



8901 E. PLEASANT VALLEY ROAD
 INDEPENDENCE, OHIO 44131-5508
TELEPHONE: (1) 216-642-1230 • **FAX:** (1) 216-642-6037
E-MAIL: tachs@avtron.com • **WEB:** www.avtronencoders.com

Encoder Instructions

M115 THIN-LINE™
INACTIVE DESIGN
 Replaced by Model AV115

115mm B-FLANGE MOUNT, MODULAR

DESCRIPTION

The Avtron M115 is a modular, two piece incremental encoder (also known as a tachometer or rotary pulse generator). It provides a two phase, A Quad B frequency (pulse) output, with complements. The M115 mounts on a 115mm C-Face, also known as a B-Flange.

Because the M115 is modular, there are no bearings or couplings required. This, combined with the latest magneto-resistive (MR) sensor technology, allows the M115 to provide superior mechanical performance and increased reliability.

An Avtron M115 can be configured with one or two independent outputs. Each output has six signals: (A, B) 90° out of phase, with complements (\bar{A} , \bar{B}). A marker pulse with complement (Z , \bar{Z}) is also provided.

INSTALLATION

Refer to the back page of these instructions for outline and mounting dimensions. Axial float or endplay must be less than ± 1.27 mm.

In preparation for installing the Model M115 pulse generator, it is first necessary to clean both the accessory motor shaft and the mounting face. These surfaces must be inspected and any paint, burrs, or other surface imperfections removed.

Installation procedures should be performed only by qualified personnel. Safety precautions must be taken to ensure machinery cannot rotate and all sources of power are removed during installation.

Equipment Needed for Installation

Provided	Optional	Not Provided
M115 Stator/Housing Socket Hd Cap Screw M10 x 20mm (4) M115 Rotor Socket Set Screw M4 x 6mm (2)	Thru Shaft Cover w/ V-Ring Seal and Silicone Lubricant	Phillips Screwdriver 2mm Hex Wrench (T-Handle Style for Std. Thru-Shaft Rotors) 5mm Hex Wrench

STANDARD THRU SHAFT ROTOR INSTALLATION

The motor shaft must project at least 16mm from the motor face. Apply anti-seize compound to the motor shaft. Apply thread locker to the rotor set screw holes, preferably from the inside of the bore. Slide the rotor onto the shaft with the P/N marking facing out (away from the motor face). The rotor centerline must match the sensor centerline. To accomplish this, use the Rotor Locating Gauge and slide the rotor onto the shaft until it is in the proper position as shown in Figure 1. Tighten the rotor set screws to 2 N-m using the 2mm T-handle hex wrench.

CAUTION

Use only a T-handle or torque hex wrench to tighten set screws; using a right angle wrench will not provide enough holding force, and the rotor may slip.

STATOR HOUSING INSTALLATION

The stator housing is attached to the motor using four socket head cap screws M10 x 1.5 x 20mm long, locating

M115 PART NUMBERS AND AVAILABLE OPTIONS

Model	Housing Type	Shaft Size (Thru Shaft Rotor)	Cover Style	Line Driver	Single/Left Output	Right Output	Connector	Modifications
M115	1- Single Output, 115mm Pilot 2- Dual Output, 115mm Pilot	0- Non-Standard Shaft Size X- None 2- 10mm L- 42mm A- 11mm M- 45mm 3- 12mm N- 48mm B- 14mm P- 52mm C- 15mm R- 55mm D- 16mm S- 60mm 4- 18mm T- 65mm E- 19mm V- 70mm F- 24mm W- 75mm G- 28mm Y- 80mm H- 30mm Z- 85mm i- 32mm J- 36mm K- 38mm	X- None F- Flat Cover T- Flat Thru-Hole Cover with Shaft Seal	1- 5 to 24 VDC 2- 5 to 15 VDC 4- 5 to 24 VDC, 5v out	BASE PPR 128 A- 128 PPR B- 256 PPR C- 512 PPR D- 1024 PPR E- 2048 PPR BASE PPR 120 F- 120 PPR G- 240 PPR H- 480 PPR i- 960 PPR L- 600 PPR M- 1200 PPR BASE PPR 90 J- 90 PPR K- 360 PPR N- 720 PPR P- 900 PPR	X- None BASE PPR 128 A- 128 PPR B- 256 PPR C- 512 PPR D- 1024 PPR E- 2048 PPR BASE PPR 120 F- 120 PPR G- 240 PPR H- 480 PPR i- 960 PPR L- 600 PPR M- 1200 PPR BASE PPR 90 J- 90 PPR K- 360 PPR N- 720 PPR P- 900 PPR	P- 10 Pin EPIC Industrial w/ Plug W- 1 M Flexible Cable, Sealed Z- 1 M Flexible Cable w/ EPIC Industrial	000- No Modification 004- Drain Hole (single output only) 006- Right Angle Cable Bushing 009- No Paint 9xx- Special Cable Length, xx=length in feet

