

Largest Selection of Optical Encoders

Rotary Incremental Shaft Size 15, 20, 25 & 30
Hollow Shaft, Wheeled, Qube 2.25" & Absolute Encoders.
Manual Pulse Generators & Pendant Hand-Helds.



LISTED 87ML
IND. CONT. EQ.



WORLD[®] ENCODERS



TDS Precision Products GmbH
Industriestrasse 1a
CH-8157 Dielsdorf

T + 41 44 885 30 80
info@tds-pp.com
www.tds-pp.com

Delivering Reliable, Durable and Cost Effective Encoders for many years!!
Failure Rate: 0.01%

The World Encoders!

Quality Products, Super-Low Prices, Best Service & Immediate Delivery
Incredible Features and Super-Low Prices!

Quality Products

— World Encoders offer quality products which are made in certified ISO 9001 and 14001 factories. All our encoders have standard UL (USA and Canada) and CE product markings.

Value & Technology

— World Encoders has been producing reliable, durable and cost-effective encoders for many years. Our encoders are used by many OEM companies in major industries worldwide for angle controls, precision measuring, position sensing in Machine Tools, Medical, Packaging and Motion Control Industries.

Durability

— All World Encoders feature a reinforced aluminum die cast or stainless steel cap and come equipped with Standard Protection such as NEMA 4/IP66 and NEMA 12/IP54



Our Staff is waiting anxiously to serve you.

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SIZE SR12

ABSOLUTE SHAFT ENCODER 8 BITS, 9 BITS & 10 BITS

Starting at \$270.00–8bits, \$280.00–9 bits,
\$330.00–10 bits
Binary, Gray code & Analog outputs



FEATURES



brand, Made in USA

- Size 12 dia, 1/4" Shaft Single-turn
- 256 (8 bits), 512 (9 bits), 1024 (10 bits) Resolution
- Natural Binary, Parallel 5v outputs
Analog 0-10v outputs, 12-30v input
- Std. 3 ft. cable w/2x6 header conn. (Parallel outputs)
- 3 pos. terminal block for Analog outputs

SPECIFICATIONS

Electrical

| | |
|----------------------------|---|
| Pulse per Revolution | 256 (8-bits), 512 (9-bits), 1024 (10-bits) |
| Supply Voltage | 5vdc (Binary, Gray, 12-30vdc (Analog)) |
| Current | 25ma Max. (No Load) |
| Operating Temp. | 0° to 70°C |
| Interrogation Rate | 1 KHZ |
| Accuracy | Plus Minus 2/3 bit digital, 1 bit analog |
| Rotation | CW-increase as viewed from the shaft end. |
| Digital Output Logic Level | Logic "0": Low voltage, 0.6 Max Logic "1": High voltage, Supply 0.7v Min. |
| Data Ready Outputs | Normally high, goes low momentarily 7 sec. while the outputs are changing. Stays low to indicate error. |
| Analog Output Levels | Zero code error: 20mv, Full-scale error: 125mv. Relative accuracy: plus minus 20mv |
| Output Circuits | Totem-pole 5ma. max source and 6ma. max sink current |
| Analog 0-10 vdc | Potentiometer is hooked up to 10v & Grd. The output looks like a sawtooth wave where the output voltage increases from 0 to 10v for each complete rev. and then immediately drops to 0v as a new rev. is started. |

Mechanical & Environmental

| | |
|---------------|---|
| Max. Speed | 5,000 rpm |
| Bearings | Shielded ball bearings |
| Shaft loading | 10 lbs. Axial, 10 lbs. Radial |
| Weight | 2 oz |
| Materials | Case: Anodized Aluminum Shaft: 303 Stainless Steel |
| Humidity | 35-85% w/o condensation |
| Vibration | Max 10g (58 to 500Hz) |
| Shock | 50g (11ms duration) |
| Enclosure | IP-54/NEMA 12 |

Wiring Diagram

Digital Parallel (8, 9-bits)

| PIN # | Function |
|-------|----------------|
| 1 | Supply |
| 2 | 2 ³ |
| 3 | 2 ² |
| 4 | 2 ¹ |
| 5 | 2 ⁰ |
| 6 | Data Ready |
| 7 | 2 ⁸ |
| 8 | 2 ⁷ |
| 9 | 2 ⁶ |
| 10 | 2 ⁵ |
| 11 | 2 ⁴ |
| 12 | Common |

Digital Pararell (10-bits)

| PIN# | FUNCTION |
|------|----------------|
| 1 | Reserved |
| 2 | Reserved |
| 3 | Supply |
| 4 | 2 ³ |
| 5 | 2 ² |
| 6 | 2 ¹ |
| 7 | 2 ⁰ |
| 8 | Data Ready |
| 9 | 2 ⁸ |
| 10 | 2 ⁷ |
| 11 | 2 ⁶ |
| 12 | 2 ⁵ |
| 13 | 2 ⁴ |
| 14 | Common |
| 15 | 2 ⁹ |
| 16 | Reserved |

Analog

| Terminal | Function |
|----------|-----------------|
| — | Common |
| ~ | 0-10vdc output |
| + | 12-30vdc supply |

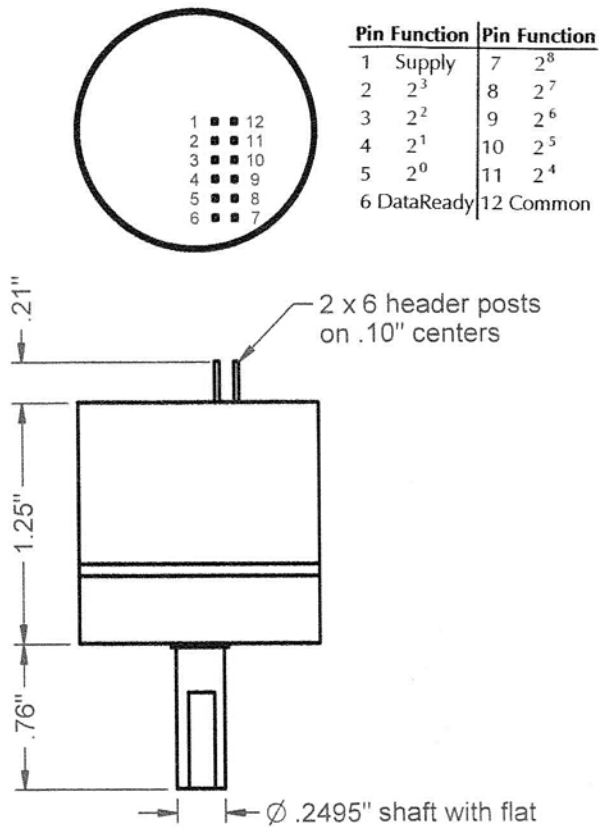
Note: Analog outputs has no cable.

SIZE SR12

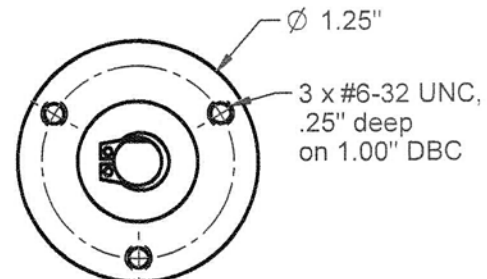
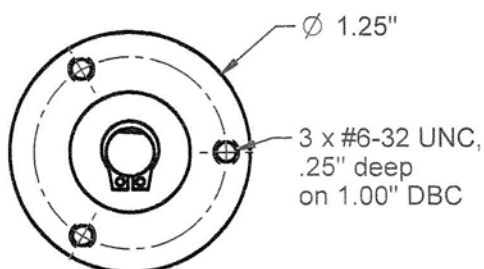
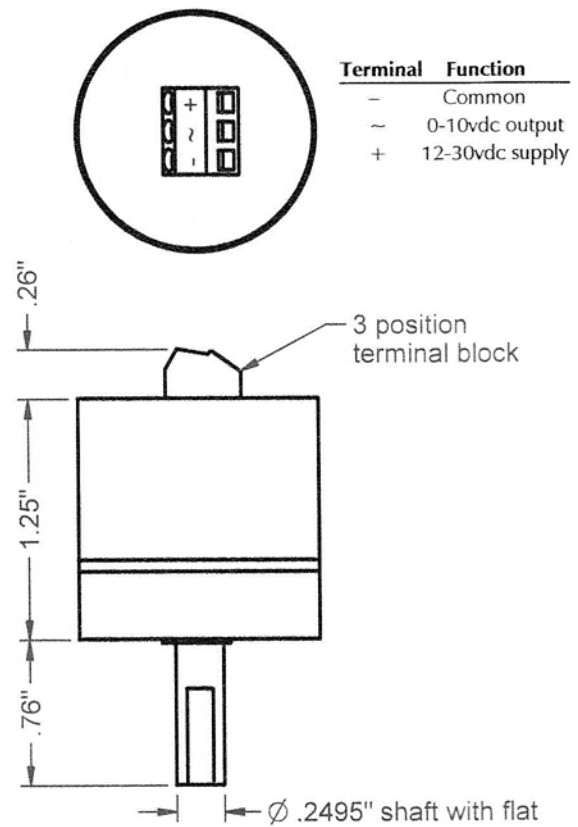
ABSOLUTE SHAFT ENCODER 8 BITS, 9 BITS & 10 BITS

| MODEL NUMBER | SPECIFICATION | CABLE | S.R.P. |
|------------------|---|-------------------------|----------|
| SR12-256N/5 | 8 bits Natural Binary, Parallel 5v outputs | 3ft. Ribbon Cable | \$270.00 |
| SR12-512N/5 | 9 bits Natural Binary, Parallel 5v outputs | | \$280.00 |
| SR12-1024N/5 | 10 bits Natural Binary, Parallel 5v outputs | | \$330.00 |
| SR12-256G/5 | 8 bits Gray code, Parallel 5v outputs | | \$270.00 |
| SR12-512G/5 | 9 bits Gray code, Parallel 5v outputs | | \$280.00 |
| SR12-1024G/5 | 10 bits Gray code, Parallel 5v outputs | | \$330.00 |
| SR12-256A/12-30 | 8 bits Analog 0-10v outputs,12-30v input | N/A | \$270.00 |
| SR12-512A/12-30 | 9 bits Analog 0-10v outputs,12-30v input | N/A | \$280.00 |
| SR12-1024A/12-30 | 10 bits Analog 0-10v outputs,12-30v input | N/A | \$330.00 |

SR12 with parallel outputs



SR12 with analog output



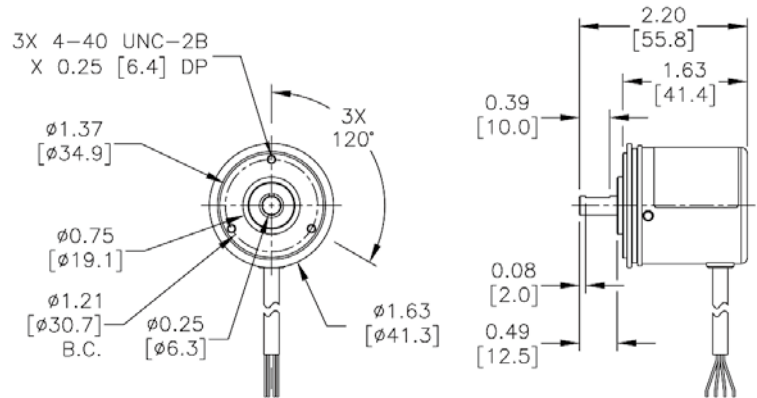
SIZE 15 SERIES TRDA-2E INCREMENTAL SHAFT ENCODER



FEATURES

- 1.5" O.D./Servo Mount
- Up to 2500 P/R, heavy-duty, alumi-diecast case NEMA12 (IP-54)
- 200 KHz frequency response
- A, B, Index with complements
- C-Flange, Flex-coupling available
- Applications:
Machine Tool, Robotics, Packaging,
Medical Diagnostic Equipment,
Elevator Control, Printing Equipment
Semiconductor Processing, Food Process

OUTLINE DIMENSIONS



SPECIFICATIONS

Electrical

| | |
|------------------------|---|
| Pulse per Revolution | Up to 2500 |
| Supply Voltage | 5Vdc (line driver), 5V~26Vdc (open collector) |
| Output Format | Dual Square Wave in Quadrature with Index |
| Output Option | TTL Line Driver Output 26LS31 (EIA:RS-422A) Open Collector Output |
| Current Consumption | TTL Line Driver: 50mA Max. No Load Open Collector: 50mA Max. No Load |
| Frequency Response | 200 KHz [A, B and Index] |
| Electrical Connections | 3.3ft. Shielded Cable |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |
| Output Level | (H) ≥2.5V (L) ≤0.5V |
| Rise and Fall Time | ≤1µs (When cable length is 1m) |
| Insulation Resistance | ≥50MΩ |

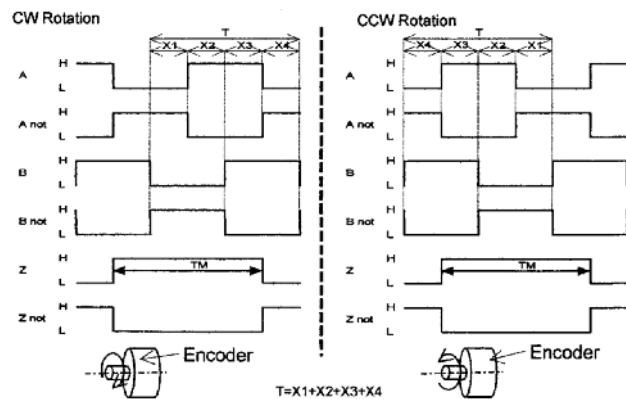
Mechanical

| | |
|----------------------------|---|
| Shaft Diameter | .2497"/.2495" |
| Shaft Loading | Axial: 4.5 lbs. Max. (20N) Radial: 6.7 lbs. Max. (30N) |
| Shaft Runout | .0016" TIR Max. |
| Starting Torque at 25°C | 0.01N • m Max. |
| Shaft Angular Acceleration | 1x10 ⁴ rad/Sec ² Max. |
| Moment of Inertia | 0.6x10 ⁻⁶ Kg • m ² |
| Rated Speed | 5000RPM |
| Weight | 3.5 oz. Max. |

Environmental

| | |
|--------------------|---|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operating Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | 490 m/s ² (11ms 3-times, each X, Y, Z) |
| Withstand Voltage | 500VAC at 50/60 Hz for 1 minute |
| Construction | NEMA12/IP-54 |

LINE DRIVER WAVE FORM



CW or CCW ROTATION AS VIEWED FROM ENCODER SHAFT

DIVISION ACCURACY

| | |
|-----------------------|-----------------------------------|
| Symmetry | X1+X2=0.5T±0.25T X2+X3=0.5T±0.25T |
| Phase shift | Xn=0.25±0.125T (n=1, 2, 3, 4) |
| Signal width of Z ch. | TM=1T±0.25T |

T=360° /N N: Pulse per revolution

DIVISION ACCURACY OF SIGNAL

| | |
|--------------------------|--------|
| Accumulative Angle Error | ≤0.4T |
| Pitch Error | ±0.01T |
| Adjacent Pitch Error | ±0.01T |

Series TRDA-2E / Size 15 Shaft Encoder

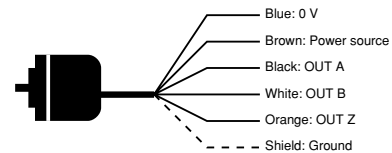
| Model | Resolution | Voltage/Output | Flange | | |
|-------------------------------------|---|----------------------------|--|--|---|
| TRDA-2E | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> — | <input type="checkbox"/> | | |
| ORDERING INFORMATION | | | | | |
| TRDA-2E Size 15 Shaft Encoder | 50 | 512 | A = Open Collector 5 - 12 VDC | NONE = 0 | SHIELDED CABLE 1 m/ 3.3 ft. Dia: 5mm Sheath: PVC Wire: AWG 24-26 |
| | 100 | 600 | | | |
| | 200 | 800 | | | |
| | 240 | 1000 | B = Open Collector 10.8 - 26.4 VDC | F - 2 F - 3 F - 6 F - 7 F - 8 | |
| | 250 | 1024 | | | |
| | 300 | 1200 | | | |
| | 360 | 2000 | V = Line Driver 5 VDC | | |
| | 400 | 2048 | | | |
| | 500 | 2500 | | | |
| | All Glass Disks | | | | |

| PRICING INFORMATION | | | | | |
|-----------------------------------|------------------|---|--|--|---|
| | RESOLUTION | ELECTRICAL | FLANGE | | TERMINATION |
| TRDA-2E Base price \$270.00 | 50 | 5 - 26 V Open Collector - - Quadrature A & B w/ Index Z N/C | F - 2 Add \$35.00 F - 3 Add \$40.00 F - 6 Add \$35.00 F - 7 Add \$30.00 F - 8 Add \$50.00 | | Shielded Cable std. 3 ft. N/C |
| | Thru 1024 | | | | |
| | 1200 | 5V linedriver - - Quadrature A & B w/ Index Z N/C | | | |
| | Thru 2048 | | | | |
| 2500 | Add \$40.00 | | | | |

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|----------------------|------------|--------------|------------|
| TRDA-2E50V | \$270.00 | TRDA-2E2500B | \$320.00 |
| TRDA-2E100A | \$270.00 | TRDA-2E2500V | \$320.00 |
| TRDA-2E100B | \$270.00 | | |
| TRDA-2E100V | \$270.00 | | |
| TRDA-2E100V-7148 | \$380.00 | | |
| TRDA-2E250A | \$270.00 | | |
| TRDA-2E250B | \$270.00 | | |
| TRDA-2E250V | \$270.00 | | |
| TRDA-2E250V-F3-7140 | \$450.00 | | |
| TRDA-2E360A | \$270.00 | | |
| TRDA-2E360B | \$270.00 | | |
| TRDA-2E360V | \$270.00 | | |
| TRDA-2E500A | \$270.00 | | |
| TRDA-2E500B | \$270.00 | | |
| TRDA-2E500V | \$270.00 | | |
| TRDA-2E512A | \$270.00 | | |
| TRDA-2E512B | \$270.00 | | |
| TRDA-2E512V | \$270.00 | | |
| TRDA-2E1000A | \$270.00 | | |
| TRDA-2E1000B | \$270.00 | | |
| TRDA-2E1000V | \$270.00 | | |
| TRDA-2E1000V-F6-7135 | \$450.00 | | |
| TRDA-2E1000V-F8-7136 | \$480.00 | | |
| TRDA-2E1000V-F8-7137 | \$480.00 | | |
| TRDA-2E1024A | \$270.00 | | |
| TRDA-2E1024B | \$270.00 | | |
| TRDA-2E1024V | \$270.00 | | |
| TRDA-2E2000A | \$300.00 | | |
| TRDA-2E2000B | \$300.00 | | |
| TRDA-2E2000V | \$300.00 | | |
| TRDA-2E2048A | \$300.00 | | |
| TRDA-2E2048B | \$300.00 | | |
| TRDA-2E2048V | \$300.00 | | |
| TRDA-2E2500A | \$320.00 | | |

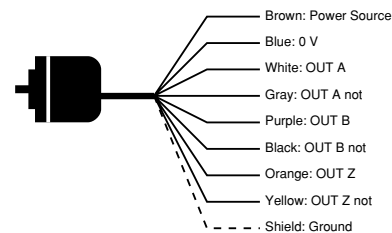
WIRING DIAGRAMS (Cable Specs)

■ Open Collector (Shield = Body)



SHIELDED CABLE 1m/3.3 ft.
Dia:5mm, Sheath:PVC, Wire: AWG24-26

■ Line Driver (Shield = Body)



FLANGES

FEATURES

- NEMA 23, NEMA 34/42 Motor Mount Bell Flanges
- Size 2.1" O.D. NEMA 23 Flanges:
F-2 (1.05" height), **F-6** (1.34" height)
- Size 3.25" O.D. NEMA 34 Flange: **F-3**
- Size 3.25" O.D. NEMA 42 Flange: **F-8**

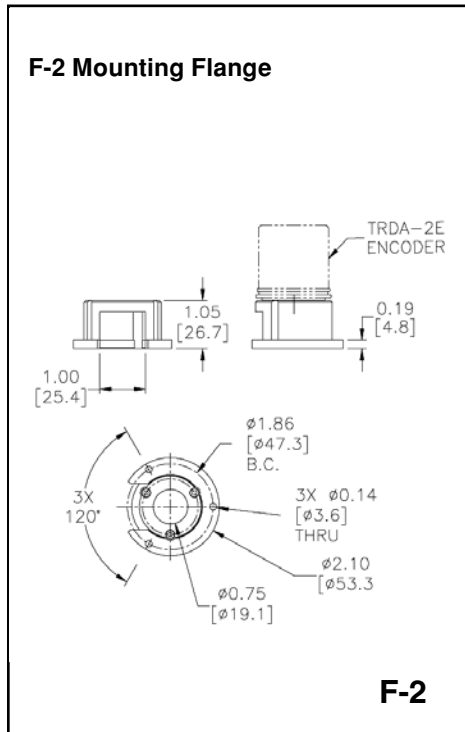
• Parker Compumotor Equivalent:

E 57= **F-6**, E 83/E 106=**F-8**

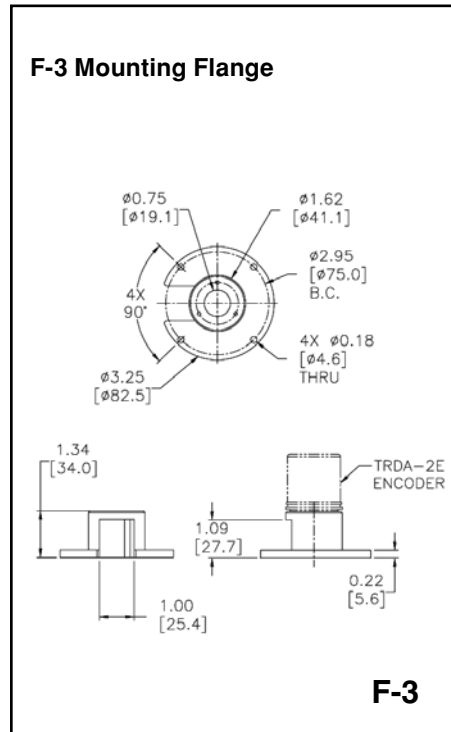
| | |
|----------------------|-------------|
| TRDA-2E1000V-F6-7135 | E57 |
| TRDA-2E1000V-F8-7136 | E83 |
| TRDA-2E1000V-F8-7137 | E106 |

• Dynapar E-23 Series, DRC M21AA Series
 Interchangeable: **F-7**

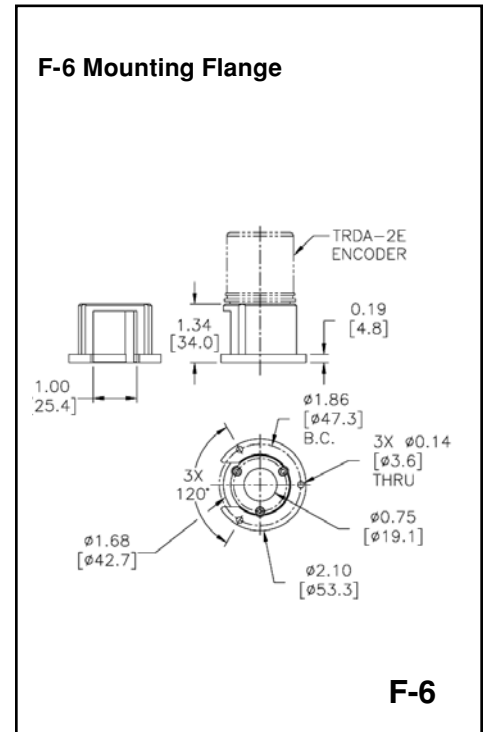
NEMA 23



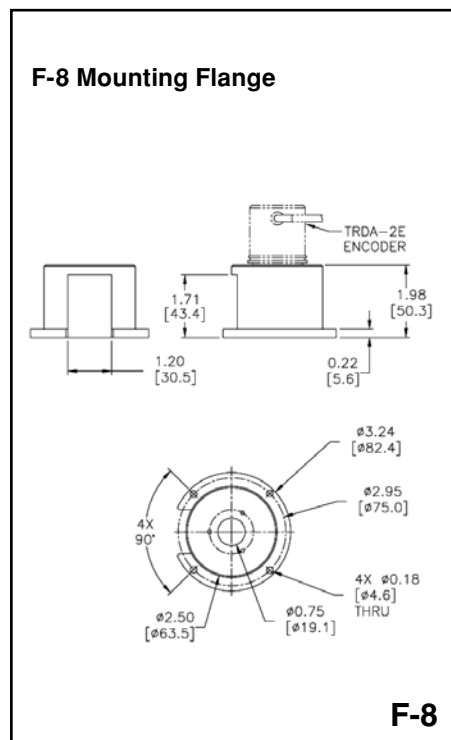
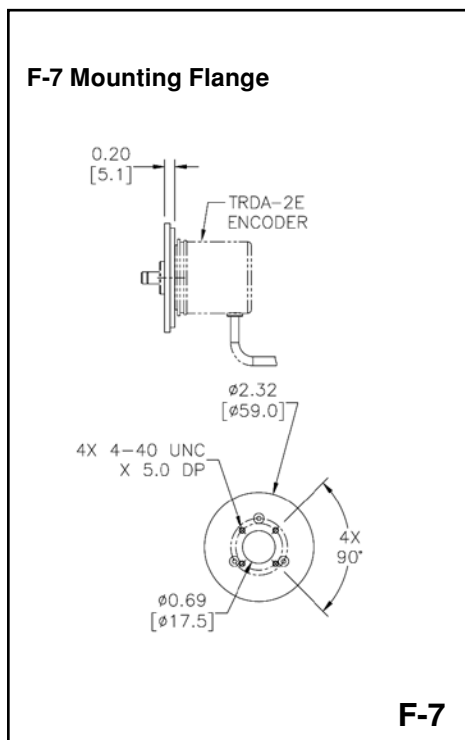
NEMA 34



NEMA 23



NEMA 42



| FLANGES | LIST PRICE |
|---------|------------|
| F-2 | \$35.00 |
| F-3 | \$40.00 |
| F-6 | \$35.00 |
| F-7 | \$30.00 |
| F-8 | \$50.00 |
| F-20 | \$60.00 |
| F-21 | \$60.00 |

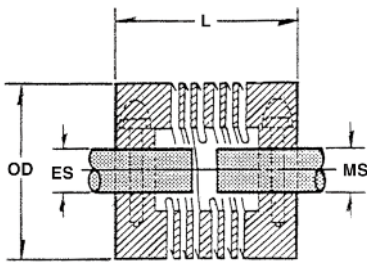
NOTE: When F-7 flange will be mounted on the unit, shaft length get shorter to 1/4".

FLEX-COUPLING

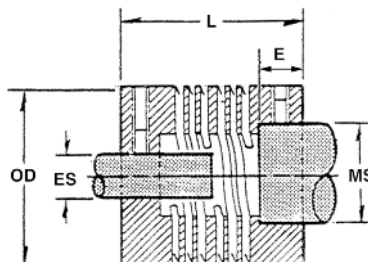


FEATURES

- Precision All Mighty Flexible Coupling
- 6 Short Thin-Double Tapered Curved Beams restrict torque wind-up
- Protects electrical leakage and thermal stress
- Reliable Integral Clamp Design
- Metric Phenolic Insert Coupling available in 5, 6, 8, 10mm



THROUGH BORE



THROUGH AND LIMITED BORE

Coupling Specifications

| | BT 075 | BT 100 | BT 125 |
|-----------------------------------|--------|--------|--------|
| O.D. | 0.75 | 1 | 1.25 |
| Length | 0.75 | 1 | 1.25 |
| E(depth) | 0.22 | 0.28 | N/A |
| Torque lb.in. | 7 | 18 | 34 |
| Angular Offset | 4° | 5° | 5° |
| Parallel Offset | 0.008 | 0.01 | 0.01 |
| Axial Offset | ±.005 | ±.010 | ±.012 |
| Static Torque | 20 | 42 | 103 |
| Inertia lb.in.² | 2.463 | 8.888 | 26.18 |
| Mass lb. | 0.031 | 0.062 | 0.122 |

| PART NUMBER | LIST PRICE |
|---|------------|
| Flexible Couplings (Aluminum, Clamping Design Both Ends) | |
| 3/4" dia X 3/4" L | |
| BT 075-C.250-C.250 | \$45.00 |
| BT 075-C.375-C.250 | \$45.00 |
| BT 075-C.375-C.375 | \$45.00 |
| BT 075-C.6MM-C.6MM | \$45.00 |
| BT 075-C.250-P000 | \$45.00 |
| BT 075-P05MM (metric plastic insert) | N/C |
| BT 075-P06MM (metric plastic insert) | N/C |
| BT 075-P08MM (metric plastic insert) | N/C |
| 1.00" dia X 1.00" L | |
| BT 100-C.250-C.250 | \$50.00 |
| BT 100-C.250-C.375 | \$50.00 |
| BT 100-C.250-C.500 | \$50.00 |
| BT 100-C.375-C.375 | \$50.00 |
| BT 100-C.500-C.250 | \$50.00 |
| BT 100-C.8MM-C.8MM | \$50.00 |
| BT 100-C.10MM-C.10MM | \$50.00 |
| BT 100-C.375-P000 | \$50.00 |
| BT 100-P06MM (metric plastic insert) | N/C |
| BT 100-P08MM (metric plastic insert) | N/C |
| BT 100-P10MM (metric plastic insert) | N/C |
| 1.25" dia X 1.25" L | |
| BT 125-C.375-C.250 | \$58.00 |
| BT 125-C.375-C.375 | \$58.00 |
| BT 125-C.375-C.500 | \$58.00 |
| BT 125-C.375-P000 | \$58.00 |
| BT 125-P06MM (metric plastic insert) | N/C |
| BT 125-P08MM (metric plastic insert) | N/C |
| BT 125-P10MM (metric plastic insert) | N/C |

SIZE 20 SERIES TRDA-20N INCREMENTAL SHAFT ENCODER

Nicely equipped MS Connector Model (Left)
US \$345.00
(up to 1024ppr)

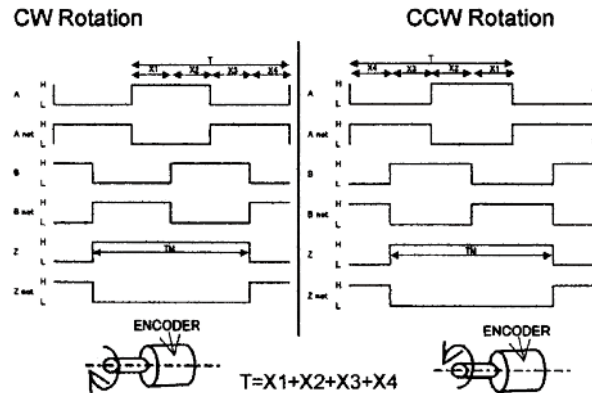


Starting at US \$290.00
(up to 1024ppr)
S.R.P. List Price
With cable model (Right)

FEATURES:

- 2.0" O.D., heavy duty designed
- 3/8" shaft, shaft seal option (Detachable and Repairable)
- 250 KHz frequency response
- Detachable Square and Servo flanges configuration
- Super Linedriver OL7272 Compatible 5-30 Vdc available

LINE DRIVER WAVE FORM



CW or CCW ROTATION AS VIEWED FROM ENCODER SHAFT

DIVISION ACCURACY

| | |
|-----------------------|---|
| Symmetry (A, B) | $X1 + X2 = 0.5T \pm 0.25T$ $X2 + X3 = 0.5T \pm 0.25T$ |
| Phase shift | $Xn = 0.25T \pm 0.125T$ (n=1, 2, 3, 4) |
| Signal width of Z ch. | $TM = 1T \pm 0.5T$ |

$T = 360^\circ / N$ N: Pulse per revolution

DIVISION ACCURACY OF SIGNAL

| | |
|----------------------|-------------|
| Pitch Error | $\pm 0.01T$ |
| Adjacent Pitch Error | $\pm 0.02T$ |

