

AVTRON INCREMENTAL ENCODER

Model: AV125 SMARTach™ III 12.5" FACE MOUNT MODULAR

DESCRIPTION

The Avtron Model AV125 SMARTach™ III is an incremental encoder (also known as tachometer or rotary pulse generator), which allows operation down to zero RPM. It provides a specific number of electrical Pulses Per Revolution (PPR) that are proportional to a shaft's revolution. The AV125 SMARTach III is a bearingless, couplingless, modular design providing unequaled reliability and mechanical performance.

The AV125 fits AC and DC motors with an 12.5" C Face. Both end-of-shaft and through shaft mountings are accommodated. AV125 may also be installed as an open modular unit without the C Face. The AV125 Encoder consists of three or four parts: a rotor, a stator housing, and one or two removable sensor modules. These precision machined parts mount to the accessory end of a motor that conforms to NEMA MG1 for Type FC Face Mounting. See Mechanical Specifications (page 4). No gapping, adjustment, or shimming is required! (If the AV125 is installed as an open rotor and sensor only system without a C face, then manual gapping of the sensor is needed.)

An Avtron AV125 SMARTach III is equipped with one or two AV12 sensor modules. Each module has a two-phase output (A,B) 90° out of phase, with complements (\bar{A} , \bar{B}), (A Quad B Output. A marker pulse with complement (Z, \bar{Z}) is also present. For applications which require more than 2 independent outputs, AV125 encoders may be stacked. Output resolution on the AV125 is determined by the AV12 sensor only. Unlike older models, any PPRs can be mixed and matched. Selection of the rotor is based only on the shaft mounting requirements (and not PPR).

NOTE

Special option code 4xx selects an alternate PPR code definition. Example: PPR code 0, special option code 405=16 PPR (Left), no right output. See Table 1.

The AV12 removable sensor assembly has a diagnostic package that includes Adaptive Electronics and a Fault-Check output. With this package, the SMARTach III can maintain itself, and let you know if there is a problem before the problem causes unscheduled downtime.

AV125 PART NUMBERS AND AVAILABLE OPTIONS

Model	Thru Shaft Rotor Bore, US Sizes	Inboard & Outboard Cover Plates	Left Module			Right Module			Connector Options	Modifications
			Line Driver	PPR		Line Driver	PPR			
AV125	XX- no rotor CE- 4.690" CH- 1.375" CA- 4.875" CJ- 1.625" CG- 5.000" CL- 1.875" CK- 5.250" CM- 2.000" C7- 5.375" CN- 2.125" C3- 6.000" CQ- 2.250" CF- 6.250" CP- 2.375" TU- 6.375" CR- 2.500" C8- 6.750" CT- 2.625" T9- 7.875** C2- 2.875" DG-25mm CV- 3.125" DY-85mm CW- 3.250" D4-90mm CY- 3.375" M1-100mm C4- 3.875" DC-110mm C1- 4.000" DE-120mm** CB- 4.125" DF-160mm C5- 4.250" M8-170mm* CC- 4.375" DE-120mm** C6- 4.500" DF-160mm CD- 4.625" M8-170mm*	X- none F- no inboard, flat outboard T- no inboard, thru outboard	X- none 6- 5-24V in/out (7272) 8- 5-24V in/out (HX) 9- 5-24V in, 5V out (7272)	X- none F- 60 C- 64 G- 100 H- 120 A- 128 L- 240 N- 256 P- 300 E- 360 B- 480 Q- 500 R- 512 S- 600 U- 720	V- 900 J- 960 W- 1000 Y- 1024 Z- 1200 2- 1500 6- 1800 3- 2000 4- 2048 5- 2500 D- 4096 8- 4800 9- 5000 0- special	X- none 6- 5-24V in/out (7272) 8- 5-24V in/out (HX) 9- 5-24V in, 5V out (7272)	X- none F- 60 C- 64 G- 100 H- 120 A- 128 L- 240 N- 256 P- 300 E- 360 B- 480 Q- 500 R- 512 S- 600 U- 720	V- 900 J- 960 W- 1000 Y- 1024 Z- 1200 2- 1500 6- 1800 3- 2000 4- 2048 5- 2500 D- 4096 8- 4800 9- 5000 0- special		000- none 003- Include analog signal converter (K661) 004- Super magnetic shielding 005- 6000 RPM top speed 006- Super magnetic shielding w/sealed/marine housing 4xx-Special PPR (see table)

Connector Options						
Mounted on Encoder Body			3' Cable			5' Flexible Conduit
Industrial Connector	10 pin MS (LARGE ENCODER PINOUT)	Other	Industrial Connector	Mini MS	Other	
P- with Plug G- (Northstar™ Pinout) with Plug	A- without Plug B- with Plug C- with Plug & Flex. Conduit Adapter L- with Right Angle Plug 5- without plug (Dynapar Pinout)	K- Condulet with Leads R- Mini MS/ Twist Lock with Plug 1- Mini EPIC with Plug	Q- Mini EPIC with Plug and Remote Base on 18" Cable Z- with Plug	S- Baldor Twist Lock with Plug	W- Leads only	N- Leads only T- Terminal box

Table 1

* To specify this PPR, also specify modification code 4xx.