on a 150mm bolt circle. Longer bolts (not included), are required for sandwich installation between a motor and a brake. Install the four mounting bolts using thread locker and torque to approximately 27 to 40 N-m using the 5mm T-handle hex wrench.

VERIFY ROTOR LOCATION

To ensure the rotor is properly located on the shaft: remove the back cover if factory-preinstalled, and verify that the outer face of the rotor is at the same depth as the alignment grooves, using a straight edge tool. (Figure 3)

CAUTION

Do not use silicone sealants or caulk of any kind on the motor or encoder face; these can cause

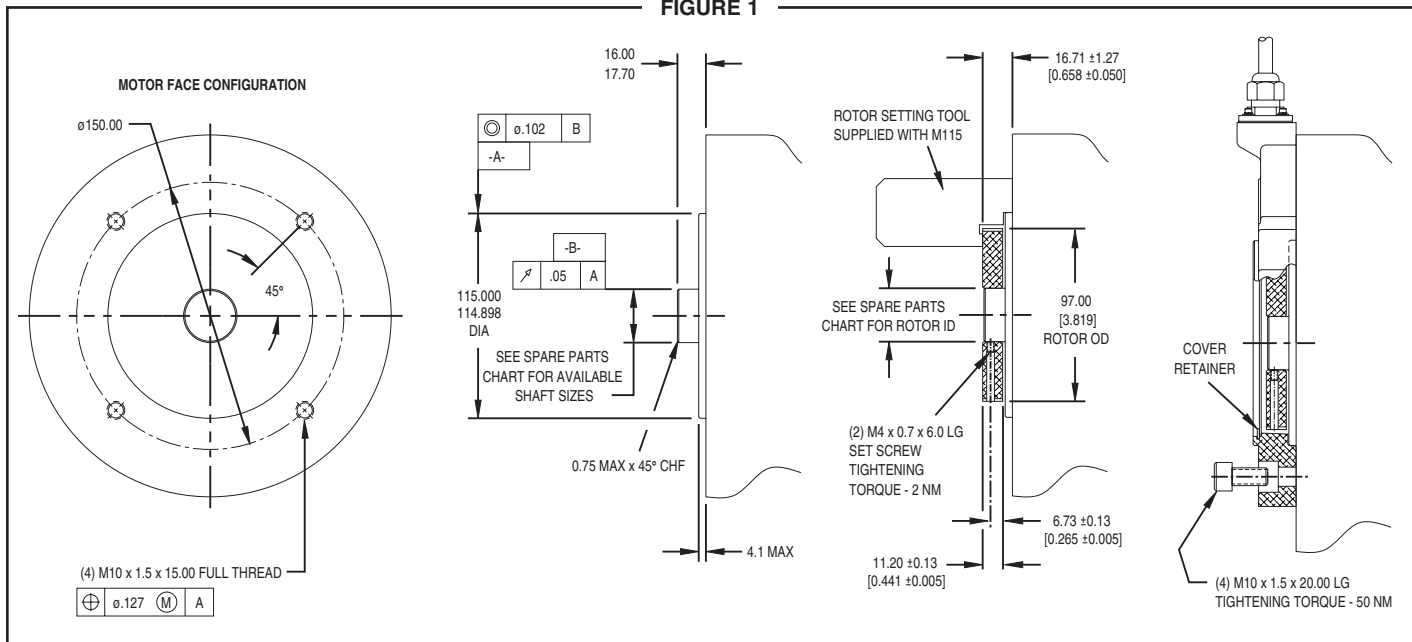
misalignment or sensor scraping damage. The M115 electronics are fully sealed; water may enter and leave the rotor area as needed. A drain hole option is available if frequent moisture buildup is expected.

