td>-</td>
<td>Output Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>-</td>
<td>Output Z</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

**Electrical Supply Voltages:**

4.5 Vdc to 30 Vdc

(6.0 Vdc to 30 Vdc for RS422 differential line driver)

**Current:**

65 mA max exclusive of load

Short circuit and ESD protected

**Operating Temperature:**

0° to 70° C

**Pulse Symmetry:**

180° ± 36° @ maxRPM

**Quadrature Phase Error:**

90° ± 36° @ maxRPM

**Phase Jitter:** 27°

**Maximum Frequency:** up to 1.4 Mhz

**Noise Immunity:**

Tested to EN61000-6-2

**Output Type:**

- Two channel quadrature square waves (A, B)
- Optional index (Z)
- Optional complimentary outputs (-A, -B, -Z)

**Output Count per Revolution:**

Choose one number:

360, 720, 1000, 1024, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000

**Output Circuit:**

- 7273 open collector
- 7272 Push-Pull

(50 mA max source or sink)

**Binary Outputs:**

- 7272 differential line driver
- RS422 differential line driver

**Connection:**

- 6-pin, 10-pin MS

**Accessories**

See our website or contact us for more information about cables, flexible couplings, and measuring wheels.
FEATURES
- 1/4", 5/16", 3/8", and 1/2" Shaft Diameters
- Double ended Shaft Option
- Hollow Shaft Available - see Model HRS
- Programmable Model Available - see Model RS-P
- Exclusive “Anti-Jitter” Circuit for Conveyor Applications
- Single (A), Quadrature (A, B), and Index (Z) Outputs
- Dual or Triple output Models with different pulses per revolution on each output (A, B, C)
- Short Circuit / ESD Protection on Most Models
- Custom Models Available

DIMENSIONS
- 2 1/4" Bolt circle
- 0.74" clearance
- 2.00" Bolt circle

Electrical Connections
- 6-Pin Connector
- Function:
  - A: Common
  - B: +vdc
  - C: Output C or Z
  - D: Output A
  - E: Output B
  - F: not used
- Wire Color:
  - A: Black
  - B: Red
  - C: Brown
  - D: White
  - E: Green
  - F: -

SPECIFICATIONS
- Mechanical
  - Maximum speed: 6,000 rpm
- Shaft Loading:
<table>
<thead>
<tr>
<th>Diameter</th>
<th>Radial</th>
<th>Axial</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;, 1/8&quot;</td>
<td>5 (11.3)</td>
<td>5 (6.8)</td>
<td>36</td>
</tr>
<tr>
<td>M182 option</td>
<td>40 (18.1)</td>
<td>30 (13.6)</td>
<td>32</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>45 (20.4)</td>
<td>35 (15.9)</td>
<td>37</td>
</tr>
</tbody>
</table>

- Electrical
  - Supply Voltages: (specify when ordering)
    - DC Supply Voltages
    - Load Resistor

- Operating Temperature: 0° to 70° C
- Output Circuit: (specify when ordering)
  - Current sinking NPN transistor with pull-up resistor (50 ma max)
  - Current sinking NPN open collector (50 ma, 30 vdc max)
  - Current sourcing PNP with pull-down resistor (50 ma max)
  - RS422 differential line driver (requires 5, 5R, or B-30 supply)

- Output Waveshape:
  - Square wave; outputs A, B, and C are 50/50 duty cycle nominal; output Z (index output) is approximately the width of one cycle on outputs A or B.
  - Pulse symmetry: ±10° ±30%
  - Pulse interval jitter: 30% max
  - Phase jitter: 30% max

- Anti-Jitter: Increases the pulse hysteresis to ½ of a pulse width, eliminating the effects of mechanical vibration and the possible dither that results in false output pulses. For example a 10 pulse per revolution output would have 18° hysteresis (i.e. 360° ÷ 10 × ½ ).

- Model Number
  - RS Standard Cube Style Shaft Encoder

- Model Number
  - Output Type: leave blank for single-ended, D — double ended
  - Output Tap: leave blank for single output on A, B, C
  - Output C: leave blank for single output on A, B, C
  - Index Output: leave blank for no index, special feature ID
  - Accessories: leave blank for no accessories

- Support: 1-800-44-CALL (442-2555)
**SPECIFICATIONS**

**Mechanical**
- **Shaft:** 1/4", 3/16", or 3/8" diameter, single or double ended.
- **Weight:** 11 oz (312 grams)
- **Shaft Loading:**
  - Radial: 25 lb (11.3 kg) max.
  - Axial: 10 lb (4.5 kg) max.
- **Bearing Life (L10):** 36 x 10/RPM = hours
- **Note:** to allow for axial and angular misalignment, a flexible shaft coupling is recommended.

**Materials:**
- Case: Aluminum, anodized
- Shaft: 303 Stainless steel
- Switch access door: Plastic

**Connector:** 6-pin, 97-3102A14S-6P
**Mating Connector:** 97-3106A14S-6S

**Electrical**
- **Supply Voltage (V_{m}):** (specify when ordering)
  - 5 ± 5% vdc or 8-30 vdc
- **Supply Current (I_{m}):** 50mA maximum (no load)
- **Output Current (I_{o}):** 50mA max source/sink
- **Output Circuits:** (specify when ordering)
  - Push/Pull
  - Combined sourcing/sinking output
  - NPN open collector
  - (V_{oc} ≈ 30 vdc maximum)
- **Output Waveform:** 50/50 squarewave
  - Pulse On-Off Ratio: 50% ± 10%
  - Pulse Interval Jitter: ±10%
  - Pulse rise time: 2 μsec (max)
  - Pulse fall time: 5 μsec (max)
  - Voltage (high): V_{in} ≥ 2.5 vdc (min)
  - Voltage (low): 1.3 vdc (max)
  - (600 rpm, V_{in} ≥ 24 vdc, 10 ma ≤ I_{o} ≤ 50 mA, 25°C)
- **Operating Temperature:** 0° to 70°C
- **Maximum Operating Speed:** 2,500 rpm (Program dependent)

**Programs**
- Please call for detailed information about P64AJ - Pulse output on connector Pin D. Switches 1-6 are used to select the pulses per revolution which could be any value from 1 through 64.
  - Please inquire about others.

**Electrical Connections**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
<th>Wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>+ vdc</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Output C or Z</td>
<td>Brown*</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Output B</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- *Output C/Z is green if B is not used.

**Accessories**
- **Cable Assembly:** (C6-x-10): 10 ft. (3m), shielded cable with 97-3106A14S-6S connector (x is number of conductors)
- Other lengths are available.
- CE mark requires Photocraft cable, and surge protection if cable exceeds 100’ (30m) or leaves the building.

**Flexible Coupling:** aluminum helical coil style coupling for shaft to shaft connections.
- AE08-70-10-10: 5/16" shaft size
  - .875" diameter x 1" length
- AE100-12-12: 3/8" shaft size
  - 1" diameter x 1.25" length

**Installation Instructions**
1. Mechanically mount the encoder.
   - Use a flexible shaft coupling to compensate for axial and angular misalignment.
2. Attach the cable leads to the control device (e.g., PLC) ensuring that the power supply meets specifications.
3. Set the configuration switches.
   - Switches can be changed at any time.
4. Attach the cable to the encoder.

**DIMENSIONS**

**ORDERING INFORMATION**

- **Model:** RS-0
- **Program Name:** /P

- **Shaft Diameter:**
  - A = 5/16"
  - B = 3/8"
  - C = 1/4"

- **Supply voltage:**
  - 5 or 8-30

- **Leave blank for:**
  - Single ended shaft
  - D = Double ended shaft

- **Output circuit:**
  - Leave blank for Push/Pull
  - C = NPN open collector

**Short lead time options are underlined.**

---

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**SPECIFICATIONS**

**Mechanical**
- Weight: 1 lb. 2 oz. (510 grams)
- Maximum speed: 6,000 rpm
- Shaft Loading: Radial: 25 lb. (11.3 kg.) max.
  - Axial: 15 lb. (6.8 kg.) max.
- Bearing Life \( (L_{bf}) \): 36 x 10/RPM = hours
- Materials:
  - Case: 1/4 Aluminum, anodized
  - Shaft: 303 Stainless steel
- Connector:
  - Single output (3 pin connector): MS3102A-10SL-3P
  - Multi output (6 pin connector): MS3102A-14S-6P
- Mating Connector:
  - Single output: MS3106A-10SL-3S
  - Multi output: MS3106A-14S-6S
  - Case Ground: The cable shield is connected via the connector shell to the encoder housing.
- Note: 10’ (3m) cable supplied at no extra charge. CE marking requires the surge protection option if the cable exceeds 100’ (30m) or leaves the building.

**Electrical**

**Power Input** (specify voltage when ordering):

<table>
<thead>
<tr>
<th>Supply ( (Vdc) )</th>
<th>R Values ( (Kohms) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>12 or 15</td>
<td>2.2</td>
</tr>
<tr>
<td>24</td>
<td>3.3</td>
</tr>
<tr>
<td>7 to 20 (5R supply voltage)</td>
<td>2.2</td>
</tr>
<tr>
<td>12 to 27 (13R supply voltage)</td>
<td>3.3</td>
</tr>
<tr>
<td>8 to 30 (8-30 supply voltage)</td>
<td>3.3</td>
</tr>
</tbody>
</table>

| (1) Others available on special order |
| (2) See output circuit figure 1 below |
| (3) R is removed for open collector |
| Current: 50 ma max (no load) 100 ma max (line driver) |
| Ripple: 2% max |
| Regulation: ±5% |
| Reverse polarity protected (except for 5Vdc) |

**Operating temperature:** \( 0° \) to \( 70° \) C

**Pulse Rate:** 0 - 30 kHz

**Pulses per Revolution:** 1 to 600

(specify when ordering)

**Output Circuit** (Figure 1, specify when ordering):
- Current sinking NPN transistor with pull-up resistor (50 ma. max.)
- Current sinking NPN open collector (50 ma., 30 vdc max.)
- Current sourcing PNP with pull-down resistor (50 ma. max.)
- RS422 differential line driver (MC3487 device; must be ordered with 5, 5R or 8-30 Supply Voltage)

**Output Waveshape:** (See Figure 2; does not apply to dual/triple output models)
- Square wave; outputs A and B are 50/50 duty cycle nominal; output Z (index output) is approximately the width of one cycle on outputs A or B.
- Pulse symmetry(A): 180°±10%
- Pulse interval jitter(B): 30% max
- Quadrature(C): 90°±30% max
- Phase jitter (D): 30% max
- Index pulse (E)

![Figure 2](image)

**Electrical Connections**

**NPN or PNP Transistor Outputs:**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Pin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-Pin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Line Driver Outputs** (not CE certified):

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-Pin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

**Model:** RBX

- Pulses per revolution.
- Enter dual and triple output values separated by a “/”.
- DC Supply voltage: 5, 12, 15, or 24; or 5R (7-20); or 12R (12-27); or 8-30

**No index is standard:**
- **Z = Index output**
- **NZ = Inverted Index**
- **C = NPN open collector**
- **P = PNP**
- **D = Differential line driver**

- **S = Side Connector**

---

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**SPECIFICATIONS**

**Mechanical**
- **Weight:** 1lb. 7 oz. (663 grams)
- **Maximum speed:** 6,000 rpm
- **Shaft Loading:** Radial: 25 lb. (11.3 kg.) max.
  Axial: 15 lb. (6.8 kg.) max.
- **Bearing Life (L10):** 36 x 10/RPM = hours
- **Materials:**
  - Case: V1A Aluminum, anodized
  - Shaft: 303 Stainless steel
- **Connector:**
  - Single output (3 pin connector):
    MS3102A-10SL-3P
  - Multi output (6 pin connector):
    MS3102A-14S-6P
- **Mating Connector:**
  - Single output: MS3106A-10SL-3S
  - Multi output: MS3106A-14S-6S
  - Case Ground:
    Silver foil at the mating connector provides a ground path via the cable shield and the connector shell to the encoder housing.
  - **Note:** A mating connector with 10-foot shielded cable is supplied at no extra charge.

**Electrical**

**Power Input** (specify voltage when ordering):

<table>
<thead>
<tr>
<th>Supply (Vdc)</th>
<th>R Values (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>12 or 15</td>
<td>2.2</td>
</tr>
<tr>
<td>24</td>
<td>3.3</td>
</tr>
<tr>
<td>7 to 20 (<em>5R</em> supply voltage)</td>
<td>2.2</td>
</tr>
<tr>
<td>12 to 27 (<em>13R</em> supply voltage)</td>
<td>3.3</td>
</tr>
<tr>
<td>8 to 30 (<em>6-30</em> supply voltage)</td>
<td>3.3</td>
</tr>
</tbody>
</table>

(1) Others available on special order
(2) See output circuit figure 1 below
(3) R is removed for open collector
- **Current:** 50 ma max (no load)
- **100 ma max (line driver)**
- **Ripple:** 2% max
- **Regulation:** ±5%
- **Reverse polarity protected (except for 5vdc)**

**Operating temperature:** 0° to 70° C
**Pulse Rate:** 0 - 30 kHz
**Pulses per Revolution:** 1 to 600
(specify when ordering)

**Output Circuit** (Figure 1, specify when ordering):
- Current sinking NPN transistor with pull-up resistor (50 ma max)
- Current sinking NPN open collector (50 ma, 30 vdc max)
- Current sourcing PNP with pull-down resistor (50 ma max)
- RS422 differential line driver (MC3487 device; must be ordered with 5, 9R or 8-30 Supply Voltage)

**Output Waveshape:** (See Figure 2; does not apply to dual/triple output models)
- Square wave; outputs A and B are 50/50 duty cycle nominal; output Z (index output) is approximately the width of one cycle on outputs A or B.
  - Pulse symmetry (A): 180°±30°
  - Pulse interval jitter (B): 30% max
  - Quadrature (C): 90°±30° max
  - Phase jitter (D): 30% max
  - Index pulse (E)

**Clockwise rotation when viewed from shaft end**

**Electrical Connections**

**NPN or PNP Transistor Outputs:**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Pin</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6-Pin</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- C</td>
<td>Output Z or C</td>
<td>Brown*</td>
<td></td>
</tr>
<tr>
<td>- D</td>
<td>Output A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>- E</td>
<td>Output B</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>- F</td>
<td>no connection</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

* Output Z is green if output B is not used.

**Line Driver Outputs** (not CE certified):

<table>
<thead>
<tr>
<th>Connector</th>
<th>Function</th>
<th>Wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-Pin</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- A</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>- B</td>
<td>+vdc</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>- C</td>
<td>Output A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>- D</td>
<td>Output B</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>- E</td>
<td>Output B</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>- F</td>
<td>Output B</td>
<td>Brown</td>
<td></td>
</tr>
</tbody>
</table>

1 Output A is green if output B is not used.
2 These are Outputs Z/Z if B/B are not used.

**DIMENSIONS**

**ORDERING INFORMATION**

**R C**
- **Model**
- **Unidirectional**
  - Output on A is standard;
  - Q = Bidirectional with Quadrature outputs on A and B
- **Line Driver Outputs**
  - No index is standard:
    - Z = Index output
    - NZ = Inverted index

**DC Supply voltage:**
- 5, 12, 15, or 24; or 5R (7-20); or 12R (12-27); or 8-30

**Output circuit:**
- PNP is standard
- NPN open collector
- D = Differential line driver

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**SPECIFICATIONS**

**Mechanical**
- **Shaft Bore:** Up to 16mm.
- **Maximum Speed:** 6,000 rpm
- **Shaft Loading:**
  - Radial: 50lbs. / 22.7kg
  - Axial: 30lbs. / 13.6kg

**Materials:** Case - Aluminum, anodized
- Shaft - 303 Stainless steel

**Weight:** 7 - 9 oz. (198 - 255 grams)

**Sealing:** IP50

**Electrical Connections**

**Single Ended Outputs:**
- **16mm Din 6-pin**
  - 1 Common Black
  - 2 +vdc Red
  - 3 Output Z Brown
  - 4 Output A White
  - 5 Supply voltage Red
  - 6 - not used -

**Differential Line Driver Outputs:**
- **16mm Din 8-pin**
  - 1 Output A White
  - 2 Output B Green
  - 3 Output Z Yellow
  - 4 Supply voltage Red
  - 5 Common Black
  - 6 Output A Blue or Green
  - 7 Output B Brown
  - 8 Output Z Orange

**8-pin connector is Amphenol T3506000 or equivalent**

**Counts per Revolution (CPR):**
- Above 4800 CPR 90°±28° @ 100khz output.
- Below 4800 CPR 90°±18° @ 100khz output,

**Electrical Connections**

**Output Type:** (specify when ordering)
- Single channel (A).
- Quadrature (A,B).
- Quadrature with index (A,B,Z).

**Output Circuit:** (specify when ordering)
- Single Ended:
  - 7273 open collector
  - 7273 Push-Pull

<table>
<thead>
<tr>
<th>CPR</th>
<th>Output Circuit</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>070-0286</td>
<td></td>
</tr>
<tr>
<td>512</td>
<td></td>
<td></td>
</tr>
<tr>
<td>540</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1024</td>
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<tr>
<td>1080</td>
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<tr>
<td>1200</td>
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<tr>
<td>1250</td>
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<tr>
<td>2000</td>
<td></td>
<td></td>
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<tr>
<td>2048</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
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<td>4096</td>
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<td>4320</td>
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<td>4800</td>
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<td>5000</td>
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<td>5200</td>
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<tr>
<td>5400</td>
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<tr>
<td>6000</td>
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<tr>
<td>6250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7273</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**
- See our website or contact us for more information about cables, flexible mounting brackets, and shaft stubs.

**DIMENSIONS**

**MAX SHAFT BORE: 16mm**

**070-0286, Rev. 2**
**FEATURES**

- Up to 5/8" or 16mm shaft bore diameter
- Heavy Duty bearings
- Unbreakable code disk
- Size 20 housing
- Short circuit and ESD protected
- Shaft model available - see Model R20
- Up to 720 pulses per revolution
- Attached cable or optional connector
- CE compliant and RoHS available
- Programmable model available - see Model HS20-P

* requires the use of a Photocraft or CE compliant cable

**DIMENSIONS**

(shown with optional connector, 5/8” shaft bore)

- Up to Ø 5/8” bore
- Ø 1.575” bolt circle
- 4 x #6-32 UNC, 200” deep

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Model Number</th>
<th>Model Number</th>
<th>Model Number</th>
<th>Model Number</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS20</td>
<td>HS20</td>
<td>HS20</td>
<td>HS20</td>
<td>HS20</td>
<td>HS20</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

**Mechanical**

- Shaft Bore: Any up to 5/8", 16mm diameter
- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial: 30 lbs. / 13.6 kg
  - Axial: 20 lbs. / 9.1 kg
- A flexible mounting bracket is recommended.
- Bearing Life: 44 x 1,000,000/rpm = hours

**Materials:**

- Case: Aluminum, anodized
- Shaft: 303 Stainless steel
- Weight: 6.5 - 8.5 oz. (185 - 240 grams)
- Protection: IP51 (IP66 available)

**Electrical**

**Single Ended Outputs:**

<table>
<thead>
<tr>
<th>Optional</th>
<th>Optional</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-Pin</td>
<td>M12 4-pin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Output Z</td>
<td>Brown</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>- not used</td>
<td></td>
</tr>
</tbody>
</table>

6-pin connector is Amphenol T3402000 or equivalent
M12 4-pin is Turek FS4/18.25 or equivalent

**Differential Line Drivers:**

- 7272 differential line driver
- (output level same as supply voltage)
- RS422 differential line driver
  - (with regulated 5vdc output level)

**Output Waveshape:**

Square wave outputs A and B are 50/50 duty cycle nominal. Output Z (index output) is approximately the width of one cycle on outputs A or B.
- Pulse symmetry: 180° ± 30%
- Pulse interval jitter: 30% max
- Quadrature: 90° ± 30% max
- Phase jitter: 30% max

**Anti-jitter:** (single output models only)

Increases the pulse hysteresis to 1/2 of a pulse width, eliminating the effects of mechanical vibration and the possible dither that results in false output pulses. For example a 10 pulse per revolution output would have 18° hysteresis (i.e. 360° × 10 × 1/2).

**Accessories**

See our website or contact us for more information about accessories.
**FEATURES**
- DIP switch selectable features (see our website)
- Up to 5/8" or 16mm shaft bore diameter
- Heavy Duty bearings
- Unbreakable code disk
- Size 20 housing
- Short circuit and ESD protected
- Shaft model available - see Model R20
- Up to 1200 pulses per revolution
- Attached cable or optional connector

**DIMENSIONS**
(shown with optional connector, 5/8" shaft bore)

**MATERIAL HANDLING AND INDUSTRIAL EXPERIENCE**
OVER 30 YEARS OF
 material handling and
 industrial experience

**HOTOCRAFT INC**
602 E. North Street 630-365-7148
Elburn, IL 60119, USA  Fax: 630-365-7149
www.photocraftencoders.com

**OVER 30 YEARS OF**
**MATERIAL HANDLING AND**
**INDUSTRIAL EXPERIENCE**

**HS20**

**SPECIFICATIONS**

**Mechanical**
- Shaft Bore: Any up to 5/8", 16mm diameter
- Maximum Speed: 6,000 rpm

**Shaft Loading:**
- Radial: 30 lbs. / 13.6 kg
- Axial: 20 lbs. / 9.1 kg

A flexible mounting bracket is recommended.