SPECIFICATIONS

Electrical

| | |
|-----------------------|--|
| Pulse per Revolution | Up to 2500 ppr |
| Supply Voltage | 5Vdc line driver, 5V~30Vdc TTL & Super line driver |
| Output Format | Dual Square Wave in Quadrature with Index |
| Output Option | TTL Output Line Driver |
| Current Requirements | TTL: 40mA Max. No Load Line Driver: 60mA Max. No Load |
| Frequency Response | 250 KHz |
| Duty Ratio | $50 \pm 25\%$ |
| Phase Shift | $25 \pm 12.5\%$ |
| Index Signal Width | $100 \pm 50\%$ |
| Output Level | (H) $\geq 2.5V$ (L) $\leq 0.5V$ |
| Rise and Fall Time | $\leq 1\mu s$ (When cable length is 1m) |
| Insulation Resistance | $\geq 50M\Omega$ |

Mechanical

| | |
|----------------------------|---|
| Shaft Diameter | .3747"/.3744" |
| Shaft Loading | Axial: 40 lbs. Max. Radial: 35 lbs. Max. |
| Shaft Seal | Std. (Detachable, Repairable) |
| Starting Torque | 2.8 oz.-in at 77°F (25°C) |
| Shaft Angular Acceleration | 1000 rad/sec ² |
| Moment of Inertia | $2.0 \times 10^{-3} \text{Kg} \cdot \text{m}^2$ |
| Mech. Perm. Speed | 6000 RPM Max. |
| Weight | 1 lb. |

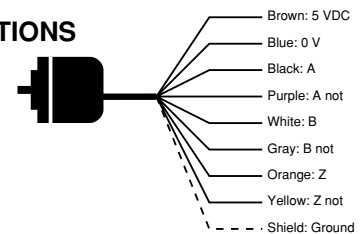
Environmental

| | |
|--------------------|--|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operating Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | Metal Slit: 981 m/s ² (11ms 3-times, each X, Y, Z) Glass Slit: 490 m/s ² (11ms 3-times, each X, Y, Z) |
| Withstand Voltage | 500VAC |
| Construction | NEMA12/IP-50 (Cable), NEMA4/IP-65 (MS connector) |

WIRING DIAGRAMS

LINE DRIVER CONNECTIONS

(Shield = Body)



ELECTRICAL CONNECTIONS/ORDER SEPARATELY

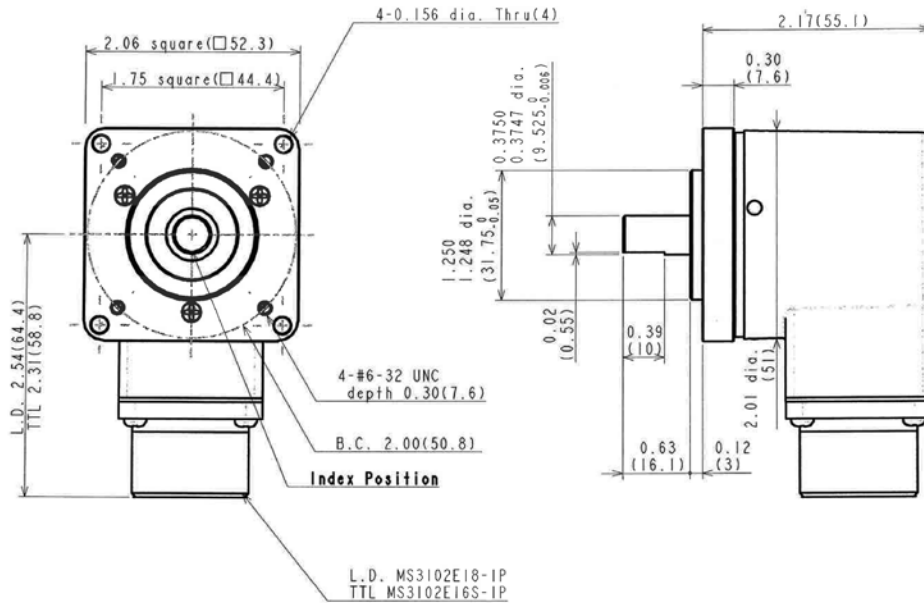
#DMS3102E18-1P (10 Pin)/MATING# DMS3106E18-1S

| Pin Code | Line Driver |
|----------|---------------|
| A | Channel A |
| B | Channel B |
| C | Index Z |
| D | Vcc |
| E | - |
| F | OV, Common |
| G | Case Ground |
| H | Channel A not |
| I | Channel B not |
| J | Index Z not |

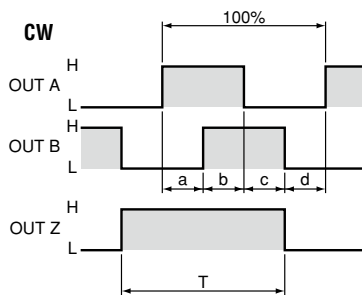
SIZE 20 SERIES TRDA-20N INCREMENTAL SHAFT ENCODER

OUTSIDE DIMENSIONS

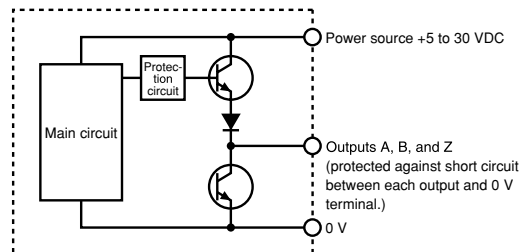
TRDA-20SNXXXX □ W-MS



TTL (Totem Pole) Wave Form (viewed from shaft side)

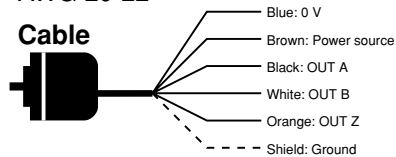


TTL Output circuit

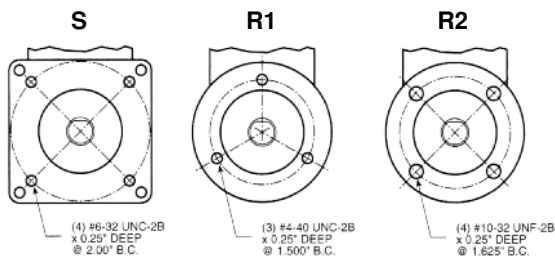


WIRING DIAGRAMS (TTL)

AWG 20-22



Detachable Flanges (You may choose and change)



TTL Connections (7 pin)/
Order Separately
#DMS3102E16-P
Mating# DMS3106E16-1S
(Shield = Body)

| Pin Code | Function |
|----------|------------|
| A | Channel A |
| B | Channel B |
| C | Index Z |
| D | Vcc |
| E | - |
| F | 0V, Common |
| G | Case, GRD |

Series TRDA-20N / Size 20 Shaft Encoder

| Model | Flange | N | Resolution | Output | Housing | Termination |
|---------|--------------------------|----------|---|--------------------------|--------------------------|--------------------------|
| TRDA-20 | <input type="checkbox"/> | N | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ORDERING INFORMATION

| | | | | | | |
|--|---|----------|--|---|--|--|
| TRDA-20 Size 20 Shaft Encoder | S: Square Flange R1: Round Flange (3) #4-40 @1.5" BC R2: Round Flange (4) #4.40 @1.625" BC | N | Metal Disks 3 4 5 10 30 40 50 60 100 120 200 240 250 300 360 400 480 500 600 Glass Disks 750 1000 1024 1200 2000 2048 2500 | RZ: 5 - 30V TTL (single ended) V: 5V Line Driver (26C31 Compatible) S: 5 - 30V Super Line Driver (0L7272 Compatible) | Blank: NEMA 12/IP50 ABS Plastic Cap W: NEMA 4/IP65 Aluminum Diecast Cap w/ MS Connector | Blank: Cable (3.3 ft.) MS: Side Mount MS Connector ME: End Mount MS Connector |
|--|---|----------|--|---|--|--|

PRICING INFORMATION

| TRDA-20 | FLANGE: | RESOLUTION | ELECTRICAL | MECHANICAL | TERMINATION |
|---|---|---|--|---|--|
| TRDA-20 Base Price \$282.00 | Detachable Flanges | 3 Thru 1024 | TTL 5-30V (Single Ended) - Quadrature A & B with Index Z N/C | Shaft Seal -MS Connector Model Standard N/C | MS Conn.-Diecast Body NEMA4 IP-65 - Side Mount Add \$55.00 - End Mount Add \$55.00 |
| | Square Flange #TRDA-20SN Add \$8.00 | | | | |
| | Round Flange 1 #TRDA-20R1N Add \$8.00 | 1200 Thru Add \$25.00 2048 | Linedriver 5V Quadrature A & B with Index Z N/C | | 3 ft. cable/ ABS Body NEMA12, IP-50 N/C |
| Round Flange 2 #TRDA-20R2N Add \$8.00 | | 2500 Add \$40.00 | Super Linedriver 5-30V Quadrature A & B with Index Z Add \$30.00 | MS 10 pin Mating-Part #DMS3106E18-1S \$38.00 (order separately) MS 7 pin Mating-Part #DMS3106E16-1S \$30.00 (order separately) | |

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE | Flanges | |
|----------------------|------------|--------------------|------------|---|----------------|
| TRDA-20R1N360RZ | \$290.00 | TRDA-20SN512VW-ME | \$345.00 | TRDA-20SN | \$8.00 |
| TRDA-20R1N2000VW-ME | \$380.00 | TRDA-20SN512VW-MS | \$345.00 | TRDA-20R1 | \$8.00 |
| TRDA-20R1N2500RZW-MS | \$385.00 | TRDA-20SN1000RZ | \$290.00 | TRDA-20R2 | \$8.00 |
| TRDA-20SN100RZ | \$290.00 | TRDA-20SN1000SW-ME | \$375.00 | Mating Connector | |
| TRDA-20SN100SW-MS | \$375.00 | TRDA-20SN1000VW-MS | \$345.00 | DMS3106E18-1S (10pin Linedriver) | \$45.00 |
| TRDA-20SN100VW-MS | \$345.00 | TRDA-20SN2000RZ | \$315.00 | DMS3106E16-1S (7pin TTL) | \$35.00 |
| TRDA-20SN250RZ | \$290.00 | TRDA-20SN2000SW-MS | \$400.00 | Mating Connector w/10ft cable assemblies | |
| TRDA-20SN250SW-MS | \$375.00 | TRDA-20SN2000VW-ME | \$370.00 | C10-9-10 LD (Linedriver) | \$85.00 |
| TRDA-20SN250VW-MS | \$345.00 | TRDA-20SN2000VW-MS | \$370.00 | MS10 pin mating w/10ft cable (9 wires) | |
| TRDA-20SN360RZ | \$290.00 | TRDA-20SN2048RZ | \$315.00 | C7-5-10 RC (TTL) | \$75.00 |
| TRDA-20SN360SW-MS | \$375.00 | TRDA-20SN2048VW-ME | \$370.00 | MS7 pin mating w/10ft cable (5 wires) | |
| TRDA-20SN360VW-MS | \$345.00 | TRDA-20SN2048VW-MS | \$370.00 | Cables | |
| TRDA-20SN500RZ | \$290.00 | TRDA-20SN2500RZ | \$330.00 | CBL-2025N-XXX FT | \$3.00 per Ft. |
| TRDA-20SN500VW-MS | \$345.00 | TRDA-20SN2500SW-MS | \$415.00 | Bell Flanges | |
| TRDA-20SN512RZ | \$290.00 | TRDA-20SN2500VW-ME | \$385.00 | F-20 | \$60.00 |
| TRDA-20SN512RZW-MS | \$375.00 | TRDA-20SN2500VW-MS | \$385.00 | F-21 | \$60.00 |
| | | | | 3.5" Center Height Foot Mounting Bracket | |
| | | | | LM-001 | \$90.00 |

NOTE: Above stock items show Square Flange. Round Flange Models 1 & 2 are also stock items.

SIZE 25 SERIES TRDA-25N INCREMENTAL SHAFT ENCODER

Nicely equipped MS
Connector Model
US \$375.00
(up to 1024ppr)

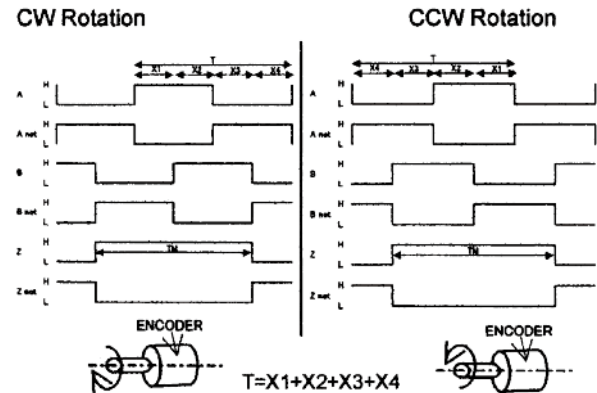


Starting at US \$310.00
(up to 1024ppr)
S.R.P. List Price
With cable model (Above)

FEATURES

- 2.5" O.D., heavy duty designed, NEMA4/IP65
- 3/8" shaft, shaft seal standard (Detachable and Repairable)
- Up to 5000 P/R Available
- 250 KHz frequency response
- Index gated 1/2, 1/4 channel cycle available
- Detachable Square flange or Servo/face flange mounting
- Super Linedriver OL7272 Compatible 5-30 Vdc available

LINE DRIVER WAVE FORM



CW or CCW ROTATION AS VIEWED FROM ENCODER SHAFT

DIVISION ACCURACY

| | |
|-----------------------|---|
| Symmetry (A, B) | $X1+X2=0.5T \pm 0.25T$ $X2+X3=0.5T \pm 0.25T$ |
| Phase shift | $Xn=0.25T \pm 0.125T$ (n=1, 2, 3, 4) |
| Signal width of Z ch. | $TM=1T \pm 0.5T$ |

$T=360^\circ/N$ N : Pulse per revolution

DIVISION ACCURACY OF SIGNAL

| | |
|----------------------|-------------|
| Pitch Error | $\pm 0.01T$ |
| Adjacent Pitch Error | $\pm 0.02T$ |

SPECIFICATIONS

Electrical

| | |
|-----------------------|--|
| Pulse per Revolution | Up to 5000 ppr, real direct count |
| Supply Voltage | 5Vdc line driver, 5~30Vdc TTL & Super line driver |
| Output Format | Dual Square Wave in Quadrature with Index |
| Output Option | TTL Output Line Driver |
| Current Requirements | TTL: 40mA Max. No Load Line Driver: 60mA Max. No Load |
| Frequency Response | 250 KHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |
| Output Level | (H) $\geq 2.5V$ (L) $\leq 0.5V$ |
| Rise and Fall Time | $\leq 1\mu s$ (When cable length is 1m) |
| Insulation Resistance | $\geq 50M\Omega$ |

Mechanical

| | |
|----------------------------|---|
| Shaft Diameter | .3747".3744" |
| Shaft Loading | Axial: 40 lbs. Max. Radial: 35 lbs. Max. |
| Shaft Seal | Standard (Detachable, Repairable) |
| Starting Torque | 2.8 oz.-in at 77°F (25°C) |
| Shaft Angular Acceleration | 1000 rad/sec ² |
| Moment of Inertia | $2.0 \times 10^{-3} \text{Kg} \cdot \text{m}^2$ |
| Mech. Perm Speed | 6000 RPM Max. |
| Weight | 1 lb. |

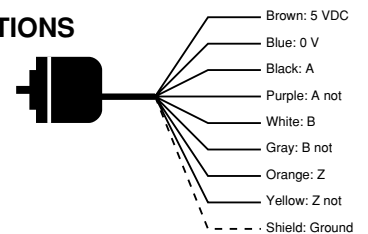
Environmental

| | |
|--------------------|--|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operating Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | Metal Slit: 981 m/s ² (11ms 3-times, each X, Y, Z) Glass Slit: 490 m/s ² (11ms 3-times, each X, Y, Z) |
| Withstand Voltage | 500VAC |
| Construction | NEMA4/IP-65 |

WIRING DIAGRAMS

LINE DRIVER CONNECTIONS

(Shield = Body)



ELECTRICAL CONNECTIONS/ORDER SEPARATELY

#DMS3102E18-1P (10 Pin)/MATING# DMS3106E18-1S

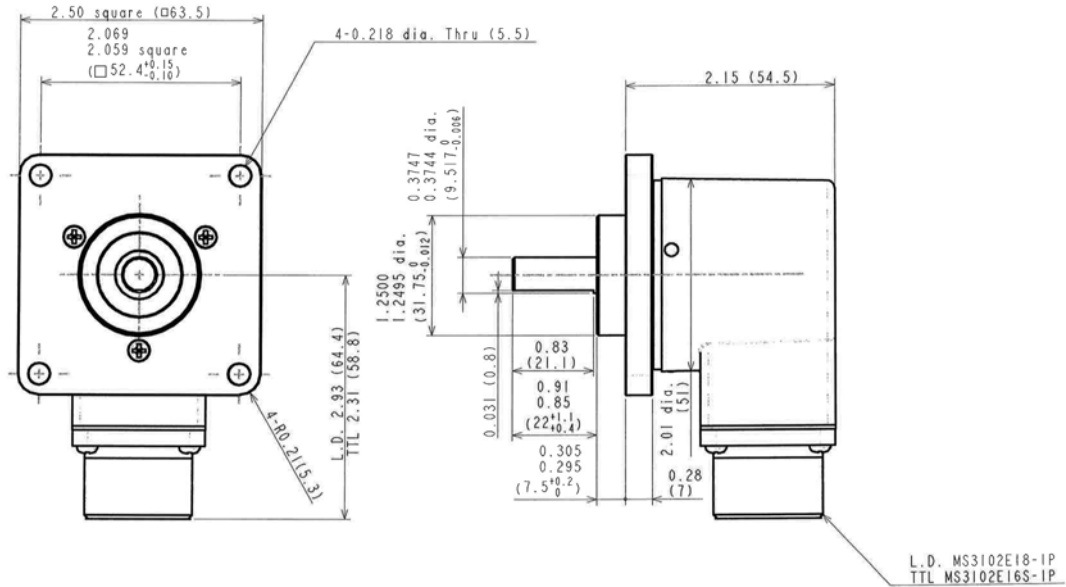
| Pin Code | Line Driver |
|----------|---------------|
| A | Channel A |
| B | Channel B |
| C | Index Z |
| D | Vcc |
| E | - |
| F | 0V, Common |
| G | Case Ground |
| H | Channel A not |
| I | Channel B not |
| J | Index Z not |

SIZE 25 SERIES TRDA-25N

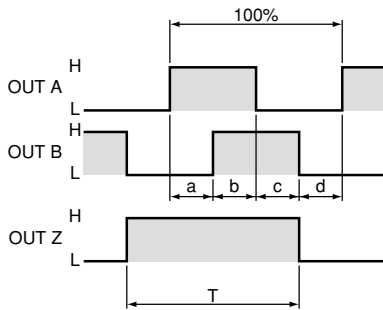
INCREMENTAL SHAFT ENCODER

OUTSIDE DIMENSIONS

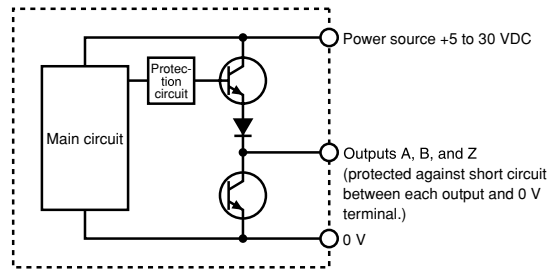
TRDA-25SNXXXX □ W-MS



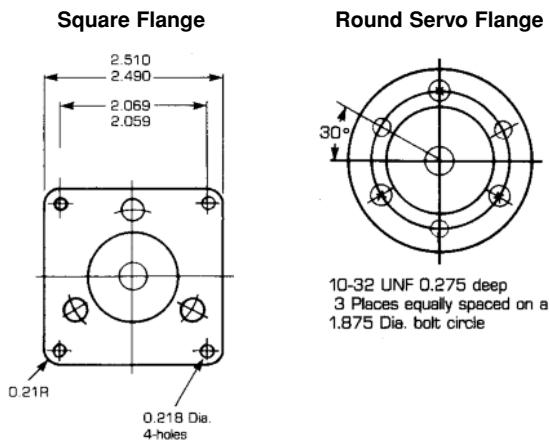
TTL (Totem Pole) Wave Form (viewed from shaft side)



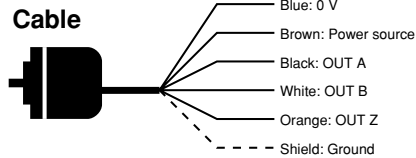
TTL Output circuit



Detachable Flanges (You may choose and change)



WIRING DIAGRAMS (TTL) AWG 20-22



TTL Connections (7 pin)
Order Separately
#DMS3102E16-P
Mating# DMS3106E16-1S
(Shield = Body)

| Pin Code | Function |
|----------|------------|
| A | Channel A |
| B | Channel B |
| C | Index Z |
| D | Vcc |
| E | - |
| F | 0V, Common |
| G | Case, GRD |

Series TRDA-25N / Size 25 Shaft Encoder

1-800-903-9093

| | | | | | | |
|---------|--------------------------|---|---|--------------------------|---|--------------------------|
| Model | Flange | N | Resolution | Output | W | Termination |
| TRDA-25 | <input type="checkbox"/> | N | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | W | <input type="checkbox"/> |

ORDERING INFORMATION

| | | | | | | |
|-------------------------------------|---|---|--|--|---|-------------------------------|
| TRDA-25 Size 25 Shaft Encoder | S: Square Flange | N | Metal Disks | RZ: 5 - 30V TTL (single ended) | W | Blank: Cable (3.3 ft.) |
| | R: Round Flange (3) #10-32 @1.875" BC | | 3 4 5 10 30 40 50 60 100 120 192 200 240 250 300 360 400 480 500 | | | |
| | | | Glass Disks | S: 5 - 30V Super Line Driver (0L7272 Compatible) | | ME: End Mount MS Connector |
| | | | 600 750 1000 1024 1200 2000 2048 2500 5000 | | | |

PRICING INFORMATION

| | FLANGE: | RESOLUTION | ELECTRICAL | MECHANICAL | TERMINATION |
|-----------------------------------|--|----------------------|--|----------------------------|---|
| TRDA-25 Base Price \$310.00 | Detachable Flanges | 3 Thru 1024 | TTL 5-30V (Single Ended) - Quadrature A & B with Index Z N/C | Shaft Seal Standard N/C | MS Conn.-Diecast Body NEMA4 IP-65 - Side Mount Add \$55.00 - End Mount Add \$55.00 |
| | Square Flange #TRDA-25SN Add \$10.00 | 1200 Thru 2048 | Linedriver 5V Quadrature A & B with Index Z N/C | | 3 ft. cable/Diecast Body NEMA4, IP-65 N/C |
| | Round Flange #TRDA-25RN Add \$10.00 | 2500 | Super Linedriver 5-30V Quadrature A & B with Index Z Add \$30.00 | | MS 10 pin Mating-Part #DMS3106E18-1S \$38.00 (order separately) MS 7 pin Mating-Part #DMS3106E16-1S \$30.00 (order separately) |
| | | 5000 | Add \$365.00 | | |

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|---------------------|------------|----------------------|------------|---|----------------|
| TRDA-25SN100RZW | \$320.00 | TRDA-25SN1000RZW-MS | \$375.00 | TRDA-25SN2500SW-MS | \$445.00 |
| TRDA-25SN100RZW-MS | \$375.00 | TRDA-25SN1000SW-ME | \$405.00 | TRDA-25SN2500VW-ME | \$415.00 |
| TRDA-25SN100SW-ME | \$405.00 | TRDA-25SN1000SW-MS | \$405.00 | TRDA-25SN2500VW-MS | \$415.00 |
| TRDA-25SN100SW-MS | \$405.00 | TRDA-25SN1000VW-ME | \$375.00 | TRDA-25SN5000VW-MS | \$780.00 |
| TRDA-25SN100VW-MS | \$375.00 | TRDA-25SN1000VW-MS | \$375.00 | Flanges | |
| TRDA-25SN192RZW-MS | \$375.00 | TRDA-25SN1000VWL-MS | \$375.00 | TRDA-25RN | \$10.00 |
| TRDA-25SN250RZW | \$320.00 | TRDA-25SN1024RZW | \$320.00 | TRDA-25SN | \$10.00 |
| TRDA-25SN250SW-MS | \$405.00 | TRDA-25SN1024RZW-MS | \$375.00 | Mating Connector | |
| TRDA-25SN250VW-MS | \$375.00 | TRDA-25SN1024SW-MS | \$405.00 | DMS3106E18-1S (10pin Linedriver) | \$45.00 |
| TRDA-25SN360RZW | \$320.00 | TRDA-25SN1024VW-ME | \$375.00 | DMS3106E16-1S (7pin TTL) | \$35.00 |
| TRDA-25SN360SW-MS | \$405.00 | TRDA-25SN1024VW-MS | \$375.00 | MS mating conn. w/10ft cable assemblies | |
| TRDA-25SN360VW-MS | \$375.00 | TRDA-25SN2000RZW | \$345.00 | C10-9-10 LD (Linedriver) | \$85.00 |
| TRDA-25SN500RZW | \$320.00 | TRDA-25SN2000RZW-MS | \$400.00 | MS10 pin mating w/10ft cable (9 wires) | |
| TRDA-25SN500RZW-MS | \$375.00 | TRDA-25SN2000SW-MS | \$430.00 | C7-5-10 RC (TTL) | \$75.00 |
| TRDA-25SN500SW-ME | \$405.00 | TRDA-25SN2000VW-7151 | \$780.00 | MS7 pin mating w/10ft cable (5 wires) | |
| TRDA-25SN500SW-MS | \$405.00 | TRDA-25SN2000VW-ME | \$400.00 | Cables | |
| TRDA-25SN500VW-ME | \$375.00 | TRDA-25SN2000VW-MS | \$400.00 | CBL-2025N-XXX FT | \$3.00 per Ft. |
| TRDA-25SN500VW-MS | \$375.00 | TRDA-25SN2048RZW | \$345.00 | Bell Flanges | |
| TRDA-25SN512RZW | \$320.00 | TRDA-25SN2048SW-MS | \$430.00 | F-20 | \$60.00 |
| TRDA-25SN512RZW-MS | \$375.00 | TRDA-25SN2048VW-ME | \$400.00 | F-21 | \$60.00 |
| TRDA-25SN512VW-ME | \$375.00 | TRDA-25SN2048VW-MS | \$400.00 | 3.5" Center Height Foot Mounting Bracket | |
| TRDA-25SN512VW-MS | \$375.00 | TRDA-25SN2500RZW | \$360.00 | LM-001 | \$90.00 |
| TRDA-25RN1000RZW-MS | \$375.00 | TRDA-25SN2500RZW-MS | \$415.00 | | |
| TRDA-25SN1000RZW | \$320.00 | | | | |

NOTE: Above stock items show Square Flange. Round Flange Models 1 & 2 are also stock items.

OPTIONAL PARTS:

Order Separately

DETACHABLE FLANGE

| | Part No. | List Price |
|---------------|-----------|------------|
| Square Flange | TRDA-25SN | \$10.00 |
| Round Flange | TRDA-25RN | \$10.00 |

MATING CONNECTOR KIT

| | | |
|--|-----------------|-------------|
| LD 10 Pin | DMS3106E18-1S | \$45.00 |
| TTL 7 Pin | DMS3106E16-1S | \$35.00 |
| (Including Straight Plug w/Cable Clamp, Insertion & Bushing) | | |
| Cable | CBL-2025N-XXXFT | \$ 3.00/Ft. |

BELL FLANGES / For Servo / Round Flange Encoder

| | | |
|----------------------|------|---------|
| NEMA 42-Flat Bottom | F-20 | \$60.00 |
| NEMA 42-Pilot@Bottom | F-21 | \$60.00 |

FLEXIBLE COUPLING

| | |
|-------------------|---------|
| BT100-C.250-C.375 | \$50.00 |
| BT125-C.375-C.250 | \$58.00 |
| BT100-C.375-C.375 | \$50.00 |
| BT125-C.375-C.375 | \$58.00 |
| BT125-C.375-C.500 | \$58.00 |
| BT125-C.375-P8MM | \$58.00 |
| BT125-C.375-P10MM | \$58.00 |

(Refer to Page 20 for the detail specifications.)

3.5" CENTER HEIGHT FOOT MOUNTING BRACKET

| | | |
|--------------------|--------|---------|
| 5.25"Hx3.2"Wx2.5"L | LM-001 | \$90.00 |
|--------------------|--------|---------|

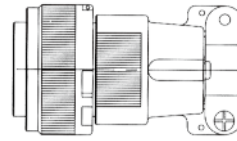
12" CIRCUMFERENCE MEASURING WHEEL (3.82" dia)

| Material | Hub x Width | | |
|----------|-------------|---------|---------|
| Urethane | 3/8" x 3/8" | MW-1-B | \$45.00 |
| Urethane | 3/8" x 1" | MW-1W-B | \$50.00 |

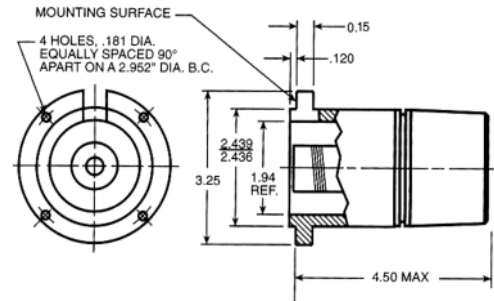
Urethane Rubber: 83A Shore Hardness

Operating Temperature: -25° to 65° C, -20° to 150° F

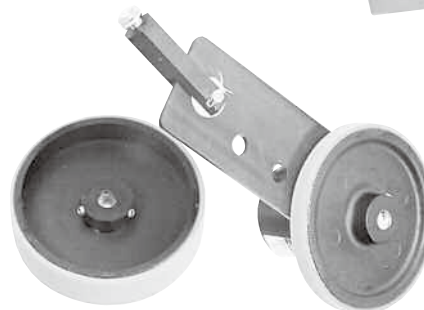
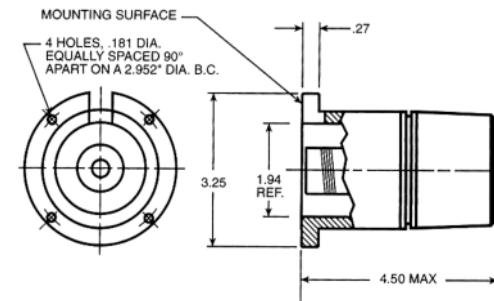
Plug Connector



F-21



F-20



OPTIONAL PARTS:

Order Separately

● Measuring Wheel Mounting Adapter & Yoke Assembly Kit

| Mt. Beam Size | Part No. | List Price |
|---------------|----------|------------|
| 1/4" - 28 | MTA/Y-1 | \$30.00 |
| 3/8" - 16 | MTA/Y-3 | \$30.00 |

Measuring Wheel Mounting Adapter

| Size | Part No. | List Price |
|-------------------------|----------|------------|
| 6"x2.25"x1/8" Thickness | MTA-001 | \$15.00 |

Yoke Assembly

| Size | Mt. Beam Size | Part No. | List Price |
|---------------|---------------|----------|------------|
| 2.25"L x 5/8" | 1/4" - 28 | Y-1 | \$15.00 |
| 2.25"L x 5/8" | 3/8" - 16 | Y-3 | \$15.00 |

● Measuring Wheel Mounting Adapter & Offset Foot Bracket Assembly Kit

| Arm Length | Part No. | List Price |
|------------|-------------|------------|
| 7.00" | MTA/MB-UB2 | \$90.00 |
| 11.25" | MTA/MB-UB2A | \$100.00 |

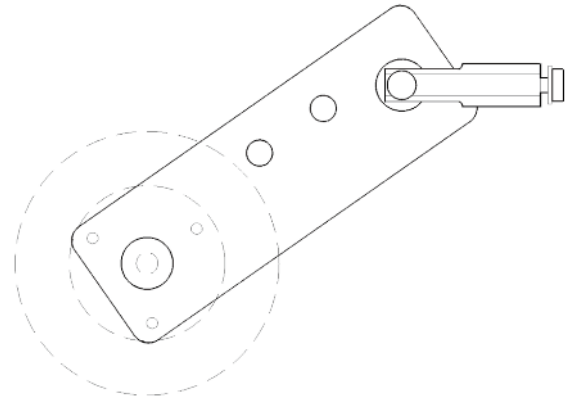
Measuring Wheel Mounting Adapter

| Size | Part No. | List Price |
|-------------------------|----------|------------|
| 6"x2.25"x1/8" Thickness | MTA-001 | \$15.00 |

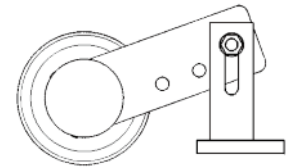
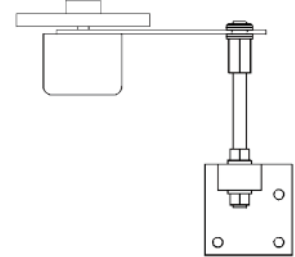
Offset Foot Bracket

| Size | Part No. | List Price |
|----------------------|----------|------------|
| 3.125"H x 7.00" Arm | MB-UB2 | \$60.00 |
| 3.125"H x 11.25" Arm | MB-UB2A | \$70.00 |

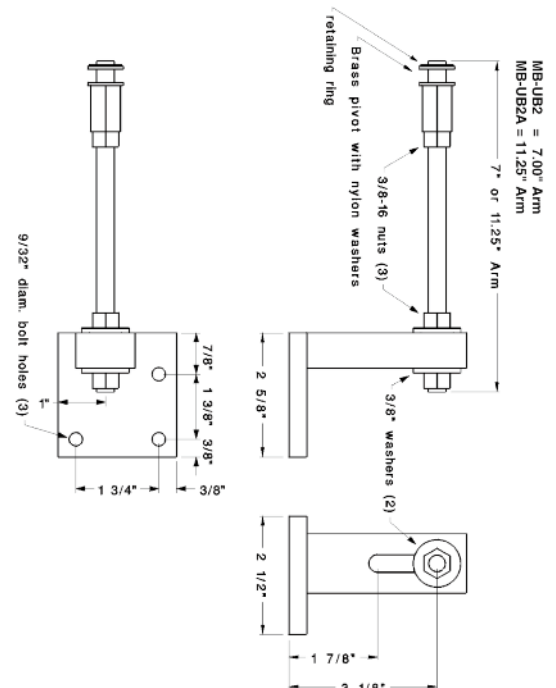
Mounting Adapter & Yoke Assembly Kit



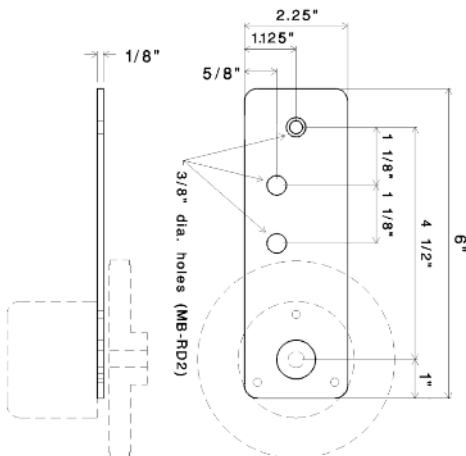
Mounting Adapter & Offset Foot Bracket Assembly Kit



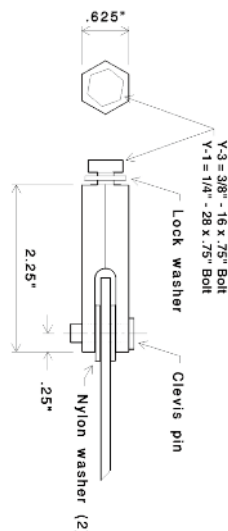
Offset Foot Bracket



Measuring Wheel Mounting Adapter



Yoke Assembly



METRIC Series

TRD-J Discontinued / New Series *TRD-N Interchangeable Increment Shaft Encoder



Starting at US \$220.00 S.R.P. List Price
Linedriver, 1024 P/R US \$265.00

FEATURES

- 2.0" (50mm) O.D.m Medium-duty designed, NEMA 12/IP54
- .315"(8mm) Solid Shaft, Standard Shaft Protection Scraper
- Up to 1024 P/R
- Strong in vibration and shock using all Metal disks.
- 5-30Vdc TTL and 5Vdc Line Driver Output.
- Competitive Low Prices!