COVER INSTALLATION

Covers must not interfere with the motor shaft or rotor. The longest shaft that can be used without interfering is 17.5mm with a standard flat cover (Cover Style option "F") and 63.5mm with an extended "pie pan" cover (Cover Style option "E"). Through shaft covers with seals are available for other applications (Cover Style option "T").

EXTENDED COVER MOUNT (Cover Style option "E")

FIGURE 1



SPECIFICATIONS

ELECTRICAL

- A. Operating Power (Vin) (See Line Driver Options)
 1. Volts.....5-24 VDC (options 1 & 4), 5-15 VDC (option 2)
 2. Current.....60mA, each output, no load
- B. Output Format
 1. 2Q & CompA, \bar{A} , B, \bar{B} (differential line driver)
 2. Marker:.....1/Rev
- C. Signal Type.....Incremental, Square Wave, 50 ±10% Duty Cycle.
- D. Direction Sensing..... $\bar{O}A$ leads $\bar{O}B$ for CW rotation as viewed from the back of the tach looking at the non-drive end of the motor.
- E. Transition Sep.....15% minimum
- F. Frequency Range:.....0 to 150,000 Hz
- G. PPR.....120-2048
- H. Line Driver Specs:.....See table
- I. Connectors.....See connector options on page 1

MECHANICAL

- A. Rotor Inertia:0.04 Oz. In. Sec.²
- B. Acceleration:.....5000 RPM/Sec. Max.
- C. Speed:.....5000 RPM Max.
- D. Weight:1.13 to 1.81 kg. [2.5 to 4 lbs.]
- E. Sensor to Rotor
 - Air Gap (nominal):.....0.762mm
 - Tolerance:.....±0.381mm

ENVIRONMENTAL

- Solid cast aluminum stator and rotor
- Fully potted electronics, protected against oil and water spray
- Use "W" cable option for IP66/67 applications
- V-Ring seals provided on through shaft covers
- Operating Temperature:-40 to 100°C, 0-100% condensing humidity

LINE DRIVER OPTIONS

	Output Options		
	1	2	4
Voltage Input (Vin)	5-24 VDC	5-15 VDC	5-24 VDC
Output High (Volts)	(Vin) -2 (typ)	(Vin) -1 (typ)	5 VDC
Output High (milliamps)	80 (max.)	80 (avg.), 1500 (peak)	80 (max.)
Output Low (Volts)	0.5 (typ)	0.5 (typ)	0.5 (typ)
Output Low (milliamps)	80 (max.)	80 (avg.), 1500 (peak)	80 (max.)
Protection	Reverse Voltage, Transient, Short Circuit (high & low)	Reverse Voltage, Transient	Reverse Voltage, Transient, Short Circuit (high & low)
Maximum Cable Drive(Feet)	304.8M @ 5 V 152.4M @ 12 V 61.0M @ 24 V	610M	304.8M @ 5 V

The extended cover mounts to the encoder housing using quantity 4 #6-32 x 0.31" screws, lock washers, and thread locker.

THRU SHAFT AND FLAT COVER INSTALLATION

(Cover Style option "T" and "F")

The housing has a machined step in the outboard face to accept the cover and a recessed groove for the retaining ring. Insert the cover, smooth side facing out, fully into the machined step until it seats against shoulder. Using a spiral assembly method, install the retaining ring by first inserting the squared off end into the machined groove. Flex the ring and insert it into the groove walking it around the perimeter (A flat blade screwdriver can be used). Final position should have the ring fully seated into groove. Remove the cover by reversing above procedure, starting with the tang end.