**Bearing Life:** 44 x 1,000,000/rpm = hours

**Materials:**
- Case: Aluminum, anodized
- Shaft: 303 Stainless steel

**Weight:** 6.5 - 8.5 oz. (185 - 240 grams)

**Electrical Connections**

**Single Ended Outputs:**

<table>
<thead>
<tr>
<th>Optional 6-Pin</th>
<th>Optional M12 4-pin</th>
<th>Function</th>
<th>Wire</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>+vdc</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Output Z</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Output A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Output B</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>not used</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*6-pin connector is Amphenol T3402000 or equivalent
M12 4-pin is Turck FS4.4/18.25 or equivalent

**Differential Line Driver Outputs:**

<table>
<thead>
<tr>
<th>Optional 8-Pin Connector*</th>
<th>Function</th>
<th>Wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output +A</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>Output +B</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Output +Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>4</td>
<td>Supply voltage</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>Output -A</td>
<td>Blue or Green</td>
</tr>
<tr>
<td>7</td>
<td>Output -B</td>
<td>Brown</td>
</tr>
<tr>
<td>8</td>
<td>Output -Z</td>
<td>Orange</td>
</tr>
</tbody>
</table>

* connector is Amphenol T3506000 or equivalent

Standard cable length is 10 ft / 3 meters.
Other lengths are available.

**Electrical**

**Programmable Features:** The encoder is factory configured with a program that offers one or more of the following features. DIP switches are used to set program parameters. (for more details, call or see our website)
- Selectable Pulses per revolution
- Quadrature (A/B) outputs
- Direction outputs
- Anti-Jitter feature
- Enhanced anti-jitter feature
- Other enhanced features

**Supply Voltages:** (specify when ordering)
- 5 VDC, or
- 8-30 VDC

**Current:** 50 mA max (no load)
- 100 mA max (line driver)

**Operating Temperature:** 0° to 70°C

**Output Circuit:** (specify when ordering)
Output voltage level is approximately the same as the input voltage level.

**Single Ended:**
- 7273 open collector
  (30 VDC max, 50 mA max)
- 7272 Push-Pull
  (50 mA max source or sink)

**Differential Line Driver:**
- 7272 differential line driver
  (also with optional 5vdc output level)

**Output Waveshape:**
- Square wave outputs A and B are 50/50 duty cycle nominal. Output Z (index output) is approximately the width of one cycle on outputs A or B. A leads B by 90° for clockwise rotation when viewed from shaft collar end.
- Pulse symmetry: ±30%
- Pulse interval jitter: 30% max
- Quadrature: ±30% max
- Phase jitter: 30% max

**Accessories**
See our website.

**OVER 30 YEARS OF**
**MATERIAL HANDLING AND**
**INDUSTRIAL EXPERIENCE**

**HOTOCRAFT INC**
602 E. North Street 630-365-7148
Elburn, IL 60119, USA  Fax: 630-365-7149
www.photocraftencoders.com

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>P</th>
<th>8-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS20</td>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>

**Model Nu:**
- 8-30 VDC
- P = programmable encoder
- See program specific datasheet for feature descriptions and DIP switch settings.

**Supply Voltage:** 5 or 8-30

**Output Circuit:**
- Modifiable blank for 7272 Push-Pull, C=7272 open collector, D=7272 line driver, E=7272 line driver with 5vdc output level
- 0902

**Modification Number:**
- Optional modification or special feature ID. Call or see website for additional information.

**Accessories:**
- Leave blank for accessories.
- Call or see our website for more information.
FEATURES
• Up to 3/8" or 10mm shaft bore diameter
• Up to 600 pulses per revolution
• Single, quadrature, and index outputs
• Direction indicator output option
• Anti-jitter feature option
• ESD and short circuit protection on most models
• 5 vdc, 8 to 30 vdc, and other supply voltages
• 9-pin D-Sub or 4-pin M12 connector
• Programmable model available - see Model HS25-P

DIMENSIONS
(shown with 3/8" shaft bore and 9-pin D-sub connector)

MODEL NUMBER

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**FEATURES**

- Up to 3/8" or 10mm shaft bore diameter
- DIP switch selectable pulses per revolution
- Single and quadrature pulse outputs
- Direction indicator output option
- Anti-jitter feature option
- ESD and short circuit protection on most models
- 5 vdc and 8 to 30 vdc supply voltages
- Fixed output model available - see Model HS25

**DIMENSIONS**

(shown with 3/8" shaft bore)

- Slot for anti-rotation pin
- Shaft collar with 2 x 6-32 set screws at 120°
- DB9P connector
- 4 x 6-32, 25° mounting holes on 2.275" dia. bolt circle

**SPECIFICATIONS**

**Mechanical**

- **Shaft Bore:** Any up to 3/8", 10mm diameter
- **Maximum Speed:** 3,000 rpm
- **Shaft Loading:**
  - Radial: 5.5 lbs. / 2.5 kg max.
  - Axial: 2.2 lbs. / 1 kg max.
  - A flexible mounting bracket is recommended.
- **Bearing Life:** 42 x 1,000,000/rpm = hours
- **Materials:**
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
  - Switch cover: ABS plastic
- **Weight:** 5.5 oz. (156 grams)

**Electrical**

- **Supply Voltages:** (specify when ordering)
  - 5 ± 5% VDC
  - 8-30 VDC
- **Current:** 50 mA max (no load)
- **Pulse Rate:** 0 - 30 kHz
- **Operating Temperature:** 0° to 70° C
- **Output Circuit:** (specify when ordering)
  - Push/Pull (combined sourcing/sinking)
  - NPN open collector (Vcc=30 vdc max)
- **Output Current:** 50mA max source/sink

**Installation Notes**

1. Slide the HS25 onto the shaft and tighten set screws. Be sure to maintain clearance around the entire encoder body.
2. Use the anti-rotation screw, flexible mounting bracket, or other means to prevent the encoder from rotating.
3. Attach the cable leads to the control device (e.g. PLC) ensuring that the power supply meets specifications.
4. Attach the cable to the encoder.

**Accessories**

See our website or contact us for more information about Cables, Flexible Mounting Brackets, and the Anti-Rotation Pin.

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>P</th>
<th>5</th>
<th>270AJB</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bore: A=5/8&quot;, B=3/8&quot;, C=1/4&quot;, M=5mm, M=10mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Program:**

- Factory configured program that offers one or more advanced features. DIP switches set program options.
- (for more details, call or see our website)

- Selectable Pulses per revolution
- Quadrature (A/B) outputs
- Direction outputs
- Anti-jitter feature
- Enhanced anti-jitter feature

**Programmable Features:**

- Enhanced anti-jitter feature
- Anti-Jitter feature
- Direction outputs
- Quadrature (A/B) outputs
- Selectable Pulses per revolution

**Output Waveshape:**

- Square wave outputs A and B are 50/50 duty cycle nominal. A leads B by 90° for clockwise rotation when viewed from shaft collar end.
- Pulse symmetry: 180°±30%
- Pulse interval jitter: 30% max
- Quadrature: 90°±30% max
- Phase jitter: 30% max

- Single pulse output on A with selectable ppr from 1 through 64, and the anti-jitter feature.
- Quadrature pulse outputs (A and B) with selectable ppr from 1 through 64
- Single pulse output on A with selectable ppr (2,3,4,5,6,7,8,9,10,12, 15,16,18,20,24,30,54,60) and the anti-jitter feature. Direction output on B with selectable direction logic.
**MODEL HS30**

**Series 30 Hollow Shaft Encoder**

**FEATURES**
- Up to 1-1/8” or 28.6mm shaft bore diameter
- Heavy Duty bearings
- Unbreakable code disk
- Size 30 housing
- Short circuit and ESD protected
- Up to 1200 pulses per revolution
- Attached cable, or DB9, 16mm or M12 connector
- IP65 protection available - see Model HS31
- Programmable model available - see Model HS30-P

**DIMENSIONS**
(shown with DB9 connector, 1-1/8”/28.6mm shaft bore)

**SPECIFICATIONS**

**Mechanical**
- Shaft Bore: Any up to 1-1/8” / 28.6mm
- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial: 30 lbs. / 13.6 kg
  - Axial: 20 lbs. / 9.1 kg
  
  *A flexible mounting bracket is recommended.*
- Bearing Life: 44 x 1,000,000/rpm = hours
- Materials:
  - Case: Aluminum, anodized
  - Shaft: Aluminum
- Weight: 10.5 - 12.5 oz. (298 - 355 grams)
- Electrical Connections
- Single Ended Outputs:

<table>
<thead>
<tr>
<th>Function</th>
<th>Wire Color</th>
<th>Optional Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td>Black</td>
<td>DB9 16mm M12</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Red</td>
<td>2 2 1</td>
</tr>
<tr>
<td>Output A</td>
<td>White</td>
<td>3 4 4</td>
</tr>
<tr>
<td>Output B</td>
<td>Green</td>
<td>4 5 2</td>
</tr>
<tr>
<td>Output Z</td>
<td>Brown</td>
<td>5 3 6</td>
</tr>
<tr>
<td>not used</td>
<td></td>
<td>6 9 6</td>
</tr>
</tbody>
</table>

- Differential Line Driver Outputs:

<table>
<thead>
<tr>
<th>Function</th>
<th>Wire Color</th>
<th>Optional Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td>Black</td>
<td>DB9 16mm M12</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Red</td>
<td>2 2 1</td>
</tr>
<tr>
<td>Output +A</td>
<td>White</td>
<td>3 1</td>
</tr>
<tr>
<td>Output +B</td>
<td>Green</td>
<td>4 2</td>
</tr>
<tr>
<td>Output +Z</td>
<td>Yellow</td>
<td>5 3</td>
</tr>
<tr>
<td>Output -A</td>
<td>Blue or Green</td>
<td>6 6</td>
</tr>
<tr>
<td>Output -B</td>
<td>Brown</td>
<td>7 7</td>
</tr>
<tr>
<td>Output -Z</td>
<td>Orange</td>
<td>8 8</td>
</tr>
<tr>
<td>not used</td>
<td></td>
<td>9 -</td>
</tr>
</tbody>
</table>

- Connectors:
  - DB9: D-Sub 9-pin.
  - 16mm: Amphenol T3402000 (6-pin) or T3506000 (8-pin) or equivalent.
  - M12: 4-pin Turck FS4.4/18.25 or equivalent.

**Electrical**
- Supply Voltages: (specify when ordering)
  - 5 VDC or 8-30 VDC
- Current: 50 mA max (no load)
  - 100 mA max (line driver)
- Pulse Rate: 0 - 30 kHz
- Pulses per Revolution: (specify when ordering)
  - 1 to 1200
- Operating Temperature: 0° to 70° C
- Output Circuit: (specify when ordering)

- Output voltage level is approximately the same as the input voltage level.
- Single Ended:
  - 7273 open collector
  - 7272 Push-Pull
- Differential Line Driver:
  - 7272 differential line driver

**Output Waveshape:**
- Square wave outputs A and B are 50/50 duty cycle nominal. Output Z (index output) is approximately the width of one cycle on outputs A or B. Output A leads B by 90° for clockwise rotation viewed from shaft collar end.
  - Pulse symmetry: 180°±30°
  - Pulse interval jitter: 30% max
  - Quadrature: 90°±30% max
  - Phase jitter: 30% max

**Anti-jitter:** (single output models only)
- Increases the pulse hysteresis to ½ of a pulse width, eliminating the effects of mechanical vibration and possible false output pulses.
- Example a 10 pulse per revolution output has 18° hysteresis (i.e. 360° × 10 × ½).

**Output Options:**
- Output Numb = 1,2,3,4,5,6,7,8,9,0
- Anti-jitter: leave blank for no anti-jitter, or 1 for anti-jitter option (single output models only)
- Special feature ID. Call or see our website.

**Accessories**
- See our website or contact us for more information about Cables, Mounting Brackets and other accessories.

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Shaft Bore</th>
<th>Output Type</th>
<th>Output Circuit</th>
<th>Output Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS30</td>
<td>1-1/8” / 28.6mm</td>
<td>leave blank for single output on A,</td>
<td>leave blank for single output on A,</td>
<td>leave blank for single output on A,</td>
</tr>
<tr>
<td></td>
<td>16mm</td>
<td>Q-quadrature outputs on A and B</td>
<td>Q-quadrature outputs on A and B</td>
<td>Q-quadrature outputs on A and B</td>
</tr>
<tr>
<td></td>
<td>M12</td>
<td>Index output</td>
<td>leave blank for index,</td>
<td>leave blank for index,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z single output</td>
<td>P—P single output</td>
<td>P—P single output</td>
</tr>
</tbody>
</table>

**Support:**
- support@logicbus.com
- PO Box 25135, 813-886-4000
- Tampa, FL 33622-5135, USA
- 800-237-0946
- hts@com - photocraftencoders.com
Hollow Shaft Encoder

**FEATURES**
- 3/8" to 1", or 9mm to 25mm Shaft Bore
- 3/4" or 19mm blind bore depth (not through bore)
- Shaft Version Available - see Model RL
- Programmable Model Available - see Model HRL-P
- Exclusive 'Anti-Jitter' Circuit for Conveyor Applications
- Single (A), Quadrature (A, B), and Index (Z) Outputs
- Dual or Triple output Models with different pulses per revolution on each output
- Short Circuit / ESD Protection on Most Models
- Custom Models Available

**DIMENSIONS**

* CE marking requires Photocraft cable, and surge protection option if cable exceeds 100' (30m) or leaves the building.

**SPECIFICATIONS**

**Mechanical**
- Maximum speed: 6,000 rpm
- Shaft Loading: Radial: 25 lb. (11.3 kg) max.
  - Axial: 15 lb. (6.8 kg) max.
- Bearing Life: 36 x 1,000,000/rpm = hours

**Materials**
- Case: 1/4" Aluminum, anodized
- Shaft: Aluminum

**Electrical Connections**

**Push/Pull Outputs:**
- 5-pin, 10-pin³

**Line Driver Outputs:**
- 6-pin, 10-pin³

**Output Circuit:**
- 7272 differential line driver (output level same as supply voltage)
- RS422 differential line driver (with regulated 5Vdc output level)

**Output Format:** Two channel quadrature square waves (A,B) with optional index (Z).
- Optional complimentary outputs (-A,-B,-Z).

**Operating Temperature:** 0° to 70° C

**Accessories**
- See our website or contact us for more information.

**MODEL NUMBER**

**Mechanical**
- Maximum speed: 6,000 rpm
- Shaft Loading: Radial: 25 lb. (11.3 kg) max.
  - Axial: 15 lb. (6.8 kg) max.
- Bearing Life: 36 x 1,000,000/rpm = hours

**Materials**
- Case: 1/4" Aluminum, anodized
- Shaft: Aluminum

**Electrical Connections**

**Push/Pull Outputs:**
- 5-pin, 10-pin³

**Line Driver Outputs:**
- 6-pin, 10-pin³

**Output Circuit:**
- 7272 differential line driver (output level same as supply voltage)
- RS422 differential line driver (with regulated 5Vdc output level)

**Output Format:** Two channel quadrature square waves (A,B) with optional index (Z).
- Optional complimentary outputs (-A,-B,-Z).

**Operating Temperature:** 0° to 70° C

**Accessories**
- See our website or contact us for more information.
**SPECIFICATIONS**

**Electrical**

**Power Input** (specify voltage when ordering):

- Supply Voltage
- 5 ± 5% vdc: 1K ohms
- 8 to 30 vdc: 3.3K ohms

**Supply Current**: 50ma maximum (no load)

**Output Current** ($I_{O}$): 50ma max source/sink

**Output Circuits**: (see figure 1)
- Push/Pull (Combined sourcing/sinking)
- Current sinking NPN transistor
- Open collector ($V_{OC}=30$ vdc max)
- Current sourcing PNP transistor

All are switch selectable for single output model; factory configured for 2 or 3 outputs

**Output Waveform**: 50/50 squarewave

- Pulse On-Off Ratio: 50% ± 10%
- Pulse Interval Jitter: ±10%
- Quadrature Deviation: 30° (max)
- Pulse rise time: 2 μsec (max)
- Pulse fall time: 5 μsec (max)
- Voltage (high): $V_{OH}=2.5$ vdc (min)
- Voltage (low): 1.5 vdc (max)
- Index Pulse: approximately the width of 1 pulse on output A ($600$ rpm, $V_{OH}=24$ vdc, 10ma $<I_{O}<50$ma, 25°C)

**Operating temperature**: $0°$ to $70°$ C

**Pulse Rate**: 0 - 30 kHz

**Output Protection**
- Short Circuit
- ESD to 8KV direct and 25KV air

**Electrical Connections**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Supply Voltage</td>
<td>Red</td>
</tr>
<tr>
<td>B</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>E</td>
<td>Output C or Z</td>
<td>Brown</td>
</tr>
<tr>
<td>—</td>
<td>Case Ground</td>
<td>Shield</td>
</tr>
</tbody>
</table>

**Connector**: 97-3102A-14S-5P (5-pin)

**Mechanical**

**Weight**: 16.8 oz. (477 grams)

**Shaft Loading**
- Radial: 25 lb. (11.3 kg) max.
- Axial: 15 lb. (6.8 kg) max.

**Bearing Life** ($L_{hr}$): 36 x 10⁶/RPM = hours

**Materials**:
- Case: $1/4$ inch Aluminum, anodized
- Shaft: Aluminum
- Window: Plastic

**Programs**

The HRL-P is preconfigured with one of the following programs. Others are available.

**144AJ** - Single pulse output on A with selectable ppr (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 16, 18, 24, 36, 48, 72, 144) and the anti-jitter feature.

**240AJ** - Single pulse output on A with selectable ppr (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 36, 40, 48, 60, 80, 120, 240) and the anti-jitter feature.

**270AJ** - Single pulse output on A with selectable ppr (2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 36, 40, 54, 60) and the anti-jitter feature.

**270AJB** - Single pulse output on A with selectable ppr (2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 36, 40, 54, 60) and the anti-jitter feature. Direction output on B with selectable direction.

**Accessories**

**Flexible Mounting Bracket** *(MB-FB1)*: allows for axial and angular shaft misalignment.

**Cable Assembly** *(C5-x-10)*: 10 ft. (3m) shielded cable with 97-3106A14S-SS mating connector is included at no extra cost (x is number of conductors). Other lengths are available.

**CE marking requires Photocraft cable, and surge protection option if cable exceeds 100’ (30m) or leaves the building.**

**DIMENSIONS**

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>HRL</th>
<th>P</th>
<th>Model</th>
<th>Output Circuit: Push/Pull is standard C = NPN open collector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage: 5 or 8-30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Short lead time options are underlined*
SPECIFICATIONS

Mechanical

Weight: 11 oz. (312 grams)
Maximum speed: 3,000 rpm
Shaft Loading: Radial: 25 lb. (11.3 kg.) max.
Axial: 15 lb. (6.8 kg.) max.
Bearing Life (L₁₀): 36 x 10^9 hours

Materials:
- Case and Shaft: Aluminum
- Switch Access Door: Plastic

Connector: 6-pin, MS3102A-14S-6P

Electrical

Power Input (specify voltage when ordering):

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>R Values (see fig. 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ± 5% vdc</td>
<td>1K ohms</td>
</tr>
<tr>
<td>12 or 15 ± 5% vdc</td>
<td>2.2K ohms</td>
</tr>
<tr>
<td>24 ± 5% vdc</td>
<td>3.3K ohms</td>
</tr>
<tr>
<td>8 to 30 vdc</td>
<td>3.3K ohms</td>
</tr>
</tbody>
</table>

Supply Current: 50mA maximum (no load)
Output Current (Iₒ): 50mA max source/sink

Output Circuits: (specify when ordering)
- Push/Pull (Combined sourcing/sinking)
- Current sinking NPN transistor
- NPN open collector
  \( V_{CC} = 30 \text{ vdc maximum} \)
- Current sourcing PNP transistor
- RS422 differential line driver
  (MC3487 device; must be ordered with 5, 9R or 8-30 supply voltage)

Output Protection:
- Short Circuit (all Programmable and A1 models; inquire for others)
- ESD to 8KV direct and 25KV air

Output Waveform: 50/50 squarewave
- Pulse On-Off Ratio: 50% ± 10%
- Pulse Interval jitter: ±10%
- Quadrature Deviation: 30° (max)
- Pulse rise time: 2 μsec (max)
- Pulse fall time: 5 μsec (max)
- Voltage (high): \( V_{OH} = 2.5 \text{ vdc (min)} \)
- Voltage (low): 1.5 vdc (max)
- Index Pulse: approximately the width of 1 pulse on output A
  (600 rpm, \( V_{PP}=24\text{vdc}, 100mA<\text{I}_{0}=50mA, 25^°C \))

Operating temperature: 0° to 70° C
Pulse Rate: 0 - 30 kHz
Pulses per Revolution: (specify when ordering)
1 to 1200.

Programs (for programmable versions)
The HRS-P is preconfigured with one of the following programs. Others are available.

64A - Single pulse output on A with selectable ppr from 1 through 64, and
the anti-jitter feature.

Electrical Connections

NPN or PNP transistor outputs:

<table>
<thead>
<tr>
<th>6-Pin Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output Z or C</td>
<td>Brown*</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>E</td>
<td>Output B</td>
<td>Green</td>
</tr>
</tbody>
</table>

* Output Z is green if Output B is not used.

Line Driver outputs:

<table>
<thead>
<tr>
<th>G-Pin Connector</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>B</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>C</td>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>D</td>
<td>Output A</td>
<td>Blue¹</td>
</tr>
<tr>
<td>E</td>
<td>Output B₁</td>
<td>Green</td>
</tr>
<tr>
<td>F</td>
<td>Output B₂</td>
<td>Brown</td>
</tr>
</tbody>
</table>

¹ Output A is green if Output B is not used.
² These are Outputs Z or Z if B is not used.

Accessories

Cable Assembly (C6-x-10): 10 ft. (3m), x conductor shielded cable & connector
Other lengths are available.
CE mark requires Photocraft cable, and surge protection if cable exceeds 100°
(30m) or leaves the building.

Flexible Mounting Bracket (MB-FB1):
flexible stainless steel that allows for axial and angular shaft misalignment.

Mounting Instructions
1. Slide HRS onto shaft, fasten flexible mounting bracket or tether to frame, and
then tighten shaft set screws.
2. Attach the cable leads to the control device (e.g. PLC) ensuring that the power supply
meets specifications.
3. If programmable then set the switches.
   Switches can be changed at any time.
4. Attach the cable to the encoder.