SPECIFICATIONS

Electrical

| | |
|-----------------------|---|
| Pulse per Revolution | Up to 1024 P/R |
| Supply Voltage | 5~30Vdc TTL & 5Vdc Line Driver |
| Output Format | Dual Square Wave in Quadrature with Index |
| Output Option | TTL Output, Line Driver |
| Current Requirement | TTL: 60mA Max. No Load Line Driver: 130mA Max. No Load |
| Frequency Response | 200 KHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |
| Output Level | (H) ≥2.5V (L) ≤0.5V |
| Rise and Fall Time | ≤1μs (When cable length is 1m) |
| Insulation Resistance | ≥50MΩ |

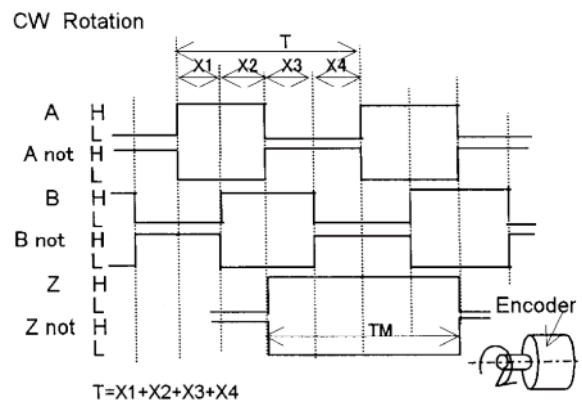
Mechanical

| | |
|----------------------------|--|
| Shaft Diameter | 8 mm (0.315") |
| Shaft Loading | Axial: 60N (14 lbs) Radial: 100N (23 lbs) |
| Shaft Scraper | Standard (Detachable, Repairable) |
| Starting Torque | 1.4 oz. in (0.003N•m) at 20°C |
| Shaft Angular Acceleration | 1000 rad/Sec ² |
| Moment of Inertia | 2.0x10 ⁻³ Kg • m ² |
| Mech. Perm. Speed | 6000 rpm Max. |
| Weight | 0.5 lb |

Environmental

| | |
|--------------------|---|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operation Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | 981 m/s ² (11ms 3 times, each X, Y, Z) |
| Withstand Voltage | 500VAC |
| Construction | NEMA 12/IP-54 |

LINE DRIVER WAVE FORM



T=X1+X2+X3+X4
CW ROTATION AS VIEWED FROM ENCODER SHAFT

DIVISION ACCURACY

| | |
|-----------------------|----------------------------------|
| Symmetry (A,B) | X1+X2=0.5±0.25T X2+X3=0.5T±0.25T |
| Phase shift | Xn=0.25T±0.125T (n=1, 2, 3, 4) |
| Signal width of Z ch. | TM=1T±0.25T |

T=360°/N N: Pulse per revolution

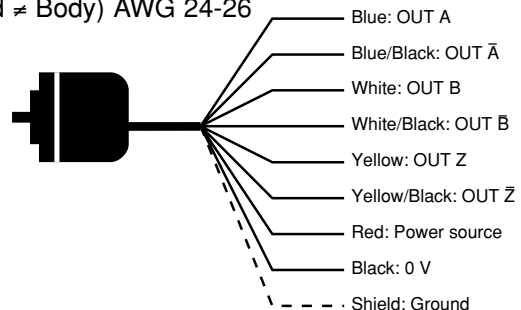
DIVISION ACCURACY OF SIGNAL

| | |
|----------------------|--------|
| Pitch Error | ±0.01T |
| Adjacent Pitch Error | ±0.02T |

WIRING DIAGRAMS

LINE DRIVER CONNECTIONS

(Shield ≠ Body) AWG 24-26

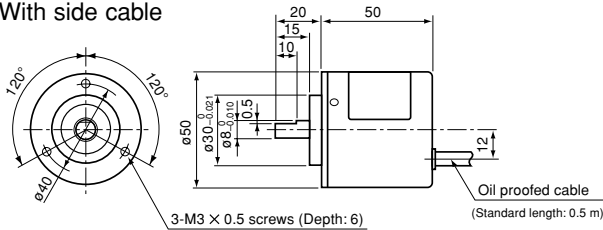


METRIC Series

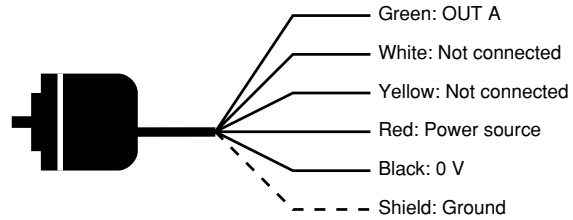
TRD-J Discontinued / New Series *TRD-N Interchangeable Increment Shaft Encoder

OUTSIDE DIMENSIONS

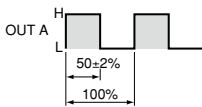
● With side cable



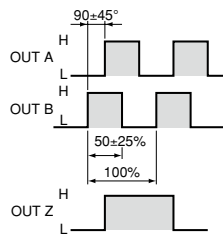
WIRING DIAGRAM (Shield ≠ Body) AWG 20-22 One-phase: TRD-JXXX-S



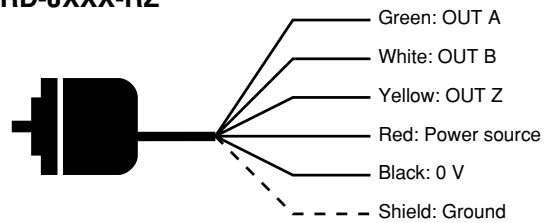
TTL (Totem Pole) Wave Form CW (Viewed from the encoder shaft) One-phase: TRD-JXXX-S



Two-phase with Index: TRD-JXXX-RZ

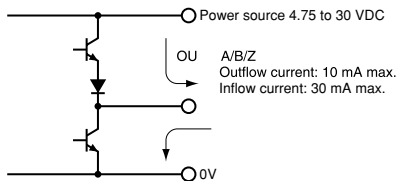


Two-phase with Index: AWG 20-22 TRD-JXXX-RZ



TTL OUTPUT circuit

Totem-pole output:



OPTIONAL PARTS: Order Separately

FLEXIBLE COUPLING

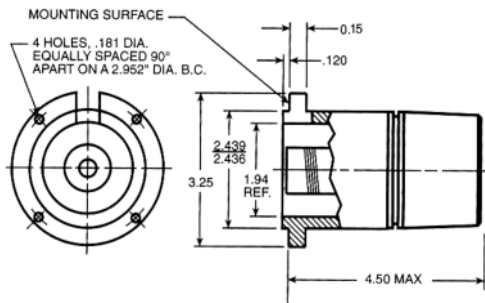
| | |
|------------------|---------|
| BT075-C.250-P8MM | \$45.00 |
| BT100-C.375-P8MM | \$50.00 |
| BT125-C.375-P8MM | \$58.00 |

(Refer to Page 20 for the detail specifications.)

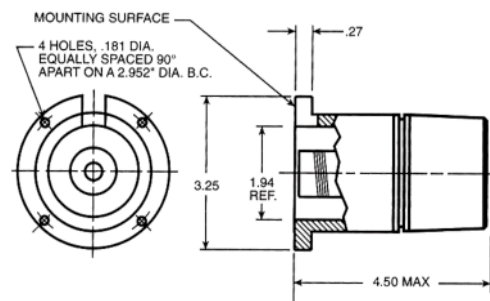
BELL FLANGES / For Servo / Round Flange Encoder

| | | |
|----------------------|------|---------|
| NEMA 42-Flat Bottom | F-20 | \$60.00 |
| NEMA 42-Pilot@Bottom | F-21 | \$60.00 |

F-21



F-20



35mm CENTER HEIGHT FOOT MOUNTING BRACKET

| | | |
|-------------------|--------|---------|
| 65mmHx65mmWx45mmL | JT-035 | \$16.00 |
|-------------------|--------|---------|



12" CIRCUMFERENCE MEASURING WHEEL (3.82" dia)

| Material | Hub x Width | | |
|----------|-------------|-----------|---------|
| Urethane | 8mm x 3/8" | MW-1-8MM | \$45.00 |
| Urethane | 8mm x 1" | MW-1W-8MM | \$50.00 |

Urethane Rubber: 83A Shore Hardness
Operating Temperature: -25° to 65° C, -20° to 150° F

Metric Series TRD-J Discontinued / New Series *TRD-N (Interchangeable)

| Model | Resolution | Output Signal | Output Type | Termination | Options |
|--------------|---|--------------------------|--------------------------|--------------------------|--------------------------|
| TRD-J/*TRD-N | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ORDERING INFORMATION

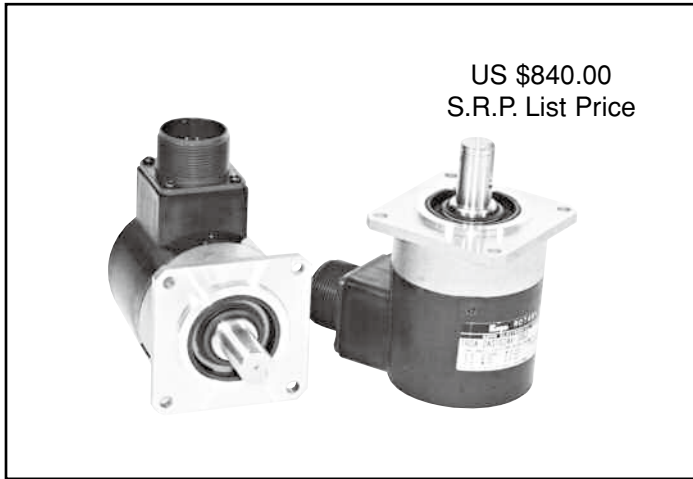
| | Resolution | Output Signal | Output Type | Termination | Options | |
|---|------------|---------------|---------------------------|--------------------------|--------------------------|-----------------------|
| TRD-J/*TRD-N Size 20 Shaft Encoder | 10 | 300 | S: One-Phase*SB | Blank: Totem-pole | Blank: Rear Cable | W: Water Proof |
| | 30 | 360 | Channel A | TTL (5 - 30V) | (Length=0.5m) | |
| | 40 | 400 | Only | | | |
| | 50 | 500 | | | | |
| | 60 | 600 | RZ: Quadrature*RZB | V: Line Driver 5V | | |
| | 100 | 750 | A & B with | | | |
| | 120 | 1000 | Index Z | | | |
| | 200 | 1024 | | | | |
| 240 | | | | | | |

PRICING INFORMATION

| | RESOLUTION | | ELECTRICAL | TERMINATION | OPTIONAL |
|---|-----------------------------------|-------------|--|----------------------------|--------------------------------------|
| TRD-J/*TRD-N Base price \$190.00 | 100 Thru 200 | N/C | S: TTL Single Phase 5 - 30V Add \$30.00 | Std. 1.5ft. Shielded Cable | W: Water Proof Add \$60.00 |
| | 240 Thru 600 | Add \$20.00 | RZ: TTL Quadrature A & B w/ Index Z 5 - 30V Add \$40.00 | | |
| | 750 Thru 1024 | Add \$30.00 | V: Linedriver Quadrature A & B w/ Index Z 5V Add \$45.00 | | |

| Discontinued TRD-J / New *TRD-N | LIST PRICE | Discontinued TRD-J / New *TRD-N | LIST PRICE |
|---------------------------------|------------|--|---------------------------|
| TRD-J100-S /*TRD-N100-SB | \$220.00 | TRD-J500-RZV /*TRD-N500-RZVB | \$255.00 |
| TRD-J120-S /*TRD-N120-SB | \$220.00 | TRD-J600-RZ /*TRD-N600-RZB | \$250.00 |
| TRD-J200-S /*TRD-N200-SB | \$220.00 | TRD-J1000-RZ /*TRD-N1000-RZB | \$260.00 |
| TRD-J400-S /*TRD-N400-SB | \$240.00 | TRD-J1000-RZV /*TRD-N1000-RZVB | \$265.00 |
| TRD-J500-S /*TRD-N500-SB | \$240.00 | TRD-J1000-RZW /*TRD-N1000-RZWB | \$325.00 |
| TRD-J1000-S /*TRD-N1000-SB | \$250.00 | TRD-J1024-RZ /*TRD-N1024-RZB | \$260.00 |
| TRD-J360-SW /*TRD-N360-SWB | \$300.00 | TRD-J1024-RZV/*TRD-N1024-RZVB | \$265.00 |
| TRD-J1000-SW /*TRD-N1000-SWB | \$310.00 | TRD-J1024-RZVW /*TRD-N1024-RZWB | \$325.00 |
| TRD-J50-RZ /*TRD-N50-RZB | \$230.00 | Retired Model Numbers | |
| TRD-J60-RZ /*TRD-N60-RZB | \$230.00 | Not Available | Direct Replacement |
| TRD-J100-RZ /*TRD-N100-RZB | \$230.00 | TRD-J100-RZ-1664 | *TRD-N100-RZB |
| TRD-J100-RZW /*TRD-N100-RZWB | \$290.00 | TRD-J1000-1472D | *TRD-N1000-RZB |
| TRD-J200-RZ /*TRD-N200-RZB | \$230.00 | TRD-J400-RZ-2306 | *TRD-N400-RZB |
| TRD-J200-RZ-2M /*N/A | \$245.00 | Foot Mtg. Bracket (Center Height: 35mm) | |
| TRD-J300-RZ /*TRD-N300-RZB | \$250.00 | JT-035 | \$20.00 |
| TRD-J300-RZW /*TRD-N300-RZWB | \$310.00 | | |
| TRD-J360-RZ /*TRD-N360-RZB | \$250.00 | | |
| TRD-J400-RZ /*TRD-N400-RZB | \$250.00 | | |
| TRD-J500-RZ /*TRD-N500-RZB | \$250.00 | | |

SIZE 25 SERIES TRDA-2A INCREMENTAL SHAFT ENCODER



US \$840.00
S.R.P. List Price

Spindle Encoder for CNC Machine Tools
Interchangeable with FANUC, SUMTAK, Kuroda and Tamagawa

FANUC # A86L-0027-001#002 (=Kuroda)

Tamagawa # TS 1508N91

SUMTAK # LF102.4BMC05P, #LF102.4BMS116, #LFC-002-1024

FEATURES:

- 2.5" (63mm) O.D. Heavy-duty designed. NEMA4/IP65
- 0.6" (15mm) Shaft, Shaft Seal Std.
- 1024 P/R Only, Square Flange & Round Flange
- Cost-effective, easy to switch for system intergrators
- For Cincinnati Machine, Mazak, Yaskawa, Hitachi (Mori) Seiki, Vickers, etc.

SPECIFICATIONS

Electrical

| | |
|-----------------------|---|
| Pulse per Revolution | 1024 |
| Supply Voltage | 4.75~5.25Vdc allowable ripple < 3% |
| Output Format | Line driver output 26C31 (EIA: RS-422A) |
| Current Consumption | 150mA |
| Frequency Response | 171 KHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |
| Output Level | (H) ≥2.3V (L) ≤0.5V |
| Rise and Fall Time | ≤3µs |
| Insulation Resistance | ≥50MΩ |
| Signal Wave | Two channel + index output |

Mechanical

| | |
|-------------------|--|
| Shaft Loading | Axial: 50 (11.2)N (lbs) Radial: 100 (22.5)N (lbs) |
| Starting Torque | ≤ 0.1N • m at +25°C |
| Moment of Inertia | 1.0x10 ³ Kg • m ² |
| Slew Speed | 10000 min ⁻¹ |
| Weight | 0.75 kg |

Environmental

| | |
|--------------------|---|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operating Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | 294 m/s ² (1ms 3-times, each X, Y, Z) |
| Withstand Voltage | 500VAC at 50/60Hz for 1 minute |
| Construction | NEMA4/IP65 |

DIVISION ACCURACY

| | |
|-----------------------|-----------------------------------|
| Symmetry (A, B) | X1+X2=0.5T±0.25T X2+X3=0.5T±0.25T |
| Phase shift | Xn=0.25T±0.125T (n=1, 2, 3, 4) |
| Signal width of Z ch. | TM=1T±0.5T |

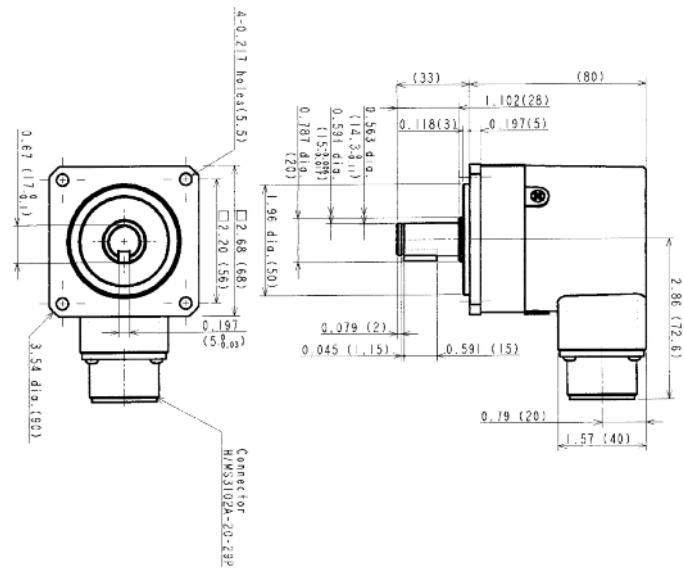
T=360° /N N: Pulse per revolution

DIVISION ACCURACY OF SIGNAL

| | |
|----------------------|--------|
| Pitch Error | ±0.01T |
| Adjacent Pitch Error | ±0.02T |

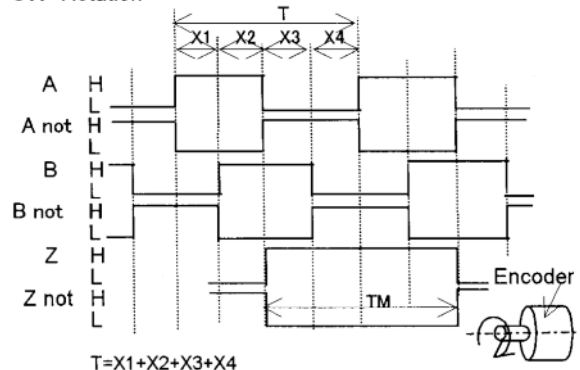
| | |
|-----------------------------|------|
| PULSE PER REVOLUTION | 1024 |
|-----------------------------|------|

OUTSIDE DIMENSIONS/SQUARE FLANGE MODEL



Order No.:
TRDA-2AS1024V-7083
LINE DRIVER WAVE FORM

CW Rotation



T=X1+X2+X3+X4
CW ROTATION AS VIEWED FROM ENCODER SHAFT

Metric Spindle for CNC

SERIES TRDA-2A

INCREMENTAL SHAFT ENCODER

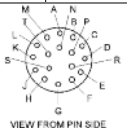
Series TRDA-2A / Size 25 Metric Spindle Encoder For CNC

| MODEL NUMBER | SPECIFICATION | LIST PRICE | OPTIONAL |
|------------------------------------|---------------|------------|---|
| TRDA-2AS1024V-7083 | Square Flange | \$840.00 | Mating Connector Kit Part #DMS3106E20-29S |
| NEW! TRDA-2ASR1024V-7083 | Round Flange | \$840.00 | Order separately List \$65.00 |

CONNECTOR

Receptacle # DMS3102E20-29P

| Pin Code | Function |
|----------|----------|
| A | A |
| B | Z |
| C | B |
| D | — |
| E | — |
| F | — |
| G | — |
| H | +5V |
| J | — |
| K | 0V |
| L | — |
| M | 0V |
| N | A not |
| P | Z not |
| R | B not |
| S | — |
| T | BODY |



VIEW FROM PIN SIDE

OPTIONAL PARTS

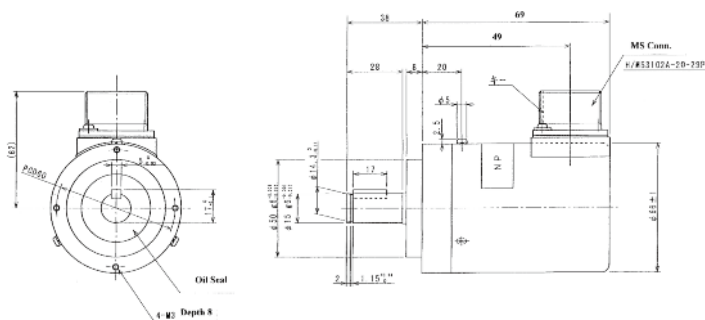
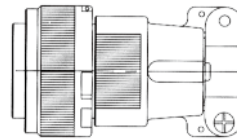
MATING CONNECTOR KIT

List Price

| | | |
|--------|----------------|---------|
| 17 Pin | DMS3106E20-29S | \$65.00 |
|--------|----------------|---------|

(Including Straight Plug w/Cable Clamp, Insertions & Bushing)

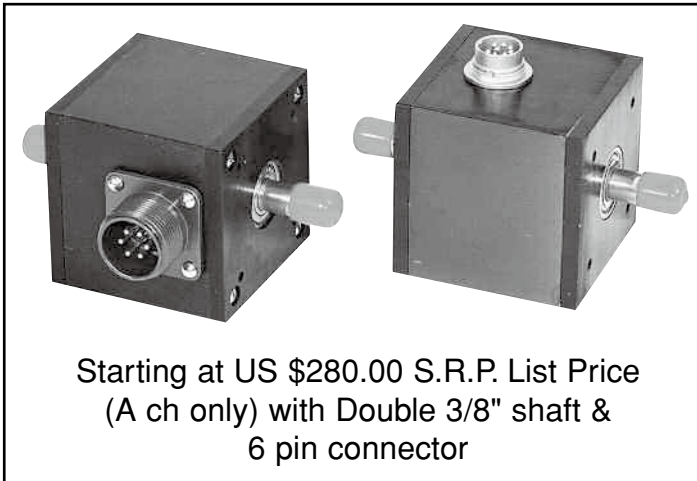
Plug Connector



NEW! Round Flange



QUBE 2.25" SERIES RS INCREMENTAL SHAFT ENCODER



Starting at US \$280.00 S.R.P. List Price
(A ch only) with Double 3/8" shaft &
6 pin connector

Electrical

| | |
|-------------------------------------|---|
| Pulse per Revolution | Up to 1200 P/R |
| Output Format | Single Ended (A ch.) Dual Square Wave in Quadrature (A & B ch.) Dual Square Wave in Quadrature with Index (A, B, Z ch.) |
| Supply Voltage (v) & Output Circuit | |
| 8-30 | Pull-up Resistor TTL current sinking (Max. 50mA) |
| 5-26C | Open Collector 7273 (Max. 50mA) |
| 5-26D | Diff. Line Driver 7272 (Max. 100mA) |
| 5-26PP | Push-Pull Resistor 7272 (Max. 50mA) |
| Frequency Response | 100kHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |

Outputs

- **Pull Up Resistor (Current Sinking)** An NPN transistor with a pull-up resistor and capable of sinking 50ma of current per output. This type of encoder output is used with a PLC or other control device that sources current. Current flows out of the PLC to the encoder, which uses the NPN transistor to represent binary logic by optionally switching the current source to ground.
- **7273 Open Collector (NPN)** For applications requiring an uncommitted output. The output voltage level can be pulled up with an external resistor to a maximum of 30vdc. Maximum sink current is 50ma. per output.
- **Differential Line Driver (7272)** An 7272 differential line driver that generates complimentary outputs: A / -A, B / -B, and Z / -Z as needed. The encoder must be operated at 5-26 vdc, input and output.
- **Push-Pull (7272)** This general purpose output functions as a PNP transistor for applications requiring a current sourcing output. It functions as an NPN transistor with 3.3K pull-up for applications requiring a current sinking output. This output is TTL compatible when used with a 5vdc supply. Maximum source / sink current is 50 ma. per output.

FEATURES

WORLD ENCODERS

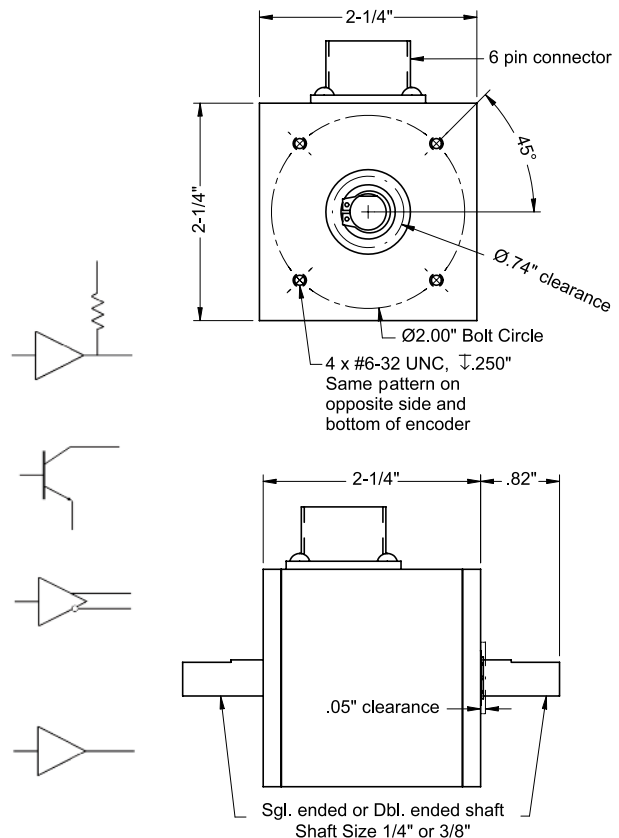
brand, Made in USA

- Qube 2.25" series RS is designed for application in industrial environments such as Measuring, Cut-to-Length, Size for Textile, Metal, Lumber and Rubber Industries.
- Tracking, Storage and Retrieval, Pick and Place, Conveying and Elevating for Material Handling applications.
- Environmentally IP54/NEMA 12 enclosure
- Up to 1200 P/R

Mechanical

| | |
|--------------------------|--|
| Shaft Diameter | 1/4", 5/16", 3/8", 1/2" |
| Shaft Type | Sgl. ended, Dbl. ended |
| Shaft Loading 1/4", 3/8" | Axial: 15 lbs. Radial: 25 lbs. |
| Shaft Loading 1/2" | Axial: 35 lbs. Radial: 45 lbs. |
| Rated Speed | 6000 RPM |
| Materials | Aluminum Case (Anodized) Shaft: 303 Stainless |
| Weight | 13 oz. |

DIMENSIONS



QUBE 2.25" SERIES RS INCREMENTAL SHAFT ENCODER

Environmental

| | |
|--------------------|--|
| Temperature | Operating: 0 ~ 70°C Storage: -10 ~ 85°C |
| Operation Humidity | 35-85% without condensation |
| Vibration | Max 10g (58 to 500 Hz) |
| Shock | 50g (11 ms duration) |
| Enclosure | IP-54/NEMA 12 |

Wiring Diagram

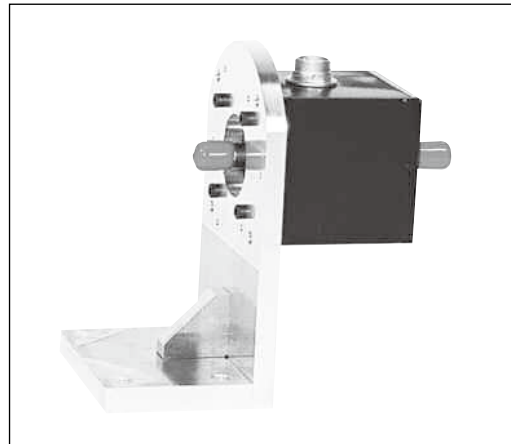
| PIN # | 6 Pin Sgle-ended | Same Wire Color | 6 pin Diff. Line Driver | Same Wire Color |
|---|------------------|-----------------------------------|---------------------------|-----------------|
| A | Common | Black | Common | Black |
| B | Supply Voltage | Red | Supply Voltage | Red |
| C | N/C | — | A ch. | White |
| D | A ch. | White | A not ch. | Blue |
| E | N/C | — | B ch. | Green |
| F | N/C | — | B not ch. | Brown |
| Mating Connector | | MS 3106A (Shell), 14S-6S (Insert) | | |
| Mating connector with 10 ft Cable Ass'y | | A ch. only | Part #C6-3-10CF (3 wires) | |
| | | A, B, Z ch. | Part #C6-6-10CF (6 wires) | |

| PIN # | 8 Pin Diff. Line Driver w/Index Z | Same Wire Color |
|---|-----------------------------------|-----------------------------------|
| 1 | A ch. | White |
| 2 | B ch. | Green |
| 3 | Z ch. | Yellow |
| 4 | Supply Voltage | Red |
| 5 | Common | Black |
| 6 | A not ch. | Blue |
| 7 | B not ch. | Brown |
| 8 | Z not ch. | Orange |
| Mating Connector | | 8 pin 16 mm Metric Circular Conn. |
| Mating Connector with 10 ft Cable Ass'y | | Part #D8-8-10 (8 wires) |

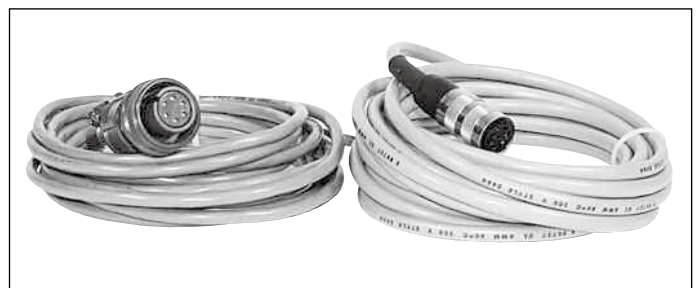
Measuring Wheels



**3.5" Center Hgt Foot Bracket
#LM-001**



Mating Connector with 10 ft cable ass'y



QUBE 2.25" Series RS Incremental Shaft Encoder

1-800-903-9093

| Model | Shaft Size | Prog. | Shaft Style | Channels | Resolution | Anti-Jitter | Voltage/Output |
|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--|---|--------------------------|
| RS | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> |

ORDERING INFORMATION

| | | | | | | | | |
|-----------|------------------------|------------------------|---|---|------|------|--|--|
| RS | B: 3/8" (Std.) | Blank: Std. | Blank: Sgl-ended Shaft D: Double-ended Shaft | Blank: Sgl-ended (A ch. Only) | 60 | 500 | Blank: Std. AJ: Anti-jitter | 8-30 = Pull-up Resistor TTL Current Sinking 8-30vdc 5-26C = Open Collector 5-26vdc (NPN w/o resistor) 7273 5-26D = Diff. Line Driver 7272 5-26vdc in, 5v out 5-26PP = Push-Pull resistor 7272 5-26vdc |
| | C: 1/4" (Std.) | P: Programmable | | Q*: Dual Quadrature: (A & B ch.) | 100 | 512* | | |
| | .5: 1/2" (Opt.) | | | QZ*: Dual Quadrature: (A, B & Z ch.) | 120 | 600* | | |
| | A: 5/16" (Opt.) | | | 180* | 720* | | | |
| | | | | 200* | 1000 | | | |
| | 250* | 1024 | | | | | | |
| | 300* | 1200* | | | | | | |
| | | | | 360 | | | | |

PRICING INFORMATION

| Model | Shaft Size | Prog. | Shaft Style | Channels | Resolution | Anti-Jitter | Voltage/Output | |
|-------------------------------------|--|---------------------------------------|-----------------------------------|-------------------------------------|---|-----------------------------------|--|------------------------------------|
| RS Base Price \$280.00 | B: 3/8" N/C C: 1/4" | Blank: Std. N/C | Blank: Sgl-ended Shaft N/C | Blank: A Ch. Only N/C | 60 Thru 600 | Blank: Std. | 8-30: N/C (Pull-up) | |
| | | | | | | | 5-26C: Add \$25.00 (Open Collector) | |
| | .5: 1/2" Add A: 5/16" \$10.00 | P: Programmable Add \$30.00 | D: Dbl-ended Shaft N/C | *Q: A & B Ch. Add \$30.00 | *QZ: A, B & Z Ch. Add \$80.00 | 720 Thru 1200 | AJ: Add \$40.00 | 5-26D Add \$25.00 (Line Driver) |
| | | | | | | | | 5-26PP Add \$25.00 (Push-Pull) |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship.