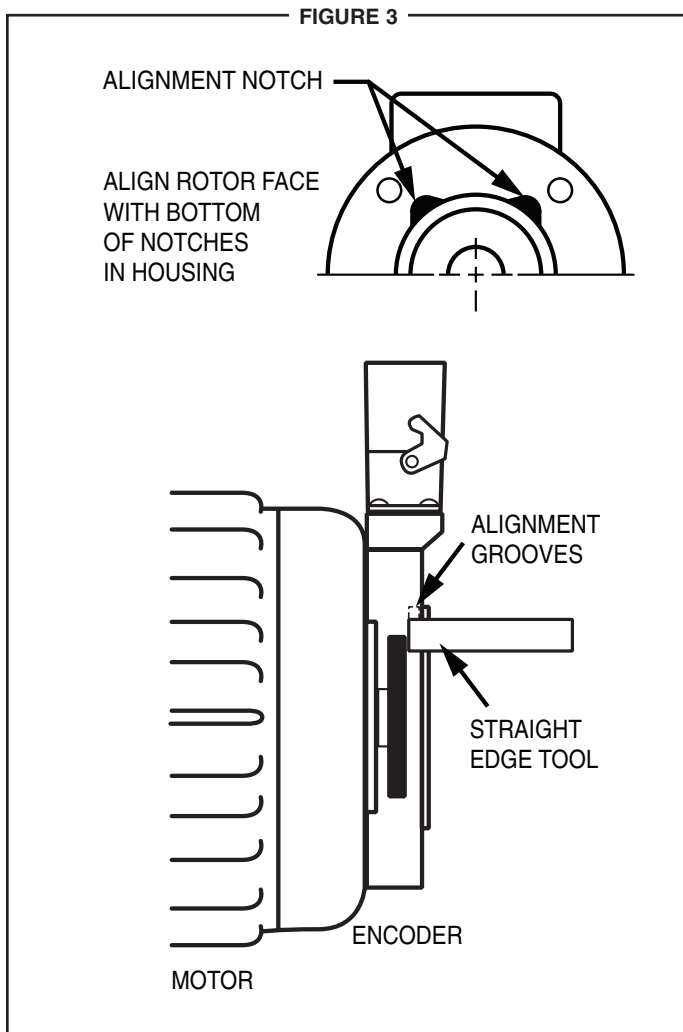
CAUTION

For through shaft applications, apply a small amount of adhesive (not supplied) to the cover and retaining ring to prevent rotation from seal contact.

V-RING INSTALLATION FOR THRU SHAFT COVERS

(Cover Style option "T")

For thru shaft covers, verify that the shaft passes completely through the hole in the cover. Apply a small amount



of silicone lubricant to the cover plate around the thru shaft hole. The V-ring seal should compress axially when it is pressed against the clean, smooth face of the cover plate. See Figure 4 for proper installation and V-Ring compression.

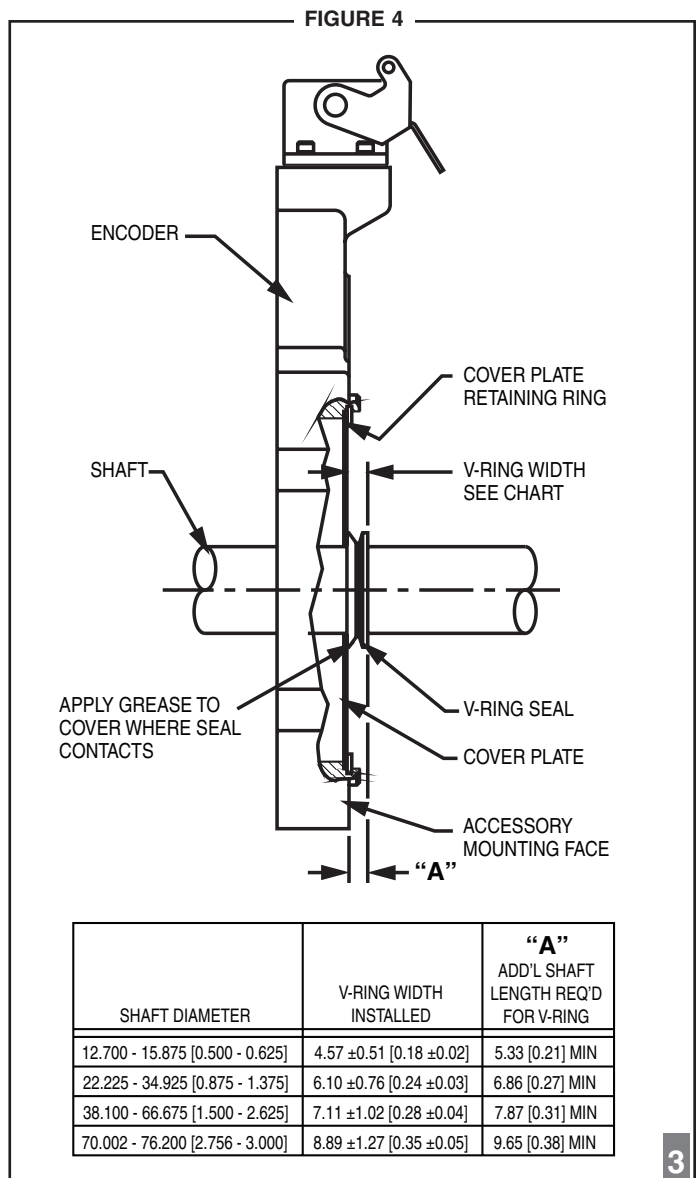
WIRING

Refer to the wiring diagrams for specific information on each option.