SPECIAL PPR OPTION CODES
See table on page 9

Spare sensors, rotors, through-shaft cover plates, and shaft grounding kits can be ordered separately. (See Tables 2 and 3)

* rotors above 6.75" bore are set screw, all others cam screw style

**m6 tolerance, all other metric rotors are h7

Cam screw rotors patented.

INSTALLATION

An installation video for AV850/AV125 encoders is shown on our web site; check the product page for the latest version.

GENERAL

The motor must comply with NEMA MG1 for dimensions, face runout, and shaft runout. Axial float or endplay must be less than ± 0.100 inch.

CAUTION

Do not strike the encoder or rotor at any time. Damage will result and the warranty will be void. The outer edge of the rotor may be damaged by scratches, severe blows, and strong magnetic fields.

At installation, clean and remove paint and burrs from motor shaft and mounting face.

INSTALLATION HARDWARE

Installation hardware required is attached to each assembly.

Equipment Needed for Installation		
Provided	Optional	Not Provided
AV125 Encoder		
1. Washer, Spring Lock 1/2 (4)	- A35679 Gauge or A25355 Gauge Block	- 15/16" Wrench
2. Hex Hd. Cap Screw 5/8-11 x 4.00 (4)	- Outboard Through-Shaft Seal Plate Kit	- Dial Indicator
Rotor	- Silicone Lubricant or 20 Weight Machine Oil	- Vernier Caliper
1. Rotor Installation Hardware Kit	- Dead Blow Hammer	- 3/32" Hex Wrench (T-Handle style) (thru shaft rotors only)
3. Thread locker (blue)		

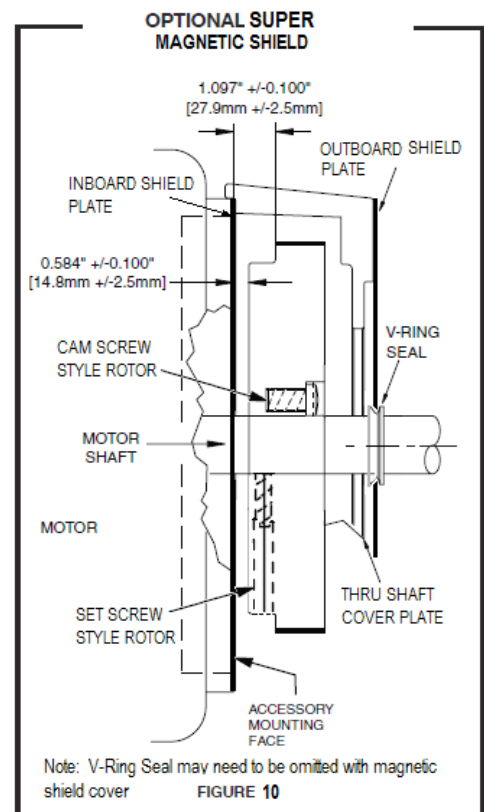
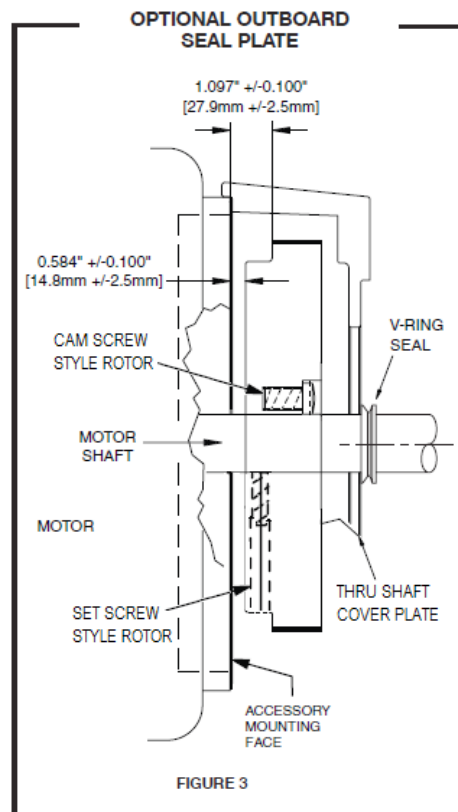
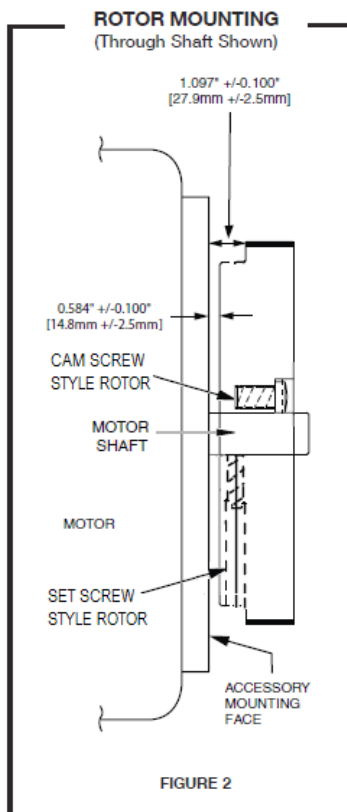
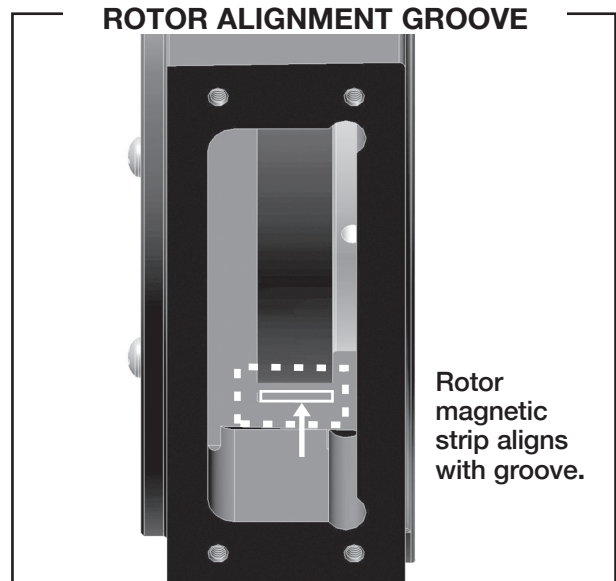
ROTOR INSTALLATION