DIMENSIONS

ORDERING INFORMATION

HRS
Model
- P

Pulses per revolution. Enter dual and triple ppr separated by "/"
AJ = Anti-jitter option
Supply voltage: 5, 12, 15, or 24; or 8-30

Output circuit
NPN is standard
C = Open collector
P = PNP
D = Differential Line Driver

Program name
Short lead time options are underlined

Over 25 Years of Material Handling and Industrial Experience

HOTOCRAFT Inc
602 E. North Street
630-365-7148

Your automation site!
The BlueCoder model RB21 is an optical incremental encoder that uses the benefits of blue LED light. It is a size 20 encoder that is a compact 2” diameter x 1-7/8” (56mm x 48mm) long optical shaft encoder with an integral mounting arm, compatible with a variety of mounting accessories for installation above, below, or in the moving web or conveyor. When used with the MW-8 (8.00” circumference) or MW-20 (20.00cm circumference) measuring wheel it can accurately track the web or conveyor to within ±0.007” or ±0.016cm per revolution. Solid construction and heavy-duty bearings make this encoder a great choice for long-term operation in continuous duty applications.

- High-Definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up to 10,000 CPR
- Unbreakable code disk
- Integrated mounting arm
- Precision measuring wheel

**DIMENSIONS**
(Shown with 16mm Din connector)

**SPECIFICATIONS**

**Mechanical**
- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial - 50 lbs. for life of 4.1 x 109 revolutions
  - Axial - 50 lbs. for life of 4.1 x 109 revolutions
- Note: A flexible shaft coupling is recommended to increase bearing life.
- Bearing Life: 32 x 1,000,000/rpm = hours
- Materials: Case - Aluminum, anodized
  - Shaft - 303 Stainless steel
- Weight: 10 oz. (285 grams)
- Sealing: P65

**Electrical Connections**

**Single Ended Outputs:**
- 16mm Din 6-pin
  - M2 4-pin
  - Function: Common
  - Color: Black
- 1
- 2
- 3
- 4
- 5
- 6

**Differential Line Driver Outputs:**
- 16mm Din 8-pin
  - M2 4-pin
  - Function: Output A
  - Color: White
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

**Electrical**
- Supply Voltages: 4.5 Vdc to 30 Vdc
  - (6.0 Vdc to 30 Vdc for RS422 differential line driver)
- Current: 65 mA max exclusive of load
- Short circuit and ESD protected
- Operating Temperature: 0° to 70°C
- Pulse Symmetry: ±180°sym @ maxRPM
- Quadrature Phase Error: 90°±3° @ maxRPM
- Phase jitter: 27°
- Maximum Frequency: up to 1.4 MHz
- Noise Immunity: Tested to EN61000-6-2

**Output Type:**
- (specify when ordering)
  - Two channel quadrature square waves (A,B)
    - optional index (Z).
    - optional complimentary outputs (-A,-B,-Z).
  - Note: Output A leads B by 90° for clockwise rotation when viewed from shaft end.

**Counts per Revolution:**
- (specify when ordering)
  - 360, 720, 1004, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000

**Output Circuit:**
- (specify when ordering)
  - Single Ended:
    - 7273 open collector
    - (30 Vdc max, 50 mA max)
    - 7272 Push-Pull
    - (50 mA max source or sink)
  - Differential Line Driver:
    - 7272 differential line driver
    - (output level same as supply voltage)
    - RS422 differential line driver
    - (5 Vdc output level)

**Connections:**
- (specify when ordering)
  - Attached 10ft cable
  - 16mm 6/8-pin Din connector
  - M12 4-pin connector

**Accessories**
See our website or contact us for more information about cables, flexible couplings, and measuring wheels.

**Build Encoder**

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>RB21</th>
<th>Output Type</th>
<th>10240DHS MW10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CPR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RB21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Type:</td>
<td>blank = single pulse A output,</td>
<td>Q = quad. outputs on A &amp; B</td>
</tr>
<tr>
<td></td>
<td>QZ = quad. outputs on A &amp; B</td>
<td>with 2 outputs</td>
</tr>
<tr>
<td>Counts Per Revolution:</td>
<td>360, 720, 1004, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000</td>
<td></td>
</tr>
<tr>
<td>Output Circuit:</td>
<td>blank = 7272 push/pull</td>
<td>C = NPN open collector</td>
</tr>
<tr>
<td></td>
<td>= Differential line driver -</td>
<td>open circuit</td>
</tr>
<tr>
<td></td>
<td>output level same as</td>
<td>input level</td>
</tr>
<tr>
<td></td>
<td>= RS422 line driver</td>
<td>5Vdc output level</td>
</tr>
<tr>
<td>Cable/Connector:</td>
<td>blank = attached 10ft. shielded</td>
<td>S = 16mm 6/8-pin Din connector</td>
</tr>
<tr>
<td></td>
<td>cable</td>
<td>S3 = 4-pin M12 connector</td>
</tr>
<tr>
<td>Measuring Wheel:</td>
<td>MW8 = 8” circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW10 = 10” circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW1 = 12” circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW1R = 12” circumference with replaceable o-ring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW1W = 12” circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW20 = 20cm circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW30 = 30cm circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW30R = 30cm circumference with replaceable o-ring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MW30W = 30cm circumference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25mm wide</td>
<td></td>
</tr>
</tbody>
</table>

Example: RB21Q-10240DHS MW10 - quadrature outputs, 1024 cpr, differential line driver output, 16mm connector (8-pin), 10” measuring wheel

**Build Encoder**

**Model Number**

- RB21
- Output Type X
- CPR
- Output Circuit
- Connector
- Measuring Wheel

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- Measuring Wheel

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- CPR
- Output Circuit
- Connector
- Measuring Wheel

**Build Encoder**

- RB21
- Output Type X
- CPR
- Output Circuit
- Connector
- Measuring Wheel
MECHANICAL

Maximum Speed: 6,000 rpm
Shaft Loading:
- Radial: 40 lbs. / 18.1 kg
- Axial: 30 lbs. / 13.6 kg
Bearing Life: 32 x 1,000,000/rpm = hours
Materials:
- Case: Aluminum, anodized
- Shaft: 303 Stainless steel
Weight: 12 oz. (340 grams)
Protection: IP50 (IP64 is available)

ELECTRICAL

Supply Voltages: (specify when ordering)
- 5 VDC or 8-30 VDC
Current: 50 mA max (no load)
100 mA max (line driver)
Pulse Rate: 0 - 30 kHz
Pulses per Revolution: (specify when ordering)
1 to 1200 (call for values up to 4800)
Operating Temperature: 0° to 70°C
Output Circuit: (specify when ordering)
Output voltage level is approximately the same as the input voltage level.

SINGLE ENDED:
- 7273 open collector
  (30 VDC max, 50 mA max)
- 7272 Push-Pull
  (50 mA max source or sink)
Differential Line Driver:
- 7272 differential line driver
  (also with optional 5Vdc output level)

Output Waveshape:
Square wave outputs A and B are 50/50 duty cycle nominal. Output Z (index output) is approximately the width of one cycle on outputs A or B. Output A leads B by 90° for clockwise rotation viewed from end by handle.
- Pulse symmetry: 180°±30°
- Pulse interval jitter: 30% max
- Quadrature: 90°±30% max
- Phase jitter: 30% max

Antijitter: (single output models only)
Increases the pulse hysteresis to ½ of a pulse width, eliminating the effects of mechanical vibration and possible false output pulses. For example a 10 pulse per revolution output has 18° hysteresis (i.e. 360°/10 x ½).

ACCESSORIES
See our website or contact us for more information about cables, measuring wheels, and mounting hardware.

MODEL NUMBER

6-pin Connector | Function      | Wire Color
---------------|---------------|-------------
1              | Output +A     | White       |
2              | Output +B     | Green       |
3              | Output +Z     | Yellow      |
4              | Supply voltage| Red         |
5              | Common        | Black       |
6              | Output -A     | Blue or Green|
7              | Output -B     | Brown       |
8              | Output -Z     | Orange      |

8-pin Connector | Function      | Wire Color
----------------|---------------|-------------
1                | Output -A     | Blue or Green|
2                | Output -B     | Brown       |
3                | Output -Z     | Orange      |
4                | Output +A     | White       |
5                | Output +B     | Green       |
6                | Output +Z     | Yellow      |
7                | Supply voltage| Red         |
8                | Common        | Black       |

Standard cable length is 10 ft / 3 meters.
Other lengths are available.
**Programmable Wheeled Encoder**

### Mechanical
- **Maximum Speed:** 3,000 rpm
- **Shaft Loading:**
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- **Bearing Life:** 32 x 1,000,000 / rpm = hours
- **Materials:** Switch cover: ABS
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- **Weight:** 12 oz. / 340 grams (without accessories)
- **Protection:** IP50 is standard, IP66 available

### Electrical
- **Supply Voltages:** (specify when ordering)
  - 5 VDC or 8-30 VDC
- **Current:** 50 mA max (no load)
  - 100 mA max (line driver)
- **Pulse Rate:** 0 - 30 kHz
- **Pulses per Revolution:** 1/4, 1/8, 1/16, 1/32, 1/64
- **Operating Temperature:** -25°C to +85°C
- **Output Circuit:** (specify when ordering)
  - Single Ended:
    - 7273 open collector
      - (30 VDC max, 50 mA max)
    - 7272 Push-Pull
      - (50 mA max source or sink)
    - RS422 differential line driver
      - (output level same as supply voltage)
    - RS422 differential line driver
      - (with regulated 5 VDC output level)
- **Output Waveshape:**
  - Square wave output A is 50/50 duty cycle nominal. Output -A is the complement of A.
  - Pulse symmetry: ±30% max
- **Enhanced Anti-jitter:**
  - Developed for conveyor applications that typically operate in one direction, and do not want pulses generated if the conveyor stops or reverses for a short distance. Pulses are generated as long as rotation continues in one direction. If the direction reverses then pulse output ceases until it returns to its original direction and position it was at before reversing. If the reverse rotation exceeds 10 rotations then the encoder resets assuming the current direction is forward and begins pulsing.

### DIMENSIONS
(shown with optional 16mm connector)

- **Configuration Switches**
- **Pulse Selection**
- **Not Used**

### Configuration Switches
Selects the pulses per linear movement of the 8" circumference measuring wheel (MW-8).

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Connectors</th>
<th>16mm</th>
<th>16mm</th>
<th>M12</th>
<th>Wire 4-Pin Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>6-Pin</td>
<td>8-Pin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>Black</td>
</tr>
<tr>
<td>+vdc</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>Red</td>
</tr>
<tr>
<td>Output A</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>White</td>
</tr>
<tr>
<td>Output -A</td>
<td>-</td>
<td>6</td>
<td>2</td>
<td>Green</td>
</tr>
</tbody>
</table>

Unlisted pins are not used.

16mm 6-pin is Amphenol T3402000 or equivalent, for Single Ended outputs.

16mm 8-pin is Amphenol T3506000 or equivalent, for Differential Line Driver.

M12 4-pin is Turck F54.4/. or equivalent for Single or Differential Outputs.

Attached cable is 10-ft / 3-meters. Other lengths are available.

**MODEL NUMBER**

<table>
<thead>
<tr>
<th>R21 P8EAJ</th>
<th></th>
</tr>
</thead>
</table>

**Address:**
- PO Box 25135
- 813-886-4000
- Tampa FL 33622-5135, USA
- 800-237-0946
- support@logicbus.com
- www.logicbus.com

**Website:**
- ttco.com
- photocraftencoders.com
- www.logicbus.com

**Support:**
- Call or see our website for information about our programs.

**Model Number:**
- R21
- P8EAJ
- Optional modification or special feature ID. Call or see our website.

**Accessories:**
- Leave blank for no accessories.
- Call or see our website for more information.
MODEL R21-P20EAJ

Programmable Wheeled Encoder

FEATURES
- Generates pulses for accurate linear measurement
- Selectable resolution: Millimeters per Pulse
- Heavy Duty construction
- Compact size
- Precision 20cm circumference measuring wheel
- 16mm or M12 connector, or attached cable
- Enhanced "Anti-Jitter" feature for web applications
- ESD, Short Circuit, Reverse Voltage protection
- Enhanced "Anti-Jitter" feature for web applications
- Various mounting hardware kits are available
- Other programmable models are available

DIMENSIONS
(shown with optional 16mm connector)

SPECIFICATIONS

Mechanical
- Maximum Speed: 3,000 rpm
- Shaft Loading:
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 32 x 1,000,000/rpm = hours
- Materials: Switch cover: ABS
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- Weight: 12 oz. / 340 grams (without accessories)
- Protection: IP50 is standard, IP66 available

Electrical
- Connectors
  - 16mm 6-Pin
  - 8-Pin
  - 4-Pin
  - M12
  - Wire Color
    - Common: 1 5 3 Black
    - +vdc: 2 4 1 Red
    - Output A: 4 1 4 White
    - Output -A: 6 2 Green
  - Unlisted pins are not used.
- 16mm 6-pin is Amphenol T3402000 or equivalent, for Single Ended outputs.
- 16mm 8-pin is Amphenol T3506000 or equivalent, for Differential Line Driver.
- M12 4-pin is Turck F54.4/.. or equivalent, for Single or Differential Outputs.
- Attached cable is 10-ft / 3-meters. Other lengths are available.

Configuration Switches
- Determines the linear movement per output pulse when used with the 20 centimeter circumference measuring wheel (MW-20).

Unlisted pins are not used.

Electrical Connections

Electrical Connections

Supply Voltages: (specify when ordering)
- 5 VDC or 8-30 VDC
- Current: 50 mA max (no load)
- 100 mA max (line driver)
- Pulse Rate: 0 - 30 kHz
- Pulses per Revolution: 2, 2-²/₃, 4, 8, 10
- 13-²/₃, 20, 40, 50, 66-²/₃, 100, 200
- Operating Temperature: -25° to +85°C
- Output Circuit: (specify when ordering)
  - Single Ended:
    - 7273 open collector
      - 30 VDC max, 50 mA max
    - 7272 Push-Pull
      - 50 mA max source or sink
  - Differential Line Driver:
    - 7272 differential line driver
      - output level same as supply voltage
    - RS422 differential line driver
      (with regulated 5vdc output level)

Output Waveshape:
- Square wave output A is 50/50 duty cycle nominal. Output -A is the compliment of A.
- Pulse symmetry: 180°±30%
- Pulse interval jitter: 30% max

Enhanced Anti-jitter: Developed for conveyor applications that typically operate in one direction, and do not want pulses generated if the conveyor stops or reverses for a short distance. Pulses are generated as long as rotation continues in one direction. If the direction reverses then pulse output ceases until it returns to its original direction and position it was at before reversing. If the reverse rotation exceeds 10 rotations then the encoder resets assuming the current direction is forward and begins pulsing.

Accessories
- See our website or contact us for more information about cables, measuring wheels, and mounting hardware.
**Mechanical**

- Maximum Speed: 2,500 rpm
- Shaft Loading:
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 32 x 1,000,000 rpm = hours
- Materials:
  - Switch cover: ABS
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- Weight: 12 oz. / 340 grams (without accessories)
- Protection: IP50 is standard, IP66 available

**Configuration Switches**

<table>
<thead>
<tr>
<th>Switch definitions:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up (on)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down (on)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pulses per Revolution Selection**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>43</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

**Electrical**

- Supply Voltages (+vdc): (specify when ordering)
  - 5 ± 5% vdc or 8 to 30 vdc
- Supply Current: 50 ma max (no load)
  - 100 ma max (line driver)
- Output Circuit: (specify when ordering)
  - Output voltage level is approximately the same as the input voltage level
    - Single Ended: 7273 open collector
      - (30 VDC max, 50 mA max)
    - 7272 Push-Pull
      - (50 mA max source or sink)
- Differential Line Driver:
  - 7272 line driver, unregulated output
  - RS422 line driver with 5vdc output

**Outputs**

- Pulses per Revolution Output: Selectable by setting configuration switches 1 to 6.
- Operating Temperature: -25° to +85° C

**Electrical Connections**

**Differential Line Driver Outputs:**

<table>
<thead>
<tr>
<th>Optional Connectors</th>
<th>8-Pin</th>
<th>Function</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Output +A</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**MODEL NUMBER**

R21-P64AJ

**FEATURES**

- Generates pulses for accurate linear measurement
- Selectable pulses per revolution
- Heavy Duty construction
- Compact size
- Precision 8" or 20cm circumference measuring wheel
- 16mm or M12 connector, or attached cable
- "Anti-Jitter" feature for conveyor applications
- ESD, Short Circuit, Reverse Voltage protection
- Various mounting hardware kits are available

**DIMENSIONS**

Configuration Switches

The handle can be removed, rotated to a new position in 30° increments, and reattached.

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Tampa FL 33622-5135, USA  800-237-0946

support@logicbus.com  www.logicbus.com

Your automation site!
Model R21-P144AJ

Programmable Wheeled Encoder

**Mechanical**
- Shaft Loading:
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 32 x 1,000,000/rpm = hours
- Materials:
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
  - Switch access door: plastic
- Weight: 12 oz. / 340 grams (without accessories)
- Protection: IP50 is standard
  - IP66 is available

**Configuration Switches**

<table>
<thead>
<tr>
<th>Switches</th>
<th>-1</th>
<th>-2</th>
<th>-3</th>
<th>-4</th>
<th>-5</th>
<th>-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pulses per Revolution Selection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Option</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Outputs**
- Selectable pulses per revolution
- Heavy Duty construction
- Compact size
- Precision 8" or 12" circumference measuring wheel
- 16mm or M12 connector, or attached cable
- "Anti-Jitter" feature for web applications
- ESD, Short Circuit, Reverse Voltage protection
- Various mounting hardware kits are available

**Configuration Switches**

<table>
<thead>
<tr>
<th>Switches</th>
<th>-1</th>
<th>-2</th>
<th>-3</th>
<th>-4</th>
<th>-5</th>
<th>-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulses per Revolution Selection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Electrical**

- **Supply Voltages (+vdc):** (specify when ordering)
  - 5 ± 5% vdc or 8 to 30 vdc
- **Supply Current:** 50 ma max (no load)
  - 100 ma max (line driver)
- **Output Circuit:** (specify when ordering)
  - Single Ended:
    - 7273 open collector
    - 7272 Push-Pull
    - 50 mA max source or sink
  - Differential Line Driver:
    - 7272 differential line driver
      - Output level same as supply voltage
    - RS422 differential line driver
      - (with regulated 5vdc output level)
- **Operating Temperature:** 0° to 70° C
- **Maximum Operating Speed:** 2,500 rpm

**Dimensions**

- Shown with optional 16mm connector
- The handle can be removed, rotated to a new position in 30° increments, and reattached.

**Model Number**

- **R21-P144AJ**
- **Program Name:** Call or see our website for more information about other programs.
- **Supplied Voltage:** 5 or 8-30
- **Output Circuit**:
  - C: 7273 Push/Pull, DI: line driver
  - M: 7272 Push/Pull, DI: line driver
  - W: 7272 differential line driver
  - M12: 50 mA max source or sink
- **Cable Connector**:
  - Leave blank for attached cable, or add one of the following:
    - 16mm connector, 8-pin connector, 50 mA max source or sink
- **Modification Number**:
  - Optional modification or special feature ID. Call or see our website.
- **Accessories**:
  - Leave blank for no accessories.
  - Call or see our website for more information.

**Features**

- Generates pulses for accurate linear measurement
- Selectable pulses per revolution
- Heavy Duty construction
- Compact size
- Precision 8" or 12" circumference measuring wheel
- 16mm or M12 connector, or attached cable
- "Anti-Jitter" feature for web applications
- ESD, Short Circuit, Reverse Voltage protection
- Various mounting hardware kits are available

**Specifications**

**Electrical Connections**

<table>
<thead>
<tr>
<th>Optional 8-Pin</th>
<th>Optional M12 4-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 3</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>+vdc</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Output A</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Common</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Output A</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>2, 3, 7, 8</td>
<td>not used</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**

- Adapters, Cables, Flexible Couplings,
- Measuring Wheels, Mounting Brackets
The BlueCoder model RB22 is an optical incremental encoder that uses the benefits of blue LED light. It is a size 20 encoder that is a compact 2” diameter x 1-7/8” (51mm x 48mm) long optical shaft encoder with an integral mounting arm, compatible with a variety of mounting accessories for installation either above or below a moving web or conveyor. When used with the MW-8 (8.00” circumference) or MW-20 (20.00cm circumference) measuring wheel it can accurately track the web or conveyor to within ±.007” or ±.016cm per revolution. Solid construction and heavy duty bearings make this encoder a great choice for long-term operation in continuous duty applications.

- High-Definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up to 10,000 CPR
- Unbreakable code disk
- Integrated mounting arm
- Precision measuring wheel

**DIMENSIONS**
(Shown with 16mm Din connector)

**SPECIFICATIONS**

**Mechanical**
- Maximum Speed: 6,000 rpm
- Shaft Loading:
  - Radial - 50 lbs. for life of 4.1 x 109 revolutions
  - Axial - 50 lbs. for life of 4.1 x 109 revolutions
- Note: A flexible shaft coupling is recommended to increase bearing life.