The M115 can be wired for single phase or two phase, either with or without complements, with or without markers. For bidirectional operation, Phase A channel leads phase B channel for clockwise shaft rotation as viewed from the anti-drive or accessory end of the motor (M115 mounting end).

NOTE

Avtron's convention for A and B wiring, as well as clockwise rotation, are EXACTLY REVERSED from Northstar (Danaher) Slimline™. This means the Avtron THIN-LINE™ M115 can be installed to an existing connection for Slimline SL115, and it will produce rotation in the expected direction without rewiring.



CORRECTIVE ACTION FOR PHASE REVERSAL

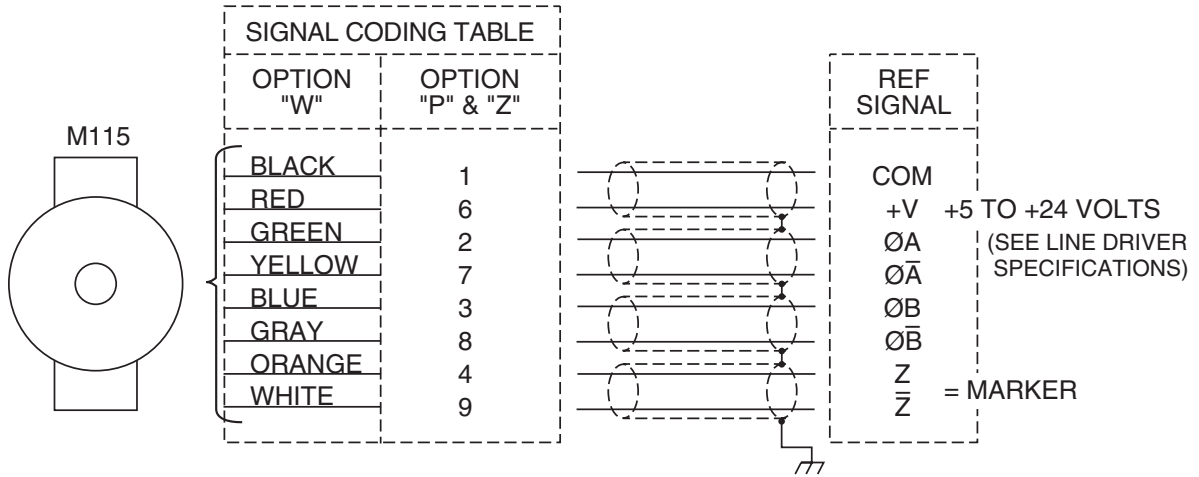
- 1) Remove Power.
- 2) Exchange wires on cable, either at encoder cable end, or at speed controller end (but not both).
 - a) **Single Ended 2 Phase Wiring** (see wiring diagram) Exchange A and B at the use end of the wires.
 - b) **Differential 2 Phase Wiring** (see wiring diagram) Exchange **either** A with \bar{A} in the phase A pair **OR** B with \bar{B} in the phase B pair but **NOT** both.
- 3) Apply Power.
- 4) Verify encoder feedback is correct, using hand rotation of shaft, or jog mode of the speed controller.

Interconnecting cables specified in the wire selection chart are based on typical applications. Physical properties of cable such as abrasion, temperature, tensile strength, solvents, etc., are dictated by the specific application. General electrical requirements are: stranded copper, 22 through 16 AWG (Industrial EPIC connector type options can use 14 AWG), each wire pair individually shielded with braid or foil with drain wire, .05 uf of maximum total mutual or direct capacitance, outer sheath insulator. See specifications for maximum cable length. Stranded 22 AWG wire should not be used for cable runs greater than 61 meters. If 22 AWG is used with EPIC type connector options the wire ends should be tinned.