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|-----------------|------------|---|------------|
| RSB60/8-30 | \$280.00 | Mating Connector with 10-20 Ft. Cable Assembly | |
| RSB120/8-30 | \$280.00 | #C6-3-10CF (A ch. Only-Sgl.ended) | \$35.00 |
| RSB360/8-30 | \$280.00 | MS 6pin Mating w/10ft cable (3 wires) | |
| RSB500/8-30 | \$280.00 | #C6-4-10CF (A,B ch-Sgl.ended) | \$40.00 |
| RSB600/8-30 | \$280.00 | MS 6pin Mating w/10ft cable (4 wires) | |
| RSB1000/8-30 | \$305.00 | #C6-6-10CF (A,B & Z chs.) or (A, \bar{A} , B, \bar{B} , chs.) | \$40.00 |
| RSBD60/8-30 | \$280.00 | MS 6pin Mating w/10ft cable (6 wires) | |
| RSBD120/8-30 | \$280.00 | #C6-6-20CF MS 6 pin mating w/20ft cable (6 wires) | \$80.00 |
| RSBD360/8-30 | \$280.00 | #D8-8-10 (A, \bar{A} , B, \bar{B} , Z, \bar{Z} chs.-Linedriver) | \$50.00 |
| RSBD500/8-30 | \$280.00 | Amphenol 16mm Circular Mating w/10ft cable (8 wires) | |
| RSBD1000/8-30 | \$305.00 | #D8-8-20 | \$80.00 |
| RSBQ-1056/5-26G | \$510.00 | M16 conn. 8 pin mating w/20ft cable (8 wires) | |
| RSC360/8-30 | \$280.00 | | |

Best Selling Models for Conveyors

| | |
|----------------|----------|
| RSBQ-500/8-30 | \$310.00 |
| RSBQ-600/8-30 | \$310.00 |
| RSBQ-1000/8-30 | \$335.00 |
| RSBQ-1200/8-30 | \$335.00 |
| RSB-5AJ/8-30 | \$320.00 |
| RSB-P64AJ/8-30 | \$380.00 |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship.

Mounting Flange

| | |
|---|---------|
| #MB-FL3 Rectangular Flange 2.25" W x 3.25" L x 0.25" T with 1" hole in center. | \$18.00 |
| #LM-001 3.5" Center Height Ft. Mounting Bracket 5.25" H x 3.2" W x 2.5" L w/1.25" hole | \$90.00 |

Measuring Wheels

| | |
|---|---------|
| #MW-1-B 3" Dia, 12" Circumference 3/8" wide, 3/8" Hub I.D. | \$50.00 |
| #MW-1W-B 3" Dia, 12" Circumference 1" wide, 3/8" Hub I.D. | \$50.00 |
| #MW-30-B 30cm Circumference 3/8" wide, 3/8" Hub I.D. | \$50.00 |
| #MW-30W-B 30cm Circumference 1" wide, 3/8" Hub I.D. | \$50.00 |

SIZE 20 SERIES R22 WHEELED INCREMENTAL SHAFT ENCODER



Starting at US \$360.00 S.R.P. List Price
(A ch only) with Std. 8" cir. wheels
(Urethane Tire)

FEATURES



brand, Made in USA

- Generates pulses for accurate linear measurement.
- Heavy Duty construction, NEMA12, IP-54.
- Compact size vs. Size 30.
- Precision 8" or 20cm circumference measuring wheels.
- 16mm or M12 mating conn. with 10' 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.

Electrical

| | |
|-------------------------------------|---|
| Pulse per Revolution | Up to 1200 P/R, 1800, 3600 (A ch only) |
| Output Format | Single Ended (A ch.) Dual Square Wave in Quadrature (A & B ch.) Dual Square Wave in Quadrature with Index (A, B, Z ch.) |
| Supply Voltage (V) & Output Circuit | |
| 5-26* | Push-Pull 5-26 vdc 7272 |
| 5-26C* | Open Collector 7273 (Max. 50mA) |
| 5-26D* | Diff. Line Driver 7272 (Max. 100mA) |
| 5-26DH* | Diff. Line Driver 7272 (Max. 100mA) w/index |
| Frequency Response | 100kHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |

* Note: Refer to Outputs on page 50.

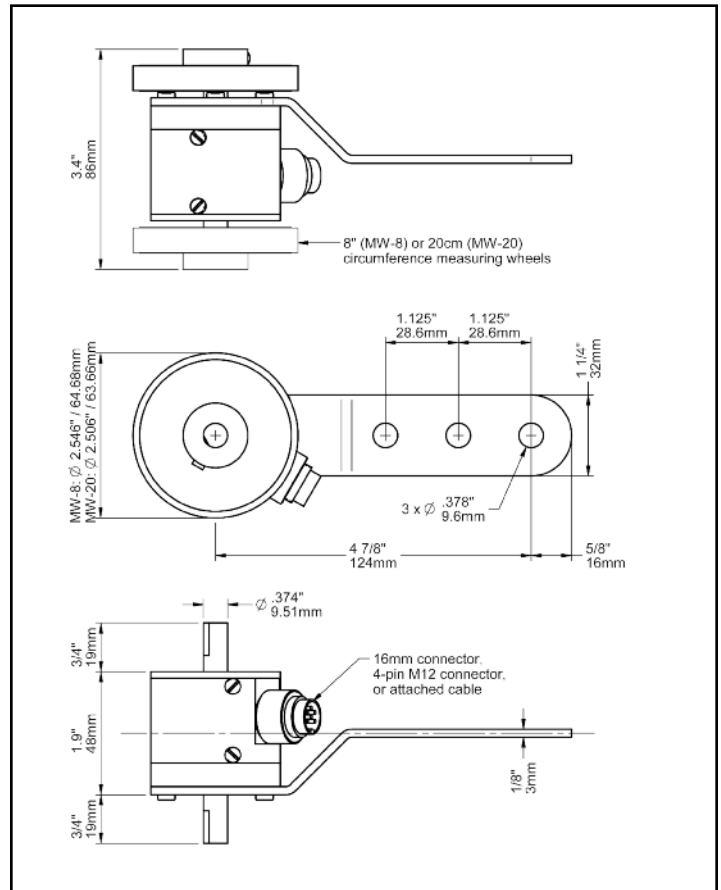
Mechanical

| | |
|----------------|--|
| Shaft Diameter | 3/8" |
| Shaft Type | Dbl. ended |
| Shaft Loading | Axial: 30 lbs. Max. Radial: 40 lbs. Max. |
| Rated Speed | 6000 RPM |
| Materials | Aluminum Case (Anodized) Shaft: 303 Stainless |
| Weight | 12 oz. (340g) |

Environmental

| | |
|--------------------|--|
| Temperature | Operating: 0 ~ 70°C Storage: -10 ~ 85°C |
| Operation Humidity | 35-85% without condensation |
| Vibration | Max 10g (58 to 500 Hz) |
| Shock | 50g (11 ms duration) |
| Enclosure | IP-54/NEMA 12 |

DIMENSIONS



SIZE 20 SERIES R22

WHEELED INCREMENTAL SHAFT ENCODER

Wiring Diagram

| M16-6 Pin Sgl-ended | M12-4 Pin Sgl-ended | Function | Wire Color | 6 pin Diff. Line Driver | Pin # | Same Wire Color |
|---------------------|---------------------|----------------|------------|-------------------------|-------|-----------------|
| 1 | 3 | Common | Black | Common | 5 | Black |
| 2 | 1 | Supply Voltage | Red | Supply Voltage | 4 | Red |
| 3 | — | Z ch. | Brown | A ch. | 1 | White |
| 4 | 4 | A ch. | White | A not ch. | 6 | Blue or Green |
| 5 | 2 | B ch. | Green | B ch. | 2 | Green |
| 6 | — | N/C | — | B not ch. | 7 | Brown |
| | | | | Z ch. | 3 | Yellow |
| | | | | Z not ch. | 8 | Orange |

M12-4 pin Connector: Turck FS4.4

M16-6 pin/8 pin Connector: Amphenol T3402000.

| Model | Channels | Resolution | Voltage/Output | Measuring Wheel |
|----------------------|--|--|---|--|
| R22 | <input type="checkbox"/> - <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> / | <input type="checkbox"/> | <input type="checkbox"/> |
| ORDERING INFORMATION | | | | |
| R22 | Blank: Sgl-ended (A ch. Only) M12-4 pin Q: Quadrature (A & B ch.) M12-4 pin QZ: Quadrature w/index (A, B, & Z ch.) M16-6 pin, M16-8 pin P: Programmable w/Sgl-ended (A ch.) M12-4 pin | 24 360 60 500 100 512* 120 600* 180* 720* 200* 1000 240 1024 250* 1200 300* 1800** 3600** | 5-26 = Push-Pull 5~26vdc 7272 (M12-4 pin) 5-26C = Open Collector 5~26vdc 7273 (NPN w/o resistor) (M12-4 pin) 5-26D = Diff. Line Driver 7272 5~26vdc (M16-6 pin, A & B ch) 5-26DH = Diff. Line Driver 7272 5~26vdc (M16-8 pin, A, B & Z ch) | MW8: Std. (2) MW-8-B wheels 2.5" dia., 8" cir., 3/8" wide Options: MW20: 64mm dia, 3/8" wide, 20 cm cir. |

PRICING INFORMATION

| Model | Channels | Resolution | Anti-Jitter | Voltage/Output |
|------------|---|--|--|--|
| R22 | Blank: A Ch. Only N/C *Q: A & B Ch. Add \$30.00 *QZ: A, B & Z Ch. Add \$80.00 P: Prog. Add \$30.00 | 60 Thru N/C 1200 1800** 3600** Add \$30.00 | Blank: Std. AJ: Add \$40.00 | 5-26: (Push-Pull) N/C 5-26C: (Open Collector) Add \$25.00 5-26D or 5-26DH: (Line Driver) Add \$25.00 |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship. **Available: A ch only

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|--|------------|--|------------|
| R22-60/5-26MW-8 | \$360.00 | Replacement Measuring Wheels (Urethane Tire) | |
| R22-120/5-26MW-8 | \$360.00 | #MW-8-B 2.5" Dia., 8" Circumference 3/8" wide, 3/8" Hub I.D. | \$45.00 |
| R22-360/5-26MW-8 | \$360.00 | #MW-20-B 20cm Circumference, 64mm dia 3/8" wide, 3/8" Hub I.D. | \$45.00 |
| R22-1000/5-26MW-8 | \$360.00 | Mating Connector with 10-20 Ft. Cable Assembly | |
| R22-1024/5-26MW-8 | \$360.00 | #D4-4-10 (1 or 2 ch. Sgl.ended) M12 conn. 4 pin mating w/10 ft cable (4 wires) | \$35.00 |
| R22Q-1024/5-26CMW8 | \$390.00 | #D6-5-10 (A,B & Z chs.) or (A, Ā, B, B̄, chs.) M16 conn. 6 pin mating w/10 ft cable (5 wires) | \$40.00 |
| R22-1200/5-26MW-8 | \$360.00 | #D8-8-10 (A, Ā, B, B̄, Z, Z̄ chs. - Linedriver) M16 conn. 8 pin mating w/10ft cable (8 wires) | \$50.00 |
| R22Q-1200/5-26DMW8 | \$395.00 | #D8-8-20 M16 conn. 8 pin mating w/20ft cable (8 wires) | \$80.00 |
| R22QZ-1200/5-26DHMW8 | \$465.00 | | |
| Mounting Bracket | | | |
| #Y-1 York Ass'y w/1/4"-28 Bolt | \$15.00 | | |
| #Y-3 York Ass'y w/3/8"-16 Bolt | \$15.00 | | |
| #MB-UB2 Offset Mtg. Bracket w/7" Arm | \$60.00 | | |
| #MB-UB2A Offset Mtg. Bracket w/11.25" Arm | \$70.00 | | |
| #MB-UB3 Under-Belt Center Hgt. Foot Bracket w/2 springs tension controlled | \$90.00 | | |
| #MB-UB4 Under-Belt Mtg. Bracket w/2 springs tension controlled | \$85.00 | | |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship.

**Available: A channel only

SIZE 30 SERIES RH WHEELED INCREMENTAL SHAFT ENCODER



Starting at US \$390.00 S.R.P. List Price
(A ch only) with Std. 12" cir. wheels
(Urethane Tire)

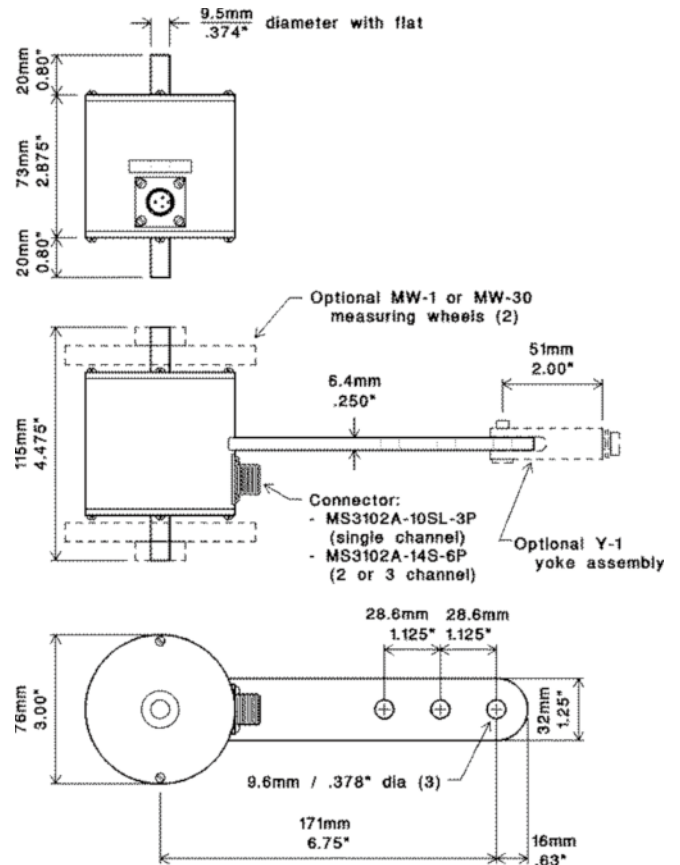
FEATURES



brand, Made in USA

- The RH encoder, also known as a Pulse Position Indicator (PPI), generates tracking pulses for web applications when used with barcode laser scanners or CCD vision systems.
- It typically is equipped with two 12 inch or 30 centimeter circumference measuring wheels that ride directly on the conveyor belt or web, eliminating any slippage problems typically encountered with shaft encoders.
- With its double wheel construction, the encoder is self-aligning when allowed to pivot freely from its integral arm.
- The encoder's weight is sufficient to maintain contact when mounted above the moving material.
- Special mounting accessories are also available.

DIMENSIONS



Electrical

| | |
|-------------------------------------|---|
| Pulse per Revolution | Up to 1200 P/R, 1800, 3600 (A ch only) |
| Output Format | Single Ended (A ch.) Dual Square Wave in Quadrature (A & B ch.) Dual Square Wave in Quadrature with Index (A, B, Z ch.) |
| Supply Voltage (V) & Output Circuit | |
| 8-30 | Pull-up Resistor TTL, Current Sinking (Max. 50mA) |
| 5-26C | Open Collector 7273 (Max. 50mA) |
| 5-26D, 5-26DH | Diff. Line Driver 7272 (Max. 100mA) |
| 5-26PP | Push-Pull 7272 (Max. 50mA) |
| 120ACT | AC120v, Triac Output |
| Frequency Response | 100kHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |

Mechanical

| | |
|----------------|--|
| Shaft Diameter | 3/8" |
| Shaft Type | Dbl. ended |
| Shaft Loading | Axial: 10 lbs. Max. Radial: 25 lbs. Max. |
| Rated Speed | 6000 RPM |
| Materials | Aluminum Case (Anodized) Shaft: 303 Stainless |
| Weight | 1.5 lb. (700g) |

SIZE 30 Series RH Wheeled Incremental Shaft Encoder

| Model | Channels | Resolution | Voltage/Output | Measuring Wheel |
|----------------------|---|--|--|--|
| RH | <input type="checkbox"/> - | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> / | <input type="checkbox"/> | <input type="checkbox"/> |
| ORDERING INFORMATION | | | | |
| RH | Blank: Sgl-ended (A ch. Only) Q: Quadrature (A & B ch.) QZ: Quadrature w/index (A, B, & Z ch.) P: Programmable w/Sgl-ended (A ch.) | 24 360 60 500 100 512* 120 600* 180* 720* 200* 1000 240 1024 250* 1200 300* 1800** 3600** | 8-30 = Pull-up Resistor TTL Current Sinking 8~30vdc 5-26C = Open Collector 5~26vdc 7273 (NPN w/o resistor) 5-26D = Diff. Line Driver 7272 5~26vdc (MS 6 pin, A & B ch) 5-26DH = Diff. Line Driver 7272 5~26vdc (MS 10 pin, A, B & Z ch) 5-26PP = Push-Pull 5~26vdc 7272 120ACT = 120vAC Triac** | MW-1: Std. (2) MW-1-B wheels 3" dia., 12" cir., 3/8" wide Options: MW-1W: 1" wide, 12" cir. MW-30W: 1" wide, 30 cm cir. MW-30: 3/8" wide, 30 cm cir. |

| PRICING INFORMATION | | | | |
|---------------------|---|--|--|---|
| Model | Channels | Resolution | Anti-Jitter | Voltage/Output |
| RH | Blank: A Ch. Only N/C *Q: A & B Ch. Add \$30.00 *QZ: A, B & Z Ch. Add \$80.00 P: Prog. Add \$30.00 | 60 Thru N/C 1200 1800** 3600** Add \$30.00 | Blank: Std. AJ: Add \$40.00 | 8-30: (Pull-up) N/C 5-26C: Add \$25.00 (Open Collector) 5-26D Add \$25.00 (Line Driver) 5-26PP Add \$25.00 (Push-Pull) 120ACT Add \$70.00 (120vAC Triac) |
| Base Price | \$390.00 | | | |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship. **Available: A ch only

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|---|------------|--|------------|
| RH-60/8-30MW-1 | \$390.00 | Measuring Wheels for Replacement (Urethane Tire) | |
| RH-100/8-30MW-1 | \$390.00 | #MW-1-B 3" Dia, 12" Circumference 3/8" wide, 3/8" Hub I.D." | \$50.00 |
| RH-120/8-30MW-1 | \$390.00 | #MW-1W-B 3" Dia, 12" Circumference 1" wide, 3/8" Hub I.D. | \$50.00 |
| RH-360/8-30MW-1 | \$390.00 | #MW-30-B 30cm Circumference 3/8" wide, 3/8" Hub I.D. | \$50.00 |
| RH-500/8-30MW-1 | \$390.00 | #MW-30W-B 30cm Circumference 1" wide, 3/8" Hub I.D. | \$50.00 |
| RH-1000/8-30MW-1 | \$390.00 | Mating Connector with 10-20 Ft. Cable Assembly | |
| RH-1024/8-30MW-1 | \$390.00 | #C3-3-10CF (A ch. only Sgl. ended) MS 3 pin mating w/10ft cable (3 wires) | \$35.00 |
| RH-1200/8-30MW-1 | \$390.00 | #C6-4-10CF (A, B ch) MS 6pin mating w/10ft cable (4 wires) | \$40.00 |
| Best Selling Models for Conveyors | | | |
| RH-24AJ/12CMW-1 | \$430.00 | #C6-6-10CF (A, B & Z chs.) or (A, \bar{A} , B, \bar{B} , chs.) MS 6 pin mating w/10ft cable (6 wires) | \$40.00 |
| RH-P240AJ/8-30MW-1 | \$460.00 | #C6-6-20CF MS 6 pin mating w/20ft cable (6 wires) | \$80.00 |
| RH-P600AJ2/8-30MW-1 | \$460.00 | #C10-9-10LD (A, \bar{A} , B, \bar{B} , Z, \bar{Z} chs. - Linedriver) MS10 pin mating w/10ft cable (9 wires) | \$85.00 |
| RH-P600AJB/8-30MW-1 | \$460.00 | | |
| RHQZ360/526DHW1M226 | \$495.00 | | |
| Mounting Bracket | | | |
| #Y-1 York Ass'y w/1/4"-28 Bolt | \$15.00 | | |
| #Y-3 York Ass'y w/3/8"-16 Bolt | \$15.00 | | |
| #MB-UB2 Offset Mtg. Bracket w/7" Arm | \$60.00 | | |
| #MB-UB2A Offset Mtg. Bracket w/11.25" Arm | \$70.00 | | |
| #MB-UB3 Under-Belt Center Hgt. Foot Bracket w/2 springs tension controlled | \$90.00 | | |
| #MB-UB4 Under-Belt Mtg. Bracket w/2 springs tension controlled | \$85.00 | | |

Standard Stock Items: Shipped immediately. *Lead Time: 7 - 10 days to ship. **Available: A ch only

SIZE 30 SERIES RH WHEELED INCREMENTAL SHAFT ENCODER

Environmental

| | |
|--------------------|--|
| Temperature | Operating: 0 ~ 70°C Storage: -10 ~ 85°C |
| Operation Humidity | 35-85% without condensation |
| Vibration | Max 10g (58 to 500 Hz) |
| Shock | 50g (11 ms duration) |
| Enclosure | IP-54/NEMA 12 |

Wiring Diagram

| PIN # | 3 Pin Sgl-ended | 6 Pin Sgl-ended | Same Wire Color | 6 pin Diff. Line Driver | Same Wire Color |
|---|-----------------------|---------------------------|-----------------|-------------------------|-----------------|
| A | Common | Common | Black | Common | Black |
| B | Supply Voltage | Supply Voltage | Red | Supply Voltage | Red |
| C | — | Z ch. | Brown | A ch. | White |
| D | A ch. | A ch. | White | A not ch. | Blue |
| E | — | B ch. | Green | B ch. | Green |
| F | — | N/C | — | B not ch. | Brown |
| Mating Connector | 3 Pin=MS3102A-10SL-3P | 6 Pin=MS3102A-14S-6P | | | |
| Mating connector with 10 ft Cable Ass'y | A ch only 3 Pin | Part #C6-3-10CF (3 wires) | | | |
| | A, B, Z, ch 6 Pin | Part #C6-6-10CF (6 wires) | | | |

Mating Connector with 10 ft cable ass'y



Diff. Line Driver 10 pin-MS conn.

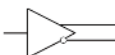
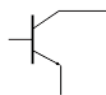
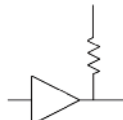
| MS10 Connector Pin | Function | Wire Color |
|--------------------|--------------|------------|
| A | Output +A | White |
| B | Output +B | Green |
| C | Output +Z | Yellow |
| D | Supply Volts | Red |
| E | not used | — |
| F | Common | Black |
| G | Case Ground | Shield |
| H | Output -A | Blue |
| I | Output -B | Brown |
| J | Output -Z | Orange |

Mating Connector (10 pin)

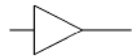
#DMS3106E18-1S \$38.00 (order separately)

Outputs

- **Pull Up Resistor (Current Sinking)** An NPN transistor with a pull-up resistor and capable of sinking 50ma of current per output. This type of encoder output is used with a PLC or other control device that sources current. Current flows out of the PLC to the encoder, which uses the NPN transistor to represent binary logic by optionally switching the current source to ground.
- **7273 Open Collector (NPN)** For applications requiring an uncommitted output. The output voltage level can be pulled up with an external resistor to a maximum of 30vdc. Maximum sink current is 50ma. per output.
- **Push-Pull (7272)** This general purpose output functions as a PNP transistor for applications requiring a current sourcing output. It functions as an NPN transistor with 3.3K pull-up for applications requiring a current sinking output. This output is TTL compatible when used with a 5vdc supply. Maximum source / sink current is 50 ma. per output.



- **Differential Line Driver (7272)** An 7272 differential line driver that generates complimentary outputs: A / -A, B / -B, and Z / -Z as needed. The encoder must be operated at 5-26 vdc, input and output.



- **120vac Triac** an optically isolated triac capable of directly driving most 120 vac loads up to 2 amps (ms) without the use of any external components. It includes a zero crossing detector that switches the triac on and off synchronously at near zero volts. The triac output can be directly interfaced to AC inputs on most PLCs and other motion controllers. Only available with 120 vac supply voltage.