**Bearing Life:** 32 x 1,000,000rpm = hours

**Materials:** Case - Aluminum, anodized
- Shaft - 303 Stainless steel

**Weight:** 10 oz. (285 grams)

**Electrical Connections**

**Single Ended Outputs:**

16mm Din (6-pin)
- M12 (4-pin)

<table>
<thead>
<tr>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>Output Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Red</td>
</tr>
<tr>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>Output A</td>
<td>Blue or Green</td>
</tr>
<tr>
<td>Output B</td>
<td>Brown</td>
</tr>
<tr>
<td>Output Z</td>
<td>Orange</td>
</tr>
</tbody>
</table>

8-pin connector is Amphenol T3506000 or equivalent

**Differential Line Driver Outputs:**

16mm Din (8-Pin)
- M12 (4-pin)

<table>
<thead>
<tr>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output A</td>
<td>White</td>
</tr>
<tr>
<td>Output B</td>
<td>Green</td>
</tr>
<tr>
<td>Output Z</td>
<td>Yellow</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>Red</td>
</tr>
<tr>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>Output A</td>
<td>Blue or Green</td>
</tr>
<tr>
<td>Output B</td>
<td>Brown</td>
</tr>
<tr>
<td>Output Z</td>
<td>Orange</td>
</tr>
</tbody>
</table>

6-pin connector is Turck FS4.4/18.25 or equivalent

**Counts per Revolution:**
- Choose one number: 360, 720, 1000, 1204, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000

**Current:** 65 mA max exclusive of load

**Input Level:** 5Vdc output level
**Output Level:** Same as input level
**Supply Voltage:** 6.0 Vdc to 30 Vdc

**Measuring Wheel**
- MW8 = 8” circumference
- MW10 = 10” circumference
- MW11 = 12” circumference
- MW1R = 12” circumference with replaceable o-ring
- MW1W = 12” circumference
- MW20 = 20cm circumference
- MW30 = 30cm circumference
- MW30R = 30cm circumference with replaceable o-ring
- MW30W = 30cm circumference 25mm wide

**Example:** RB22Q-10240DHS MW10 - quadrature outputs, 1024 cpr, differential line driver output, 16mm connector (8-pin), 10” measuring wheel
**MODEL R22**

**Series 20 Wheeled Encoder**

**MECHANICAL**
- **Maximum Speed:** 6,000 rpm
- **Shaft Loading:**
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- **Bearing Life:** 32 x 1,000,000/rpm = hours
- **Materials:**
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- **Weight:** 12 oz. (340 grams)
- **Protection:** IP50 (IP64 is available)

**ELECTRICAL**
- **Supply Voltages:** 5 VDC or 8-30 VDC
- **Current:** 50 mA max (no load)
- **100 mA max (line driver)**
- **Pulse Rate:** 0 - 30 kHz
- **Pulses per Revolution:** 1 to 1200 (call for values up to 4800)
- **Operating Temperature:** 0° to 70° C
- **Output Circuit:** (specify when ordering)
  - Output voltage level is approximately the same as the input voltage level.

**FEATURES**
- Generates pulses for accurate linear measurement
- Heavy Duty construction
- Compact size
- Precision 8” or 20cm circumference measuring wheels
- 16mm or M12 connector, or attached cable
- *‘Anti-Jitter’ and other material handling features
- ESD, Short Circuit, Reverse Voltage protection
- Various mounting hardware kits are available
- Programmable model available - see Model R22-P
- Single wheel version - see Model R21

**DIMENSIONS**
- Shown with optional MW-8 measuring wheels and 16mm connector
- 6-pin connector is Amphenol T3402000 or equivalent
- M12 4-pin is Turck FS4.4/18.25 or equivalent
- 6-pin connector is Amphenol T3506000 or equivalent

**SPECIFICATIONS**

**Electrical Connections**
- **Single Ended Outputs:**
  - Optional 2-pin Connector
  - Function: Common, Output A, Output B
  - Wire: Black, Red
- **Differential Line Driver Outputs:**
  - Optional 8-pin Connector
  - Function: +A, +Z, -A, -Z
  - Wire: White, Yellow, Blue, Orange

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Elburn, IL 60119, USA  Fax: 630-365-7149
www.photocraftencoders.com

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**ACCESSORIES**
- See our website or contact us for more information about cables, measuring wheels, and mounting hardware.

**MODEL NUMBER**

- **MDL Nu mb er:**
  - leave blank for single output on A, Q = quadrature outputs on A and B
  - G = index output
  - leave blank for no index, Q = index output
  - leave blank for single output on A,
  - leave blank for single output on A, Q = quadrature outputs on A and B
  - leave blank for no index, Q = index output
  - leave blank for no index, Q = index output
  - leave blank for anti-jitter, AI = anti-jitter option (single output models only)
  - leave blank for single output on A, Q = quadrature outputs on A and B
  - leave blank for no index, Q = index output
  - leave blank for anti-jitter, AI = anti-jitter option (single output models only)

- **Supply Voltage:** 5 or 8-30
- **Model Number:**
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.

**ACCESSORIES**
- Call or see our website for more information.

**SHAFT LIFE**
- 32 x 1,000,000rpm = hours

**OUTPUT WAVESHAPES**
- Square wave outputs A and B are 50/50 duty cycle nominal.
- Output Z (index output) is approximately the width of one cycle on outputs A or B.
- Output A leads B by 90° for clockwise rotation viewed from end by handle.
- Pulse symmetry: 180°±30%
- Pulse interval jitter: 30% max
- Quadrature: 90°±30% max
- Phase jitter: 30% max

**Bearing Life:**
- Axial: 30 lbs. / 13.6 kg
- Radial: 40 lbs. / 18.1 kg

**Shaft Loading:**
- 40 lbs. / 18.1 kg
- 30 lbs. / 13.6 kg

**Electronic Connections**
- Optional 2-pin Connector
- Function: Common, Output A, Output B
- Wire: Black, Red
- Optional 8-pin Connector
- Function: +A, +Z, -A, -Z
- Wire: White, Yellow, Blue, Orange

**Electrical Connections**
- **Single Ended Outputs:**
  - Optional 2-pin Connector
  - Function: Common, Output A, Output B
  - Wire: Black, Red
- **Differential Line Driver Outputs:**
  - Optional 8-pin Connector
  - Function: +A, +Z, -A, -Z
  - Wire: White, Yellow, Blue, Orange

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Elburn, IL 60119, USA  Fax: 630-365-7149
www.photocraftencoders.com

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**ACCESSORIES**
- See our website or contact us for more information about cables, measuring wheels, and mounting hardware.

**MODEL NUMBER**

- **MDL Nu mb er:**
  - leave blank for single output on A, Q = quadrature outputs on A and B
  - G = index output
  - leave blank for no index, Q = index output
  - leave blank for single output on A, Q = quadrature outputs on A and B
  - leave blank for no index, Q = index output
  - leave blank for anti-jitter, AI = anti-jitter option (single output models only)

- **Supply Voltage:** 5 or 8-30
- **Model Number:**
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.
  - leave blank for no accessories.

**ACCESSORIES**
- Call or see our website for more information.
**Programmable Wheeled Encoder**

**Product Information**

**Model Number:** R22-P8EAJ

**Dimensions**

- **Mechanical**
  - Maximum Speed: 3,000 rpm
  - Shaft Loading:
    - Radial: 40 lbs. / 18.1 kg
    - Axial: 30 lbs. / 13.6 kg
  - Bearing Life: 32 x 1,000,000 rpm = hours
  - Materials:
    - Switch cover: ABS
    - Case: Aluminum, anodized
    - Shaft: 303 Stainless steel
  - Weight: 12 oz. / 340 grams (without accessories)
  - Protection: IP50 is standard, IP66 available

**Electrical**

- **Supply Voltages:** (specify when ordering)
  - 5 VDC or 8-30 VDC
- **Current:**
  - 50 mA max (no load)
  - 100 mA max (line driver)
- **Pulse Rate:** 0 - 30 kHz
- **Pulses per Revolution:** 1/3, 1-1/3, 2, 2-2/3, 4, 8, 16, 24, 32, 40, 80, 128, 160
- **Operating Temperature:** -25°C to +85°C

**Output Circuit:** (specify when ordering)

- Single Ended:
  - 7273 open collector
  - 7272 Push-Pull
  - 7272 differential line driver
  - RS422 differential line driver
- **Output Waveshape:**
  - Square wave output A is 50/50 duty cycle nominal. Output -A is the complement of A.
  - Pulse symmetry: 180° ± 30%
  - Pulse interval jitter: 30% max

**Enhanced Anti-Jitter:**

- Developed for conveyor applications that typically operate in one direction, and do not want pulses generated if the conveyor stops or reverses for a short distance. Pulses are generated as long as rotation continues in one direction. If the direction reverses then pulse output ceases until it returns to its original direction and position it was at before reversing. If the reverse rotation exceeds 10 rotations then the encoder resets assuming the current direction is forward and begins pulsing.

**Accessories**

- See our website or contact us for more information about cables, measuring wheels, and mounting hardware.
MODEL R22-P20EAJ

Programmable Wheeled Encoder

FEATURES
• Generates pulses for accurate linear measurement
• Selectable resolution: Millimeters per Pulse
• Heavy Duty construction
• Compact size
• Precision 20cm circumference measuring wheels
• 16mm or M12 connector, or attached cable
• Enhanced "Anti-Jitter" feature for web applications
• ESD, Short Circuit, Reverse Voltage protection
• Enhanced "Anti-Jitter" feature for web applications
• 16mm or M12 connector, or attached cable
• Precision 20cm circumference measuring wheel
• Compact size
• Heavy Duty construction
• Selectable resolution: Millimeters per Pulse
• Generates pulses for accurate linear measurement

DIMENSIONS
(shown with optional 16mm connector)

Configuration Switches
Determine the linear movement per output pulse when used with the 20 centimeter circumference measuring wheel (MW-20).

Configuration Switches

- Pulses are generated if the conveyor stops or reverses for a short distance.
- Pulses are generated as long as rotation continues in one direction. If the direction reverses then pulse output ceases until it returns to its original direction and position it was at before reversing. If the reverse rotation exceeds 10 rotations then the encoder resets assuming the current direction is forward and begins pulsing.

SPECIFICATIONS

Mechanical
- Maximum Speed: 3,000 rpm
- Shaft Loading:
  - Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 32 x 1,000,000/rpm = hours
- Materials:
  - Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
- Weight: 12 oz. / 340 grams (without accessories)
- Protection: IP50 is standard, IP66 available

Electrical
- Supply Voltage: (specify when ordering)
  - 5 VDC or 8-30 VDC
- Current: 50 mA max (no load)
  - 100 mA max (line driver)
- Pulse Rate: 0 - 30 kHz
- Pulses per Revolution: 2, 2-²/³, 4, 8, 10
  - 13-¹/³, 20, 40, 50, 66-²/³, 100, 200
- Operating Temperature: -25° to +85° C
- Output Circuit: (specify when ordering)
  - Single Ended:
    - 7272 differential line driver
    - 7272 Push-Pull
    - 7273 open collector
    - 7273-²/³ open collector
    - 7273-²/³ open collector (50 mA max source or sink)
  - Differential Line Driver:
    - 7272 differential line driver
    - 7272 differential line driver
    - 7272 differential line driver
    - 7272 differential line driver (output level same as supply voltage)
    - 7272 differential line driver (with regulated 5Vdc output level)
- Output Waveshape:
  - Square wave output A is 50/50 duty cycle nominal. Output -A is the complement of A.
  - Pulse symmetry: 180°±30%
  - Pulse interval jitter: 30% max
- Enhanced Anti-jitter: Developed for conveyor applications that typically operate in one direction, and do not want pulses generated if the conveyor stops or reverses. For a short distance. Pulses are generated as long as rotation continues in one direction. If the direction reverses then pulse output ceases until it returns to its original direction and position it was at before reversing. If the reverse rotation exceeds 10 rotations then the encoder resets assuming the current direction is forward and begins pulsing.

ACCESSORIES
See our website or contact us for more information about cables, measuring wheels, and mounting hardware.

MODEL NUMBER

R22 - P20EAJ

Program Name: Call or see our website for information about other programs.

Supply Voltage: 5 or 8-30

Output Circuit: Leave blank for 7272 Push-Pull, DL-line driver, DI-line driver, or optional modification or special feature ID. Call or see our website.

Cable Connector: Leave blank for attached cable, M12 connector, or optional modification or special feature ID. Call or see our website.

Modifications: Leave blank for no accessories, Call or see our website for more information.

Accessories: Call or see our website for more information.

TRI-TRONICS®

HOTOCRAFT Encoders

PO Box 25135 813-886-4000 Tampa FL 33622-5135, USA 800-237-0946

support@logicbus.com

www.logicbus.com

Your automation site!
Mechanical
Shaft Loading:
- Radial: 40 lbs. / 18.1 kg
- Axial: 30 lbs. / 13.6 kg

Bearing Life: 32 x 1,000,000/rpm = hours

Materials:
- Case: Aluminum, anodized
- Shaft: 303 Stainless steel
- Switch access door: plastic

Weight: 10 oz. (285 grams)

Protection: IP50 is standard, IP66 available

Configuration Switches

Configuration Switches

Pulses per Revolution Selection

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<thead>
<tr>
<th>1</th>
<th>2</th>
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<th>6</th>
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<td>64</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Switch definitions:
- □ Up (off)
- ■ Down (on)

SPECIFICATIONS

Electrical
Supply Voltages (+vdc): (specify when ordering)
5 ± 5% vdc or 8 to 30 vdc

Supply Current: 50 ma max (no load)
100 ma max (line driver)

Output Circuit: (specify when ordering)
Output voltage level is approximately the same as the input voltage level
Single Ended:
- 7273 open collector
  (30 VDC max, 50 mA max)
- 7272 Push-Pull
  (50 mA max source or sink)

Differential Line Driver:
- 7272 line driver, unregulated output
- RS422 line driver with 5vdc output

Operating Temperature: -25° to +85° C

Maximum Operating Speed: 2,500 rpm

Outputs
Pulses per Revolution Output: Selectable by setting configuration switches 1 to 6.
Output is 'low' when initially powered.

Anti-Jitter feature: details on our website

Electrical Connections

Optional Connectors

<table>
<thead>
<tr>
<th>6-Pin</th>
<th>M12 4-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>Common</td>
<td>Black</td>
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<tr>
<td>2</td>
<td>1</td>
<td>+vdc</td>
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<td>3, 5, 6</td>
<td>2</td>
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<td>-</td>
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Optional Connectors

<table>
<thead>
<tr>
<th>8-Pin</th>
<th>M12 4-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
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<td>White</td>
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<tr>
<td>4</td>
<td>1</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Output -A</td>
<td>Green</td>
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<tr>
<td>2, 3, 7, 8</td>
<td>not used</td>
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<td></td>
</tr>
</tbody>
</table>

Differentiator Line Driver Outputs

Optional Connectors

<table>
<thead>
<tr>
<th>6-Pin</th>
<th>M12 4-pin</th>
<th>Function</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>Output +A</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>+vdc</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Common</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Output -A</td>
<td>Green</td>
</tr>
<tr>
<td>2, 3, 7, 8</td>
<td>not used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8-pin connector is Amphenol T3062000 or equivalent
M12 4-pin is analog F54-18.25 or equivalent

DIMENSIONS

Configuration Switches

The handle can be removed, rotated to a new position in 30° increments, and reattached.

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MATERIAL HANDLING AND INDUSTRIAL EXPERIENCE SINCE 1974

HOTOCRAFT Encoders
PO Box 25135 Tampa FL 33622-5135, USA 800-237-0946
R22-P240AJB Programmable Wheeled Encoder

**DESCRIPTION**
The R22-P240AJB wheeled encoder converts shaft rotation into square wave output pulses to provide an accurate and reliable means of digitizing position, rate, or length of travel. Pulses per each revolution of the shaft, determined by setting configuration switches, are on Output A. Output B is a direction output indicating the shaft rotation direction, clockwise (CW) or counter-clockwise (CCW), as viewed from the shaft end where the handle is attached. Various measuring wheels are available for converting shaft rotation into linear measurement of inches or centimeters of travel. For conveyor applications, accessories are available for mounting either above or below the conveyor belt or roller.

**FEATURES**
- Selectable Pulses/Revolution (up to 240 ppr)
- Programmable Direction Output
- Precision 8”, 12”, 20cm, or 30cm circumference measuring wheels
- 16mm or M12 connector, or attached cable
- Double ended shaft for well balanced operation
- ESD / Short Circuit / Reverse Voltage Protected
- Double ended shaft for well balanced operation
- CE marked and RoHS compliant

**DIMENSIONS**
(shown with optional 16mm connector)

**SPECIFICATIONS**

**Electrical**
- Supply Voltages (+vdc): specify when ordering
  - 5 ± 5% vdc or 8 to 30 vdc
- Supply Current: 50 ma max (no load)
  - 100 ma max (line driver)
- Output Circuit: specify when ordering
- Single Ended:
  - 7273 open collector
    - (30 VDC max, 50 mA max)
  - 7272 Push-Pull
    - (50 mA max source or sink)
- Differential Line Driver:
  - 7272 differential line driver
    - (output level same as supply voltage)
  - RS422 differential line driver
    - (with regulated 5vdc output level)
- Operating Temperature: 0° to 70° C
- Maximum Operating Speed: 2,500 rpm

**Electrical Connections**

**Differential Line Driver Outputs:**

**MODEL NUMBER**

**Mechanical**
- Shaft Loading: — Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
- Bearing Life: 44 x 1,000,000 rpm = hours
- Materials: — Case: Aluminum, anodized
  - Shaft: 303 Stainless steel
  - Switch access door: plastic
- Weight: 12 oz. (340 grams)
- Protection: IP50 is standard, IP66 available

**Configuration Switches**

**Outputs**
- Pulses per Revolution Output(A): Selectable by setting configuration switches 2 to 6. Output is "low" when initially powered up.
- Anti-Jitter feature: Increases pulse output by 1/3 of a pulse width eliminating the effects of mechanical vibration and the possible dither that results in false output pulses.
- Direction Output(B): Indicates direction of rotation updated each 1/240th/revolution. Switch 1 setting determines polarity.

**Configuration Switches**

**Electrical Connections**

**Differential Line Driver Outputs:**

**MODEL NUMBER**

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- Shaft Loading: — Radial: 40 lbs. / 18.1 kg
  - Axial: 30 lbs. / 13.6 kg
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- Anti-Jitter feature: Increases pulse output by 1/3 of a pulse width eliminating the effects of mechanical vibration and the possible dither that results in false output pulses.
- Direction Output(B): Indicates direction of rotation updated each 1/240th/revolution. Switch 1 setting determines polarity.
The BlueCoder model RBH is an optical incremental encoder that uses the benefits of blue LED light. It is housed in a 3" diameter x 2-3/8" long ultra-rugged enclosure with an integral mounting arm, compatible with a variety of mounting accessories for installation either above or below a moving web or conveyor. When used with the MW-1 (12.00" circumference) or MW-30 (30.00cm circumference) measuring wheel it can accurately track the web or conveyor to within ±0.007" or ±0.016cm per revolution. Solid construction and heavy-duty bearings make this encoder a great choice for long-term operation in continuous duty applications.

- Heavy duty bearings
- High-definition blue-light phased array technology
- Compensated blue-light source
- Wide operating voltage 4.5Vdc - 30Vdc
- High resolution up to 10,000 CPR
- Unbreakable code disk
- IP50 environmental seal

### DIMENSIONS

- **Diameter:** 3" (75mm)
- **Height:** 2-3/8" (114mm)
- **Shaft:** 0.378" (9.6mm) with flat
- **Overall Length:** 1.14" (28.6mm)

### SPECIFICATIONS

#### Mechanical
- **Maximum Speed:** 6,000 rpm
- **Shaft Loading:**
  - Radial: 25 lbs. / 11.3 kg
  - Axial: 10 lbs. / 4.5 kg
- **Note:** A flexible shaft coupling is recommended to increase bearing life.
- **Bearing Life:** 70 x 1,000,000 rpm = hours
- **Materials:** Case - Aluminum, anodized
  - Shaft - 303 Stainless steel
- **Weight:** 1.34 lbs. / .6 kg
- **Sealing:** IP50

#### Electrical
- **Output Type:** CPR
- **Output Circuit:** Differential Line Driver
  - **Current:** 65 mA max exclusive of load
  - **Electrical Connections:**
    - **Type:** Differential Line Driver
    - **Circuit:**
      - blank = single pulse A output,
      - Q = quad. outputs on A & B
      - QZ = quad. outputs on A & B with Z outputs
    - **Counts Per Revolution:**
      - Choose one number:
        - 360, 720, 1000, 1024, 1200, 1250, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 3000, 3600, 4000, 4096, 4800, 5000, 6000, 7200, 8000, 8192, 10000
- **Modification Number:**
  - **Standard:** MS style 3-pin or 6-pin connector
  - **M226:** Modification - 12mm 4-pin connector
    - **Modification - 10-pin connector:**
      - **MLH:** 10-pin connector on A & B
      - **M226:** Modification - 10-pin connector
- **Measuring Wheel:**
  - MW1 = 12" circumference
  - MW1R = 12" circumference with replaceable O-ring
  - MW6 = 30cm circumference
  - MW6R = 30cm circumference with replaceable O-ring

#### Build Encoder

### MODEL NUMBER

#### Output Type:
- **blank** = single pulse A output,
- **Q** = quad. outputs on A & B
- **QZ** = quad. outputs on A & B with Z outputs

#### Modification Number:
- **Standard:** MS style 3-pin or 6-pin connector
  - **M226:** Modification - 10-pin connector

#### Measuring Wheel:
- **MW1** = 12" circumference
- **MW1R** = 12" circumference with replaceable O-ring
- **MW3** = 30cm circumference
- **MW3R** = 30cm circumference with replaceable O-ring

Example: RBH2-10240HD MW10 - quadrature outputs, 1024 CPR, differential line driver output, 10" measuring wheel
**FEATURES**

- Generates pulses for accurate linear measurement
- Tracks conveyor movement independent of conveyor roller diameters
- Heavy duty construction
- Precision 12" or 30cm circumference measuring wheels
- Programmable model available - see Model RH-P
- Exclusive ‘Anti-Jitter’ circuit for conveyor applications
- Single (A), quadrature (A, B), and index (Z) outputs
- Short circuit, ESD, reverse voltage protection
- Various mounting hardware kits are available
- See the model R22 for a smaller wheeled encoder

**SPECIFICATIONS**

**Mechanical**

- Maximum speed: 6,000 rpm
- Shaft Loading:
  - Radial: 25 lbs. / 11.3 kg
  - Axial: 10 lbs. / 4.5 kg
- Bearing Life: 70 x 1,000,000 rpm = hours

**Materials:**

- Case: 1/4” Aluminum, anodized
- Shaft: 303 Stainless steel
- Weight: 1.34 lbs. / .6 kg

**Electrical Connections**

**Single Ended Outputs:**

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<tr>
<th>Connectors</th>
<th>3-pin</th>
<th>6-pin</th>
<th>4-pin</th>
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<tbody>
<tr>
<td>Function</td>
<td>Wire</td>
<td>Color</td>
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<tr>
<td>B/2</td>
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</tr>
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<td>C/3</td>
<td>Y</td>
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<tr>
<td>D/4</td>
<td>Z</td>
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**Differential Line Driver Outputs:**

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<tr>
<td>E</td>
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<tr>
<td>F</td>
<td>7</td>
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</tbody>
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**DIMENSIONS**

- 3 x 3.78” 9.6mm
- 4 1/2” 114mm
- 1 1/2” 38.1mm
- 1 1/2” 38.1mm
- 1 1/2” 38.1mm
- 1 1/2” 38.1mm

**Model Number**

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<th>Output Waveform</th>
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<th>Y</th>
<th>Z</th>
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<td>DC Supply Voltages: (specify when ordering)</td>
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**Material Handling and Industrial Experience**

HOTOCRAFT INC

SINCE 1974

602 E. North Street 630-365-7148
Elburn, IL 60119, USA 630-365-7149

www.photocraftencoders.com

Support@logicbus.com www.logicbus.com

Your automation site!
**SPECIFICATIONS**

**Electrical**
- **Power Input** (specify voltage when ordering):
  - 5 ± 5% vdc: 1K ohms
  - 8 to 30 vdc: 3.3K ohms
- **Supply Voltage R Values** (see fig. 1)
  - 5 ± 5% vdc: 1K ohms
  - 8 to 30 vdc: 3.3K ohms
- **Supply Current**: 50ma maximum (no load)
- **Output Current (Iₒ):** 50ma max source/sink
- **Output Circuits:** (see figure 1)
  - Push/Pull (Combined sourcing/sinking)
  - Current sinking NPN transistor
  - Open collector (Vₒc=30 vdc max)
  - Current sourcing PNP transistor
  - All switch selectable for single output model; factory configured for 2 or 3 outputs
- **Output Waveform:** 50/50 square wave
  - Pulse On-Off Ratio: 50% ± 10%
  - Pulse Interval Jitter: ±10%
  - Quadrature Deviation: 30° (max)
  - Pulse rise time: 2 μsec (max)
  - Pulse fall time: 5 μsec (max)
  - Voltage (high): Vₒh=2.5 vdc (min)
  - Voltage (low): 1.5 vdc (max)
  - Index Pulse: approximately the width of 1 pulse on output A
    (600 rpm, Vₒh=24vdc, 10mA<Iₒ<50mA, 25°C)
- **Operating temperature:** 0° to 70° C
- **Pulse Rate:** 0 - 30 kHz
- **Output Protection:**
  - Short Circuit
  - ESD to 8KV direct and 25KV air
- **RoHS Compliance** available on most models.