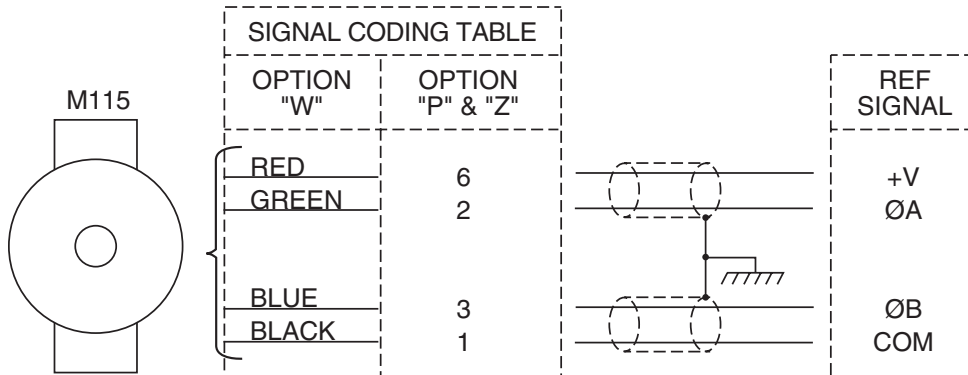
SPARE PARTS							
NOMINAL SHAFT SIZE	MOTOR SHAFT TOLERANCE	ROTOR ID TOLERANCE	OPTION CODE	ROTOR P/N			THRU SHAFT COVER P/N
				BASE PPR 120	BASE PPR 128	BASE PPR 90	
10MM [0.3937]	h6 (-0.009/+0.000)	+0.013/+0.030	2	B29329-24	B29530-24		A31207-23
11MM [0.4331]	h6 (-0.011/+0.000)	+0.013/+0.030	A	B29329-16	B29530-16	B29851-16	A31207-16
12MM [0.4724]	j6 (-0.003/+0.008)	+0.021/+0.038	3	B29329-25	B29530-25		A31207-24
14MM [0.5512]	j6 (-0.003/+0.008)	+0.021/+0.038	B	B29329-3	B29530-3	B29851-3	A31207-3
15MM [0.5906]	g6 (-0.017/-0.006)	+0.007/+0.024	C	B29329-1	B29530-1	B29851-1	A31207-1
16MM [0.6299]	j6 (-0.003/+0.008)	+0.021/+0.038	D	B29329-19	B29530-19	B29851-19	A31207-19
18MM [0.7087]	j6 (-0.003/+0.008)	+0.021/+0.038	4	B29329-23	B29530-23	B29851-23	A31207-25
19MM [0.7480]	j6 (-0.004/+0.009)	+0.022/+0.039	E	B29329-4	B29530-4	B29851-4	A31207-4
24MM [0.9449]	j6 (-0.004/+0.009)	+0.022/+0.039	F	B29329-5	B29530-5	B29851-5	A31207-5
28MM [1.1024]	j6 (-0.004/+0.009)	+0.022/+0.039	G	B29329-6	B29530-6	B29851-6	A31207-6
30MM [1.1811]	h6 (-0.013/+0.000)	+0.013/+0.030	H	B29329-2	B29530-2	B29851-2	A31207-2
32MM [1.2598]	h6 (-0.016/+0.000)	+0.013/+0.030	i	B29329-17	B29530-17	B29851-17	A31207-17
36MM [1.4173]	j6 (-0.005/+0.011)	+0.024/+0.041	J	B29329-20	B29530-20	B29851-20	A31207-20
38MM [1.4961]	k6 (+0.002/+0.018)	+0.031/+0.046	K	B29329-7	B29530-7	B29851-7	A31207-7
42MM [1.6535]	k6 (+0.002/+0.018)	+0.031/+0.046	L	B29329-8	B29530-8	B29851-8	A31207-8
45MM [1.7717]	h6 (-0.016/+0.000)	+0.013/+0.030	M	B29329-18	B29530-18	B29851-18	A31207-18
48MM [1.8898]	k6 (+0.002/+0.018)	+0.031/+0.046	N	B29329-9	B29530-9	B29851-9	A31207-9
52MM [2.0472]	m6 (+0.011/+0.030)	+0.043/+0.060	P	B29329-21	B29530-21	B29851-21	A31207-21
55MM [2.1654]	m6 (+0.011/+0.030)	+0.043/+0.060	R	B29329-10	B29530-10	B29851-10	A31207-10
60MM [2.3622]	m6 (+0.011/+0.030)	+0.043/+0.060	S	B29329-11	B29530-11	B29851-11	A31207-11
65MM [2.5591]	m6 (+0.011/+0.030)	+0.043/+0.060	T	B29329-12	B29530-12	B29851-12	A31207-12
70MM [2.7559]	m6 (+0.011/+0.030)	+0.043/+0.060	V	B29329-13	B29530-13	B29851-13	A31207-13
75MM [2.9528]	m6 (+0.011/+0.030)	+0.043/+0.060	W	B29329-14	B29530-14	B29851-14	A31207-14
80MM [3.1496]	m6 (+0.011/+0.030)	+0.043/+0.060	Y	B29329-22	B29530-22	B29851-22	A31207-22
85MM [3.3465]	m6 (+0.013/+0.035)	+0.048/+0.065	Z	B29329-15	B29530-15	B29851-15	A31207-15