OPTIONAL PARTS:

Order Separately

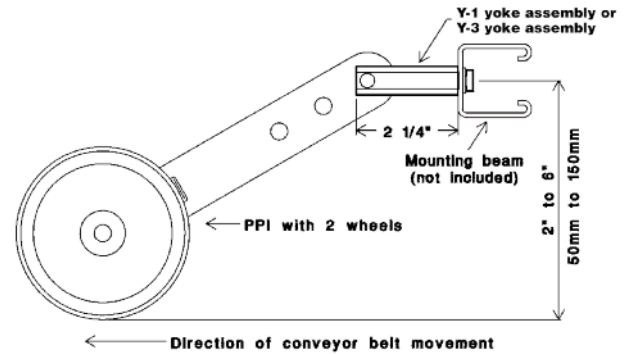
● Yoke Assembly

| Size | Mt. Beam Size | Part No. | List Price |
|---------------|---------------|----------|------------|
| 2.25"L x 5/8" | 1/4" - 28 | Y-1 | \$15.00 |
| 2.25"L x 5/8" | 3/8" - 16 | Y-3 | \$15.00 |

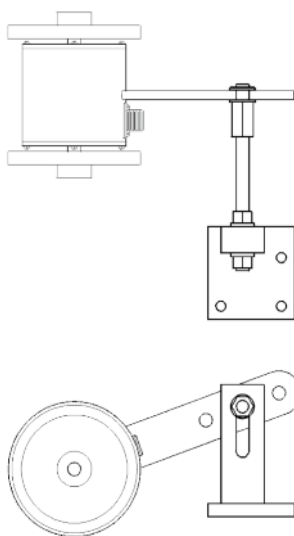
● Offset Foot Bracket

| Size | Part No. | List Price |
|----------------------|----------|------------|
| 3.125"H x 7.00" Arm | MB-UB2 | \$60.00 |
| 3.125"H x 11.25" Arm | MB-UB2A | \$70.00 |

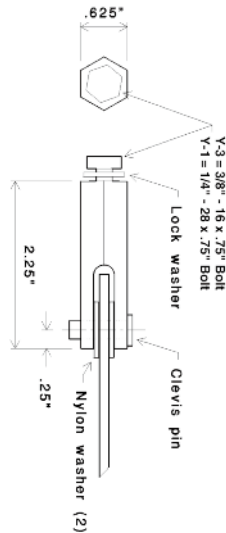
Yoke Assembly



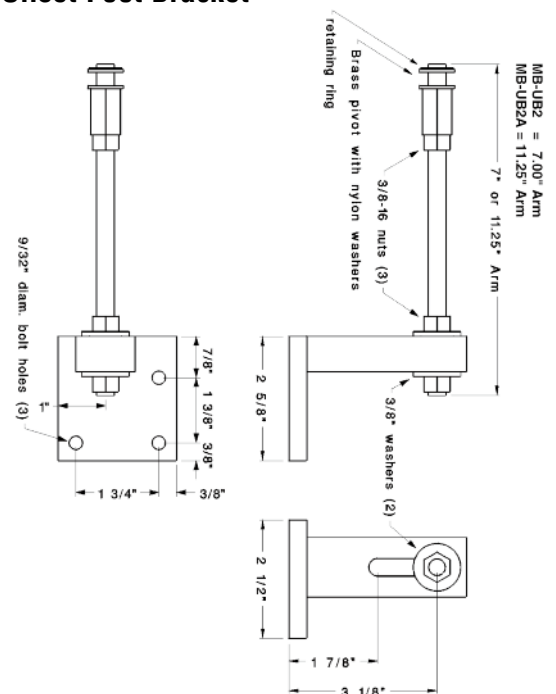
w/ Offset Foot Bracket



Yoke Assembly



Offset Foot Bracket



MB-UB3 / Under-Belt Center Hgt Bracket

List Price \$90.00

MB-UB4 / Under-Belt Center Hgt Bracket

List Price \$85.00

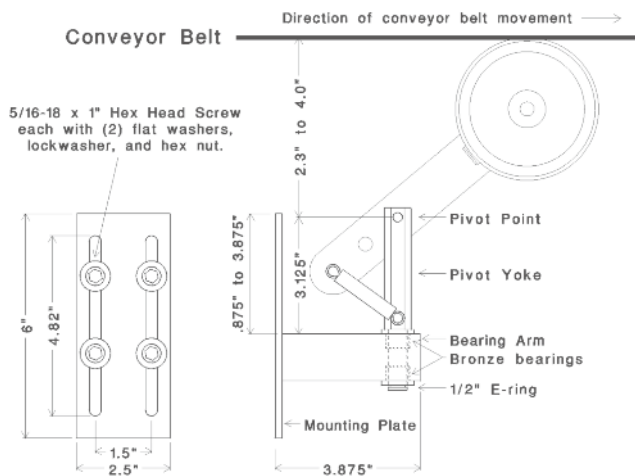


Figure 1: MB-UB3 Assembly (shown with PPI)

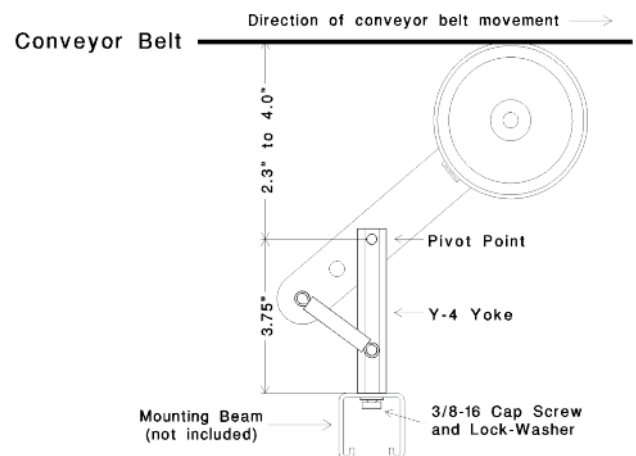


Figure 1: MB-UB4 Assembly (shown with PPI)

SIZE 15 SERIES TRDA-VA

INCREMENTAL HOLLOW SHAFT ENCODER (1" Thickness)



US \$210.00 (ABZ only)
S.R.P. List up to 1024ppr
with commutation signals \$270.00

FEATURES

- 1.5" O.D., Hollow Shaft designed with 1" Thickness
- Up to 2500 P/R, 120°C Operating Temperature
- 250 KHz Frequency Response
- Unique Twist Lock Designed Mounting Spring
- Micro Capsule Pre-coating Set Screws for Anti-Loose/Anti-slip
- Hub I.D. size 1/4", 6, 8mm available
- Applications: Brushless & Brush Motor, Stepping Motor

Cable

| | |
|--------------------|--------------------------------|
| Form | Cable based connector |
| Material | Oil resistant PVC |
| Lead/Cross-Section | 0.089mm ² (AWG #28) |
| Outward Form | 5.8±0.3mm |

Mating Connector

| | |
|-----|--|
| JST | Housing: SHR-15V-S Contact Pin: SSH-003T-PO.2 |
|-----|--|

PCB Connector

| | |
|-----|------------------------------|
| JST | 15-Pin Connector: SM15B-SRSS |
|-----|------------------------------|



| PIN | WIRE COLOR | SIGNAL |
|-----|-------------|--------|
| 1 | Blue/Red | 0V |
| 2 | Red/Blue | 5V |
| 3 | Green | A not |
| 4 | Brown | A |
| 5 | Blue | B not |
| 6 | Orange | B |
| 7 | Black | Z |
| 8 | Yellow | Z not |
| 9 | White/Brown | U not |
| 10 | Brown/White | U |
| 11 | White/Gray | W not |
| 12 | Gray/White | W |
| 13 | Red/Orange | V not |
| 14 | Orange/Red | V |
| 15 | — | NC |

Mechanical

| | |
|--------------------------|---|
| Allowable rotation speed | 7500 rpm |
| Starting Torque | ≤ 0.005N • m (at 20°C) |
| Moment of inertia | 30g • cm ² (calculated value) |
| Shaft load | Radial: 10 (2.24)N (lbs.) Axial: 10 (2.24)N (lbs.) |
| Weight | 0.05kg |

Electrical

| | |
|----------------------|--|
| Power Source Voltage | 5±0.5Vdc |
| Allowable Ripple | ≤1% |
| Current Consumption | ≤180mA |
| Output Channel | Main: A, B, Z Commutation: U, V, W |
| Output Signal | A, A not, B, B not, Z, Z not, U, U not, V, V not, W, W not, |
| Output Circuit | Line driver output (26C31 compatible) |
| H-level voltage | ≥2.3V (5Vdc power supply) |
| L-level voltage | ≤0.5V (5Vdc power supply) |
| Rise time | ≤100ns |
| Fall time | ≤100ns |

Main Output (Channel A, B, Z)

| | |
|--------------------|--------------------------|
| Output code | Incremental |
| Output wave form | Rectangular pulse signal |
| Flutter | 0.1T maximum |
| Duty ratio | 50±10% |
| Phase shift | 25±10% |
| Index signal width | 100±50% |
| Frequency response | 250KHz (max) |

Commutation Output (Channel U, V, W)

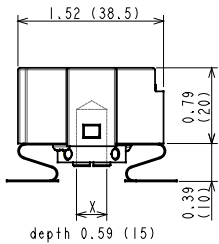
| | |
|---------------------------------------|--|
| Resolution | 2PR, 3PR, 4PR |
| Flutter | 0.01f maximum |
| Period | 90°±1.0° |
| Phase shift | 15°±1.0° |
| Output position "C" (Mechanically) | ±1.0° (It is aligned to the rising edge of U channel with the center of index channel Z) |

Environmental

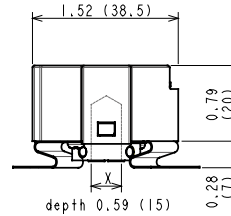
| | |
|-----------------------|--|
| Temperature | Operating: 0 ~ +120°C Storage: -20 ~ +120°C |
| Operating Humidity | 35 ~ 90% without condensation |
| Vibration | 10 to 2000Hz at 98m/s ² in three axial directions, each for 2 hours |
| Shock resistance | 10 to 15ms at 1960m/s ² in six directions along three axes, each for three times |
| Withstand voltage | 500VAC For 1 minute between 0v and case |
| Insulation resistance | More than 50MΩ Between 0v and case |

SIZE 15 SERIES TRDA-VA INCREMENTAL HOLLOW SHAFT ENCODER

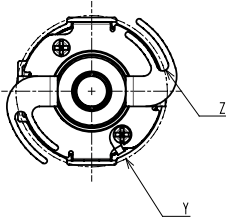
OUTLINE DIMENSIONS



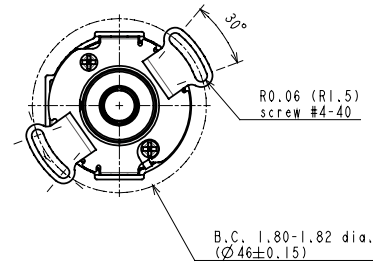
| X-SCALE | | |
|---------|-----------------------|------------------------------|
| X | inch-SCALE | mm-SCALE |
| 6 | 0.2367 0.2363 dia. | $\varnothing 6 \pm 0.012$ |
| Q | 0.2505 0.2500 dia. | $\varnothing 6.35 \pm 0.012$ |
| 8 | 0.3155 0.3150 dia. | $\varnothing 8 \pm 0.012$ |



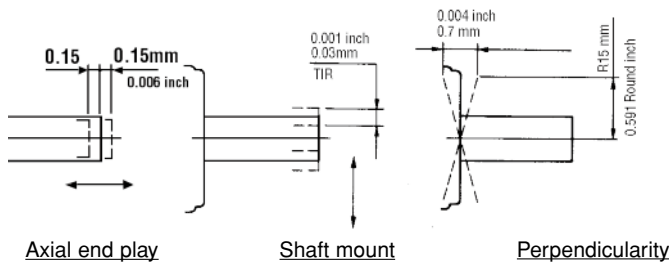
| X-SCALE | | |
|---------|-----------------------|------------------------------|
| X | inch-SCALE | mm-SCALE |
| 6 | 0.2367 0.2363 dia. | $\varnothing 6 \pm 0.012$ |
| Q | 0.2505 0.2500 dia. | $\varnothing 6.35 \pm 0.012$ |
| 8 | 0.3155 0.3150 dia. | $\varnothing 8 \pm 0.012$ |



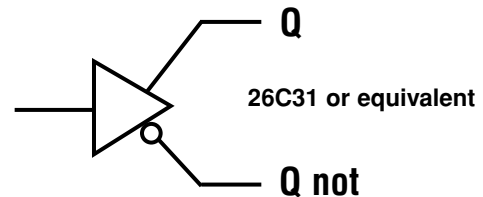
| Y, Z-SCALE | | | | | |
|------------|-------------------|--------------------------|------------|----------|-------|
| TYPE | Y | | Z | | SCREW |
| | inch SCALE | mm SCALE | inch SCALE | mm SCALE | |
| 29 | 1.15 1.13 dia. | $\varnothing 29 \pm 0.1$ | R0.04 | R1.1 | M2 |
| 40 | 1.58 1.57 dia. | $\varnothing 40 \pm 0.1$ | R0.06 | R1.5 | #4-40 |



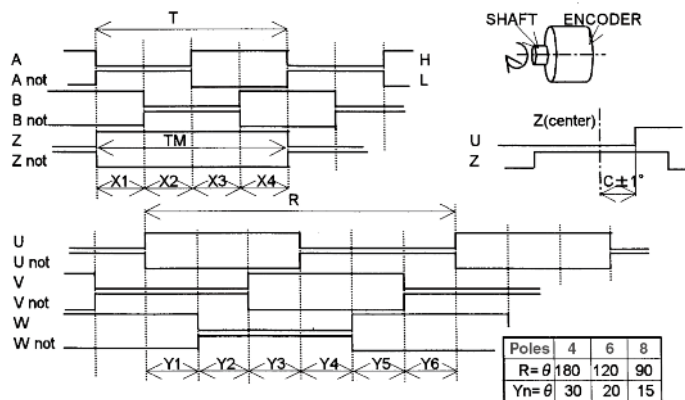
MOUNTING SHAFT SPECIFICATIONS (mm/inch)



OUTPUT CIRCUIT



OUTPUT WAVEFORM CW as viewed to encoder shaft



DIVISION ACCURACY

| | |
|-----------------------|---|
| Symmetry (A, B) | $X1+X2=0.5T \pm 0.1T$ $X3+X4=0.5T \pm 0.1T$ |
| Phase shift (A, B) | $Xn=0.25T \pm 0.1T$ (n=1, 2, 3, 4) |
| Signal width of Z ch. | $TM=1.0T \pm 0.5T$ |
| Symmetry (U, V, W) | $R=\pm 1.0^\circ$ (mechanical angle) $Yn=0 \pm 1.0^\circ$ (mechanical angle) $C=\pm 1.0^\circ$ (mechanical angle) $Y1+Y2+Y3=0.5R \pm 0.03R$ $Y4+Y5+Y6=0.5R \pm 0.03R$ $Yn=0.1666R \pm 0.03R$ |

DIVISION ACCURACY OF SIGNAL

| | |
|--------------------------|-------------|
| Accumulative Angle Error | $\leq 0.4T$ |
| Pitch Error | $\pm 0.01T$ |
| Adjacent Pitch Error | $\pm 0.02T$ |

T=360°/N N: Pulse per revolution

Series TRDA-VA / Size 15 Hollow Shaft Encoder

1-800-903-9093

| | | | | | |
|---------|---|--------|--------------------------|---|--|
| Model | Resolution | Output | Hub I.D. | Mount Bolt Circle | Commutation Signals |
| TRDA-VA | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | V | <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

ORDERING INFORMATION

| | | | | | |
|---|-------------------|------------------------|---------|-------------------|---|
| TRDA-VA Size 15 Hollow Shaft Encoder | 500 | V: Line Driver 5VDC | 8 = 8mm | 29 = 29mm (1.14") | ABZ = ABZ Only 2PR = 4 Poles 3PR = 6 Poles 4PR = 8 Poles |
| | 1000 | | | 40 = 40mm (1.57") | |
| | 1024 | | | | |
| | 2000 | | | | |
| | 2048 | | | | |
| 2500 | 46 = 46mm (1.81") | | | | |
| All Glass Disks | | | | | |

PRICING INFORMATION

| | RESOLUTION | | MECHANICAL | MOUNT BOLT CIRCLE | ELECTRICAL | TERMINATION |
|-----------------------------------|----------------------------------|--|----------------------------|---|--|-------------------------------------|
| TRDA-VA Base price \$210.00 | 500 Thru N/C 1024 | | HUB I.D. 8mm N/C | Mounting Bracket B.C. 29 or 40 or 46mm N/C | ABZ Only N/C Commutation 4, 6, 8 poles Add \$40.00 | Std. 3 ft. Shielded Cable N/C |
| | 2000 Thru Add \$20.00 2048 | | | | | |
| | 2500 Add \$30.00 | | | | | |

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|----------------------|------------|----------------------|------------|
| TRDA-VA500V6-29-ABZ | \$210.00 | TRDA-VA500V8-40-4PR | \$250.00 |
| TRDA-VA500V6-46-ABZ | \$210.00 | TRDA-VA1024V8-40-4PR | \$250.00 |
| TRDA-VA1000V6-46-ABZ | \$210.00 | TRDA-VA1024V8-40-2PR | \$250.00 |
| TRDA-VA1024V6-29-ABZ | \$210.00 | TRDA-VA1024VQ-29-2PR | \$250.00 |
| TRDA-VA1024V6-46-ABZ | \$210.00 | TRDA-VA1024VQ-29-3PR | \$250.00 |
| TRDA-VA2000V6-29-ABZ | \$230.00 | TRDA-VA1024VQ-29-4PR | \$250.00 |
| TRDA-VA2000V6-46-ABZ | \$230.00 | TRDA-VA2000V6-40-3PR | \$270.00 |
| TRDA-VA2000V8-40-ABZ | \$230.00 | TRDA-VA2000V8-40-2PR | \$270.00 |
| TRDA-VA2000V8-46-ABZ | \$230.00 | TRDA-VA2000V8-40-3PR | \$270.00 |
| TRDA-VA2000VQ-46-ABZ | \$230.00 | TRDA-VA2000V8-40-4PR | \$270.00 |
| TRDA-VA2048V6-29-ABZ | \$230.00 | TRDA-VA2000V8-46-4PR | \$270.00 |
| TRDA-VA2048V6-46-ABZ | \$230.00 | TRDA-VA2048V6-46-4PR | \$270.00 |
| TRDA-VA2048V8-40-ABZ | \$230.00 | TRDA-VA2048V8-40-2PR | \$270.00 |
| TRDA-VA2048V8-46-ABZ | \$230.00 | TRDA-VA2048V8-46-4PR | \$270.00 |
| TRDA-VA2048VQ-46-ABZ | \$230.00 | TRDA-VA2048VQ-29-2PR | \$270.00 |
| TRDA-VA2500V6-29-ABZ | \$240.00 | TRDA-VA2048VQ-29-4PR | \$270.00 |
| TRDA-VA2500V6-46-ABZ | \$240.00 | TRDA-VA2048V6-7158 | \$480.00 |
| TRDA-VA2500V8-46-ABZ | \$240.00 | TRDA-VA2048V8-7158 | \$480.00 |
| TRDA-VA2500VQ-46-ABZ | \$240.00 | TRDA-VC2000V6-7098 | \$480.00 |

Note: Hub ID 8mm is Standard. However, 6mm, 1/4" are available in limited Qty.
ID 6mm and 1/4" will be discontinued. Check our inventory first.

SIZE 15 SERIES TRDA-SH

INCREMENTAL HOLLOW SHAFT ENCODER (Fully Enclosed)

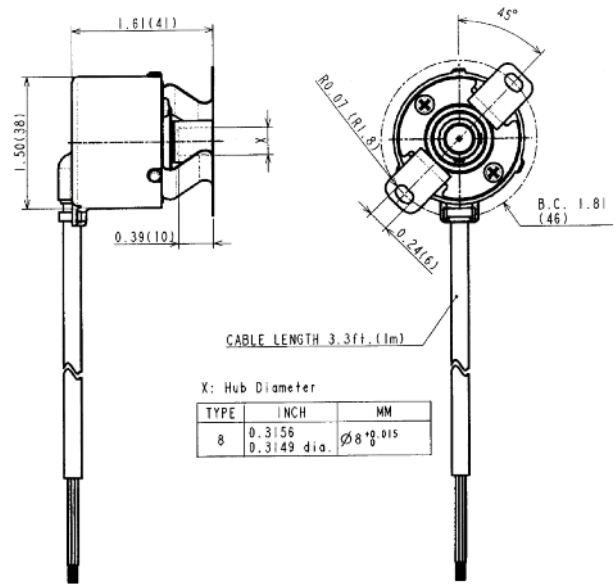


All models US \$210.00
S.R.P. List Price

FEATURES

- 1.5" O.D. Hollow Shaft Medium-duty designed
- Fully Enclosed Body NEMA12/IP-50
- Up to 2500 P/R with 200 kHz Frequency Response
- 5-30Vdc Open Collector & 5Vdc Line Driver Output
- Hub I.D. size 8mm
- Traditional Common Mounting Bolt Circle 1.81" (46mm)
- Micro Capsule Pre-coating Set Screws for Anti-Loose/Anti-slip

OUTLINE DIMENSIONS



SPECIFICATIONS

Electrical

| | |
|-----------------------|---|
| Pulse per Revolution | Up to 2500 P/R |
| Supply Voltage | 5-30Vdc Open Collector & 5Vdc Line Driver |
| Output Format | Dual Square Wave in Quadrature with Index |
| Output Option | Line Driver Output 26LS31 Open Collector Output |
| Current Requirement | Line Driver: 50mA Max. No Load Open Collector: 50mA Max. No Load |
| Frequency Response | 200 KHz |
| Duty Ratio | 50±25% |
| Phase Shift | 25±12.5% |
| Index Signal Width | 100±50% |
| Output Level | (H) ≥2.5V (L) ≤0.5V |
| Rise and Fall Time | ≤1µs (When cable length is 1m) |
| Insulation Resistance | ≥50MΩ |

Shielded Cable (1m/3.3ft.) 5 mm dia wire AWG 26-28, Sheath: PVC

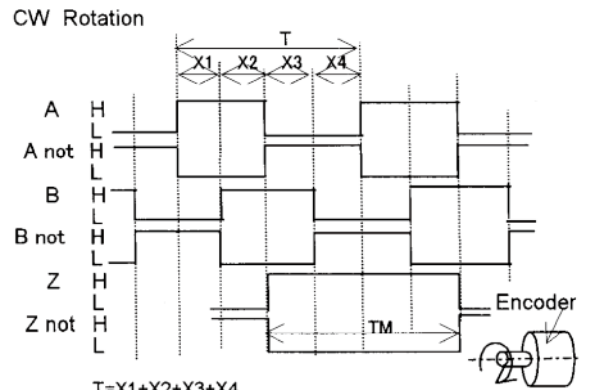
Mechanical

| | |
|----------------------------|---|
| Hub I.D. | 8mm |
| Shaft Loading | Axial: 20N (4.5 lbs) Max. Radial: 30N (6.7 lbs) Max. |
| Starting Torque | 1.4 oz. in. (0.003N•m) at 20°C |
| Shaft Angular Acceleration | 1000 rad/sec ² |
| Moment of Inertia | 2.0x10 ³ Kg•m ² |
| Mech. Perm. Speed | 6000 rpm Max. |
| Weight | 0.3 lb |

Environmental

| | |
|--------------------|---|
| Temperature | Operating: -10 ~ +70°C Storage: -25 ~ +85°C |
| Operation Humidity | 35 ~ 85% without condensation |
| Vibration | Durable for one hour along 3 axes at 10 to 55 Hz 0.75mm amplitude |
| Shock | 981 m/s ² (11ms 3 times, each X, Y, Z) |
| Withstand Voltage | 500VAC |
| Construction | NEMA12/IP-50 |

LINE DRIVER WAVE FORM



CW ROTATION AS VIEWED FROM ENCODER SHAFT

DIVISION ACCURACY

| | |
|-----------------------|-----------------------------------|
| Symmetry (A,B) | X1+X2=0.5T±0.25T X2+X3=0.5T±0.25T |
| Phase shift | Xn=0.25±0.125T (n=1, 2, 3, 4) |
| Signal width of Z ch. | TM=1T±0.5T |

T=360° /N N: Pulse per revolution

DIVISION ACCURACY OF SIGNAL

| | |
|--------------------------|--------|
| Accumulative Angle Error | ≤0.4T |
| Pitch Error | ±0.01T |
| Adjacent Pitch Error | ±0.01T |

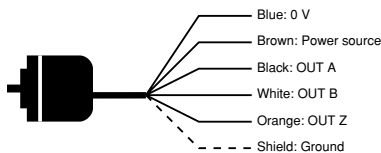
SIZE 15 SERIES TRDA-SH INCREMENTAL HOLLOW SHAFT ENCODER (Fully Enclosed)

Available Disk Resolution 10, 20, 30, 40, 50, 60
100, 200, 250, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 2000, 2048, 2500 — All Glass Disks

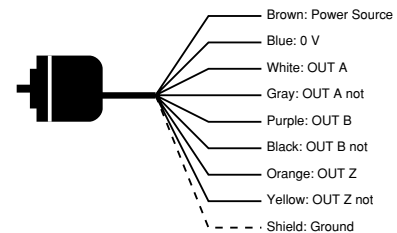
WIRING DIAGRAMS

SHIELDED CABLE 1m/3.3 ft.
Dia:5mm, Sheath:PVC, Wire: AWG24-26

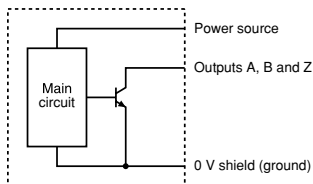
Open Collector (Shield = Body)



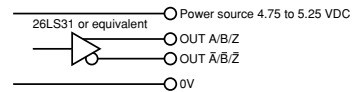
Line Driver (Shield = Body)



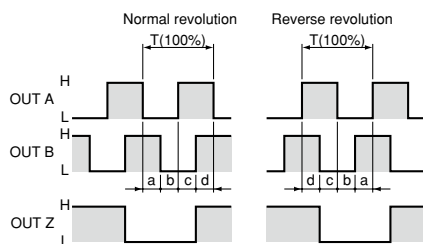
Open Collector Output Circuit



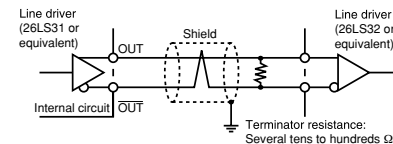
Line Driver Output Circuit



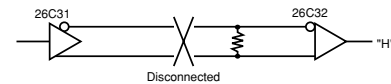
Open Collector Wave Form (Viewed from encoder shaft)



- The line driver can use a RS-422A compliant twisted pair cable of up to 1,200 m.



- Output signal turns to "H" level when the cable or connector is disconnected.



Series TRDA-SH / Size 15 Hollow Shaft Encoder (Fully Enclosed)

| Model | Resolution | Output | Mounting B.C. | Hub I.D. | Commutation Signals | |
|----------------------|---|--------------------------|--------------------------|--------------------------|-----------------------|-----|
| TRDA-SH | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | | <input type="checkbox"/> | | |
| ORDERING INFORMATION | | | | | | |
| TRDA-SH | 100 | 600 | A: Open Collector | 46mm (1.81") | 8 = 8mm (Std.) | N/A |
| Size 15 | 200 | 800 | 5 - 12VDC | | | |
| Hollow Shaft | 250 | 1000 | | | | |
| Encoder | 300 | 1024 | B: Open Collector | | | |
| (Fully Enclosed) | 360 | 1200 | 10.8 - 26.4VDC | | | |
| | 400 | 2000 | | | | |
| | 500 | 2500 | V: Line Driver | | | |
| | 512 | | 5VDC | | | |
| | All Metal Disks | | | | | |

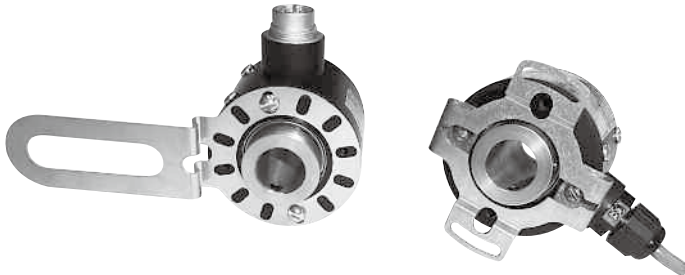
| PRICING INFORMATION | | | | | |
|---------------------|-------------------------|-------------------------------|------------|--|--|
| | RESOLUTION | OUTPUT / SIGNALS | HUB I.D. | ENVIRONMENTAL | |
| TRDA-SH | 100 | 5 - 26V Open Collector | 8mm | Fully Enclosed Body NEMA 12 (IP-50) | |
| Base price | Thru N/C | Quadrature A & B | N/C | | |
| \$210.00 | 1024 | with Index Z N/C | | | |
| | 2000 | 5V Linedriver | | | |
| | Thru Add \$20.00 | Quadrature A & B | | | |
| | 2500 | with Index Z N/C | | | |

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|----------------------------|------------|---------------|------------|
| TRDA-SH100B8 (-TRD-SH100B) | \$210.00 | TRDA-SH1024BQ | \$210.00 |
| TRDA-SH100BQ | \$210.00 | TRDA-SH1024V6 | \$210.00 |
| TRDA-SH100V6 | \$210.00 | TRDA-SH1024V8 | \$230.00 |
| TRDA-SH100V8 | \$210.00 | TRDA-SH2000B8 | \$230.00 |
| TRDA-SH100VQ | \$210.00 | TRDA-SH2000V6 | \$230.00 |
| TRDA-SH360B8 | \$210.00 | TRDA-SH2000V8 | \$230.00 |
| TRDA-SH360V6 | \$210.00 | TRDA-SH2000VQ | \$230.00 |
| TRDA-SH360V8 | \$210.00 | TRDA-SH2048B8 | \$230.00 |
| TRDA-SH360VQ | \$210.00 | TRDA-SH2048V8 | \$230.00 |
| TRDA-SH400V6 | \$210.00 | TRDA-SH2048VQ | \$230.00 |
| TRDA-SH500B8 | \$210.00 | TRDA-SH2500B8 | \$230.00 |
| TRDA-SH500BQ | \$210.00 | TRDA-SH2500BQ | \$230.00 |
| TRDA-SH500V8 | \$210.00 | TRDA-SH2500V6 | \$230.00 |
| TRDA-SH1000B8 | \$210.00 | TRDA-SH2500V8 | \$230.00 |
| TRDA-SH1000B8-2M | \$225.00 | TRDA-SH2500VQ | \$230.00 |
| TRDA-SH1000BQ | \$210.00 | | |
| TRDA-SH1000V6 | \$210.00 | | |
| TRDA-SH1000V8 | \$210.00 | | |
| TRDA-SH1024B8 | \$210.00 | | |

Note: Hub ID 8mm is Standard. However, 6mm, 1/4" are available in limited Qty.
ID 6mm and 1/4" will be discontinued. Check our inventory first.

SIZE 20 SERIES HS20 INCREMENTAL HOLLOW SHAFT ENCODER / Thru-Hub

Starting at US \$305.00 List Price
(w/cable model - A ch. only)



Amphenol connector w/ L.D. model
US \$390.00 List Price

FEATURES

WORLD ENCODERS

brand, Made in USA

- Size 20 Housing, heavy duty designed
- Up to 5/8" or 16mm, Thru-hub design
- Unbreakable code disk
- Short circuit and ESD protected
- Up to 1200 PPR
- Attached cable or optional Amphenol connector
- Super Linedriver 7272 compatible 5-26Vdc available
- NEMA12/IP54 enclosure

SPECIFICATIONS

Mechanical

| | |
|---------------|--|
| Shaft Bore | 3/8", 1/2", 5/8", 16mm diameter |
| Maximum Speed | 6000 RPM |
| Shaft Loading | Radial: 30 lbs. Axial: 20 lbs. |
| Materials | Case: Aluminum, anodized Shaft: 303 Stainless Steel |
| Weight | 8.0 oz |

Electrical

| | |
|-----------------------|--|
| Supply Voltage | 5-26 Vdc Push-Pull, Open Collector, Line Driver |
| Current | 50mA Max. No Load 100mA Max. (Line Driver) |
| Pulse Rate | 0-30 kHz |
| Pulses per Revolution | 1 to 1200 |
| Output Circuit | Single-ended <ul style="list-style-type: none"> • 7273 open collector (30VDC max, 50 mA max) • 7272 Push-Pull (50 mA max source or sink) Differential Line Driver <ul style="list-style-type: none"> • 7272 differential line driver |
| Output Wave | Square wave outputs A, B and Z are 50/50 duty cycle nominal output Z (index output) is approximately the width of one cycle on outputs A or B. <ul style="list-style-type: none"> • Pulse symmetry: 180 ±30% • Pulse interval jitter: 30% max • Quadrature: 90° ±30% max • Phase jitter: 30% max |

Environmental

| | |
|--------------------|--|
| Temperature | Operating: 0 ~ 70°C Storage: -10 ~ 85°C |
| Operation Humidity | 35-85% without condensation |
| Vibration | Max 10g (58 to 500 Hz) |
| Shock | 50g (11 ms duration) |
| Enclosure | IP-54/NEMA 12 |

Electrical Connections

Single-ended Outputs:

| 6-Pin Connector* | Function | Wire Color |
|------------------|----------|------------|
| 1 | Common | Black |
| 2 | +vdc | Red |
| 3 | Output Z | Brown |
| 4 | Output A | White |
| 5 | Output B | Green |
| 6 | not used | — |

*connector is Amphenol T34020000 or equivalent

Differential Line Driver Outputs:

| 8-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 |
| 7 | Output -B | Brown |
| 8 | Output -Z | Orange |

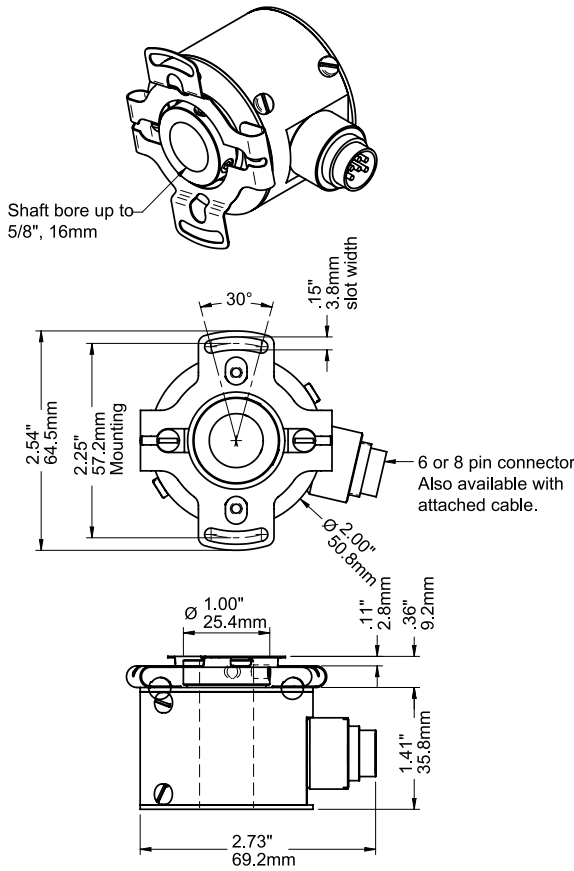
*connector is Amphenol T34020000 or equivalent

Standard Cable length is 10 ft / 3 meters.

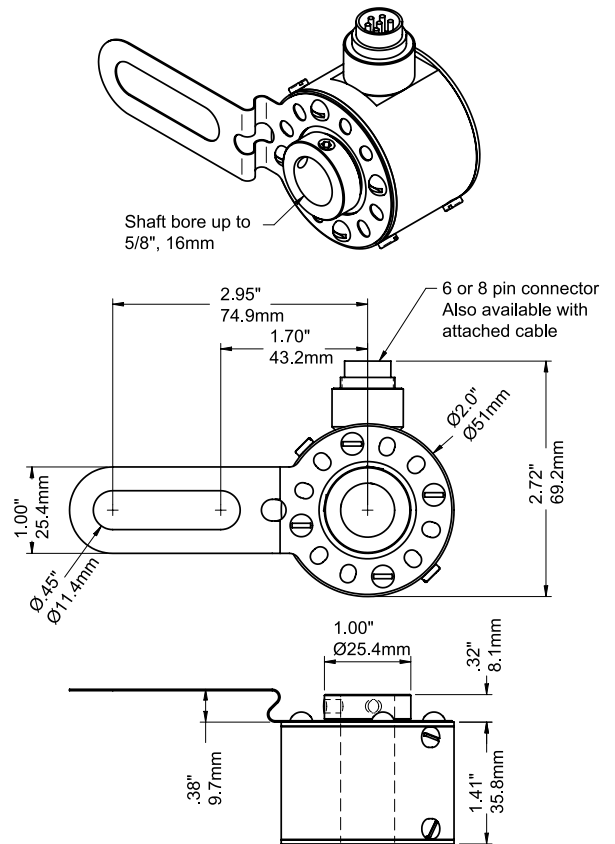
SIZE 20 SERIES HS20
INCREMENTAL HOLLOW SHAFT ENCODER / Thru-Hub

DIMENSIONS

Std. Flex-Mtg. Spring 2.25" B.C.