Use the dial indicator gauge to ensure motor shaft runout (TIR) does not exceed $(0.004") [0.10mm]$.

1. The through-shaft must project at least 1.8" [45.7mm] from the accessory mounting face. If it is greater than 3" [76.2mm] long, use the outboard through-shaft cover, detailed in Figure 3.
2. Slide the rotor on the shaft, ensuring the rotor label "this side out" is away from the motor. The space between the mounting face and the magnetic strip of the rotor must be set to 1.097" [27.9mm]. The innermost surface of the rotor will be 0.584" from the motor c-face, as shown in Figures 2 & 3. Use Avtron gauges (A35679 or A25355) or housing alignment grooves as shown in Figure 1 to verify position. If using a set screw rotor (TA-T6), apply threadlocker to the set screws (2) and tighten to 25 in-lbs.

STATOR HOUSING INSTALLATION

Figure 1



NOTE

If additional magnetic shielding (option 004) has been added to the sensors, be sure to remove the sensors before installing the stator housing.

The stator housing is retained to the motor using four, 5/8-11 x 4" bolts and spring type lock washers (supplied). If the stator is to be sandwich mounted between an accessory such as a brake and the motor, select the bolt length accordingly. Carefully move the stator housing into position, avoiding contact with the rotor. **DO NOT FORCE** the housing into place. Install the four mounting bolts (torque 30 to 35 foot pounds) [47.5-40.6 n-m].

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 AV125 electronics are fully sealed; water may enter and leave the rotor area as needed. Remove the bottom pipe plug in the housing if frequent moisture buildup is expected.

(OPTIONAL) MAGNETIC SHIELD KIT INSTALLATION

For top performance on older motors with magnetized shafts and frames we offer an optional AV125 super magnetic shield kit (special option 004). The AV125 also has built-in shields attached to the housing of every unit. (see figure 10)

1. Remove the double-stick tape protection.
2. Align the bolt holes and edges with the motor C-face.
3. Stick the shield in place on the motor C-face or on top of any inboard seal plate.
4. Install rotor as usual, but gage location from the shield. See Figure

5. Install stator housing.
6. Install outboard shield.
7. Apply silicone lubricant or medium grade machine oil (20 weight) to the outboard side of the cover where the v-ring seal will contact it.
8. Slide the V-ring seal onto the shaft and ensure that it is compressed against the cover.