WIRING DIAGRAMS

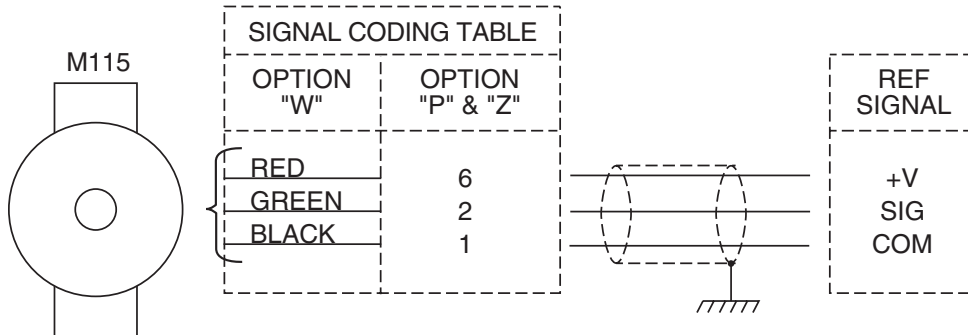
FOR DIFFERENTIAL APPLICATIONS



FOR SINGLE ENDED TWO PHASE APPLICATIONS



FOR SINGLE ENDED SINGLE PHASE APPLICATIONS



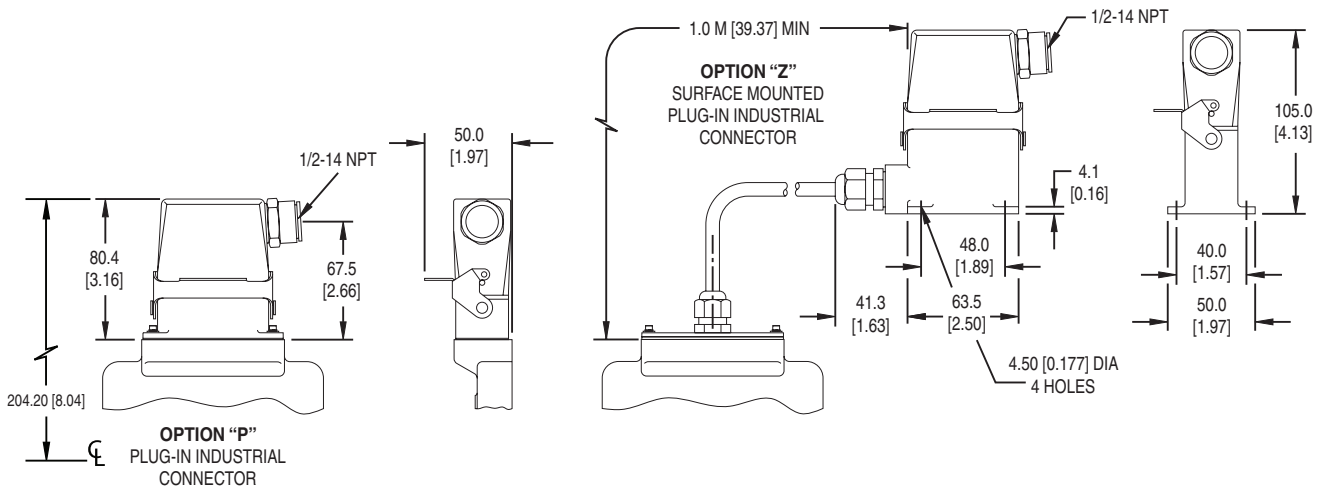
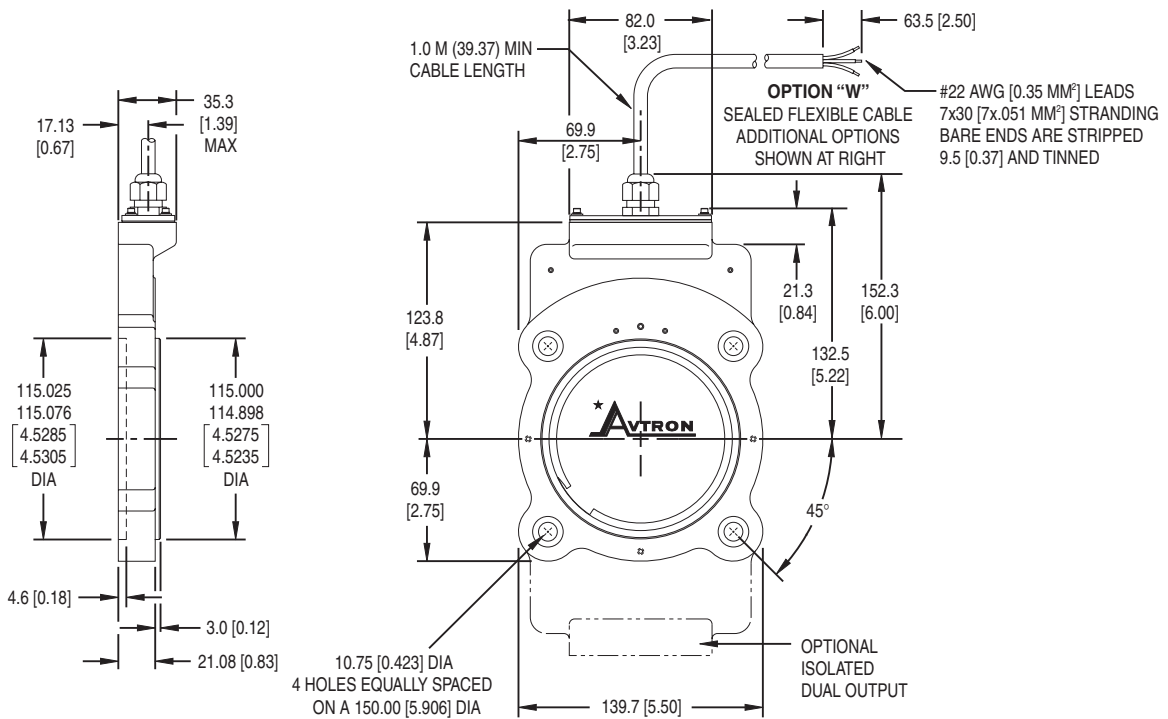
TYPICAL WIRE SELECTION CHART
for 18 AWG, multiple pair, individually shielded

	BELDEN	ALPHA
2 PAIR	9368	5620B1802
3 PAIR	9773 or 9369	6445
4 PAIR	9388	6444
3 CONDUCTOR	9365	5640B1801

For option "W", unused outputs must be insulated to prevent accidental contact.

NOTE: Avtron standard 3 year warranty applies. Copies available upon request. Specifications subject to change without notice.

OUTLINE DRAWING



- 4 - STANDARD FLAT COVER SHOWN IN FRONT VIEW.
OPTIONAL THRU-SHAFT COVER NOT SHOWN
- 3 - DIMENSIONS IN MILLIMETERS [INCHES]
- 2 - ALL DIMENSIONS ARE APPROXIMATE
- 1 - WEIGHT: 1.13 TO 1.81 KG. [2.5 TO 4 LBS.]
- NOTES:

EU DECLARATION OF CONFORMITY

The Model M115 Encoder has been assessed and type tested against the following Harmonized European Standards: BS EN 61000-6-1:2001, BS EN 61000-6-2:2001, BS EN 61000-6-3:2001, BS EN 61000-6-4:2001. The Model M115 has been determined to be compliant with the requirements of EU Directive 89/336/EEC as amended by European Directive 93/68/EEC "EMC Directive" by virtue of similarities to the M115 provided that the following conditions are met: The electrical supply to the M115 must be within specified limits. The electrical supply must offer suitable protection from voltage surges unless the application does not require such protection.

Features and specifications subject to change without notice.

Avtron standard warranty applies. All dimensions are in millimeters [inches] approx.