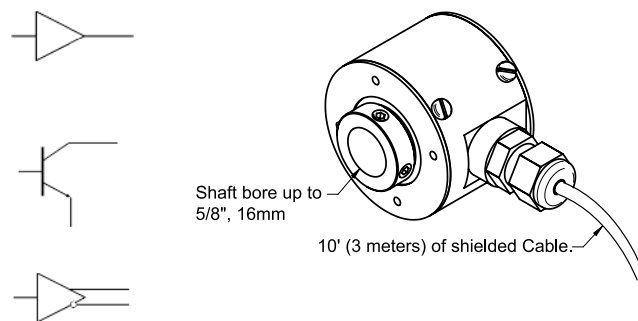
C-Face Motor Mtg. 3.4" - 5.9" B.C.



Outputs

- **Push-Pull (7272)** This general purpose output functions as a PNP transistor for applications requiring a current sourcing output. It functions as an NPN transistor with 3.3K pull-up for applications requiring a current sinking output. This output is TTL compatible when used with a 5vdc supply. Maximum source / sink current is 50 ma. per output.
- **7273 Open Collector (NPN)** For applications requiring an uncommitted output. The output voltage level can be pulled up with an external resistor to a maximum of 30vdc. Maximum sink current is 50ma. per output.
- **Differential Line Driver (7272)** An 7272 differential line driver that generates complimentary outputs: A / -A, B / -B, and Z / -Z as needed. The encoder must be operated at 5-26 vdc, input and output.

Std. 10 ft Cable w/ Straight Plug Cap



Size 20 Series HS20 Hollow Shaft Encoder/Thru-Hub

| Model | Hub I.D. | Channels | Resolution | Voltage/Output | Cable/Connector | Flex-Mtg. Spring |
|-------------|--------------------------|--------------------------|---|--------------------------|--------------------------|--------------------------|
| HS20 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> / | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ORDERING INFORMATION

| | | | | | | | |
|-------------|-----------------------|--------------------------|-----|---------------------|-----------------|----------------------------|------------------------------|
| HS20 | B = 3/8" | Blank: Sgl. Ended | 100 | 1000 | 5-26: Push-Pull | Blank: 10 ft. Cable | Blank: Std. Flex-Mtg. |
| | .5 = 1/2" | (A ch.) | 250 | 1024 | (7272) | | (2) holes @ |
| | .625 = 5/8" | | 360 | 1200 | | | 2.25" B.C. |
| | M8 = 8mm | Q: Quadrature | 500 | | 5-26C: Open | S: 16mm Circular | C: C-face Motor Mtg. |
| | M10 = 10mm | (A, B ch.) | 512 | | Collector | Conn. at side | (1) slot hole @ |
| | M12 = 12mm | | | | (7273) | | 3.4" ~ 5.9" B.C. |
| M14 = 14mm | QZ: Quadrature | | | 5-26D: Line Driver* | | | |
| M16 = 16mm | (A, B, Z ch. | | | (7272) | | | |
| | | w/Index) | | | | | |

PRICING INFORMATION

| MODEL | HUB I.D. | HUB I.D. | RESOLUTION | VOLTAGE/OUTPUT | CABLE/CONNECTOR | FLEX-MTG. SPRING |
|-------------|-------------------|--------------------------|-------------|----------------------------|----------------------------|------------------------------|
| HS20 | B = 3/8" | Blank: A ch. only | | 5-26: Push-Pull | Blank: 10 ft. Cable | Blank: Std. Flex-Mtg. |
| Base price | .5 = 1/2" | N/C | 100 | N/C | N/C | (2) holes @ |
| \$305.00 | .625 = 5/8" | | Thru | | | 2.25" B.C. |
| | M8 = 8mm | Q: A, B ch. | 1200 | 5-26C: Open | S: 16mm Circular | N/C |
| | M10 = 10mm | Add \$20.00 | | Collector | Conn. at side | C: C-face Motor Mtg. |
| | M12 = 12mm | | N/C | Add \$25.00 | Add \$30.00 | (1) slot hole @ |
| | M14 = 14mm | QZ: A, B, Z ch. | | 5-26D: Line Driver* | | 3.4" ~ 5.9" B.C. |
| | M16 = 16mm | Add \$30.00 | | Add \$25.00 | | Add \$20.00 |
| | N/C | | | | | |

Standard Stock Items: Shipped immediately. Non Stock Items: 2-3 weeks Lead Time * 5-26D: 5-26vdc input and output. **5-26DL: 5-26vdc input, 5vdc output

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|----------------------|------------|--|------------|
| HS20M6QZ50/5-26D | \$360.00 | HS20.5QZ1024/5-26DS | \$390.00 |
| HS20M8Q1000/5-26C | \$350.00 | HS20.5QZ1024/8-30 | \$335.00 |
| HS20M10QZ1000/5-26DS | \$390.00 | HS20.5QZ1024/8-30DS | \$390.00 |
| HS20B100/8-30 | \$305.00 | HS20.625-100/8-30 | \$305.00 |
| HS20BQZ100/5-26DS | \$390.00 | HS20.625QZ100/5-26DS | \$390.00 |
| HS20BQZ100/8-30 | \$335.00 | HS20.625QZ100/8-30 | \$335.00 |
| HS20B500/8-30 | \$305.00 | HS20.625-500/8-30 | \$305.00 |
| HS20BQZ500/5-26DS | \$390.00 | HS20.625QZ500/5-26DS | \$390.00 |
| HS20BQZ500/8-30 | \$335.00 | HS20.625QZ500/8-30 | \$335.00 |
| HS20B1000/5-26 | \$305.00 | HS20.625-1000/8-30 | \$305.00 |
| HS20B1000/8-30 | \$305.00 | HS20.625QZ1000/526DS | \$390.00 |
| HS20BQZ1000/5-26 | \$335.00 | HS20.625QZ1000/8-30 | \$335.00 |
| HS20BQZ1000/5-26DS | \$390.00 | HS20.625QZ1024/526DS | \$390.00 |
| HS20BQZ1024/5-26DS | \$390.00 | HS20.625QZ1024/8-30 | \$335.00 |
| HS20BQZ1024/8-30 | \$335.00 | Mating Connector w/ 10-20ft. Cable Assemblies | |
| HS20.5-100/8-30 | \$305.00 | D6-5-10 (Sgl.Ended) | |
| HS20.5QZ100/5-26DS | \$390.00 | Amphenol 6 pin mating conn. w/10ft. Cable (5 wires) | \$40.00 |
| HS20.5QZ100/8-30 | \$335.00 | D6-6-20CF (Sgl.Ended) | |
| HS20.5-500/8-30 | \$305.00 | Amphenol 6 pin mating conn. w/20ft. Cable (6 wires) | \$80.00 |
| HS20.5QZ500/5-26DS | \$390.00 | D8-8-10 (Linedriver) | |
| HS20.5QZ500/8-30 | \$335.00 | Amphenol 8 pin mating conn. w/10ft. Cable (8 wires) | \$50.00 |
| HS20.5-1000/8-30 | \$305.00 | D8-8-20 (Linedriver) | |
| HS20.5QZ1000/5-26DS | \$390.00 | Amphenol 8 pin mating conn. w/20ft. Cable (8 wires) | \$80.00 |
| HS20.5QZ1000/8-30 | \$335.00 | Mounting Bracket | |
| HS20M12Q1200/8-30DHS | \$400.00 | #MB-FB2 | |
| HS20M8QZ1024/5-26DC | \$355.00 | C-face Motor Mtg. Bracket | \$20.00 |
| HS20M10QZ1000/5-26DS | \$390.00 | | |

Standard Stock Items: Shipped immediately. Non Stock Items: 2-3 weeks Lead Time

SIZE 31 SERIES HS31 INCREMENTAL HOLLOW SHAFT ENCODER / Thru-Hub

Starting at US \$480.00 List Price
(w/cable model - A ch. only)



MS connector w/ L.D. US \$585.00 List Price

SPECIFICATIONS

Mechanical

| | | |
|----------------------|--|---------------------------------------|
| Shaft Bore/Tolerance | 5/8", 3/4", 7/8", 1" Hub I.D. / 0.001" T.I.R. Max | |
| Shaft Speed | Base 1800 rpm, *Max 3600 rpm | |
| Bearings | # 6807 35mm, abec 1, Double Shielded, AV2 grease (Shell Alvania #2) | |
| Bearing Life | at 1800 rpm | 25,000 hrs |
| | at 3600 rpm | 12,000 hrs |
| Bearing Temp. | 5/8" Hub | Derating 5°C/1000 rpm over *1800 rpm |
| | 1" Hub | Derating 10°C/1000 rpm over *1800 rpm |
| Shaft Loading | Radial: 40 lbs. Runout: 0.005" T.I.R. Max on Mating Shaft. Axial: 30 lbs. Endplay: 0.05" T.I.R. Max on Mating Shaft | |
| Materials | Body: Anodized Aluminum with anodized protective finish Hub: Aluminum with anodized protective finish, Option-Stainless Steel, Seals- Teflon, N.B.R. | |
| Weight | 16 oz. | |

*Over 1800-Max-3600 rpm speed reduces the bearing life by its heating and brown

Electrical

| | |
|-----------------------|--|
| Supply Voltage | 5-26 Vdc |
| Current | 50mA Max. No Load 100mA Max. (Line Driver) |
| Pulse Rate | 0-40 kHz |
| Pulses per Revolution | up to 1024 |
| Output Circuit | Single-ended, TTL Outputs • 7272 Push-Pull 50 mA max source or sink (Std.) • 7273 open collector 50 mA max, 30VDC max (option) Differential Line Driver • 7272Super Linedriver / 100 mA Max, 5-26VDC Max (Std.) • RS422 TTL-6 ch. or Linedriver 50 mA max, input 8-30v, output 5v |
| Output Wave | Square wave outputs A, B are 50/50 duty cycle nominal. Output Z index 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 |

FEATURES



brand, Made in USA

- Size 31 Housing, NEMA4/IP66 Heavy-duty Enclosure.
- Std. Electrically, Thermally Insulated & Isolated Hub.
- Std. Equipped with 56C Cover & Tether Mtg. Bracket.
- Hub I.D. 5/8", 3/4", 7/8", 1", Thru-hub deisgn.
- Up to 1024 ppr and Unbreakable Code Disk.
- Electrical Protection Std.: Voltage Transients, Reverse Voltage, Output Short Circuit Proof.
- Super Linedriver 5-26v, Push-Pull 5-26v TTL outputs. Linedriver or TTL (RS422 compatible) Complimentary-6ch. input 8-30v, output 5v Industrial Encoder IH950 Interchangeable.
- Military Std. 7 pin, 10 pin, Conn. NEMA4/IP66
- D-sub 9 pin, 10ft. Cable w/Straight Plug. NEMA12/IP50

Environmental

| | |
|-------------|--|
| Temperature | Operating: 0 ~ 70°C Storage: -10 ~ 85°C |
| Humidity | 98% RH without condensation |
| Vibration | 20 G's at 5 tp 2000Hz |
| Shock | 50 G's at 11 ms duration |
| Enclosure | NEMA4/IP66: MS 7-pin, 10pin Conn. NEMA 12/IP50; D-sub 9 pin, 10 ft Cable w/straight Plug |
| Sealing | Shaft Gaskets-Teflon, NBR, Viton, Neoprene. Sleeve-Delrin™ (DuPont® plastic), Washer-Teflon |
| Isolation | Encoder to be electrically isolated from motor by using insulating shaft sleeve and insulating washers on Flexible Tether Mtg. Bracket |

Electrical Connections

Push-Pull Outputs:

| MS 7-Pin Connector | Function | Wire Color | DB9 Conn. |
|--------------------|-------------|------------|-----------|
| F | Common | Black | 1 |
| D | +vdc | Red | 2 |
| C | Output Z | Brown | 5 |
| A | Output A | White | 3 |
| B | Output B | Green | 4 |
| G | Case Ground | Shield | 6 |
| E | not used | — | 7,8,9 |

Differential Line Driver Outputs:

| MS 10-Pin Connector | Function | Wire Color | DB9 Conn. |
|---------------------|----------------|------------|-----------|
| A | Output +A | White | 3 |
| B | Output +B | Green | 4 |
| C | Output +Z | Yellow | 5 |
| D | Supply Voltage | Red | 2 |
| F | Common | Black | 1 |
| H | Output -A | Blue | 6 |
| I | Output -B | Brown | 7 |
| J | Output -Z | Orange | 8 |
| G | Case Ground | Shield | 9 |
| E | not used | — | — |

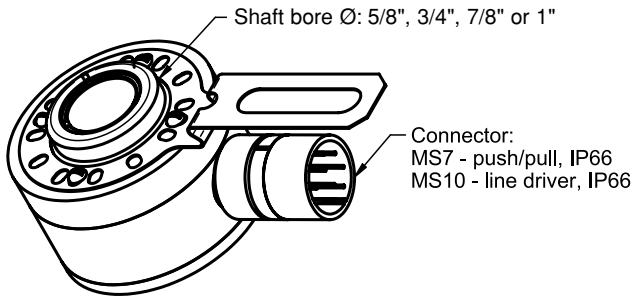
Standard Cable length is 10 ft / 3 meters.

SIZE 31 SERIES HS31

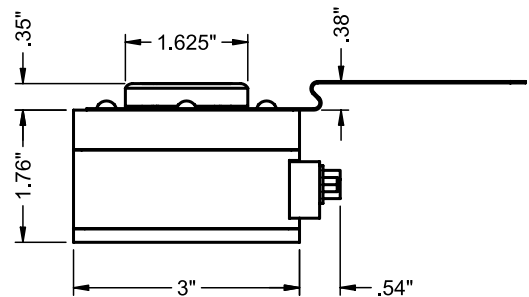
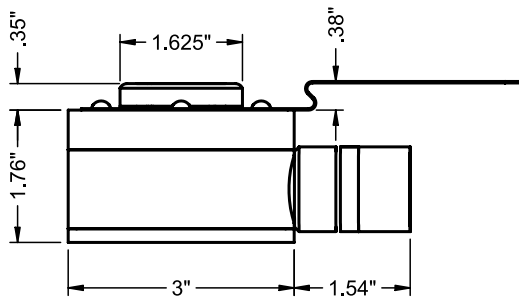
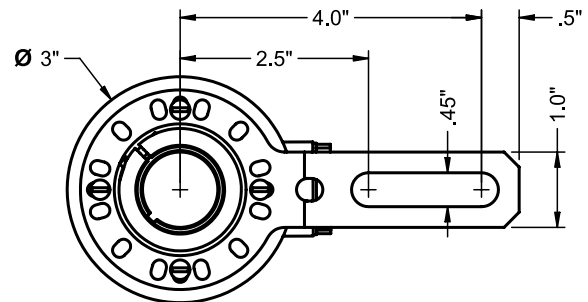
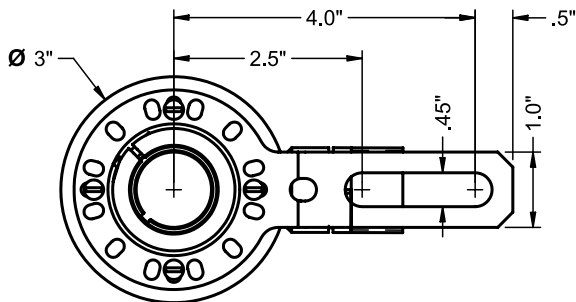
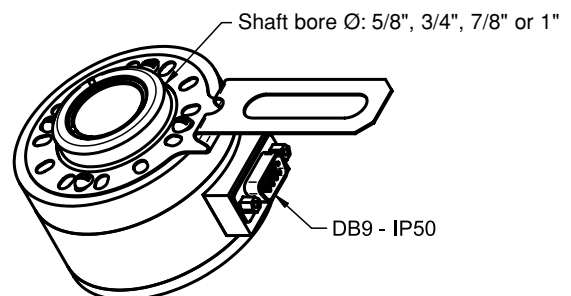
INCREMENTAL HOLLOW SHAFT ENCODER / Thru-Hub / with Tether Mtg. 5"-8" B.C.

DIMENSIONS

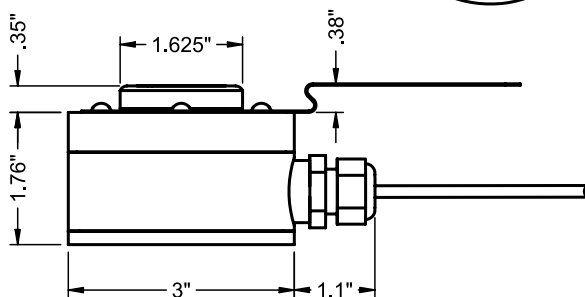
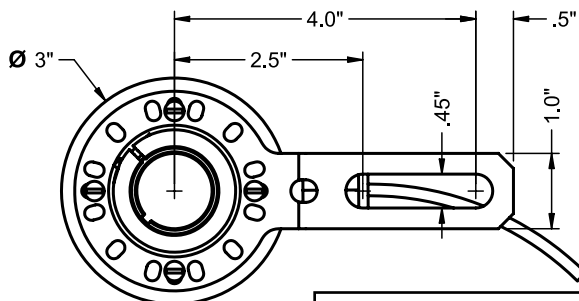
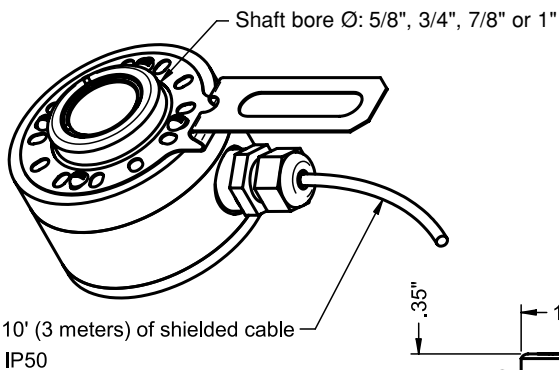
MS Conn. (MS7, MS10 pin)



D-sub (DB9) Conn.



Std. 10 ft Cable w/ Straight Plug Cap



Size 31 Series HS31 Hollow Shaft Encoder/Thru-Hub/NEMA 4

| Model | Hub I.D. | Channels | Pulse | Voltage/Output | Cable/Connector | Mtg. Spring | 56C Cover |
|-------|--------------------------|--------------------------|--------------------------|----------------------------|---|-------------|-----------|
| HS31 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> - | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Blank | Blank |

ORDERING INFORMATION

| | | | | | | | |
|------|--|--|-----------------------------------|---|--|---|---|
| HS31 | .625 = 5/8" .75=3/4" .875=7/8" 1.00 = 1" with Std. Electrical Insulated & Isolated Plastic Sleeve | Blank: Sgl. Ended (A ch.) Q: Quadrature (A, B ch.) QZ: Quadrature (A, B, Z ch. w/Index) | 100 360 500 1000 1024 | 5-26: Push-Pull Sgl. Ended 7272 5-26v TTL (Std.) 5-26D: Super Line * driver 7272 compatible 5-26v (Std.) 8-30DL: Linedriver or TTL-RS422 Complimentary-6 ch. input 8-30v, output 5v Add \$45.00 | Blank: 10 ft. Cable w/Straight Plug MS10: L.D. MS 10 pin Conn. MS7: TTL MS 7 pin Conn. DB9: D-sub 9 pin Conn. | Blank: Std. Flex Tether Mtg. Spring (1) slot hole @ 5"-8" B.C. | Blank: Std. 56C Protection Cover |
|------|--|--|-----------------------------------|---|--|---|---|

PRICING INFORMATION

| Model | Hub I.D. | Hub I.D. | Pulse | Voltage/Output | Cable/Connector | Mtg. Spring | 56C Cover |
|--------------------------------|--|---|-----------------------------|---|---|--|--|
| HS31 Base Price \$480.00 | .625 = 5/8" .75=3/4" .875=7/8" 1.00 = 1" with Std. Electrical Insulated & Isolated Plastic Sleeve | Blank: N/C Sgl. Ended. A ch. Q: Add \$20.00 Quadrature A, B Ch. QZ: Add \$30.00 Quadrature A, B, Z Ch. w/index | 100 Thru 1024 N/C | 5-26: N/C Push-Pull Sgl. Ended 7272 5-26v TTL (Std.) 5-26D: Add \$25.00 Super Linedriver * 7272 compatible 5-26v (Std.) 8-30DL: Add \$45.00 Linedriver or TTL-RS422 Complimentary-6 ch. input 8-30v, output 5v | Blank: N/C 10 ft. Cable w/Straight Plug MS10: Add \$50.00 MS 10 pin Conn. MS7: Add \$50.00 MS 7 pin Conn. DB9: Add \$30.00 D-sub 9 pin Conn. | Blank: N/C Std. Flex Tether Mtg. Spring (1) slot hole @ 5"-8" B.C. N/C | Blank: N/C Std. 56C Protection Cover N/C |

Standard Stock Items: Shipped immediately. Non Stock Items: 2-3 weeks Lead Time * 5-26D: 5-26vdc input and output. **5-26DL: 5-26vdc input, 5vdc output

| PART NUMBER | LIST PRICE | PART NUMBER | LIST PRICE |
|--------------------------|------------|--|----------------|
| HS31.625QZ100/5-26DMS10 | \$585.00 | HS311.00QZ500/5-26DMS10 | \$585.00 |
| HS31.625QZ100/5-26MS7 | \$560.00 | HS311.00QZ500/5-26MS7 | \$560.00 |
| HS31.625QZ360/5-26DMS10 | \$585.00 | HS311.00QZ1000/5-26DMS10 | \$585.00 |
| HS31.625QZ360/5-26MS7 | \$560.00 | HS311.00QZ1000/5-26MS7 | \$560.00 |
| HS31.625QZ500/5-26DMS10 | \$585.00 | HS311.00QZ1024/8-30DLDB9 | \$585.00 |
| HS31.625QZ1000/5-26MS7 | \$560.00 | HS311.00QZ1024/5-26DMS10 | \$585.00 |
| HS31.625QZ1000/5-26DMS10 | \$585.00 | HS311.00QZ1024/5-26MS7 | \$560.00 |
| HS31.625QZ1024/8-30DLDB9 | \$585.00 | Mating Connector | |
| HS31.625QZ1024/5-26DMS10 | \$585.00 | DMS3106E18-1S (10pin Linedriver) | \$45.00 |
| HS31.625QZ1024/5-26MS7 | \$560.00 | DMS3106E16-1S (7pin TTL) | \$35.00 |
| HS31.75QZ1000/5-26DMS10 | \$585.00 | MS mating w/10ft Cable Assemblies | |
| HS31.75QZ1000/5-26MS7 | \$560.00 | C10-9-10LD (Linedriver) | \$85.00 |
| HS31.75QZ1024/5-26DMS10 | \$560.00 | C7-5-10RC(TTL Sgl.ended) | \$75.00 |
| HS31.75QZ1024/5-26MS7 | \$560.00 | Cables | |
| HS31.875QZ1000/5-26DMS10 | \$585.00 | CBL-2025N-XXX FT | \$3.00 per Ft. |
| HS31.875QZ1000/5-26MS7 | \$560.00 | D-sub conn.w/10ft. Cable Assemblies | |
| HS31.875QZ1024/5-26DMS10 | \$585.00 | DB9-8-10 (Linedriver) | \$50.00 |
| HS31.875QZ1024/5-26MS7 | \$560.00 | D-sub 8pin w/10ft.cable | |
| HS311.00QZ100/5-26DMS10 | \$585.00 | DB9-5-10 (TTL Sgl.ended) | \$45.00 |
| HS311.00QZ100/5-26MS7 | \$560.00 | D-sub 5pin w/10ft.cable | |
| HS311.00QZ360/5-26MS7 | \$560.00 | | |

Standard Stock Items: Shipped immediately. Non Stock Items: 1 week Lead Time

Series MPG-N1 SIZE 20 HAND WHEEL



FEATURES

- 2" O.D. Compact size MPG
- Panel plate Sandwich design
- Black Plastic dial & body with matt finish
- 100 ppr Std., 25 ppr Option
- Dual Quadrature Channels
- Line driver 5v and Voltage 8-26v outputs

SPECIFICATIONS

Electrical

| Outputs | Line Driver | Voltage Output-TTL (NPN) |
|-----------------------|---|--------------------------|
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v | 8-26 v dc |
| Output Voltage (VH) | ≥2.5 v | Vcc -1.0 v |
| Output Voltage (VL) | ≤0.5 v | |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 0-10 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |

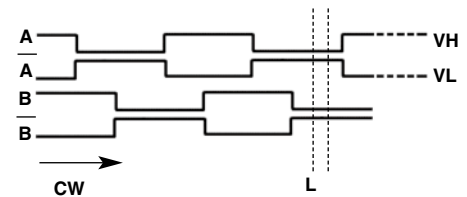
Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 600 r/min. Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 6 oz. (200g) |

Environmental

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP50/NEMA 12 |

OUTPUT WAVE FORMS



Relation between output signals and click stop position.

ELECTRICAL CONNECTION



Line driver Outputs Voltage Outputs

Series MPG-N1 / Size 20 Hand Wheel/Plastic Sgl. Dial

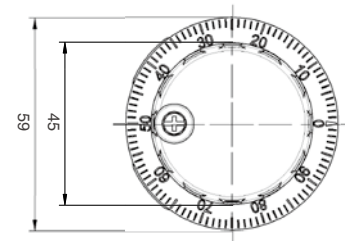
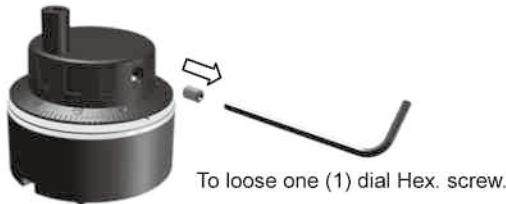
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| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|----------------------|--|------------|
| MPG-N1-100-L5 | 100 Pulse, 5vDC, Linedriver Output, Quadrature Dual Channels | \$240.00 |
| MPG-N1-100-V | 100 Pulse, 8-26vDC, Voltage Output, Quadrature Dual Channels | \$240.00 |

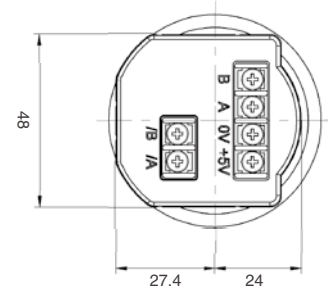
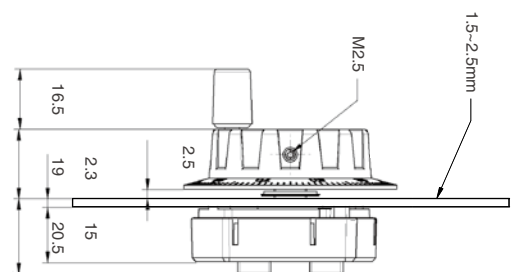
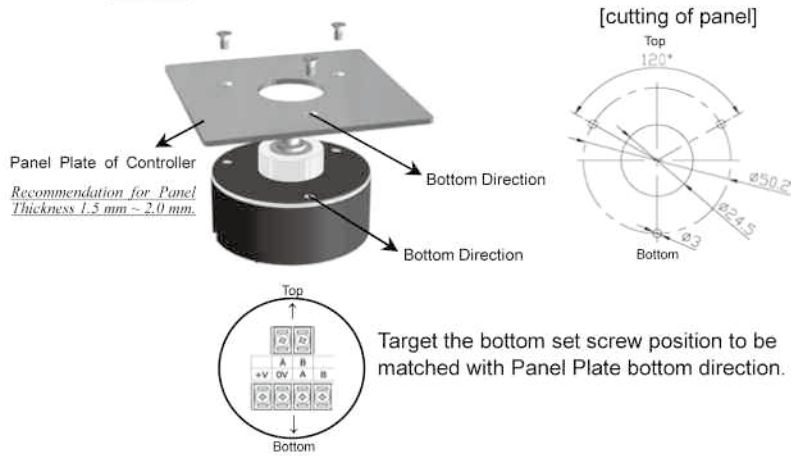
Mounting Instructions

Dimensions (mm)

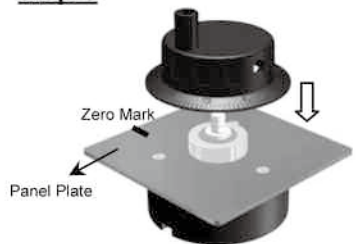
Step 1



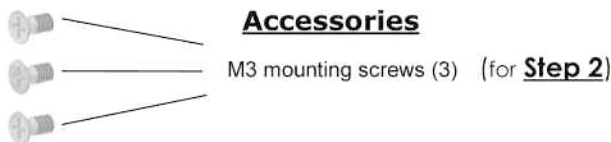
Step 2



Step 3

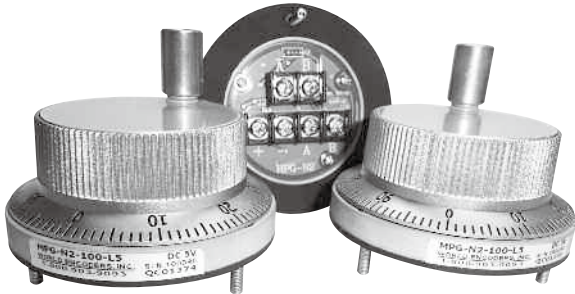


Step 4



Series MPG-N2 SIZE 20 FLAT-DESIGN HAND WHEEL

US \$240.00 (Sgl. Dial)
S.R.P. List Price



FEATURES

- 2" O.D. Compact size MPG
- Flat-design
- Zinc metal dial & body
- 100 ppr Std. only
- Dual Quadrature Channels
- Line driver 5v and TTL 5v Outputs

SPECIFICATIONS

Electrical

| | | |
|-----------------------|---|------------|
| Outputs | Line Driver | TTL (NPN) |
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v | 5 v dc |
| Output Voltage (VH) | ≥2.5 v | Vcc -1.0 v |
| Output Voltage (VL) | ≤0.5 v | |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 0-10 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |

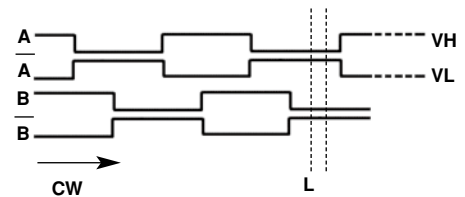
Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 600 r/min. Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 8 oz. (270g) |

Environmental

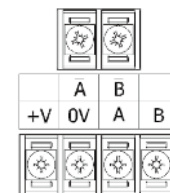
| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP50/NEMA 12 |

OUTPUT WAVE FORMS



Relation between output signals and click stop position.