**Mechanical**
- **Weight:** 1.4 lb. (635 grams)
- **Shaft Loading:** Radial: 25 lb. (11.3 kg) max.
  - Axial: 10 lb. (6.8 kg) max.
- **Bearing Life (Lₒ):** 70 x 10⁴/RPM = hours

**Materials:**
- Case: 1/4" Aluminum, anodized
- Shaft: 303 Stainless steel

**Programs**
- The RH-P is preconfigured with one of the following programs. Others are available.
  - **144AJ** - One anti-jitter pulse output on A with selectable ppr (1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144).
  - **240AJ** - One anti-jitter pulse output on A with selectable ppr (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 36, 40, 48, 60, 80, 120, 240).
  - **300AJQ** - Quadrature anti-jitter pulse outputs on A and B with selectable ppr (60, 75, 100, 120, 150, 300).

**Accessories**
- **Measuring Wheels**: Cast aluminum with 1/4" (10mm) wide urethane tire having a high coefficient of friction.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW-1-B</td>
<td>12.00 ± .01 inch</td>
</tr>
<tr>
<td>MW-30-B</td>
<td>30.00 ± .025 cm</td>
</tr>
</tbody>
</table>

**Yoke Assembly** (Y-1): Yoke, clevis pin and 1/4"-28 mounting screw. Allows the encoder to pivot freely when fastened to a rigid cross member for mounting above the moving material

**Underbelt Mounting** (MB-UB1):
- Call for information.

**Cable Assemblies**:
- C3-3-10: (for 1 output)
  - 10 ft. (3m) shielded cable with 97-3106A105L-35 connector.
- C6-x-10: (for 2 or 3 outputs)
  - 10 ft. (3m) shielded cable with 97-3106A145-6S connector
  - Other lengths are available.
  - CE marking requires Photocraft cable, and surge protection option if the cable exceeds 100’ (30m) or leaves the building.

**DIMENSIONS**

**ORDERING INFORMATION**

Single Output
- **Model**
  - RC = RoHS compliant
- **Program name**
- **Supply voltage:** 5 or 8-30

2 or 3 Outputs
- **Model**
  - RC = RoHS compliant
- **Program name**
- **Supply voltage:** 5 or 8-30
- **Output Circuit:** Push/Pull is standard
  - C = NPN open collector

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FEATURES
- 8, 9, 10, or 11 bit resolution
- Up to 2048 positions/revolution, single turn
- Parallel Outputs
- Digital Output: Natural Binary or Gray Code
- Supply: 5 vdc
- Fits 1/4", 5/16", 3/8", 8mm, or 10mm Shaft Diameters
- ESD Protected
- Optional mounting base and cover
- Custom Models Available

DIMENSIONS
- 82" 20.8mm
- 1.36" 34.55mm
- 1.20" 30.55mm
- 567" 14.4mm
- 62" 20.8mm
- 250° bolt circle
- 3 x Ø .110"/2.8mm mounting holes
- Ø .025" .64mm Suggested sensor to code disk gap
- 2x10 header posts on .1" centers

SPECSIFICATIONS

Output Configuration

<table>
<thead>
<tr>
<th>Circuit Bd. Pin No.</th>
<th>DB25P Pin No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2⁹</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>2⁸</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2⁷</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>2⁶</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>2⁵</td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>2⁴</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>2³</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
<td>2²</td>
</tr>
<tr>
<td>17</td>
<td>9</td>
<td>2¹</td>
</tr>
<tr>
<td>19</td>
<td>10</td>
<td>2⁰</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>2¹⁰</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>†</td>
</tr>
<tr>
<td>6</td>
<td>16</td>
<td>†</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>†</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>†</td>
</tr>
<tr>
<td>12</td>
<td>19</td>
<td>DataReady</td>
</tr>
<tr>
<td>16</td>
<td>21</td>
<td>Common</td>
</tr>
<tr>
<td>18</td>
<td>22</td>
<td>Supply</td>
</tr>
</tbody>
</table>

† Unlisted pins have no connection.
‡ Unused pins have undefined outputs and are reserved for future use.

Optional Mounting Base
- Materials: Aluminum, Brass posts.
- Mounting: Circuit board attaches to the 3 mounting posts using the 4-40 machine screws supplied.

Optional Cover / Connector
- Materials: Aluminum
- Connector: DB25P
- A circuit board to DB25P ribbon cable is supplied.

MODEL NUMBER

- Model Number: MR30 = 1KHz update rate
- MR31 = 3KHz update rate
- MB = 8mm, M10 = 10mm
- Resolution: 256, 512, 1024, or 2048
- Output Code: G = Gray Code, N = Natural Binary

Electrical
- Supply Voltages: 5 vdc ± 5%
- Current: 15 ma max (no load)
- Operating Temperature: -40° to 70° C
- Output Codes: (specify when ordering)
  - Gray Code
  - Natural Binary
- Interrogation Rate: The rate at which the code disk is sampled. Regardless of the rotational speed, this determines the maximum rate the outputs change.
  - Model MR30: 1KHz
  - Model MR31: 3KHz
- Resolution: (specify when ordering)
  - 256, 512, 1024, or 2048
- Accuracy: ± 1/2 bit
- Rotation: Counts increase with clockwise rotation as viewed from sensor side of circuit board.
- Digital Output Logic Levels:
  - Logic 0: low voltage (.6 volts max.)
  - Logic 1: high (Supply - .7 volts min.)
- DataReady Output: Normally high, goes low momentarily (7 µsec minimum) while the outputs are changing. Stays low to indicate an error condition.
- Output Circuits: Totem-pole output
  - 5 ma. max source and
  - 6 ma. max sink current
- LED Indicator:
  - "Off" when in the zero position.
  - "On" in all other positions.
  - When slowly rotating the disk (>½ rev/sec), blinking indicates an alignment error.

Connectors:
- Circuit Board: 2x10 header posts on .1" centers
- Optional Cover: 25-pin D-subminiature (DB25P)
SPECIFICATIONS

Logic: Positive logic is standard

<table>
<thead>
<tr>
<th>Logic</th>
<th>&quot;0&quot; value</th>
<th>&quot;1&quot; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>0 vdc</td>
<td>Supply vdc</td>
</tr>
<tr>
<td>Negative</td>
<td>Supply vdc</td>
<td>0 vdc</td>
</tr>
</tbody>
</table>

DataReady Signal: Normally high, goes low momentarily (7 µsec) while the outputs are changing. Available on all models except R30 with GC output. Optional low data ready is available, and is required for PNP output.

Rotation: Counts increase with clockwise rotation as viewed from shaft end. Decreasing counts are available. Selectable direction is available.

Accuracy: ±1/2 bit

Output Circuit Ratings:
5 vdc R30 with GC output:
- NPN with 10K pull-up resistor (5 ma max sink current)
5 vdc R30 with NB, or any 5 vdc SR30:
- Totem-pole output (5 ma max source or sink current)
Any 8-28 vdc R30 or SR30 model, or optional with any 5 vdc model:
- NPN with 3.3K pull-up resistor (50 ma max sink current);
- NPN open collector (50 ma, 30 vdc max); or
- PNP with 3.3K pull-down resistor (50 ma max source current)

Electrical Connections

<table>
<thead>
<tr>
<th>DB25 Pin No.</th>
<th>MS Pin No.</th>
<th>R30</th>
<th>SR30</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>2a</td>
<td>2a</td>
</tr>
<tr>
<td>2</td>
<td>L</td>
<td>2b</td>
<td>2b</td>
</tr>
<tr>
<td>3</td>
<td>K</td>
<td>2c</td>
<td>2c</td>
</tr>
<tr>
<td>4</td>
<td>J</td>
<td>2d</td>
<td>2d</td>
</tr>
<tr>
<td>5</td>
<td>H</td>
<td>2e</td>
<td>2e</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
<td>2f</td>
<td>2f</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>2g</td>
<td>2g</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>2h</td>
<td>2h</td>
</tr>
<tr>
<td>9</td>
<td>D</td>
<td>2i</td>
<td>2i</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>2j</td>
<td>2j</td>
</tr>
<tr>
<td>11</td>
<td>R</td>
<td>DataReady</td>
<td>DataReady</td>
</tr>
<tr>
<td>12</td>
<td>A</td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td>13</td>
<td>B</td>
<td>Supply</td>
<td>Supply</td>
</tr>
<tr>
<td>14</td>
<td>T</td>
<td>Case Gnd</td>
<td>Case Gnd</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

Model: R30, SR30, SR31
Supply Voltage: 5 or 8-28 vdc
Options: MS=MS Connector
WP=Environmentally Sealed

Counts/Rev:
- 256, 360, 512
- 1000, or 1024
- G=Gray code
- N=Negative Logic
- Positive Logic is standard
- High Data Ready is standard
- Power supply: 5ma supply standard
- 8-28vdc supply: R is standard
- R=50ma NPN
- C=50ma NPN
- G=Gray code
- Open collector
- P=50ma PNP
- 5ma standard
- 8-28vdc supply: R is standard
- R=50ma NPN
- C=50ma NPN
- G=Gray code
- Open collector
- P=50ma PNP

DIMENSIONS

6-32 x .375" deep on 2.00" D.B.G. (3)

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- Digital Output: Natural Binary or Gray Code
- Analog Output: 0-10 vdc or 4-20 ma
- 1/4" or 6mm Shaft Diameters
- ESD Protected
- Custom Models Available

**DIMENSIONS**
- Connector: 2x6 posts (shown) or terminal block
- 1.25" 31.8mm
- 7/6" 19.2mm
- 1.875" 47.6mm
- 0.25" or 6mm
- 0.32" 0.81mm clearance
- 0.43" 10.9mm clearance
- 1.00" 25.4mm bolt circle
- 6-32 x 0.25" deep, or M4x.7 6.35mm deep (M137 modification)

**SPECIFICATIONS**

### Output Configurations

**Digital Parallel (7,8,9 bit):** 2x6 posts with .1" spacing. 5vdc totem-pole outputs.

<table>
<thead>
<tr>
<th>Pin Function</th>
<th>Pin Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Supply</td>
<td>12 Common</td>
</tr>
<tr>
<td>2</td>
<td>11 Common</td>
</tr>
<tr>
<td>3</td>
<td>10 Common</td>
</tr>
<tr>
<td>4</td>
<td>9  Common</td>
</tr>
<tr>
<td>5</td>
<td>8  Common</td>
</tr>
<tr>
<td>6 DataReady</td>
<td>7  2</td>
</tr>
</tbody>
</table>

**Digital Parallel (10 bit):** 2x8 posts with .1" spacing. 5vdc totem-pole outputs.

<table>
<thead>
<tr>
<th>Pin Function</th>
<th>Pin Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 reserved</td>
<td>16 reserved</td>
</tr>
<tr>
<td>2 reserved</td>
<td>15 2</td>
</tr>
<tr>
<td>3 Supply</td>
<td>14 Common</td>
</tr>
<tr>
<td>4</td>
<td>13 2</td>
</tr>
<tr>
<td>5</td>
<td>12 2</td>
</tr>
<tr>
<td>6</td>
<td>11 2</td>
</tr>
<tr>
<td>7</td>
<td>10 2</td>
</tr>
<tr>
<td>8 DataReady</td>
<td>9  2</td>
</tr>
</tbody>
</table>

**Digital Serial (SPI):** 5 position terminal block. 5vdc totem-pole outputs.

**Analog:** 3 position terminal block. 12-30vdc supply with 0-10vdc or 4-20ma output.

<table>
<thead>
<tr>
<th>Terminal Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 5vdc supply</td>
</tr>
<tr>
<td>1 Slave Select</td>
</tr>
<tr>
<td>2 Clock Input</td>
</tr>
<tr>
<td>3 Data Output</td>
</tr>
<tr>
<td>– Common</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Common</td>
</tr>
<tr>
<td>~ analog output</td>
</tr>
<tr>
<td>+ 12-30vdc supply</td>
</tr>
</tbody>
</table>

**MODEL NUMBER**

- SR12

**FEATURES**

- **Output Configurations**
  - **Digital Parallel (7,8,9 bit):** 2x6 posts with .1" spacing. 5vdc totem-pole outputs.
  - **Digital Parallel (10 bit):** 2x8 posts with .1" spacing. 5vdc totem-pole outputs.
  - **Digital Serial (SPI):** 5 position terminal block. 5vdc totem-pole outputs.
  - **Analog:** 3 position terminal block. 12-30vdc supply with 0-10vdc or 4-20ma output.

**SPECIFICATIONS**

### Electrical

- **Supply Voltages:** (specify when ordering)
  - 5 vdc ± 5%, or 12-30 vdc (analog only)
- **Current:** 25 ma max (no load)
- **Operating Temperature:** -40° to 70° C
- **Output Codes:** Gray code, Natural binary, 0-10vdc analog, or 4-20ma analog
- **Interrogation Rate:** 2KHz (minimum)
- **Accuracy:** ± 1/2 bit digital, ±1 bit analog
- **Rotation:** (specify when ordering)
  - Counts can increase with clockwise (CW) rotation as viewed from shaft end, or they can decrease clockwise.

### Mechanical

- **Bearings:** ball bearings, shielded
- **Shaft Loading:** 10 lb. (4.5 kg) axial and radial
- **Bearing Life:** 52 x 1,000,000/rpm = hours
- **Weight:** 1.75 oz. (50 gm)
- **Materials:** Anodized aluminum housing, 303 stainless steel shaft, epoxy potting

**CONNECTOR:**
- 2x6 posts (shown) or terminal block
- 2x8 posts

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Encoder Cables and Connectors

Cable Assemblies
Photocraft supplies standard and custom cable assemblies for all encoders. A standard cable consists of 10 feet (3 meters) of multi-conductor, shielded cable, a connector that mates with the encoder on one end, and stripped and tinned leads on the other end. Cable specifications are shown below. For example, 3 conductor cable is Belden 8771 or equivalent. Standard cable assemblies use MIL-C-5015 style circular connectors, 16mm circular connectors, 12mm circular (M12) connectors, or D-subminiature connectors depending on the encoder model. Others connectors and cable lengths are available.

Cable specifications:
- Multi-conductor
- Overall foil shielded with drain wire
- PVC jacket
- Stranded conductors (7 x 30 typically)
- Wire gage: 22 (3 or 4 conductor)
- 24 (5 or more conductor)

Encoders that are CE marked require specially constructed cables that include EMI foil shielding visible at the cable clamp. Use of other cables voids the CE mark. CE marked encoders also include cadmium-free connectors to meet European environmental requirements.

Ordering information:

<table>
<thead>
<tr>
<th>Connector:</th>
<th>Number of connector pins</th>
<th>CF = Cadmium free connector</th>
<th>RC = RoHS compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>C = MIL-C-5015 style</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D = 16mm circular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB = D-subminiature style</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 = 12mm circular</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples:
- C3-3-10 is a 3-pin MIL-C-5015 style circular connector, with 10 feet of 3 conductor cable.
- DB9-5-6M is a 9-pin D-sub style connector, with 6 meters of 5 conductor cable.

Connectors
Connectors without cable are available. Connectors are supplied with all necessary hardware.

Note: use of a non-Photocraft cable assembly voids the CE mark.

Ordering information:

<table>
<thead>
<tr>
<th>Connector:</th>
<th>Number of connector pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>C = MIL-C-5015 style</td>
<td></td>
</tr>
<tr>
<td>D = 16mm circular</td>
<td></td>
</tr>
<tr>
<td>DB = D-subminiature style</td>
<td></td>
</tr>
<tr>
<td>M12 = 12mm circular</td>
<td></td>
</tr>
</tbody>
</table>

Extension Cables
Extension cables consists of a cable assembly with the encoder mating connector (socket) on one end and a plug that will mate with another cable assembly on the other end.

Ordering information:

<table>
<thead>
<tr>
<th>Connector:</th>
<th>Number of connector pins</th>
<th>EXT</th>
<th>CF = Cadmium free</th>
<th>RC = RoHS compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>C = MIL-C-5015 style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D = 16mm circular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB = D-subminiature style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M12 = 12mm circular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of connector pins
Number of cable conductors

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**MB-ST.375  Hollow Shaft Encoder Shaft Stubs**

**DESCRIPTION**

The MB-ST.375 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS25 encoders. The HS20 or HS25 should be ordered with a 3/8" shaft bore so it fits the MB-ST.375

**INSTALLATION**

1. Drill and tap either a 5/16-18, 10-24, or 3/8-16 hole, at least 1/2" deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST.375 shaft stub. Tighten with a 3/16" hex key or a screwdriver.

3. Install the HS20 or HS25 hollow shaft encoder onto the shaft stub and tighten the set screws.

**DIMENSIONS**

![Figure 1: MB-ST.375 and conveyor roller bearing](image1)

![Figure 2: MB-ST.375](image2)

![Figure 3: MB-ST.375A](image3)

![Figure 4: MB-ST.375B](image4)

---

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**Measuring Wheels**

**DIMENSIONS**

<table>
<thead>
<tr>
<th>MW-8</th>
<th>MW-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00&quot; ± .007&quot; circumference</td>
<td>20.00cm ± .016cm circumference</td>
</tr>
<tr>
<td>2.5465&quot; ± .002&quot; diameter</td>
<td>6.3662cm ± .005cm diameter</td>
</tr>
<tr>
<td>Shore Hardness of tire: 83A</td>
<td>Urethane is FDA compliant, food grade.</td>
</tr>
<tr>
<td>Operating Temperature Range: -25° to 65°C, -20° to 150°F</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION**

The **MW-8** and **MW-20** measuring wheels provide an accurate way to precisely measure linear movement of a conveyor or web when used with the R22 wheeled encoder. The wheels are aluminum with a urethane tire with a precisely ground tread, and having a high coefficient of friction that resists slipping. They attach to an encoder shaft using a 10-24 set screw.

**SPECIFICATIONS**

MW-8 dimensions: 8.00" ± .007" circumference
2.5465" ± .002" diameter
MW-20 dimensions: 20.00cm ± .016cm circumference
6.3662cm ± .005cm diameter
Shore Hardness of tire: 83A
Operating Temperature Range: -25° to 65°C, -20° to 150°F
Urethane is FDA compliant, food grade.

**INSTALLATION and MAINTENANCE**

Measuring wheels should be installed such that they are perpendicular to and their rotation is directly in line with the moving web or conveyor, or there could be premature wheel tread wear. For the double wheel R22 encoder, use of the Y-1, Y-3, MB-UB1, MB-UB2, MB-UB3, or MB-UB4 mounting adapters allow the R22 encoder to self-align with the moving web. The underbelt adapters apply an upward force that is directly along the centerline of the R22 encoder, minimizing wheel wear. On curved sections of conveyors, we recommend the use of the IW modification with the RH encoder, or use a single wheeled encoder. Special care must be used when installing a single wheel encoder to ensure it is properly aligned.

Maintenance consists of periodically cleaning the wheel tread. In dirty environments this is especially important since dirt accumulation on the wheel will increase its diameter.

**MODEL NUMBERS**

<table>
<thead>
<tr>
<th>Measuring Wheel</th>
<th>Circumference: 8 = 2.5465&quot; (diameter)</th>
<th>Type: leave blank for standard width (there are no other options at this time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW-8-B</td>
<td>8 = 20 centimeters (6.3662cm d.a.)</td>
<td>(there are no other options at this time)</td>
</tr>
<tr>
<td>MW-20-B</td>
<td>20 = 20 centimeters (6.3662cm d.a.)</td>
<td>(there are no other options at this time)</td>
</tr>
</tbody>
</table>
Measuring Wheels

DIMENSIONS

DESCRIPTION

The MW-10 measuring wheel provides an accurate way to precisely measure linear movement of a conveyor or web when used with the R21, R22 or RH wheeled encoders. The wheels are aluminum with a urethane tire with a precisely ground tread, and having a high coefficient of friction that resists slipping. They attach to an encoder shaft using a 10-24 set screw.