ELECTRICAL CONNECTION

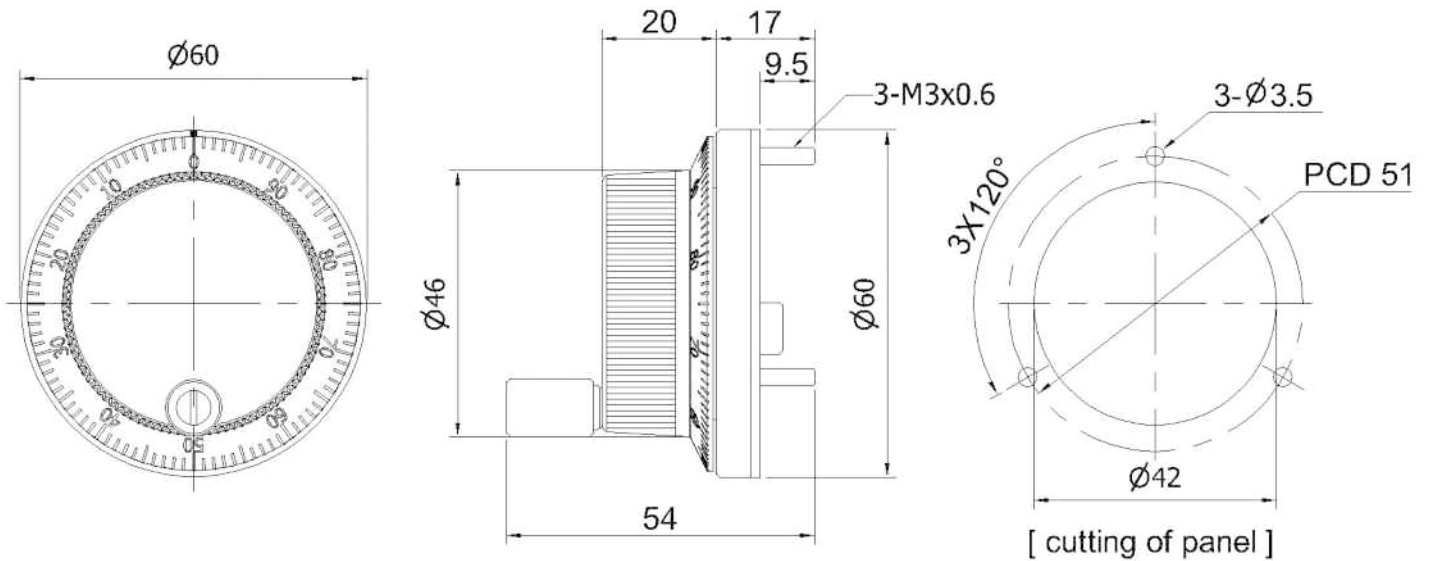


Linedriver Outputs

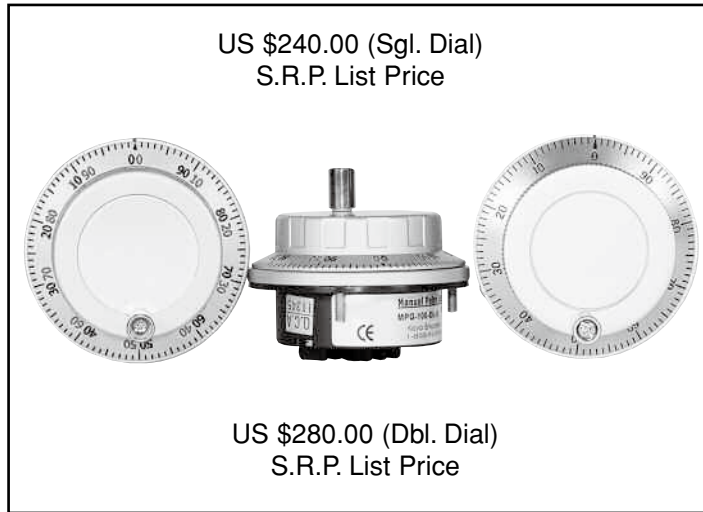
Series MPG-N2 / Size 20 Flat-Design Hand Wheel/Metal Sgl. Dial

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|----------------------|--|------------|
| MPG-N2-100-L5 | 100 Pulse, 5vDC, Linedriver Output, Quadrature Dual Channels | \$240.00 |
| MPG-N2-100-T | 100 Pulse, 5vDC, TTL Output, Quadrature Dual Channels | \$240.00 |

Dimensions (mm)



Series MPG/SIZE 30 HAND WHEEL



**For CNC Panels
Interchangeable with**

- Euchner
- Nemicon
- Sumtak
- Fanuc

FEATURES

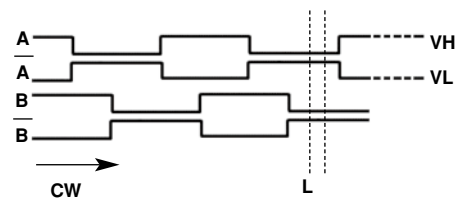
- Std. Interchangeable Designed
- Quadrature Dual Channels
- Line driver 5v and Voltage 8-26v Outputs

SPECIFICATIONS

Electrical

| Outputs | Line Driver | Voltage Output-TTL (NPN) |
|-----------------------|---|--------------------------|
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v dc | 8-26 v dc |
| Output Voltage (VH) | ≥2.5 v | Vcc -1.0 v |
| Output Voltage (VL) | ≤0.5 v | ≤0.5 v |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 0-10 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |

OUTPUT WAVE FORMS



Relation between output signals and click stop position.

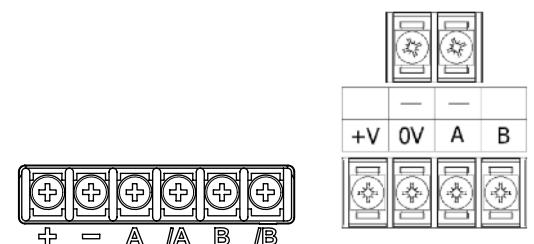
Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 600 r/min.-Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 8.2 oz (270 g) |

Environmental

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP54/NEMA 12 |

CONNECTIONS



L.D.
5VDC

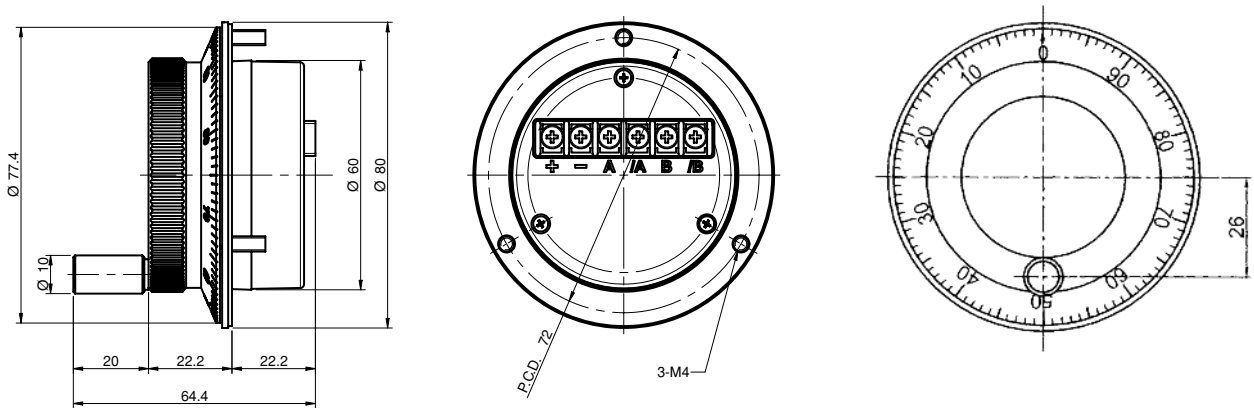
Voltage
8-26VDC

MPG-100-L5

MPG-100-V

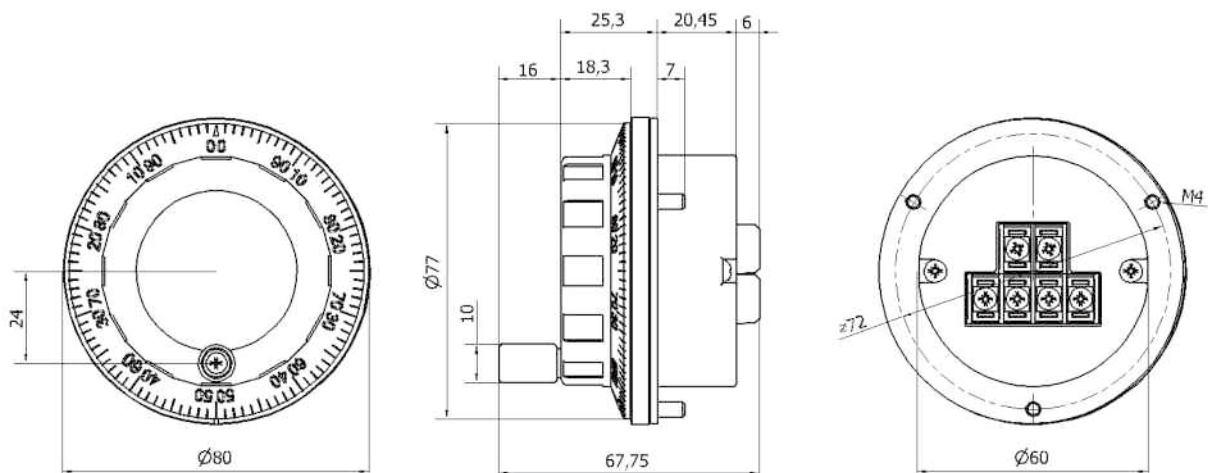
Series MPG / Size 30 Hand Wheel/Single Dial

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|-------------------|--|------------|
| MPG-100-L5 | 100 Pulse, 5vDC, Linedriver Output, Quadrature Dual Channels | \$240.00 |
| MPG-100-V | 100 Pulse, 8-26vDC, Voltage TTL Output, Quadrature Dual Channels | \$240.00 |



Series MPG / Size 30 Hand Wheel/Double Dial (Black: CW Red: CCW)

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|---------------------|--|------------|
| MPG-100-DL-5 | 100 Pulse, 5vDC, Linedriver Output, Quadrature Dual Channels | \$280.00 |



Series PHD/Pendant Hand-held For CNC Panels/4 Axis/Without E-Stop



US \$600.00
S.R.P.
List Price

FEATURES

- Hand-held Pulse Generator for “manual” axis jog
- Differential Line Driver Output & Fanuc 5v TTL Output
- X, Y Z Selector switch with OFF position plus 4 axis
- “Handy” and “Light Weight” and “Very Thin”
- Standard 10 ft. extended spiral cable
- Rear Magnets

FANUC CNC model available
#EPG-B-A-4-S \$600.00 S.R.P.

SPECIFICATIONS

Electrical

| Outputs | Line Driver | TTL Voltage Output for FANUC |
|-----------------------|---|------------------------------|
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v dc | 5 v±0.25 v dc |
| Output Voltage (VH) | ≥2.5 v | ≥4.0 v |
| Output Voltage (VL) | ≤0.5 v | ≤0.5 v |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 0-10 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |
| Spiral Cable | 10 ft. extended, 21/17 pol., 22-24 AWG | |

Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 500 r/min.-Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x6 bits turns at ≤ 200 rpm |
| Weight | 2.2 lbs (1 kg) |

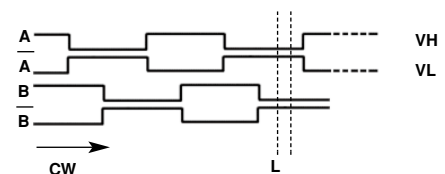
Environmental

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP64/NEMA 4 |

Rotary Switch

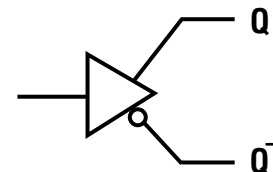
| | |
|------------------|---------------|
| Max. Voltage | 28 v dc |
| Current | 10 mA |
| Operating Torque | 0.005-0.02 Nm |

OUTPUT WAVE FORMS



Relation between output signals and click stop position.

OUTPUT CIRCUIT



26LS31 or equivalent
Recommended line receiver: 26LS32

| MODEL | PRICE |
|---|---------|
| Amp CPC Size 17 connector kit | \$90.00 |
| 1.3"O.D., 0.75" I.D., 28 pos., #18-28 AWG Gold Solder 1-#206039-1 Plug, 28-#66570-3 Pin, 28-#66569-3 Socket, 1-#206038-1 Mating Receptacle 1-#207241-1 Cable Boot, 1-#207387 Cable Grip | |

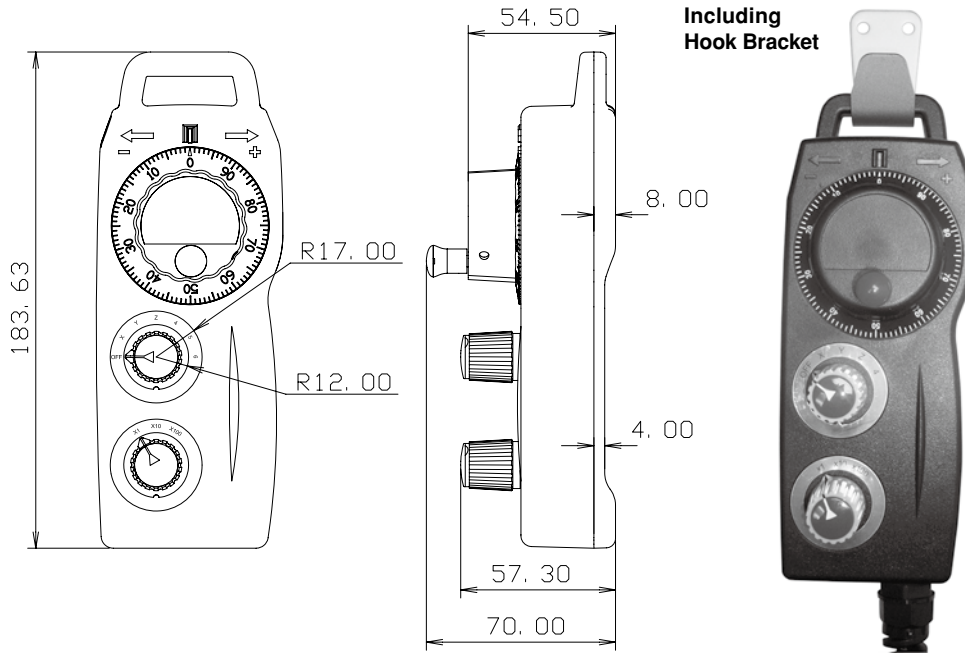


| MODEL | PRICE |
|--|---------|
| Amphenol Alloy Size 24 connector kit | \$90.00 |
| 1.7"O.D., 1.2" I.D., 24 pos., Size 24-28, 1-1/2"-18 UNEF 1-#MS3106F24-28P Straight Cable Plug with 24 Pin-Solder-Contacts, 1-Cable Clamp Backshell, 1-Rubber Grommet 1-#MS3102E24-28S Mating Receptacle with 24 Socket-Solder-Contacts, 1-Rubber Washer 1-1/4"O.D.x 3/8" I.D. x 1/16" 1-#AN3420-16, 1-#AN3420-6 Rubber Bushing Boots | |



Series PHD / Pendent Hand-Held / 4 Axis without E-Stop

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|--------------------|--|------------|
| PHD-100-B-S | 100 Pulse, 5v DC, Linedriver Output, Quadrature Dual Channels. Rear Magnets Two (2) Mode Switches. (4 axis and multiplier) 3m (10 ft.) Spiral Cable | \$600.00 |
| EPG-B-A-4-S | For FANUC CNC, 5v DC, TTL Output, Quadrature Dual Channels. Rear Magnets Two (2) Mode Switches. (4 axis and multiplier) 3m (10 ft.) Spiral Cable | \$600.00 |



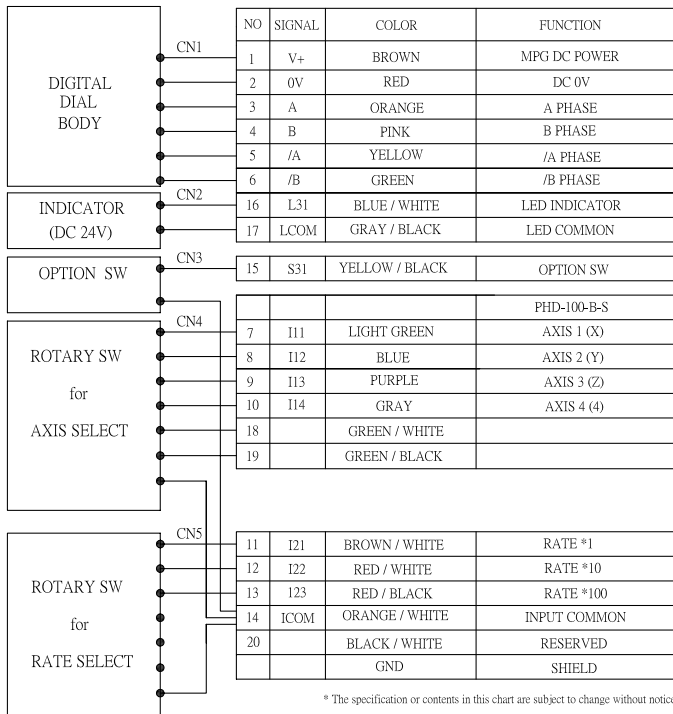
Including Hook Bracket



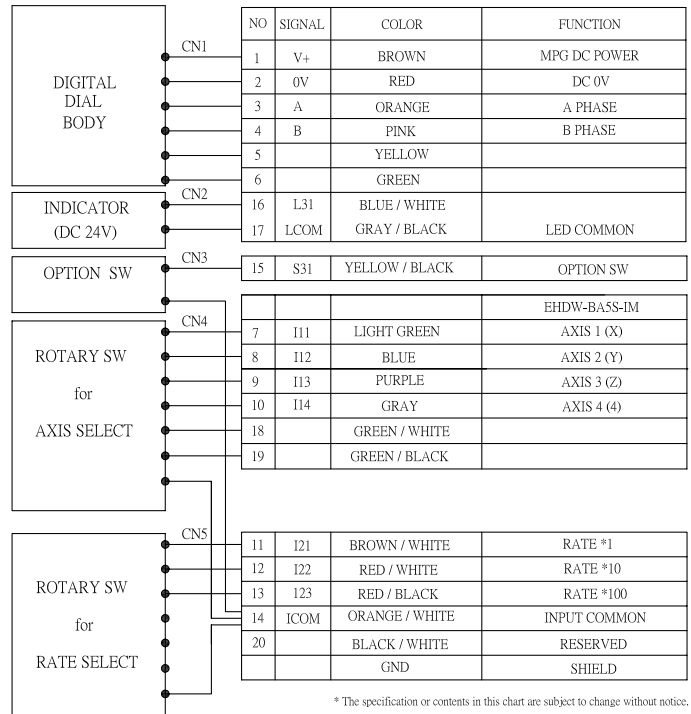
Replacement 5m (16ft.) Spiral Cable (21 wires) - D.I.Y. work

| Model | Price |
|-----------------------------|----------|
| Replacement Cable 5M | \$210.00 |

PHD-100-B-S CONNECTION DIAGRAM



EPG-B-A-4-S CONNECTION DIAGRAM



Series PHD/Pendant Hand-held

with E-Stop(2-Contacts) / Enable SW / Push Button SW capability



US \$750.00
S.R.P.
List Price

FEATURES

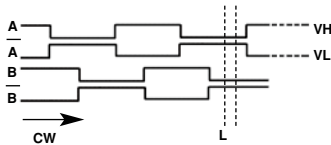
- New! 2-Contacts E-Stop SW (2B-Options are pre-wired) selection of wiring either 1A or 2B available
- New! Durable thick-wall case & reliable thread mold with brass inserts
- New! Durable thick multiplier & axis selector Blue SW's
- New! Push Button SW's by IDEC (Sold Separately)
- 5v Linedriver and 5v TTL outputs (Point to point)
- IP 65, NAMA 4 enclosure protection
- Std. 16ft.extended spiral cable
- Std. Magnets attached in rear
- Circular Plastic Size 17 & Amphenol Alloy Size 24 Connector Kits

SPECIFICATIONS

Electrical

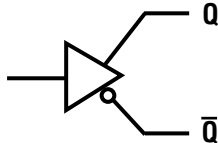
| Outputs | Line Driver | TTL Voltage Output for FANUC |
|-----------------------|---|------------------------------|
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v dc | 5 v±0.25 v dc |
| Output Voltage (VH) | ≥2.5 v | ≥4.0 v |
| Output Voltage (VL) | ≤0.5 v | ≤0.5 v |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 5 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |
| Spiral Cable | 16 ft. extended, 25 pol., 22-24 AWG | |

OUTPUT WAVE FORMS



Relation between output signals and click stop position.

OUTPUT CIRCUIT



26LS31 or equivalent
Recommended line receiver: 26LS32

Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 500 r/min.-Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 5 ozf-in (360 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 3 lbs (1.5 kg) |

Environmental

| | |
|-----------------------|-------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 2G |
| Shock | 0.5G |
| Enclosure | IP65/NEMA 4 |

Rotary Switch (PTP, Step Angle 30 Degree)

| | |
|-----------------------|------------------------|
| Max. Voltage | 30 v dc |
| Current / Switch Life | 50 mA / ≥25,000 cycles |

Emergency Stop Switch (Omron, 2B, A165E-S-02)

| | |
|--------------------|----------------------------------|
| DC Load Resistance | 30 vdc, 1.0 A OMRON # A165E-S-02 |
|--------------------|----------------------------------|

Enable Switch (Dailywell, 1A, PAS6B1M1CES-5)

| | |
|--------------------|--|
| DC Load Resistance | 50 vdc, 100 mA Dailywell # PAS6B1M1CES-5 |
|--------------------|--|

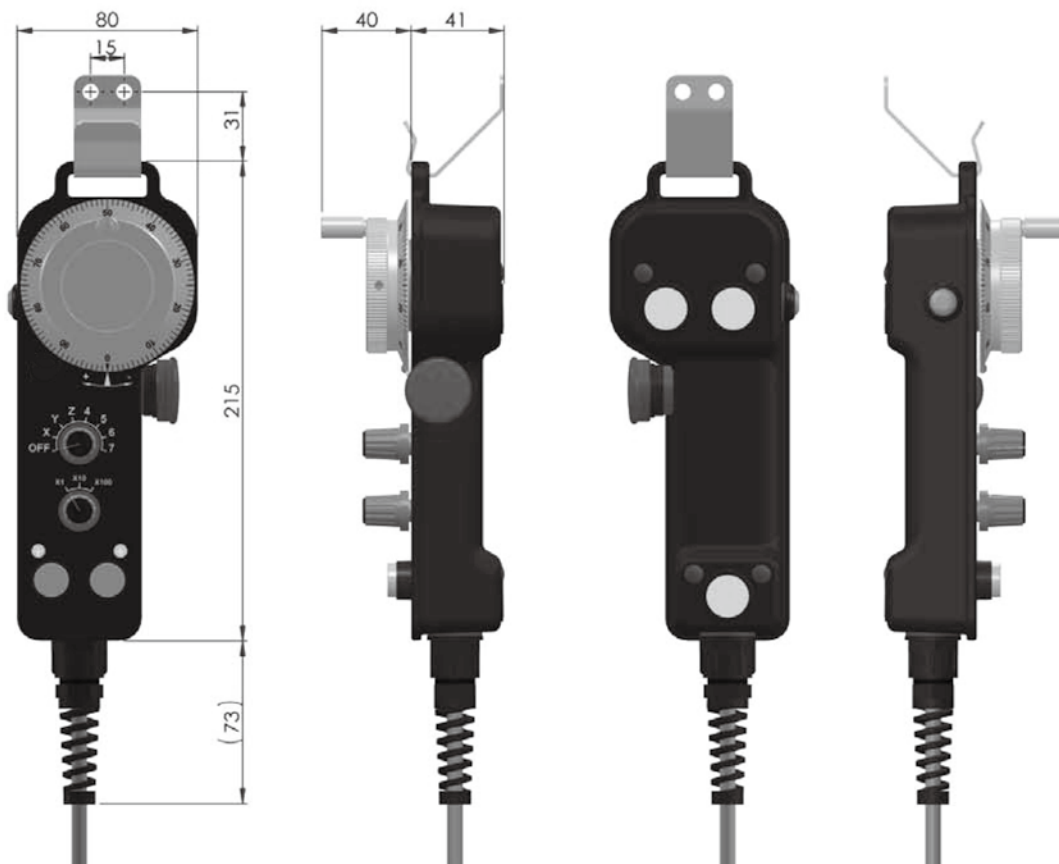
Series PHD / Pendent Hand-Held / 6 Axis / With E-Stop (2-Contacts) / Enable SW

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|---|--|------------|
| PHD-100-E-6-L | 100 Pulse, 5v DC, Linedriver Output, E-Stop SW, Rear Magnets Two (2) Mode Switches. (6 axis and multiplier) 5m (16 ft.) Spiral Cable | \$750.00 |
| PHD-100-E-6-L-EN (w/Push Button SW capability) | 100 Pulse, 5v DC, Linedriver Output, E-Stop SW, Enable SW, Rear Magnets Two (2) Mode Switches. (6 axis and multiplier) 5m (16 ft.) Spiral Cable | \$800.00 |
| PHD-100-E-6-T-EN (For FANUC w/Push Button SW capability) | 100 Pulse, 5v DC, TTL Output, E-Stop SW, Enable SW, Rear Magnets Two (2) Mode Switches. (6 axis and multiplier) 5m (16 ft.) Spiral Cable | \$800.00 |

Series PHD / Pendent Hand-Held / 6 Axis / E-Stop (2-Contacts) / Push Button SW

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|---|---|------------|
| PHD-100-E-6-L-PB (w/Push Button SW capability) | 100 Pulse, 5v DC, Linedriver Output, E-Stop SW, Push Button SW Capability. Order Separately. Rear Magnets Two (2) Mode Switches. (6 axis and multiplier) 5m (16 ft.) Spiral Cable | \$770.00 |
| PHD-100-E-6-T-PB (For FANUC w/Push Button SW capability) | 100 Pulse, 5v DC, TTL Output, E-Stop SW, Push Button SW Capability. SW Order Separately. Rear Magnets Two (2) Mode Switches. (6 axis and multiplier), 5m (16 ft.) Spiral Cable | \$770.00 |

Outline Drawings (mm)



Series PHD / Pendant Hand-held

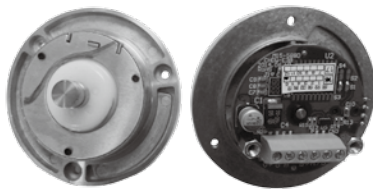
with E-Stop(2-Contacts) / Enable SW / Push Button SW capability

Push Button SW (-Sold Separately) -D.I.Y.Work



| MODEL NUMBER | SPECIFICATION | LISTPRICE |
|--------------------|--|-----------|
| AL6M-M14PWC | Momentary Push Button SW -IDEC, Hole dia 16 mm, SW dia 16-18 mm. Direct replacement for our previous Deca #D16LMR2 comes with One(1) set -(2) flying 3" wires w/2-pin conn. on the end | \$20.00 |
| AL6M-A14PWC | Alternate Push Button SW-IDEC, Hole dia 16 mm, SW dia 16-18 mm. Direct replacement for our previous Deca #D16LAR2 comes with One(1) set -(2) flying 3" wires w/2-pin conn. on the end | \$20.00 |

Replacement MPG for PHD-100-E-6 Series-Yellow SW's



| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|----------------------|--|------------|
| HDW-AE-80-CHM | Replacement MPG for 5v Line Driver outputs such as PHD-100-E-6-L, PHD-100-E-6-L-EN, PHD-100-E-6-L-PB, D.I.Y.Work | \$210.00 |
| HDW-AA-80-CHM | Replacement MPG for 5v TTL-Fanuc models outputs such as PHD-100-E-6-T-EN, PHD-100-E-6-T-PB, D.I.Y.Work | \$210.00 |

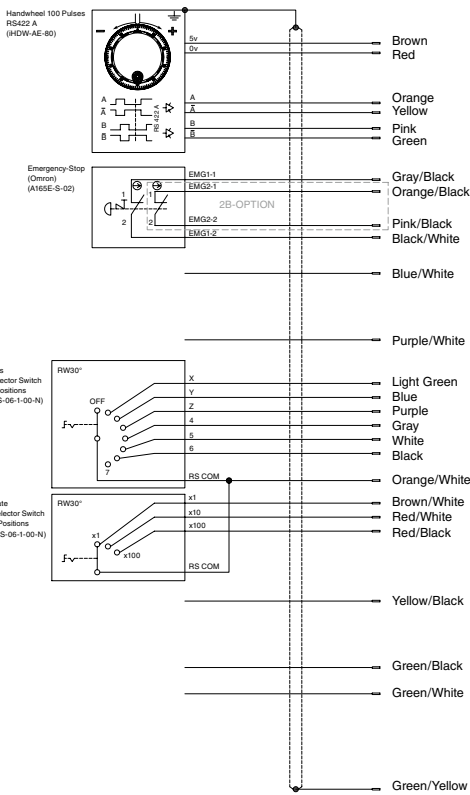
How to install a Replacement MPG to the old Pendant 2006-2016 model (Yellow SW's, Symmetrical Design)



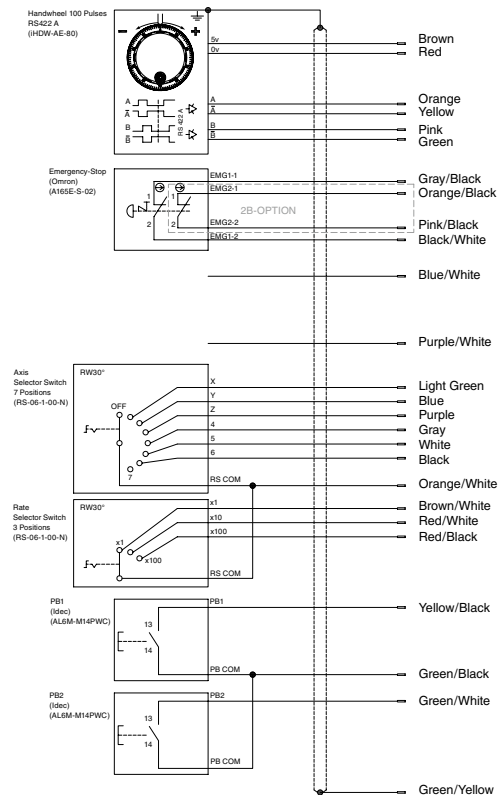
1. Take MPG dial out either side Hex. 2mm set screw of dial or remove the center aluminum plate out using a mini-flat screw driver.
2. Also, take (2) SW's out.
3. Take all screws (8) out from the front panel.
4. Cut over-sized 1.65" hole on the existing 1" hole of the front plastic panel.
5. Cut previous 6-wires and those flying wires insert into the new MPG.
6. Wire-color code:
 - 5v – Brown
 - 0v – Red
 - Ch.A – Orange
 - Ch.B – Pink
 - Ch.Anot – Yellow(Line Driver only)
 - Ch.Bnot – Green (Line Driver only)

Wiring Diagram-5v Line driver output (2B-Options are pre-wired)

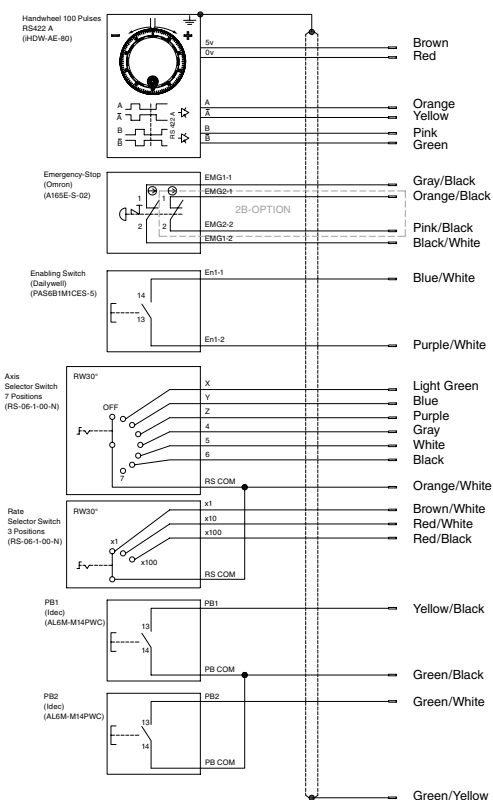
PHD-100-E-6-L



PHD-100-E-6-L-PB

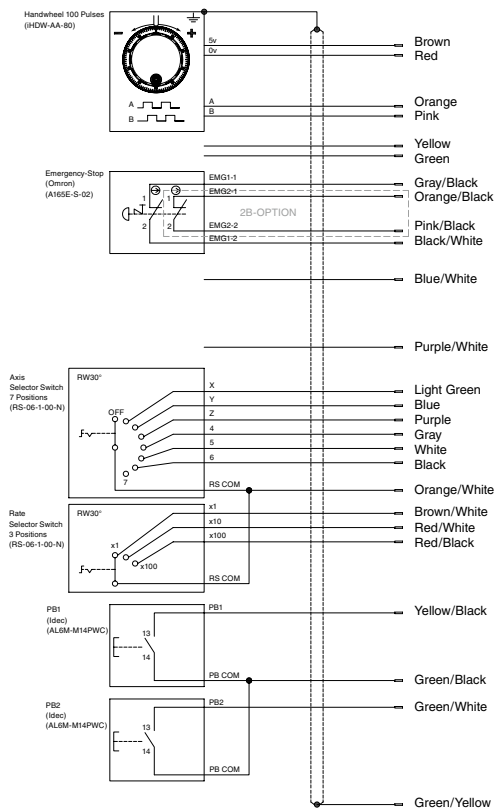


PHD-100-E-6-L-EN

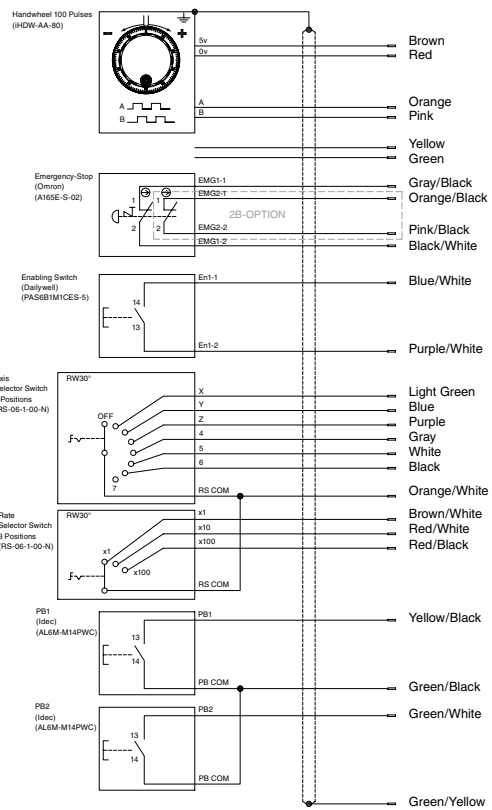


Wiring Diagram-5v TTL(Fanuc) output (2B-Options are pre-wired)

PHD-100-E-6-T-PB



PHD-100-E-6-T-EN



| MODEL | PRICE |
|---|----------|
| EE-6C004-A01 | \$230.00 |
| Replacement *5 m (16 ft.) Spiral Cable (25 wires)D.I.Y.Work* 5 m (16 ft.)-Extended length. Shrinked length= approx. 6 ft. | |



| MODEL | PRICE |
|---|--------|
| PH2.0-2P L8cm** | \$4.00 |
| Two(2) sets 3" length flying wires w/2-pin conn.on the end for your own Push Button SW's (Not World Encoders Brand)**If use World Encoders Push Button SW, Not required. | |



| MODEL | PRICE |
|---|---------|
| Amp CPC Size 17 connector kit | \$90.00 |
| 1.3"O.D., 0.75" I.D., 28 pos., #18-28 AWG Gold Solder 1-#206039-1 Plug, 28-#66570-3 Pin, 28-#66569-3 Socket, 1-#206038-1 Mating Receptacle 1-#207241-1 Cable Boot, 1-#207387 Cable Grip | |



| MODEL | PRICE |
|--|----------|
| Amp CPC Size 23 connector kit | \$190.00 |
| 1.73"O.D., 1.20" I.D., 24 pos., #20-26 AWG Gold Solder 1-#206037-1 Plug, 24-#66182-1 Pin, 24-#66183-1 Socket, 1-#206038-Mating Receptacle, 1-#206138-8 Cable Clamp, 1-#CF20MA-BK Strain Relief | |



| MODEL | PRICE |
|--|---------|
| Ampenhol Alloy Size 24 connector kit | \$90.00 |
| 1.7"O.D., 1.2" I.D., 24 pos., Size 24-28, 1-1/2"-18 UNEF 1-#MS3106F24-28P Straight Cable Plug with 24 Pin-Solder-Contacts, 1-Cable Clamp Backshell, 1-Rubber Grommet 1-#MS3102E24-28S Mating Receptacle with 24 Socket-Solder-Contacts, 1-Rubber Washer 1-1/4"O.D.x 3/8" I.D. x 1/16" 1-#AN3420-16, 1-#AN3420-6 Rubber Bushing Boots | |

Series EHDW/Pendant Hand-held



US \$600.00
S.R.P.
List Price

FEATURES

- CNC Controls for Fanuc, Mitsubishi, All others
- Multiplier x1, x10, x100 and axis selector SW's
- 5v TTL outputs (Point to point)
- IP 65, NAMA 4 enclosure protection
- Std. 10 ft. extended spiral cable
- Amp CPC Size 17 or Size 23 connector kit available as options
- John Ford replacement - 4,5 axis SW with Enable SW available
- Centroid Part # 10808, 5v TTL with 5 axis, CNC10 System, CPU10 MPG's CNC Control for Mills
- Centroid Part # 11069, 5v TTL with 3 axis, CNC11 System & Vice-versa, MPU11 MPG's CNC Control for Lathes
- Circular Plastic Size 17 & Amphenol Alloy Size 24 Connector Kits

SPECIFICATIONS

Electrical

| | |
|-----------------------|---|
| Outputs | TTL Voltage Output for FANUC |
| Pulse per Revolution | 100 PPR |
| Supply Voltage | 5 v±0.25 v dc |
| Output Voltage (VH) | ≥4.0 v |
| Output Voltage (VL) | ≤0.5 v |
| Current Requirement | ≤60 mA (No Loading) |
| Sink Current | ≤20 mA |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) |
| Rise/Fall Time | ≤2 μs |
| Frequency Response | 0-10 kHz |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) |
| Spiral Cable | 10 ft. extended, 21/17 pol., 22-24 AWG |

Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 500 r/min.-Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 3 lbs (1.5 kg) |

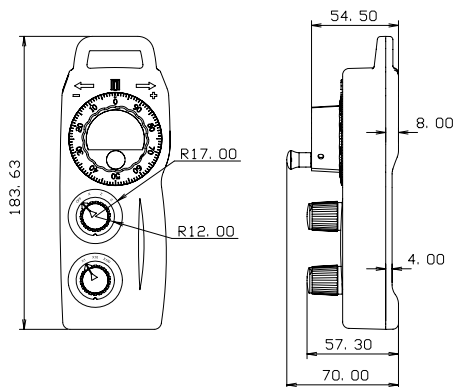
Environmental

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP65/NEMA 4 |

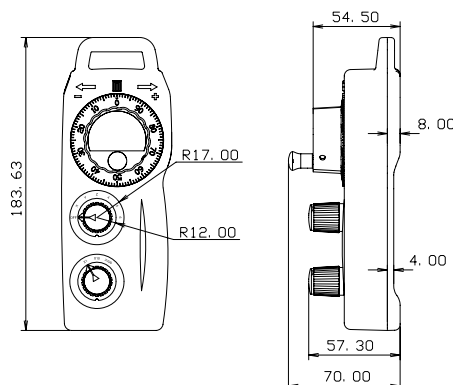
Rotary Switch

| | |
|-----------------------|------------------------|
| Max. Voltage | 30 v dc |
| Current / Switch Life | 50 mA / ≥25,000 cycles |

3-Axis



5-Axis



Series EHDW-Pendant Hand-Held for FANUC CNC-Lathes or Mills

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|---------------------|--|------------|
| EHDW-BA3S-IM | Fanuc CNC Control-3 axis Lathes. Centroid Part # 10808 100 Pulse, 5vDC, TTL Output, 3 axis SW. Multiplier SW, 10 ft. Spiral Cable, Magnets in rear. | \$600.00 |
| EHDW-BA5S-IM | Fanuc CNC Control-5 axis Mills. Centroid Part # 11069 100 Pulse, 5vDC, TTL Output, 5 axis SW. Multiplier SW, 10 ft. Spiral Cable, Magnets in rear. | \$600.00 |
| EHDW-CA4S-IM | Fanuc CNC Control-4 axis Mills with Enable SW 100 Pulse, 5vDC, TTL Output, 4 axis SW. Johnford replacement Multiplier & Enable SW's, 10 ft. Spiral Cable, Magnets in rear. | \$660.00 |
| EHDW-CA5S-IM | Fanuc CNC Control-5 axis Mills with Enable SW 100 Pulse, 5vDC, TTL Output, 5 axis SW. Johnford replacement Multiplier & Enable SW's, 10 ft. Spiral Cable, Magnets in rear. | \$660.00 |

Series EHDW-Pendant Hand-Held for Mitsubishi & Std. CNC Controls

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|---------------------|--|------------|
| EHDW-CD5S-IM | Mitsubishi CNC Control with Enable SW 25 Pulse, 12vDC, TTL Output, 5 axis SW Multiplier & Enable SW's, 10 ft. Spiral Cable, Magnets in rear. | \$660.00 |
| EHDW-BE5S-IM | Std. CNC Controls 100 Pulse, 5vDC, Diff. Line driver Output, 5 axis SW Multiplier & Enable SW's, 10 ft. Spiral Cable, Magnets in rear. | \$660.00 |
| EHDW-CE3L-IM | Std. CNC Controls 100 Pulse, 5vDC, Diff. Line driver Output, 3 axis SW Multiplier & Enable SW's, 16 ft. Spiral Cable, Magnets in rear. | \$770.00 |

WIRING DIAGRAM:

| Wire Color | Function | Centroid Pin# (AMP#206039-1) |
|--------------------|--------------|---------------------------------|
| Brown | 5v DC | 1 |
| Red + Orange/White | Ground | 2 |
| Orange | A | 3 |
| Pink | B | 4 |
| Olive | Axis 1 | 5 |
| Blue | Axis 2 | 6 |
| Purple | Axis 3 | 7 |
| Gray | Axis 4 | 8 (N/A in 3 Axis) |
| Green/White | Axis 5 | 9 (N/A in 3 Axis) |
| Brown/White | Rate x1 | 10 |
| Red/White | Rate x10 | 11 |
| Red/Black | Rate x100 | 12 |
| Blue/White | LED 5-24v dc | 13 |
| Gray/Black | LED Ground | 14 |
| Shield | Shield | 26 |

| MODEL | PRICE |
|--|---------|
| Amp CPC Size 17 connector kit | \$90.00 |
| 1.3"O.D., 0.75" I.D., 28 pos., #18-28 AWG Gold Solder Solder 1-#206039-1 Plug, 28-#66570-3 Pin, 28-#66569-3 Socket, 1-#206038-1 Mating Receptacle 1-#207241-1 Cable Boot, 1-#207387 Cable Grip | |



| MODEL | PRICE |
|--|---------|
| Amphenol Alloy Size 24 connector kit | \$90.00 |
| 1.7"O.D., 1.2" I.D., 24 pos., Size 24-28, 1-1/2"-18 UNEF 1-#MS3106F24-28P Straight Cable Plug with 24 Pin-Solder-Contacts, 1-Cable Clamp Backshell, 1-Rubber Grommet 1-#MS3102E24-28S Mating Receptacle with 24 Socket-Solder-Contacts, 1-Rubber Washer 1-1/4"O.D.x 3/8" I.D. x 1/16" 1-#AN3420-16, 1-#AN3420-6 Rubber Bushing Boots | |



| Model | Price |
|---------------------|----------|
| EE-6C004-A01 | \$230.00 |



Replacement 5m (16ft.) Spiral Cable (25 wires) - D.I.Y. work

Series iPHD/iHDW Pendant Hand-held with E-Stop (2-Contacts), 2-Enable, Jog+, Jog-, F1 SW's



US \$950.00
S.R.P.
List Price

FEATURES

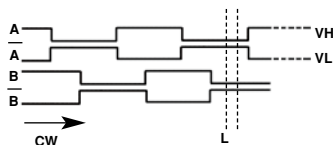
- Safety Level 3, conforms to EN418
- 2-Contacts E-Stop SW, 2-Enable SW (R & L)
- Jog+, Jog-, F1 function SW's
- Multiplier x1, x10, x100 and X-Y-Z-4-5 or X-Y-Z-4-5-6 axis selector SW's
- 5v Linedriver and 5v TTL outputs (Point to point)
- IP65, NAMA 4 enclosure protection
- Std. 16 ft. extended spiral cable
- Std. Magnets attached in rear
- Amp CPC Size 17 & Amphenol Allow Size 24 connector kit
- Euchner HBA-072 910 interchangeable model available in stock. (Binary code 0-Z-X-Y-4-5 axis)

SPECIFICATIONS

Electrical

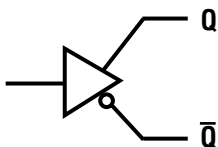
| Outputs | Line Driver | TTL Voltage Output for FANUC |
|-----------------------|---|------------------------------|
| Pulse per Revolution | 100 PPR | |
| Supply Voltage | 5 v±0.25 v dc | 5 v±0.25 v dc |
| Output Voltage (VH) | ≥2.5 v | ≥4.0 v |
| Output Voltage (VL) | ≤0.5 v | ≤0.5 v |
| Current Requirement | ≤60 mA (No Loading) | |
| Sink Current | ≤20 mA | |
| Output Capacity | Sync. Current: 20 mA, Residual Voltage: ≤0.5 v | |
| Phase Difference | Quadrature Square Wave A & B: 90°±45° (T/4±T/8) | |
| Rise/Fall Time | ≤2 μs | |
| Frequency Response | 0-10 kHz | |
| Insulation Resistance | 20 MΩ At 500 v dc Megger (Circuit-Body) | |
| Spiral Cable | 16 ft. extended, 25/26 pol., 22-24 AWG | |

OUTPUT WAVE FORMS



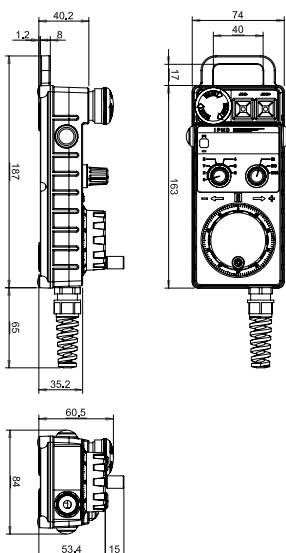
Relation between output signals and click stop position.

OUTPUT CIRCUIT



26LS31 or equivalent
Recommended line receiver: 26LS32

OUTLINE DRAWINGS



Mechanical

| | |
|---------------------|---|
| Dial Rotating Speed | 500 r/min.-Max., 200 r/min.-Normal (Continuous) |
| Starting Torque | 8.34 ozf-in (600 gf-cm) at 25°C |
| Rotational Life | 10x 6 bits turns at ≤ 200 rpm |
| Weight | 3 lbs (1.5 kg) |

Environmental

| | |
|-----------------------|--------------------------------------|
| Operating Temperature | 0° to 60° C |
| Humidity | RH 35% to 90% no condensation |
| Storage Temperature | 0° to 80° C |
| Vibration | 10-50 Hz/1.5mm X, Y, Z - 2 hrs. each |
| Shock | 50 G per 11 ms |
| Enclosure | IP65/NEMA 4 |

Rotary Switch

| | |
|-----------------------|------------------------|
| Max. Voltage | 30 v dc |
| Current / Switch Life | 50 mA / ≥25,000 cycles |

Emergency Stop Switch

| | |
|--------------------|-----------------------------------|
| DC Load Resistance | 30 vdc, 1.0 A IDEC # XA1E-BV3U02R |
|--------------------|-----------------------------------|

Enable Switch

| | |
|--------------------|--|
| DC Load Resistance | 50 vdc, 100 mA Dailywell # PAS6B1M1CES-5 |
|--------------------|--|

NOTE: Jog+, Jog-, F1 SW's Specifications are Momentary and Normally Open.

Series iPHD/iHWD Pendant Head-Held with E-Stop (2-Contacts), 2-Enable, Jog+, Jog-, F1 SW's

| MODEL NUMBER | SPECIFICATION | LIST PRICE |
|----------------------|---|------------|
| iPHD-FOE6L-IM | 100 Pulse 5v DC, Linedriver Output, E-Stop (2-Contacts) SW, 2-Enable SW (R+L), Two (2) Mode SW's (6 axis & multiplier), Jog+, Jog-, F1 Function SW's, 5m (16ft.) Spiral Cable | \$950.00 |
| iPHD-FOA5L-IM | 100 Pulse 5v DC, TTL Output, E-Stop (2-Contacts) SW, 2-Enable SW (R+L), Two (2) Mode SW's (5 axis & multiplier), Jog+, Jog-, F1 Function SW's, 5m (16ft.) Spiral Cable | \$950.00 |
| iPHD-FOECL-IM | Euchner HBA-072 910 Interchangeable Model, (Binary Code 0-Z-X-Y-4-5 axis) 100 Pulse, 5v DC, Linedriver Output, E-Stop (2-Contracts) SW (R+L), Two (2) Mode SW's (5 axis & multiplier), Jog+, Jog-, F1 Function SW's, 5m (16 ft.) Spiral Cable | \$980.00 |
| iHDW-BPE5L-IM | IPG Photonics Model (Formerly: iPHD-FOE5L-IM) 100 Pulse 5v DC, Linedriver Output, E-stop(2-Contacts) SW, 5 Axis, 2-Enable SW (R+L), Jog+, Jog-, 5m (16 ft.) Spiral Cable | \$900.00 |

| MODEL | PRICE |
|---|---------|
| Amp CPC Size 17 connector kit | \$90.00 |
| 1.3"O.D., 0.75" I.D., 28 pos., #18-28 AWG Gold Solder 1-#206039-1 Plug, 28-#66570-3 Pin, 28-#66569-3 Socket, 1-#206038-1 Mating Receptacle 1-#207241-1 Cable Boot, 1-#207387 Cable Grip | |



| MODEL | PRICE |
|--|----------|
| Amp CPC Size 23 connector kit | \$190.00 |
| 1.73"O.D., 1.20" I.D., 24 pos., #20-26 AWG Gold Solder 1-#206037-1 Plug, 24-#66182-1 Pin, 24-#66183-1 Socket, 1-#206038-Mating Receptacle, 1-#206138-8 Cable Clamp, 1-#CF20MA-BK Strain Relief | |



| MODEL | PRICE |
|--|---------|
| Amphenol Alloy Size 24 connector kit | \$90.00 |
| 1.7"O.D., 1.2" I.D., 24 pos., Size 24-28, 1-1/2"-18 UNEF 1-#MS3106F24-28P Straight Cable Plug with 24 Pin-Solder-Contacts, 1-Cable Clamp Backshell, 1-Rubber Grommet 1-#MS3102E24-28S Mating Receptacle with 24 Socket-Solder-Contacts, 1-Rubber Washer 1-1/4"O.D.x 3/8" I.D. x 1/16" 1-#AN3420-16, 1-#AN3420-6 Rubber Bushing Boots | |

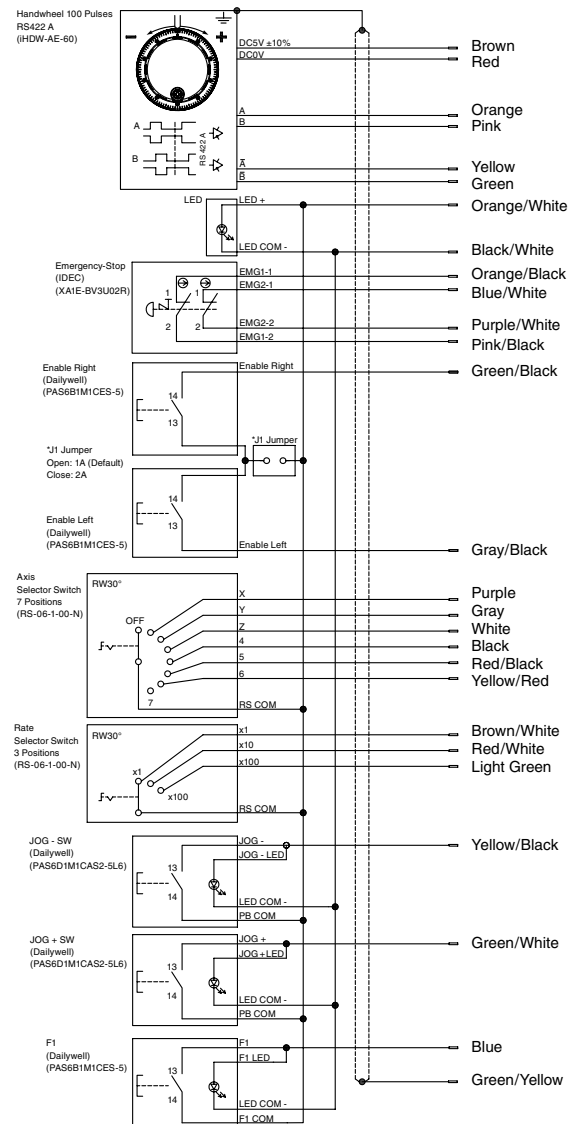


| MODEL | PRICE |
|--|----------|
| EE-6C004-A01 | \$230.00 |
| Replacement *5 m (16 ft.) Spiral Cable (25 wires) D.I.Y.Work* 5 m (16 ft.)-Extended length. Shrunked length= approx. 6 ft. | |



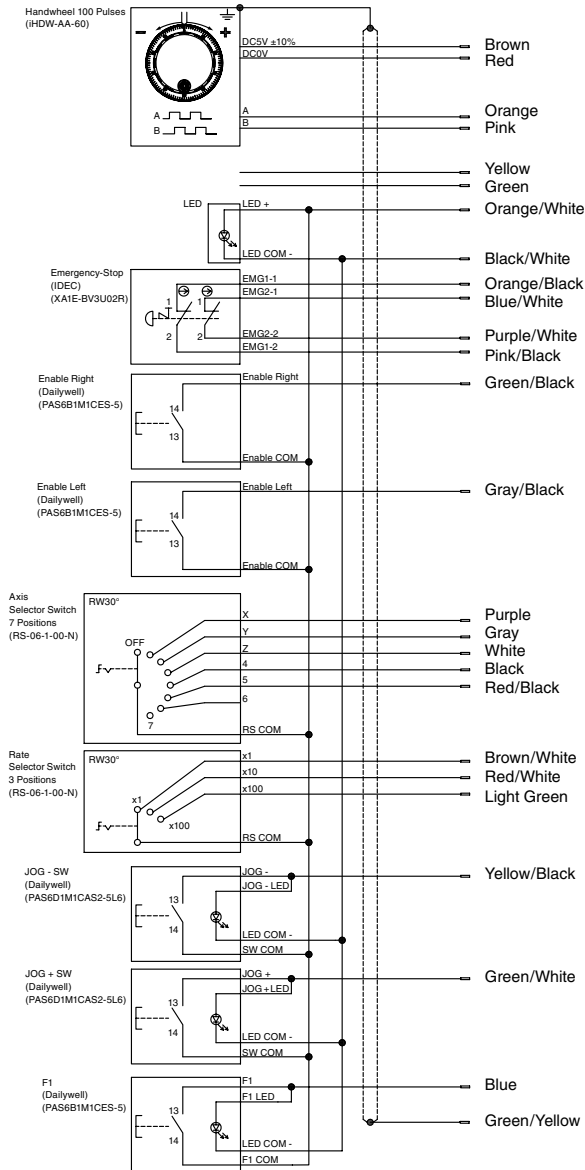
WIRING DIAGRAM

iPHD-FOE6L-IM (6 axis, 5v Line Driver, PTP)

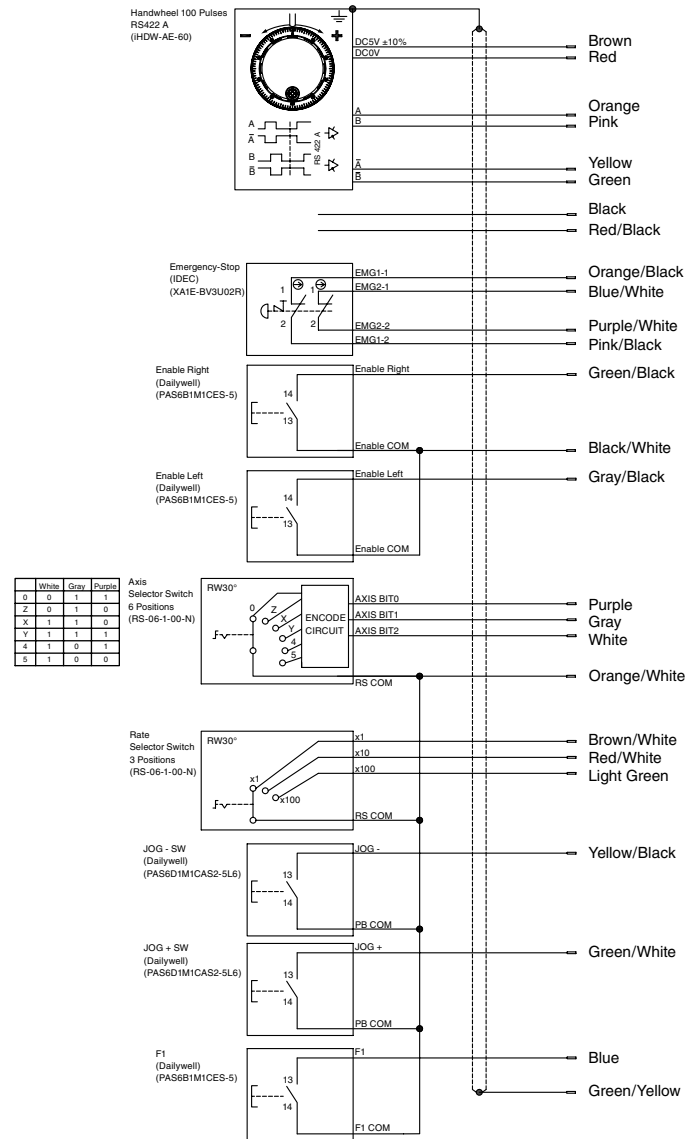


WIRING DIAGRAM

IPHD-FOA5L-IM (5 axis, 5v TTL, PTP)



IPHD-FOECL-IM (5 axis, 5v Line Driver, Binary)



Warranty and Terms

1. GENERAL

WORLD ENCODERS INCORPORATED is hereinafter referred to as "World Encoders". All sales of World Encoders are subject to the following terms and conditions. Any order that contains terms and conditions in addition to or inconsistent with the following shall not be binding upon World Encoders unless acceptance thereof is made in writing by an authorized representative of World Encoders, and failure of World Encoders to object to provisions contained in any purchase order or other communication from Buyer shall not be construed as a waiver of these conditions nor an acceptance of any such provisions.

Specific quotations showing definite quantities must be made for each order and are subject to immediate acceptance.

No orders for products of World Encoders shall be binding upon World Encoders until accepted in writing by an authorized representative of World Encoders.

The right is reserved to correct clerical and stenographic errors at any time.

World Encoders will comply with all applicable federal, state and local laws. Without limiting the generality of the foregoing, World Encoders represents that the products to be furnished or the services rendered hereunder were or will be produced or performed in compliance with all applicable requirements of Sections 6, 7, and 12 of the Fair Labor Standards Act of 1938, as amended, and of all valid and applicable regulations and orders of the Administrator of the Wage and Hour Division issued under Section 14 thereof.

IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

3. MINIMUM BILLING

Minimum billing for any apparatus or parts sold by World Encoders shall be \$50.00 NET.

4. DELIVERY POINT

All prices quoted (including repairs, parts, and bases sold separately) are f.o.b. the World Encoders's factory.

5. PACKING

All prices listed provide for standard packing for domestic shipment in accordance with World Encoders's standard specifications. If special packing is required for domestic shipment or for export shipment, refer to the factory, or nearest District Office for price additions.

6. PRICE CHANGES

All prices in World Encoders' price book or other printed matter as well as written or verbal quotations are subject to change without further notice.

7. PENALTY CAUSES

Contracts or quotations showing penalty clause for failure to meet shipment are not acceptable unless specifically approved in writing by an officer of World Encoders.

8. PRODUCT CHANGES

Changes in design and improvements in manufacture are constantly being made by World Encoders. These changes and improvements are being made whenever World Encoders believes the product will be improved. No obligation to incorporate these changes in units manufactured prior to the change will be assumed.

9. CANCELLATION

All orders are considered non-cancelable if our factory is already in the process of manufacturing. However, cancellation may be accepted by World Encoders' Sales Management (at their sole discretion) if the item is considered to be a popular, saleable, item.

Minimum cancellation charge is 25% of unit price.

Orders for non-standard catalog items are not subject to cancellation after order is accepted by World Encoders.

10. DELAY

Delay in delivery of any installment shall not relieve Buyer of his obligations to accept remaining deliveries. World Encoders shall not be liable for damage as a result of any delay due to any cause beyond World Encoders' reasonable control including, without limitation, act of God, act of war, riot, delay in transportation or inability to obtain necessary labor, materials, or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

2. WARRANTY

Standard products manufactured by World Encoders are warranted to be free from defects in workmanship and material for period of one (1) year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced at the option of World Encoders, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with World Encoders. The obligation of World Encoders hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by World Encoders of written notice of any alleged defects, or deficiency promptly after discovery, within the warranty period, and in the case of components or units purchased by World Encoders, the obligation of World Encoders shall not exceed the settlement that World Encoders is able to obtain from the supplier thereof. No products shall be returned to World Encoders without its prior consent. Products which World Encoders consents to have returned shall be shipped of f.o.b. World Encoders's factory. World Encoders cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of World Encoders depends to a large extent upon type of usage thereof, and World Encoders MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO A PERIOD OF SERVICE UNLESS World Encoders SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR

Warranty and Terms

11. TAXES AND OTHER CHARGES

Any manufacturer's tax, retailer's occupation tax, use tax, sales tax, excise tax, duty, custom inspection or testing fee or any other tax, fee or charge of any nature whatsoever imposed by any governmental authority, on or measured by any transaction between World Encoders and the Buyer, shall be paid by the Buyer in addition to the prices quoted or invoiced. In the event World Encoders shall be required to pay any back tax, fee, or charge, the Buyer shall reimburse World Encoders therefore or in lieu of such payment, the Buyer shall provide World Encoders at the time the order is submitted with an exemption certificate or other document acceptable to the authority imposing the same.

12. PAYMENTS

Standard terms of credit are net 30 days providing satisfactory credit is established with World Encoders.

A 1-1/2% monthly service charge (18% annually) will be added to all accounts not paid within 30 days from date of invoice.

If in the judgement of World Encoders the financial condition of the Buyer at any time does not justify continuance of production or shipment on the terms of payment originally specified World Encoders may require full or partial payment in advance and in the event of bankruptcy or insolvency of the Buyer or if any proceeding is brought by or against the Buyer under the bankruptcy or insolvency laws, World Encoders shall be entitled to cancel any order then outstanding and shall receive reimbursement for its cancellation charges.

Each shipment shall be considered a separate and independent transaction and payment therefore, shall be made accordingly. If shipments are delayed by the Buyer, payments shall become due on the date when World Encoders is prepared to make shipment. If the work covered by the purchase order is delayed by the Buyer payment shall be made on the purchase price and the percentage of completion. Products held for the Buyer shall be at the risk and expense of the Buyer unless otherwise agreed upon in writing. World Encoders reserves the right to ship to its order and make collection by slight draft with bill of lading attached or on a C.O.D. basis or any other terms approved in writing by World Encoders's Credit Department.

13. PATENTS

World Encoders shall defend any suit or proceeding brought against Buyer so far as it is based on a claim that any Company apparatus, or any part thereof furnished, when employed in the manner intended by World Encoders, constitutes an infringement of any patent of the United States, issued on the date hereof, if notified promptly in writing and given authority, information and assistance (at World Encoders's expense) for the defense of same, and World Encoders shall pay all damages and costs awarded therein against Buyer. In case the apparatus or any part thereof is in such suit held to constitute infringement and its use, in the manner intended by World Encoders is enjoined, World Encoders shall, at its own expense, and at its option,

either: Procure the right to continue using said apparatus or replace same with non-infringing apparatus, or modify it so it becomes non-infringing or remove said apparatus and refund the purchase price and the transportation and installation costs thereof.

The foregoing states the entire liability of World Encoders for patent infringements by said apparatus or any part thereof, and in no event shall World Encoders be liable if the infringement is based on the use of the apparatus for a purpose other than that for which sold by World Encoders. As to any product furnished by World Encoders to the Buyer manufactured in accordance with designs proposed, by the Buyer shall indemnify the Company against any loss, cost, expense and/or award made against World Encoders for any patent, trademark, or copyright infringements or alleged infringements.

14. RMA RETURNS

Before returning material to World Encoders, a return authorization number must be obtained. We will not accept any returns or exchange without a return authorization number.

15. WARRANTY & RMA POLICY

World Encoders products are warranted to be free from defects in workmanship and material for a period of one(1) year from the date of shipment.

Warranty repairs/Return Material Authorization will not be accepted after one(1) year.

Also after one(1) year, we will not accept any repairs. Do not send us any out of warranty items.

World Encoders has the right to refuse and dispose of your out of warranty items without notice.

NOTE: PRICE SUBJECT TO CHANGE WITHOUT NOTICE.



TDS Precision Products GmbH
Industriestrasse 1a
CH-8157 Dielsdorf

T + 41 44 885 30 80
info@tds-pp.com
www.tds-pp.com