SPECIFICATIONS

MW-10 dimensions: 10.00" ± .008" circumference
3.1831" ± .0025" diameter
Shore Hardness of tire: 83A
Operating Temperature Range: -25° to 65°C, -20° to 150°F
Urethane is FDA compliant, food grade.

INSTALLATION and MAINTENANCE

Measuring wheels should be installed such that they are perpendicular to and their rotation is directly in line with the moving web or conveyor, or there could be premature wheel tread wear. For the double wheel R22 and RH encoders, use of the Y-1, Y-3, MB-T, MB-UB1, MB-UB2, MB-UB3, or MB-UB4 mounting adapters allow the encoder to self-align with the moving web. The underbelt and torsion spring adapters apply a force that is directly along the centerline of the R22 or RH encoder, minimizing wheel wear. On curved sections of conveyors, we recommend the use of the IW modification with the RH encoder, or use a single wheeled encoder. Special care must be used when installing the single wheel R21 encoder to ensure it is properly aligned.

Maintenance consists of periodically cleaning the wheel tread. In dirty environments this is especially important since dirt accumulation on the wheel will increase its diameter.

MODEL NUMBERS

MW

Measuring Wheel

Circumference:

Type:
leave blank for standard width

Shaft Size:
B = 3/8"

Examples: MW-10-B (10" circumference, 3/8" shaft)
MW-1 and MW-30 Measuring Wheels

DESCRIPTION

The MW-1 measuring wheels are precision ground to a 12.00° ± .01" circumference (3.82° ± .003" diameter), and the MW-30 to 30.00cm ± .025cm (95.5mm ± .1mm diameter). The wheels are aluminum with a urethane tire having a high coefficient of friction. They attach to an encoder shaft using one or two 10-24 set screws, as shown in the drawings to the left.

The MW-1W and MW-30W are similar to the MW-1 and MW-30, but have a 1" (25mm) wide precision ground urethane tire.

The MW-1R and MW-30R are made using the same aluminum wheel as the MW-1 and MW-30, but have a replaceable 3/16" width urethane O-ring that can be ordered separately (part no. 450-PLA-MW1R). Because these wheels are not precision ground they have greater tolerances than the other wheels. The MW-1R is 12.00° ± .03" circumference (3.82° ± .01" diameter), and the MW-30R is 30.00cm ± .078cm (95.5mm ± .25mm diameter).

SPECIFICATIONS

Shore Hardness: 83A
Operating Temperature Range: -25° to 65°C, -20° to 150°F
Urethane is FDA compliant, food grade.

INSTALLATION and MAINTENANCE

Measuring wheels should be installed such that they are perpendicular to and their rotation is directly in line with the moving web or conveyor, or there could be premature wheel tread wear. For the double wheel RH encoder, use of the Y-1, Y-3, MB-UB1, MB-UB2, MB-UB3, or MB-UB4 mounting adapters allow the RH encoder to self-align with the moving web. The underbelt adapters apply an upward force that is directly along the centerline of the RH encoder, minimizing wheel wear. On curved sections of conveyors, we recommend the use of the IW modification with the RH encoder, or use a single wheeled encoder. Special care must be used when installing a single wheel encoder to ensure it is properly aligned.

Maintenance consists of periodically cleaning the wheel tread, or replacing the O-ring (part no. 450-PLA-MW1R). In dirty environments this is especially important since dirt accumulation on the wheel will increase its diameter.

MODEL NUMBERS

<table>
<thead>
<tr>
<th>Measuring Wheel</th>
<th>Circumference:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW</td>
<td>1=1 foot or 12&quot; (3.82&quot; dia), 30=30 centimeters (95.5mm dia).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Width Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW</td>
<td>R=standard width, replaceable O-ring</td>
</tr>
<tr>
<td>MW</td>
<td>W=1&quot; (25mm) width</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shaft Size:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=5/16&quot;, B=3/8&quot;, C=1/4&quot;, D=5/16&quot;, 6mm, 7mm, 8mm, 10mm</td>
</tr>
</tbody>
</table>

Examples: MW-1-B (1 ft circumference, 3/8" shaft)
DESCRIPTION

Designed for the HRL, HRS, and HS25 hollow shaft encoders, the MB-FB1 flexible mounting bracket is made from .015” (.38mm) thick stainless steel that flexes to accommodate the axial misalignment between the encoder’s hollow shaft and the mounting shaft. Failure to use a flexible mounting such as this can significantly reduce the life of the encoder’s bearings.

INSTALLATION

1. Fasten flexible bracket to face of encoder using two 6-32 screws (supplied) so that the bracket is approximately centered on the encoder shaft.

2. Slide encoder onto mounting shaft, but do not tighten set screws.

3. Securely fasten bracket to frame using two screws in the .260” diameter bracket holes (screws are not provided).

4. Tighten set screws to fasten the encoder shaft to the mounting shaft.

DIMENSIONS

<table>
<thead>
<tr>
<th>(2) .260° Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) 6.8mm Diameter</td>
</tr>
</tbody>
</table>

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**MB-FB2**

**Flexible Mounting Tether**

**DIMENSIONS**

Shown with HS20 hollow shaft encoder. Also fits the R20, RG and RL shaft encoders.

**DESCRIPTION**

Designed to adapt the HS20 hollow shaft encoder to a C-face motor mount. It also fits the RG and RL shaft encoders, and provides a flexible tether for many diverse applications. The MB-FB2 is made of .015" (.38mm) thick stainless steel that flexes to accommodate the axial misalignment between the rigidly coupled encoder/motor shafts and the motor mount. Failure to use a flexible mounting such as this can significantly reduce the life of the encoder's bearings.

Also, see our other tethers:

- MB-FB2A - flattened version of the MB-FB2
- MB-FB2B - .125" thick rigid version of the MB-FB2

**INSTALLATION**

1. Fasten the MB-FB2 tether to the face of the encoder using three or four 6-32 screws (supplied). Note: the RL uses 8-32 screws. The MB-FB2 mounting holes allow for the positioning of the tether in 30° increments.

2. Position the encoder onto the motor shaft but do not tighten any shaft set screws.

3. Securely fasten the MB-FB2 to the motor frame.

4. Tighten the shaft set screws.

**ORDERING INFORMATION**

Part No.: MB-FB2

(includes all parts shown in the parts list)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FB2 flexible tether</td>
<td>500-MSC010</td>
</tr>
<tr>
<td>4</td>
<td>6-32 x 3/16&quot; RH screws</td>
<td>550-SCR202</td>
</tr>
</tbody>
</table>
**DIMENSIONS**

Shown with HS20 hollow shaft encoder. Also fits the R20, RG and RL shaft encoders.

**DESCRIPTION**

Designed to tether the HS20 hollow shaft encoder and prevent it from rotating without rigidly attaching it to the motor frame. It also fits the R20, RG and RL shaft encoders. Ideally the tether is held in position by placing a pin parallel to the motor shaft through the tether's slot and fastening the pin to the motor frame. The pin prevents the encoder from rotating, and allows it to float on the motor shaft.

The MB-FB2A is made of .015" (.38mm) thick stainless steel that flexes to accommodate the axial misalignment between the rigidly coupled encoder/motor shafts and the motor mount. Failure to use a flexible mounting such as this can significantly reduce the life of the encoder's bearings.

Also, see our other tethers:
- MB-FB2 - formed version of the MB-FB2A
- MB-FB2B - .125" thick rigid version of the MB-FB2A

**INSTALLATION**

1. Fasten the MB-FB2A tether to the face of the encoder using three or four 6-32 screws (supplied). Note: the RL uses 8-32 screws. The MB-FB2A mounting holes allow for the positioning of the tether in 30° increments.

2. Install a pin on the motor housing parallel to the motor shaft and 2.16" to 3.41" from the shaft center, such that it will engage the MB-FB2A slot when the encoder is installed.

3. Position the encoder onto the motor shaft placing the MB-FB2A slot over the pin previously installed.

**ORDERING INFORMATION**

Part No.: MB-FB2A

(includes all parts shown in the parts list)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FB2A flexible tether</td>
<td>500-MSC010-F</td>
</tr>
<tr>
<td>4</td>
<td>6-32 x 3/16&quot; RH screws</td>
<td>550-SCR202</td>
</tr>
</tbody>
</table>
The MB-FL5 provides a rigid mounting bracket for the RL encoder. During installation it can be adjusted in all three dimensions to optimize alignment with the mating shaft. Because it is a rigid mounting, we recommend the use of a flexible shaft coupling when directly coupling the encoder shaft to another shaft.

**ORDER INFORMATION**

Part No.: MB-FL5

(includes all parts in spare parts list except the RL encoder)

**INSTALLATION**

1. Assemble MB-FL5 mounting bracket as shown in the figure using the four .25" x 1" slots on the mounting base to attach the assembly to the machine frame. Do not tighten the screws.

2. Align the encoder shaft with the machine shaft. Use a flexible shaft coupling to couple the shafts.

3. After the two shafts are aligned, tighten all screws.

**SPARE PARTS LIST**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FL5 mounting base</td>
<td>500-MCH100</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MB-FL5 mounting plate</td>
<td>500-MCH099</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Socket Head Cap Screw</td>
<td>550-SCR302</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>8-32 x .625&quot; binder head screw</td>
<td>550-SCR307</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>RL.5 Encoder (1/2&quot; shaft)</td>
<td>550-SCA07</td>
<td>1</td>
</tr>
</tbody>
</table>

*see circled reference numbers in figure above*
**MB-FB2B**

**Rigid Mounting Tether**

**DIMENSIONS**

Shown with HS20 hollow shaft encoder.

**DESCRIPTION**

Designed to tether the HS20 hollow shaft encoder and prevent it from rotating without rigidly attaching it to the motor frame. Ideally the tether is held in position by placing a pin parallel to the motor shaft through the tether's slot and fastening the pin to the motor frame. The pin prevents the encoder from rotating, and allows it to float on the motor shaft.

The MB-FB2B is made of 1/8" (3.2mm) thick aluminum. The tether should not be rigidly attached to the motor frame. Doing so will significantly reduce the life of the encoder's bearings.

Also, see our other tethers:

— MB-FB2 - .015" thick formed, flexible, stainless steel version of the MB-FB2B.
— MB-FB2A - .015" thick flat, stainless steel version of the MB-FB2B.

**INSTALLATION**

1. Fasten the MB-FB2B tether to the face of the encoder using the four 6-32 screws (supplied). The MB-FB2B mounting holes allow for the positioning of the tether in 30° increments.

2. Install a pin on the motor housing parallel to the motor shaft and 1.88" to 3.38" from the shaft center, such that it will engage the MB-FB2B slot when the encoder is installed.

3. Position the encoder onto the motor shaft such that the previously installed pin is in the MB-FB2B slot.

**ORDERING INFORMATION**

Part No.: MB-FB2B

(includes all parts shown in the parts list)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FB2B rigid tether</td>
<td>500-MCH110</td>
</tr>
<tr>
<td>4</td>
<td>6-32 x 1/4&quot; RH screws</td>
<td>550-SCR200</td>
</tr>
</tbody>
</table>
**MB-FB3**

**Flexible Mounting Bracket**

**DIMENSIONS**

Shown with HS20 hollow shaft encoder.

**DESCRIPTION**

Designed for the HS20 hollow shaft encoder, the MB-FB3 flexible mounting bracket is made of .015" (.38mm) thick stainless steel that flexes to accommodate the axial misalignment between the rigidly coupled encoder/motor shafts and the motor mount. Failure to use a flexible mounting such as this can significantly reduce the life of the encoder's bearings.

**INSTALLATION**

1. Fasten the MB-FB3 bracket to the face of the encoder using two 6-32 screws (supplied) so the bracket is approximately centered on the encoder shaft.

2. Position the encoder onto the motor shaft but do not tighten any shaft set screws.

3. Securely fasten the MB-FB3 to the motor frame using two screws (screws are not provided).

4. Tighten the shaft set screws.

**ORDERING INFORMATION**

Part No.: MB-FB3
(includes all parts shown in the parts list)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FB3 flexible bracket</td>
<td>500-MSC011</td>
</tr>
<tr>
<td>2</td>
<td>6-32 x 3/16&quot; RH screws</td>
<td>550-SCR202</td>
</tr>
</tbody>
</table>
**DIMENSIONS**

Shown with HS30 hollow shaft encoder. Also fits the HS25, HS31, HRL, HRS, and RL encoders.

**DESCRIPTION**

Designed to adapt the HS30 hollow shaft encoder to a C-face motor mount. It also fits the HS25, HS31, HRL, and HRS hollow shaft encoders, and RL shaft encoder, providing a flexible tether for many diverse applications. The MB-FB5 is made of .020" (.51mm) thick stainless steel that flexes to accommodate the axial misalignment between the rigidly coupled encoder/motor shafts and the motor housing. Failure to use a flexible mounting such as this can significantly reduce the life of the encoder's bearings.

**INSTALLATION**

1. Fasten the MB-FB5 tether to the face of the encoder using three or four 6-32 screws (supplied). Note: the RL uses 8-32 screws. The MB-FB5 mounting holes allow for flexible positioning of the tether onto the encoder.

2. Position the encoder onto the motor shaft but do not tighten any shaft set screws.

3. Securely fasten the MB-FB5 to the motor frame. Use the fiber washer and fiber shoulder washer to insulate the MB-FB5 arm from the motor housing (if necessary).

4. Tighten the shaft set screws.

**ORDERING INFORMATION**

Part No.: MB-FB5  
(includes all parts shown in the parts list)

**PARTS LIST**

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-FB5 flexible tether</td>
<td>500-MSC016</td>
</tr>
<tr>
<td>4</td>
<td>6-32 x 3/16&quot; RH screws</td>
<td>550-SCR202</td>
</tr>
<tr>
<td>1</td>
<td>7/16&quot; fiber washer</td>
<td>550-WSH016</td>
</tr>
<tr>
<td>1</td>
<td>3/8&quot; shoulder washer</td>
<td>550-WSH017</td>
</tr>
</tbody>
</table>
MB-FB5C Hollow shaft encoder mounting

DESCRIPTION

The MB-FB5C provides a means to mount the model HRL, HRS, HS30 and HS31 hollow shaft encoders to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 5" to 8". It is commonly used with the MB-ST.5A shaft stub that is attached to the end of the conveyor roller and supports the encoder. The MB-FB5C provides a tether that prevents the encoder from rotating yet is flexible, thus avoiding excess load on the encoder bearings. Mounting hardware anchors the tether to one of the 1/2" threaded mounting studs of the flange bearing.

INSTALLATION

1. If using the MB-ST.5A shaft stub (purchased separately), drill and tap a 3/8-16 hole, at least 5/8" deep into the end of the conveyor shaft. Insert the MB-ST.5A shaft stub or equivalent. The shaft stub should be in-line with the shaft axis, so there is minimum wobble when the shaft is rotating.

2. Fasten the MB-FB5 flexible tether to the face of the encoder using the four 6-32 screws (supplied).

3. Attach the coupling nut to one of the 1/2" threaded mounting studs of the flange bearing. It may be necessary to remove the existing 1/2" nut.

4. Install the encoder onto the shaft stub (MB-ST.5A or equivalent), such that the flexible tether rests on the coupling nut. Tighten the encoder set screws.

5. Secure the tether to the coupling nut using the 3/8-16 cap screw and washers as shown.

MB-FB5C includes the following parts

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/8-16 x 3/4&quot; cap screw</td>
<td>550-SCR303</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3/8&quot; split lock washer</td>
<td>550-WSH005</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3/8&quot; flat washer</td>
<td>550-WSH007</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>MB-FB5 flexible tether</td>
<td>500-MSC016</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Coupling nut</td>
<td>500-MCH118</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>6-32 x 3/16&quot; round head screw</td>
<td>550-SCR202</td>
<td>4</td>
</tr>
</tbody>
</table>

MB-FB5 Flexible Tether

Coupling Nut
**DESCRIPTION**

The MB-UB6 "L" bracket bolts to a cross beam above or below a conveyor belt, and provides an attachment point for a model R21, R22, or RH wheeled encoder. The bolts on the MB-UB6 allow the encoder to be adjusted so the measuring wheels contact the conveyor belt. Note: Because the encoder is rigidly fixed and cannot self-align with the conveyor belt, this bracket is not intended for continuous duty applications where rapid wear of the measuring wheel tread will occur if the wheels are not perfectly aligned with the belt movement.

**INSTALLATION**

1. Attach the MB-UB6 "L" bracket to a cross beam that is several inches above or below the conveyor belt, ensuring that the correct bracket edge is nearest to the conveyor belt (see figure to the right). To minimize tread wear on the measuring wheel, the slotted flange of the "L" bracket must be exactly in-line with the conveyor belt movement, and its face must be perpendicular to the belt.

2. Connect the R21, R22 or RH encoder handle to the "L" bracket by inserting one of the three encoder mounting holes, either the middle hole or the hole nearest the encoder body, through the captive bolt on the "L" bracket. Loosely add washers and hex nut.

3. Insert the 5/16-18 x 1" hex bolt and washer through the curved "L" bracket slot and the encoder handle mounting hole. Loosely add washers and hex nut.

4. Adjust the encoder so the measuring wheel firmly contacts the encoder belt. Then tighten the hex nuts.

---

**MB-UB6 "L" Bracket**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-UB6 &quot;L&quot; Bracket</td>
<td>500-MCH115</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5/16-18 x 1&quot; hex bolt</td>
<td>550-SCR306</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5/16 flat washer</td>
<td>550-WSH008</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5/16 split-lock washer</td>
<td>550-WSH009</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>5/16-18 hex nut</td>
<td>550-NUT009</td>
<td>2</td>
</tr>
</tbody>
</table>
**DESCRIPTION**

The adapters shown in the figures to the right can be attached to the model RG, RJ or RS encoders to provide alternate bolt hole patterns or methods of mounting the encoder. The adapters are shipped attached to the encoder if ordered at the same time. If ordered separately, the adapters are supplied with hardware for attaching to the encoder. Because environmental seals are an integral part of the adapter, they can not be field installed on the RJ encoder, and therefore must be ordered with the encoder.

The table shows the adapters that can be used with each encoder model.

<table>
<thead>
<tr>
<th>Adapter Model</th>
<th>Encoder Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB-075</td>
<td>X X</td>
</tr>
<tr>
<td>MB-076</td>
<td>X X</td>
</tr>
<tr>
<td>MB-078</td>
<td>X X</td>
</tr>
<tr>
<td>MB-FL</td>
<td>X X</td>
</tr>
<tr>
<td>MB-FL3</td>
<td>X X</td>
</tr>
<tr>
<td>MB-FL4</td>
<td>X X</td>
</tr>
<tr>
<td>MB-KOYO</td>
<td>X X</td>
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<tr>
<td>MB-FL6</td>
<td>X X X</td>
</tr>
<tr>
<td>MB-5PY</td>
<td>X X</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

- **MB-75**
  - 4.40 x .26" deep
  - 1.03"D bolt circle
  - .210"D
  - .186"

- **MB-FL**
  - 1.032"D
  - .694"X .694"

- **MB-76**
  - 10-32 x .375" deep
  - 2.25"D bolt circle
  - .203"D
  - .430"X .445"

- **MB-FL3**
  - 10-32 x .375" deep
  - .500"D bolt circle
  - 3/4"X 1.1/4"

- **MB-78**
  - 5-40 x .375" deep
  - 1.875"D bolt circle
  - .156"D

- **MB-FL4**
  - 10-32 x .375" deep
  - .375"D

- **MB-KOYO**
  - 3mm tap x 5mm deep
  - 40mm dia. bolt circle (3)

- **MB-FL6**
  - 2.5" Square
  - 1.88"X .248"
MB-RD and Y-1G

Measuring Wheel Adapter for RG/RJ

DESCRIPTION

MB-RD Adapter
The MB-RD adapts the model RG or RJ encoders for use with a measuring wheel. The MB-RD is a 2” x 6” x 1/8” aluminum plate that bolts to the face of the encoder and includes a ¼” diameter mounting hole, 4.5” from the center of the encoder’s shaft.

Part Number: MB-RD (includes all items in spare parts list)

Spare Parts List:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-RD adapter</td>
<td>605-0012-01</td>
</tr>
<tr>
<td>3</td>
<td>6-32 x ¼” RH screws</td>
<td>541-6045</td>
</tr>
</tbody>
</table>

MB-RD2 Adapter
The MB-RD2 is similar to the MB-RD except it includes three 3/8” diameter mounting holes that can be used with the Y-1G yoke assembly or the MB-UB2 offset mounting adapter (not shown here).

Part Number: MB-RD2 (includes all items in spare parts list)

Spare Parts List:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MB-RD2 adapter</td>
<td>605-0041-01</td>
</tr>
<tr>
<td>3</td>
<td>6-32 x ¼” RH screws</td>
<td>541-6045</td>
</tr>
</tbody>
</table>

Y-1G Yoke Assembly
The Y-1G yoke assembly can be rigidly connected to a mounting beam (not provided) and attaches to the MB-RD2, as shown in figure 3, to provide a pivot point so the encoder measuring wheel can ride on the moving web and freely pivot up and down as the moving material moves under the wheel. The weight of the encoder is sufficient to maintain continuous contact with the web.

Part Number: Y-1G (includes all items in spare parts list)

Spare Parts List:

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y-1 Yoke</td>
<td>605-0022-01</td>
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<tr>
<td>1</td>
<td>1/4”D Clevis Pin</td>
<td>541-0001</td>
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<td>1</td>
<td>Yoke Bushing (brass)</td>
<td>603-0276-01</td>
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<tr>
<td>1</td>
<td>1/16”x1/2” Cotter Pin</td>
<td>541-0002</td>
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<tr>
<td>1</td>
<td>1/4-28 x ¾” Cap Screw</td>
<td>543-1400</td>
</tr>
<tr>
<td>1</td>
<td>⅜” Split-Lock Washer</td>
<td>543-1201</td>
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<tr>
<td>2</td>
<td>Nylon washers</td>
<td>543-3806</td>
</tr>
</tbody>
</table>

DIMENSIONS

Figure 1: MB-RD and MB-RD2 Adapters

Figure 2: Y-1G Yoke Assembly

Figure 3: RG encoder with MB-RD2 and Y-1G
**DESCRIPTION**

The MB-UB2 attaches above and to the side of a moving web, providing a pivot point for the encoder with measuring wheels. It can be ordered with either a 7" or 11-1/4" arm. The extension and height of the arm is fully adjustable.

**ORDER INFORMATION**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>MB-UB2</td>
<td>For R21, R22, RH encoder with 7&quot; arm</td>
</tr>
<tr>
<td>MB-UB2A</td>
<td>For R21, R22, RH encoder with 11-1/4&quot; arm</td>
</tr>
<tr>
<td>MB-UB2G</td>
<td>For R20, RG, or RJ encoder with 7&quot; arm</td>
</tr>
<tr>
<td>MB-UB2AG</td>
<td>For R20, RG, or RJ encoder with 11-1/4&quot; arm</td>
</tr>
<tr>
<td>MB-UB2S</td>
<td>For RS encoder with 7&quot; arm</td>
</tr>
<tr>
<td>MB-UB2AS</td>
<td>For RS encoder with 11-1/4&quot; arm</td>
</tr>
</tbody>
</table>

**INSTALLATION**

1. Fasten bracket to the side of the web such that the arm is perpendicular to the direction of the moving web.
2. Adjust the height and extension of the arm; tighten all bolts.
3. Attach the encoder to the pivot as shown in the diagrams. Use one nylon washer on either side of the RH encoder arm. Use two nylon washers on either side of the arm or MB-RD for the R20, R21, R22, RG, RJ, or RS encoders.
4. Insert retaining ring at end of pivot.
5. Adjust wheels if necessary to avoid rubbing against bracket or encoder body.
6. Ensure that the encoder cable has sufficient slack and is clear of any moving parts.

**PARTS LIST**

<p>| The MB-UB2 and MB-UB2A include the following parts |</p>
<table>
<thead>
<tr>
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<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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<tbody>
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<td>500-MCH087</td>
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<tr>
<td>2</td>
<td>MB-UB2 base</td>
<td>500-MCH088</td>
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<td>MB-UB2 post</td>
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<td>6&quot; threaded rod</td>
<td>500-MCH087A</td>
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<td>5</td>
<td>10-1/4&quot; threaded rod</td>
<td>500-MCH074A</td>
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<td>6</td>
<td>Retaining ring</td>
<td>500-RNG008</td>
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<td>7</td>
<td>3/8&quot; X 16 nut</td>
<td>550-NUT008</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>10-24 x 1/2&quot; screw</td>
<td>550-SRC302</td>
<td>2</td>
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<tr>
<td>9</td>
<td>Nylon washers</td>
<td>550-WSH006</td>
<td>4</td>
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<tr>
<td>10</td>
<td>3/8&quot; I.D. washers</td>
<td>550-WSH007</td>
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</table>

* Use #4 for 7" arm; #5 for 11-1/4" arm

<p>| Additional parts for MB-UB2G / MB-UB2AG |</p>
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<td>MB-RD2</td>
<td>500-MCH080</td>
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<td>12</td>
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</table>

<p>| Additional parts for MB-UB2S / MB-UB2AS |</p>
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<th>Description</th>
<th>Part No.</th>
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<td>500-MCH080A</td>
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<td>6-32 x 1/4&quot; screw</td>
<td>550-SCR200</td>
<td>4</td>
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</table>
DESCRIPTION
The MB-UB3 underbelt mounting assembly facilitates installation of the model RH, R21 or R22 wheeled encoders under the convey belt (or roller). The pivot yoke rotates 360° relative to the mounting plate giving maximum flexibility in locating the plate. The pivot point allows for up and down movement of the encoder with the conveyor belt while the 2 springs assure constant contact of the measuring wheels to the conveyor. The pivot point and pivot yoke are centered on the encoder to automatically optimize for alignment with the conveyor and minimize wheel wear. An optional lock washer can be inserted to lock the pivot yoke into a fixed position, preventing it from rotating for conveyor applications that reverse direction. Nylon washers are included to accommodate the thinner handle on the R21 and R22 wheeled encoders.

INSTALLATION
1. Assemble the pivot yoke onto the encoder as shown in figure 3. Note: the yoke attaches to the hole at the center of the encoder arm, and the springs attach to the outermost hole of the encoder arm.

2. Attach the pivot yoke to the mounting plate and bearing arm assembly using the 1/2" x 3/4" shoulder bolt as shown in figure 1. After tightening the shoulder bolt, the pivot yoke should rotate freely.

OPTIONAL: to prevent the pivot yoke from rotating, insert the 1/2" x 7/8"OD lock washer onto the pivot yoke before installing. If the conveyor operates in both directions then the lock washer should be installed to prevent the encoder from rotating 180° when the conveyor reverses direction. In this case, if the pivot yoke is not locked in a fixed position there could be premature wheel tread wear for the measuring wheels, or the cable could become tangled.

3. Bolt the mounting plate to the conveyor frame using 5/16-18 cap screws and hardware supplied as shown in figure 1. The pivot yoke should be perpendicular to the conveyor belt with the pivot point below the belt as shown in figure 1, and be positioned so the encoder is aligned with the belt. The greatest pressure is applied when the pivot point is closest to the belt.

Note: The bearing arm can be attached to different locations on the mounting plate to facilitate installation.

4. Make sure the encoder has unobstructed rotation and up/down movement.

5. Attach the cable so the cord is clear of the pivot point and sharp edges, and with sufficient slack to allow for expected up/down and sideways movement.
**DESCRIPTION**

The MB-UB4 underbelt mounting assembly facilitates installation of the model RH, R21 or R22 wheeled encoders under the convey belt (or roller) as shown in figure 1. The Y-4 yoke provides a pivot point that allows the up/down and some sideways movement of the encoder with the conveyor belt while the springs assure constant contact of the wheels to the conveyor. The pivot point and Y-4 yoke are centered on the encoder to automatically optimize alignment with the conveyor. Nylon washers are included to accommodate the thinner handle on the R21 and R22 wheeled encoders.

**INSTALLATION**

1. Assemble the MB-UB4 components onto the encoder as shown in figure 2. Note: when ordered with an encoder as an assembly, the MB-UB4 is preassembled onto the encoder to simplify installation.

2. Bolt the Y-4 yoke to the mounting beam (not supplied) using the 3/8-16 hex cap screw and lock washer supplied. The Y-4 should be perpendicular to the conveyer belt with the pivot point below the belt as shown in figure 1, and positioned so it is aligned with the belt. The greatest pressure is applied when the pivot point is closest to the belt. Caution: If the encoder is not well aligned with the belt, premature wheel wear will result.

3. Make sure the encoder has unobstructed up/down movement.

4. Attach the cable so the cord is clear of the pivot point and sharp edges, and with sufficient slack to allow for expected up/down and some sideways movement.

**PARTS LIST**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
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<td>500-MCH096A</td>
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<tr>
<td>2</td>
<td>Brass bushing</td>
<td>500-MCB041</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>Nylon shoulder washer</td>
<td>550-MSC008</td>
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<td>2.5&quot; x 3/8&quot; spring</td>
<td>500-MSC009</td>
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<td>7/32&quot; E-ring</td>
<td>550-RNG010</td>
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<td>7</td>
<td>3/4&quot; Clevis pin</td>
<td>550-MSC004</td>
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<td>Cotter pin</td>
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<td>Y-4 Yoke</td>
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<td>550-WSH003</td>
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<td></td>
<td>Nylon Washers</td>
<td>550-WSH006</td>
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</tbody>
</table>

**Figure 1: MB-UB4 Assembly (shown with RH wheeled encoder)**

**Figure 2: MB-UB4 Component Detail**
DESCRIPTION

The Y-1 facilitates mounting the model RH dual wheeled encoder above a conveyor belt or web as shown in the figure. For the R21 and R22 wheeled encoders, order the Y-1G.

The Y-1 yoke provides a pivot point along the center of gravity of the encoder equipped with a pair of measuring wheels, allowing for up/down and some sideways movement of the encoder so that it self-aligns with the conveyor belt movement, thus minimizing wheel wear.

It should be mounted as shown such that the movement of the conveyor pulls the encoder, and the Y-1 should be aligned as parallel as possible with the conveyor belt. If the encoder is mounted such that it is pushed towards the Y-1, it will not maintain proper alignment and will result in premature wheel wear.

INSTALLATION

1. Insert the brass bushing through the hole on the encoder handle.
2. Align the handle and brass bushing between the fork of the Y-1. Then insert the clevis pin into one hole of the Y-1, through the handle and brass bushing, and out the other hole of the Y-1. Secure the clevis pin with the cotter pin.
Note: For the R21 and R22 encoders, place a nylon washer, included with the Y-1G, on each side of the handle to eliminate excess gap.
3. Bolt the Y-1 to a mounting beam (not supplied) using the 1/4-28 cap screw and lock washer. The Y-1 should be parallel to the conveyor belt with the pivot point 2” to 6” above the belt, and be aligned with the movement of the conveyor.
4. Attach the encoder cable so it is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways movement.

<table>
<thead>
<tr>
<th>Y-1 Yoke Components</th>
<th>Description</th>
<th>Part No.</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-1 Yoke</td>
<td>605-0022-01</td>
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</tr>
<tr>
<td>1/4-28 Cap Screw</td>
<td>541-1400</td>
<td>1</td>
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<tr>
<td>Split-Lock Washer</td>
<td>543-1201</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Brass Bushing</td>
<td>603-0276-01</td>
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<tr>
<td>Clevis Pin</td>
<td>541-0001</td>
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<tr>
<td>Cotter Pin</td>
<td>541-0002</td>
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</table>

Additional parts for Y-1G

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon Washer</td>
<td>543-3806</td>
<td>2</td>
</tr>
</tbody>
</table>
**DESCRIPTION**

The Y-2a provides a single point of attachment that allows the model RH pulse position indicator (PPI) to maintain alignment with the conveyor belt or rollers, and therefore minimize wheel wear. With its double wheel construction, the PPI is self-aligning when allowed to pivot freely from the Y-2a.

The Y-2a is intended to be used with a customer supplied counter-weight or other mechanism to keep the PPI wheels firmly against the conveyor belt when mounted under the conveyor.

**INSTALLATION**

1. Assemble Y-2a components onto the PPI as shown in the figure.
2. Bolt Y-2a yoke to a mounting beam (not supplied) using the 3/8-16 Hex Cap Screw and lock washer supplied.
3. Assemble the customer supplied counter-weight onto the PPI.
4. Attach the PPI cable so the cable is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways PPI movement.

**ORDER INFORMATION**

Part No.: Y-2a

(Includes all parts shown in the spare parts list)

**SPARE PARTS LIST**

<table>
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<tr>
<th>Qty</th>
<th>Description</th>
<th>Part #</th>
</tr>
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<td>Brass Bushing</td>
<td>500-MCH041</td>
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<td>1</td>
<td>Cotter Pin</td>
<td>550-MSC005</td>
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<tr>
<td>1</td>
<td>3/8-16 x 3/4&quot; Cap Screw</td>
<td>550-SCR303</td>
</tr>
<tr>
<td>1</td>
<td>3/8&quot; Lock Washer</td>
<td>550-WSH005</td>
</tr>
</tbody>
</table>
DESCRIPTION

The Y-3 facilitates mounting the model RH dual wheeled encoder above a conveyor belt or web as shown in the figure. For the R21 and R22 wheeled encoders, order the Y-3G.

The Y-3 yoke provides a pivot point along the center of gravity of the encoder equipped with a pair of measuring wheels, allowing for up/down and some sideways movement of the encoder so that it self-aligns with the conveyor belt movement, thus minimizing wheel wear.

It should be mounted as shown such that the movement of the conveyor pulls the encoder, and the Y-3 should be aligned as parallel as possible with the conveyor belt. If the encoder is mounted such that it is pushed towards the Y-3, it will not maintain proper alignment and will result in premature wheel wear.

INSTALLATION

1. Insert the brass bushing through the hole on the encoder handle.
2. Align the handle and brass bushing between the fork of the Y-3. Then insert the clevis pin into one hole of the Y-3, through the handle and brass bushing, and out the other hole of the Y-3. Secure the clevis pin with the cotter pin.

Note: For the R21 and R22 encoders, place a nylon washer, included with the Y-3G, on each side of the handle to eliminate excess gap.

3. Bolt the Y-3 to a mounting beam (not supplied) using the 3/8-16 cap screw and lock washer. The Y-3 should be parallel to the conveyor belt with the pivot point 2" to 6" above the belt, and be aligned with the movement of the conveyor.

4. Attach the encoder cable so it is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways movement.

---

**Y-3 Yoke Components**

<table>
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<tr>
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<th>Quantity</th>
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<td>Split-Lock Washer</td>
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<td>Clevis Pin</td>
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**Additional parts for Y-3G**

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**TORSION SPRING ADAPTER**

 `(included with all kits)`

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**MOUNTING KITS**

(Each kit also includes a Torsion Spring Adapter with RH or LH spring)

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<tr>
<td>Example Models:</td>
<td>MB-T1R0  -  Base style, RH spring,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0&quot; extension rod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example Models:</td>
<td>MB-T2R10  -  Base and Post style,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RH spring, 10.25&quot; rod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example Models:</td>
<td>MB-T7  -  Universal kit containing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

**INSTALLATION**

1. Put the mandrel through one of the 3 holes in the encoder arm, with a nylon washer on each side of the encoder arm.
2. Place the spring on the mandrel, inserting the spring end into the small hole on the encoder arm.
3. Place the spring support through the spring and onto the mandrel so the encoder arm and 2 nylon washers are sandwiched between the 5/8 hex part of the mandrel and the spring support. Leave just enough slack so the encoder arm pivots freely.
4. Gently tighten one of the spring support set-screws.
5. Using one of the mounting kits, mount the encoder on the machine or conveyor.
6. Once the encoder and torsion spring mounting are in place, loosen the spring support set-screw.
7. Using a 3/32 allen wrench as a lever in one of the set screws, rotate the spring support clockwise (for LH spring) or counter-clockwise (for RH spring). About 1/10th of a rotation (30 degrees) will provide sufficient tension. Do not exceed 90 degrees.
8. Tighten all 3 spring support set-screws.

**DESCRIPTION**

The MB-T torsion spring wheeled encoder mounting assembly facilitates installation of the R21 or R22, or RH (with M266 modification) encoders onto a conveyor belt or roller, or other moving web. The adjustable torsion spring is locked into place to provide constant pressure of the wheel against the web, even for uneven surfaces. Adapting to a variety of installations is made possible through various mounting kits.

**MB-T0_0 Mounting Kit with 0" Rod**

- Mandrel: 603-0555-01
- Nylon Washer: 543-3806
- LH Torsion Spring: 600-2188-01
- RH Torsion Spring: 600-2189-01
- Spring Support: 603-0554-01
- Set Screw: 541-1017

**MB-T0_3 Mounting Kit with 3" Rod**

- 3" Threaded Rod: 603-0558-01
- 3/8" Lock Washer: 543-3809
- 3/8-16 Hex Bolt: 542-3804

**MB-T0_6 Mounting Kit with 6" Rod**

- 6" Threaded Rod: 603-0287-01
- 3/8" Lock Washer: 543-3809
- 3/8-16 Hex Bolt: 542-3804

**MB-T0_10 Mounting Kit with 10.25" Rod**

- 10.25" Threaded Rod: 603-0279-01
- 3/8" Lock Washer: 543-3809
- 3/8-16 Hex Bolt: 542-3804

**MB-T1_0 Mounting Kit with Base**

- Base: 603-0556-01

**MB-T2_0 Mounting Kit with Base and Post**

- Base: 603-0556-01
- Post: 603-0557-01
- 10-24 Cap Screw: 541-1016

**ORDERING INFORMATION**

Example Models:
- MB-T0L6 - Extension rod style, LH spring, 6" threaded rod
- MB-T1R0 - Base style, RH spring, 0" extension rod
- MB-T2R10 - Base and Post style, RH spring, 10.25" rod
- MB-T7 - Universal kit containing
MB-FB2C  Hollow shaft encoder mounting

DESCRIPTION

The MB-FB2C provides a means to mount the model HS20 hollow shaft encoder to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 3.4" to 5.9". It is commonly used with the MB-ST.5 shaft stub that is attached to the end of the conveyor roller and supports the HS20 encoder. The MB-FB2C provides a tether that prevents the HS20 from rotating yet is flexible, thus avoiding excess load on the encoder bearings. Mounting hardware anchors the tether to one of the 1/2" threaded mounting studs of the flange bearing.

INSTALLATION

1. If using the MB-ST.5 shaft stub (purchase separately), drill and tap a 3/8-16 hole, at least 5/8" deep into the end of the conveyor shaft. Insert the MB-ST.5 shaft stub or equivalent. The shaft stub should be in-line with the shaft axis, so there is minimum wobble when the shaft is rotating.

2. Fasten the MB-FB2 flexible tether to the face of the encoder using the four 6-32 screws (supplied).

3. Attach the coupling nut to one of the 1/2" threaded mounting studs of the flange bearing. It may be necessary to remove the existing 1/2" nut.

4. Install the HS20 onto the shaft stub (MB-ST.5), such that the flexible tether rests on the coupling nut. Tighten the encoder set screws.

5. Secure the tether to the coupling nut using the 3/8-16 cap screw and washers as shown.

MB-FB2C includes the following parts

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/8-16 x 3/4&quot; cap screw</td>
<td>550-SCR303</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3/8&quot; split lock washer</td>
<td>550-WSH005</td>
<td>1</td>
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<tr>
<td>3</td>
<td>3/8&quot; flat washer</td>
<td>550-WSH007</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>MB-FB2 flexible tether</td>
<td>500-MSC010</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Coupling nut</td>
<td>500-MCH118</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>6-32 x 3/16&quot; round head screw</td>
<td>550-SCR202</td>
<td>4</td>
</tr>
</tbody>
</table>

MB-FB2 Flexible Tether

Coupling Nut
**MB-FB2C-1** Hollow shaft encoder mounting

**DESCRIPTION**

The MB-FB2C-1 provides a means to mount the model HS20 hollow shaft encoder to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 3.4" to 5.9". It is commonly used with the MB-ST.5 shaft stub that is attached to the end of the conveyor roller and supports the HS20 encoder. The MB-FB2C-1 provides a tether that prevents the HS20 from rotating yet is flexible, thus avoiding excess load on the encoder bearings. Mounting hardware anchors the tether to one of the 3/8" threaded mounting studs of the flange bearing.

**INSTALLATION**

1. If using the MB-ST.5 shaft stub (purchase separately), drill and tap a 3/8-16 hole, at least 5/8" deep into the end of the conveyor shaft. Insert the MB-ST.5 shaft stub or equivalent. The shaft stub should be in-line with the shaft axis, so there is minimum wobble when the shaft is rotating.

2. Fasten the MB-FB2 flexible tether to the face of the encoder using the four 6-32 screws (supplied).

3. Attach the coupling nut to one of the 3/8" threaded mounting studs of the flange bearing. It may be necessary to remove the existing 3/8" nut.

4. Install the HS20 onto the shaft stub (MB-ST.5), such that the flexible tether rests on the coupling nut. Tighten the encoder set screws.

5. Secure the tether to the coupling nut using the 3/8-16 cap screw and washers as shown.

---

**MB-FB2C includes the following parts**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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<tbody>
<tr>
<td>1</td>
<td>3/8-16 x 3/4&quot; cap screw</td>
<td>550-SCR303</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3/8&quot; split lock washer</td>
<td>550-WSH005</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3/8&quot; flat washer</td>
<td>550-WSH007</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>MB-FB2 flexible tether</td>
<td>500-MSC010</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Coupling nut</td>
<td>500-MCH118-1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>6-32 x 3/16&quot; round head screw</td>
<td>550-SCR202</td>
<td>4</td>
</tr>
</tbody>
</table>

**MB-FB2 Flexible Tether**

![Diagram of MB-FB2 flexible tether]

**Coupling Nut**

![Diagram of coupling nut]
**MB-FB2D Hollow shaft encoder mounting**

**DESCRIPTION**

The MB-FB2D provides a means to mount the model HS20 hollow shaft encoder to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 3.75” to 6.75”. It is commonly used with the MB-ST.5 shaft stub (not included) that is attached to the end of the conveyor roller and supports the HS20 encoder. The MB-FB2D provides a rigid tether, locked in place by a second MB-ST.5 shaft stub (included) that prevents the HS20 from rotating, yet has free non-rotational movement, thus avoiding excess load on the encoder bearings. A coupling nut anchors the tether shaft stub to one of the 1/2” threaded mounting studs of the flange bearing.

**INSTALLATION**

1. If using the MB-ST.5 shaft stub (purchased separately) drill and tap a 3/8-16 hole, at least 5/8” deep into the end of the conveyor shaft. Insert the MB-ST.5 shaft stub or equivalent. The shaft stub should be in-line with the shaft axis, so there is minimum wobble when the shaft is rotating.

2. Fasten the MB-FB2B rigid tether to the face of the encoder using the four 6-32 screws (supplied).

3. Attach the coupling nut and the shaft stub to one of the 1/2” threaded mounting studs of the flange bearing as shown. It may be necessary to remove the existing 1/2” nut.

4. Install the HS20 onto the shaft stub (MB-ST.5 or equivalent), such that the slot of the rigid tether fits over the second shaft stub as shown. Tighten the encoder set screws.
**MB-FB2D-1 Hollow shaft encoder mounting**

**DESCRIPTION**

The MB-FB2D-1 provides a means to mount the model HS20 hollow shaft encoder to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 3.75" to 6.75". It is commonly used with the MB-ST.5 shaft stub (not included) that is attached to the end of the conveyor roller and supports the HS20 encoder. The MB-FB2D-1 provides a rigid tether, locked in place by a second MB-ST.5 shaft stub (included) that prevents the HS20 from rotating, yet has free non-rotational movement, thus avoiding excess load on the encoder bearings. A coupling nut anchors the tether shaft stub to one of the 3/8" threaded mounting studs of the flange bearing.

**INSTALLATION**

1. If using the MB-ST.5 shaft stub (purchased separately) drill and tap a 3/8-16 hole, at least 5/8" deep into the end of the conveyor shaft. Insert the MB-ST.5 shaft stub or equivalent. The shaft stub should be in-line with the shaft axis, so there is minimum wobble when the shaft is rotating.

2. Fasten the MB-FB2B rigid tether to the face of the encoder using the four 6-32 screws (supplied).

3. Attach the coupling nut and the shaft stub to one of the 3/8" threaded mounting studs of the flange bearing as shown. It may be necessary to remove the existing 3/8" nut.

4. Install the HS20 onto the shaft stub (MB-ST.5 or equivalent), such that the slot of the rigid tether fits over the second shaft stub as shown. Tighten the encoder set screws.

**MB-FB2D includes the following parts**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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<tbody>
<tr>
<td>1</td>
<td>Coupling nut</td>
<td>500-MCH118-1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MB-ST.5 shaft stub</td>
<td>500-MSC-ST.5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>MB-FB2B rigid tether (aluminum)</td>
<td>500-MCH110</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>6-32 x 1/4&quot; round head screw</td>
<td>550-SCR200</td>
<td>4</td>
</tr>
</tbody>
</table>

**MB-ST.5 Shaft Stub**

- 3/8-16 UNC
- 1/4" hex
- .5"
- .625"
- 1.81"
- 1.50"
- 1.875"
- .125"
- .52"

**MB-FB2B Rigid Tether**

- 3/8-16 UNC
- .75"

**Coupling Nut**

- 3/8-16 UNC
- .125"
DESCRIPTION

The MB-FL8 provides a means to mount the Model R20, RG, RL or RS shaft encoders to a conveyor roller that is supported by a 2-bolt flange mount bearing with a bolt spacing of 4" to 6". A 3/8" threaded stud is inserted into a hole drilled and tapped at the end of the conveyor roller. The flexible rubber hose accommodates the misalignment between the threaded stud and the encoder shaft, eliminating excess load on the encoder bearings.

INSTALLATION

1. Drill and tap a 3/8-16 hole, 3/4" deep, in the end of the conveyor roller. To minimize the excess load on the encoder bearings, the hole must be in-line with the conveyor roller axis.

2. Insert the stud into the drilled hole.

3. Attach the rubber hose to the stud using one of the hose clamps.

4. Attach the 3/4" hex MB-FL8 mounting posts to the 2 flange mount bearing studs.

5. Assemble the encoder to the MB-FL8 mounting base using the 6-32 screws (or 8-32 for RL encoder).

6. Assemble the mounting plate and encoder to the mounting posts using the 1/2-13 bolts and lock washers. At the same time insert the encoder shaft into the hose and clamp it using the other hose clamp, shortening the hose if necessary.

NOTE: For maximum protection of the encoder bearings, the distance between the end of the encoder shaft and the end of the threaded stud should be as large as possible.

## MB-FL8 Shaft encoder mounting bracket

### INSTALLATION

1. Drill and tap a 3/8-16 hole, 3/4" deep, in the end of the conveyor roller. To minimize the excess load on the encoder bearings, the hole must be in-line with the conveyor roller axis.

2. Insert the stud into the drilled hole.

3. Attach the rubber hose to the stud using one of the hose clamps.

4. Attach the 3/4" hex MB-FL8 mounting posts to the 2 flange mount bearing studs.

5. Assemble the encoder to the MB-FL8 mounting base using the 6-32 screws (or 8-32 for RL encoder).

6. Assemble the mounting plate and encoder to the mounting posts using the 1/2-13 bolts and lock washers. At the same time insert the encoder shaft into the hose and clamp it using the other hose clamp, shortening the hose if necessary.

NOTE: For maximum protection of the encoder bearings, the distance between the end of the encoder shaft and the end of the threaded stud should be as large as possible.

### MB-FL8 Mounting Plate

- **#** | **Description** | **Part No.** | **Qty**
- 1 | 1/2-13 x 3/4 Bolt | 550-SCR311 | 2
- 2 | 1/2" split-lock washer | 550-WSH015 | 2
- 3 | MB-FL8 Mounting Plate, 1/8" aluminum | 500-MCH113 | 1
- 4 | 6-32 x 1/4" screws | 550-SCR200 | 4
- 5 | Hose clamp | 500-MSC018 | 2
- 6 | MB-FL8 Hex Post, 3/4" steel | 500-MCH114 | 2
- 7 | 3/8"ID, 3/4"OD rubber hose | 500-MSC019 | 1
- 8 | 3/8-16 x 2" threaded stud | 500-MSC020 | 1

### MB-FL8 Hex Post

- 4.5"
- 1/2-13 UNC
- 1"
DESCRIPTION

The MB-FL8A attaches the Model R20, RG, RL or RS shaft encoders to a conveyor roller, supported by a 2-bolt flange mount bearing with a bolt spacing of 4" to 6". A threaded stud is inserted into a hole drilled and tapped at the end of the conveyor roller. The flexible rubber hose accommodates the misalignment between the threaded stud and the encoder shaft, eliminating excess load on the encoder bearings.

INSTALLATION

1. Drill and tap a 3/8-16 hole, 3/4" deep, in the end of the conveyor roller. To minimize the excess load on the encoder bearings, the hole must be in-line with the conveyor roller axis.

2. Insert the stud into the drilled hole.

3. Attached the rubber hose to the stud using one of the hose clamps.

4. Attach the 3/4" hex MB-FL8A mounting posts to the 2 flange mount bearing studs.

5. Assemble the encoder to the MB-FL8A mounting base using the 6-32 screws (or 8-32 for RL encoder).

6. Assemble the mounting plate and encoder to the mounting posts using the 1/2-13 bolts and lock washers. At the same time insert the encoder shaft into the hose and clamp it using the other hose clamp, shortening the hose if necessary.

NOTE: For maximum protection of the encoder bearings, the distance between the end of the encoder shaft and the end of the threaded stud should be as large as possible.

# Description Part No. Qty
1 1/2-13 x 3/4 Bolt 550-SCR311 2
2 1/2" split-lock washer 550-WSH015 2
3 MB-FL8A Mounting Plate, 1/8" aluminum 500-MCH113 1
4 6-32 x 1/4" screws 550-SCR200 4
5 Hose clamp 500-MSC018 2
6 MB-FL8 Hex Post, 3/4" steel 500-MCH114 2
7 3/8"ID, 3/4"OD rubber hose 500-MSC019 1
8 3/8-16 x 2" threaded stud 500-MSC020 1
Model: **MB-UB1**

**Under-belt mounting**

### Conveyor Belt

Direction of Conveyor Belt Movement

![Diagram of conveyor belt and mounting components](image)

**DESCRIPTION**

The MB-UB1 Counter Weight assembly facilitates mounting the model RH, R21 and R22 wheeled encoders under the conveyor belt (or roller) as shown in figure 1. The Y-3 yoke provides a pivot point so the encoder wheels maintain contact and alignment with the belt, compensating for up/down and some sideways movement of the belt. Nylon washers are included to accommodate the thinner handle on the R21 and R22 wheeled encoders.

### INSTALLATION

1. Assemble the Y-2 yoke assembly on the end of the encoder arm as shown in figure 2.

2. Assemble the weight and threaded rod (figure 3).

3. Assemble the Y-3 yoke assembly (figure 4).

4. Bolt the Y-3 yoke to a mounting beam (not supplied) using the 3/8-16 bolt and lock washer. The Y-3 should be perpendicular to the conveyor belt with the pivot point below the conveyor belt as shown in figure 1, and positioned so the encoder is aligned with the belt. **Caution**: If the encoder is not aligned with the belt, premature wheel wear will result.

5. Adjust the position of the 1.25 lb. weight along the threaded rod. Locating the weight at the end of the rod results in the maximum upward force of the wheels against the belt (this is the normal configuration). The weight can be positioned closer to the encoder along the rod to reduce the upward force.

6. Attach the encoder cable so the cord is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways encoder movement.

---

### Optional Nylon Washers

- Inserted here for R21 and R22 wheeled encoders

---

**Y-2 Yoke Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Y-2 Yoke</td>
<td>500-MCH075</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Plastic Bushing</td>
<td>500-MSC007</td>
<td>2</td>
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<tr>
<td>3</td>
<td>Clevis Pin</td>
<td>550-MSC004</td>
<td>2</td>
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<td>4</td>
<td>Cotter Pin</td>
<td>550-MSC005</td>
<td>2</td>
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<tr>
<td></td>
<td>Nylon Washer</td>
<td>550-WSH006</td>
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</table>

**Weight and Threaded Rod Components**

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<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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</thead>
<tbody>
<tr>
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<td>Threaded Rod</td>
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<tr>
<td>2</td>
<td>Split-lock Washer</td>
<td>550-WSH000</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3/8-16 Hex Nut</td>
<td>550-NUT008</td>
<td>3</td>
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<tr>
<td>4</td>
<td>1.25 lb. Weight</td>
<td>500-MCH074</td>
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</table>

**Y-3 Yoke Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
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<td>500-MCH077</td>
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<tr>
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<td>3/8-16 x 3/4 Bolt</td>
<td>550-SGR003</td>
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<td>3</td>
<td>Split-lock Washer</td>
<td>550-WSH000</td>
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<td>4</td>
<td>Brass Bushing</td>
<td>500-MCH041</td>
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<td>Clevis Pin</td>
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<td>Cotter Pin</td>
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<tr>
<td></td>
<td>Nylon Washer</td>
<td>550-WSH006</td>
<td>2</td>
</tr>
</tbody>
</table>
**Model: MB-UB1 M185**

**Under-belt mounting**

**Conveyor Belt**

The MB-UB1 M185 Counter Weight assembly facilitates mounting the model RH Pulse Position Indicator (PPI) under the conveyor belt (or roller) as shown in figure 1. The Y-3 yoke provides a pivot point so the PPI wheels maintain contact and alignment with the belt, compensating for up/down and some sideways movement of the belt.

**INSTALLATION**

1. Assemble the Y-2 yoke assembly on the end of the PPI arm as shown in figure 2.

2. Assemble the weight and hardware (figure 3).

3. Assemble the Y-3 yoke assembly (figure 4).

4. Bolt the Y-3 yoke to a mounting beam (not supplied) using the 3/8-16 bolt and lock washer. The Y-3 should be perpendicular to the conveyor belt with the pivot point 2-1/4" to 3-3/4" below the conveyor belt, and positioned so the PPI is aligned with the belt. Caution: If the PPI is not aligned with the belt, premature wheel wear will result.

5. Adjust the position of the 2 x 1.25 lb. weights along the threaded rod. Locating the weight at the end of the rod results in the maximum upward force of the wheels against the belt (this is the normal configuration). The weight can be positioned closer to the PPI along the rod to reduce the upward force.

6. Attach the PPI cable so the cord is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways PPI movement.

---

**Y-2 Yoke Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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<tbody>
<tr>
<td>1</td>
<td>Y-2 Yoke</td>
<td>500-MCH075</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Plastic Bushing</td>
<td>500-MSC007</td>
<td>2</td>
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<tr>
<td>3</td>
<td>Clevis Pin</td>
<td>550-MSC004</td>
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<tr>
<td>4</td>
<td>Cotter Pin</td>
<td>550-MSC005</td>
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**Y-3 Yoke Components**

<table>
<thead>
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<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
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<tbody>
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<td>Y-3 Yoke</td>
<td>500-MCH077</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3/8-16 x 3/4 Bolt</td>
<td>550-SCR303</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Split-lock Washer</td>
<td>550-WSH005</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Brass Bushing</td>
<td>500-MCH041</td>
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<td>5</td>
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<td>Cotter Pin</td>
<td>550-MSC005</td>
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**Weight and Hardware Components**

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Threaded Rod</td>
<td>customer supplied</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Split-lock Washer</td>
<td>550-WSH005</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3/8-16 Hex Nut</td>
<td>550-NUT008</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>1.25 lb. Weight</td>
<td>500-MCH074</td>
<td>2</td>
</tr>
</tbody>
</table>

---

**Figure 1: MB-UB1 M185**

**Figure 2: Y-2 Yoke Assembly**

**Figure 3: Weights and Hardware**

**Figure 4: Y-3 Yoke Assembly**
**DESCRIPTION**

The MB-UB1A Counter Weight assembly with 2 x 1.25 lb. weights facilitates mounting the model RH, R21 and R22 wheeled encoders under the conveyor belt as shown in figure 1. The Y-3 yoke provides a pivot point so the encoder wheels maintain contact and alignment with the belt, compensating for up/down and some sideways movement of the belt. Nylon washers are included to accommodate the thinner handle on the R21 and R22 encoders.

**INSTALLATION**

1. Assemble the Y-2 yoke assembly on the end of the encoder arm as shown in figure 2.

2. Assemble the weights and hardware (figure 3).

3. Assemble the Y-3 yoke assembly (figure 4).

4. Bolt the Y-3 yoke to a mounting beam (not supplied) using the 3/8-16 bolt and lock washer. The Y-3 should be perpendicular to the conveyor belt with the pivot point below the conveyor belt as shown in figure 1, and positioned so the encoder is aligned with the belt. **Caution:** If the encoder is not aligned with the belt, premature wheel wear will result.

5. Adjust the position of the weights along the threaded rod. Locating the weights at the end of the rod results in the maximum upward force of the wheels against the belt (this is the normal configuration). The weight can be positioned closer to the encoder along the rod to reduce the upward force.

6. Attach the encoder cable so the cord is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways encoder movement.

**MATERIAL HANDLING AND INDUSTRIAL EXPERIENCE**

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**DESCRIPTION**

The MB-UB1M Counter Weight assembly facilitates mounting the model RH, R21 and R22 wheeled encoders under the conveyor belt (or roller) as shown in figure 1. The Y-3M yoke provides a pivot point so the encoder wheels maintain contact and alignment with the belt, compensating for up/down and some sideways movement of the belt. Nylon washers are included to accommodate the thinner handle on the R21 and R22 wheeled encoders.

**INSTALLATION**

1. Assemble the Y-2M yoke assembly on the end of the encoder arm as shown in figure 2.
2. Assemble the weight and threaded rod (figure 3).
3. Assemble the Y-3M yoke assembly (figure 4).
4. Bolt the Y-3M yoke to a mounting beam (not supplied) using the M10-1.5 bolt and lock washer. The Y-3M should be perpendicular to the conveyor belt with the pivot point below the conveyor belt as shown in figure 1, and positioned so the encoder is aligned with the belt. **Caution:** If the encoder is not aligned with the belt, premature wheel wear will result.
5. Adjust the position of the .6 kg. weight along the threaded rod. Locating the weight at the end of the rod results in the maximum upward force of the wheels against the belt (this is the normal configuration). The weight can be positioned closer to the encoder along the rod to reduce the upward force.
6. Attach the encoder cable so the cord is clear of the pivot point, and with sufficient slack to allow for expected up/down and sideways encoder movement.

---

**Y-2M Yoke Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y-2M Yoke</td>
<td>605-0150-01</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Plastic Bushing</td>
<td>543-2668</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Clevis Pin</td>
<td>541-0001</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cotter Pin</td>
<td>541-0002</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Nylon Washer</td>
<td>543-3806</td>
<td>4</td>
</tr>
</tbody>
</table>

**Weight and Threaded Rod Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Threaded Rod</td>
<td>603-0533-01</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Split-lock Washer</td>
<td>543-1005</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>M10-1.5 Hex Nut</td>
<td>542-0100</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>.6 kg. Weight</td>
<td>603-0270-01</td>
<td>1</td>
</tr>
</tbody>
</table>

---

**Y-3M Yoke Components**

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Part No.</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y-3M Yoke</td>
<td>605-0151-01</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>M10-1.5 x 20 Bolt</td>
<td>541-0100</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Clevis Pin</td>
<td>541-0001</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cotter Pin</td>
<td>541-0002</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Nylon Washer</td>
<td>543-3806</td>
<td>4</td>
</tr>
</tbody>
</table>

---

**Diagram Figure 3: Weight and Threaded Rod**

**Diagram Figure 4: Y-3M Yoke Assembly**

---

Optional Nylon Washers inserted here for R21 and R22 wheeled encoders

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Flexible Shaft Couplings

Helical coil style flexible couplings are available for shaft-to-shaft connection of the encoder. Their one-piece design results in no moving parts, no maintenance, and no backlash. These significantly reduce bearing wear caused by parallel, angular, and skewed (three-dimensional) misalignment of the mating shafts. The couplings are manufactured from a single piece of aluminum and include 4 set screws, as shown in the diagram to the right. Other sizes are available.

<table>
<thead>
<tr>
<th>Model</th>
<th>Shaft Diameter</th>
<th>Dimensions D x L (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE087-10-10</td>
<td>5/16&quot;</td>
<td>.875 x 1</td>
</tr>
<tr>
<td>AE087-8mm-8mm</td>
<td>8mm</td>
<td>.875 x 1</td>
</tr>
<tr>
<td>AE100-12-12</td>
<td>3/8&quot;</td>
<td>1 x 1.25</td>
</tr>
<tr>
<td>AE100-10mm-10mm</td>
<td>10mm</td>
<td>1 x 1.25</td>
</tr>
<tr>
<td>AE-100-12mm-12mm</td>
<td>12mm</td>
<td>1 x 1.25</td>
</tr>
</tbody>
</table>

MB-085 Rigid Shaft Couplings

Rigid aluminum couplings are available for shaft-to-shaft connection of the encoder. These are appropriate where axial and angular misalignment is not an issue. The **MB-085** couples a 3/8" diameter encoder shaft to a 1" diameter shaft (see figure below). The **MB-085-.75** couples a 3/8" diameter encoder shaft to a ¾" diameter shaft. The **MB-085-.375** couples a 3/8" diameter encoder shaft to a 3/8" diameter shaft. Please inquire about other models. The couplings are manufactured from a single piece of aluminum and include 4 or 5 set screws, as shown in the diagrams below.

**Notes:**
1. Supplied with (5) 10-32 x 5/16" L cup point socket set screws, alloy steel with black oxide finish.
2. Runout: +/- .010"
**MB-ST-M10 Hollow Shaft Encoder Shaft Stubs**

**DESCRIPTION**

The MB-ST-M10 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HRL encoders. The HS20 or HRL should be ordered with a 10mm shaft bore so it fits the MB-ST-M10.

**INSTALLATION**

1. Drill and tap an M8 x 1.25mm hole, at least 13mm deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST-M10 shaft stub. Tighten with a 5mm hex key.

3. Install the HS20 or HRL hollow shaft encoder onto the shaft stub and tighten the set screws.

**DIMENSIONS**

![Figure 1: MB-ST-M10 and conveyor roller bearing](image1.png)

![Figure 2: MB-ST-M10](image2.png)
**DESCRIPTION**

The MB-ST-M12 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS30 encoders. The HS20 or HS30 should be ordered with a 12mm shaft bore so it fits the MB-ST-M12.

**INSTALLATION**

1. Drill and tap a M10-1.5mm hole, at least 16mm deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST-M12 shaft stub. Tighten with a 6mm hex key.

3. Install the HS20 or HS30 hollow shaft encoder onto the shaft stub and tighten the set screws.
**MB-ST.250  Hollow Shaft Encoder Shaft Stubs**

**DESCRIPTION**

The MB-ST.250 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS25 encoders. The HS20 or HS25 should be ordered with a 1/4" shaft bore so it fits the MB-ST.250

**INSTALLATION**

1. Drill and tap a 10-24 hole, at least 3/8" deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST.250 shaft stub. Tighten with a 1/8" hex key.

3. Install the HS20 or HS25 hollow shaft encoder onto the shaft stub and tighten the set screws.

**DIMENSIONS**

Figure 1: MB-ST.250 and conveyor roller bearing

Figure 2: MB-ST.250

Figure 3: MB-ST.250A
**DESCRIPTION**

The MB-ST.312 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS25 encoders. The HS20 or HS25 should be ordered with a 5/16" shaft bore so it fits the MB-ST.312.

**INSTALLATION**

1. Drill and tap a 1/4-20 hole, at least 1/2" deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST.312 shaft stub. Tighten with a 5/32" hex key.

3. Install the HS20 or HS25 hollow shaft encoder onto the shaft stub and tighten the set screws.
**DESCRIPTION**

The MB-ST.375 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS25 encoders. The HS20 or HS25 should be ordered with a 3/8" shaft bore so it fits the MB-ST.375.

**INSTALLATION**

1. Drill and tap either a 5/16-18, 10-24, or 3/8-16 hole, at least 1/2" deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST.375 shaft stub. Tighten with a 3/16" hex key or a screwdriver.

3. Install the HS20 or HS25 hollow shaft encoder onto the shaft stub and tighten the set screws.
**DESCRIPTION**

The MB-ST.5 can be installed on the end of a conveyor roller to provide a mounting shaft for a hollow shaft encoder, such as the HS20 or HS30 encoders. The HS20 or HS30 should be ordered with a 1/2" shaft bore so it fits the MB-ST.5.

**INSTALLATION**

1. Drill and tap a 3/8-16 hole, at least 5/8" deep, into the end of the conveyor roller. The hole must be centered and in-line with the conveyor roller axis so there is minimum wobble when the roller is rotating.

2. Insert the MB-ST.5 shaft stub. Tighten with a 1/4" hex key.

3. Install the HS20 or HS30 hollow shaft encoder onto the shaft stub and tighten the set screws.

**DIMENSIONS**

![Figure 1: MB-ST.5 and conveyor roller bearing](image1)

![Figure 2: MB-ST.5](image2)

![Figure 3: MB-ST.5A](image3)