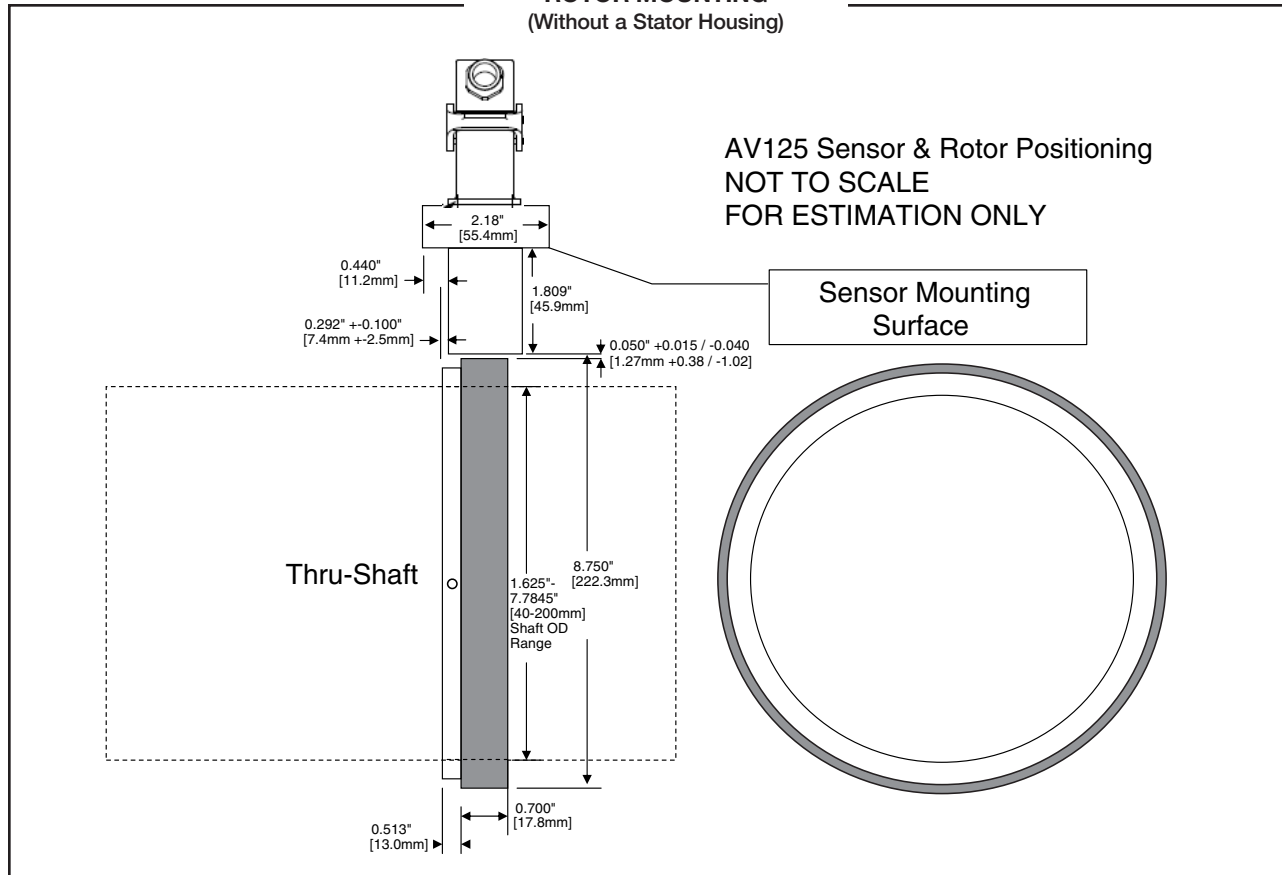
The outer edge of the rotor may be damaged by scratches, severe blows, and strong magnetic fields.

(OPTIONAL) OUTBOARD SEAL PLATE KIT INSTALLATION.

For applications requiring shafts to pass completely through the AV125, Avtron offers an outboard through-shaft seal plate kit with V-ring seal. See Table 3 for part numbers and Figure 3. Note that for large through-shaft bores T8 and T9, no seal is available. For T9 through-shafts, no cover is needed.

1. Install the encoder rotor as shown above.
2. Remove the existing cover of the encoder. Retain the screws and washers.
3. Mount the AV125 stator housing as shown above.
4. Install new through-shaft cover using the (4) #10-24 screws and washers from step 2.
5. Apply silicone lubricant or medium grade machine oil (20 weight) to the outboard side of the cover where the V-ring seal will contact it.
6. Slide the V-ring seal onto the shaft, and ensure that it is compressed against the cover. See installation Figure 3.

FIGURE 4

ROTOR MOUNTING
(Without a Stator Housing)

MOUNTING THE AV125 WITHOUT A STATOR HOUSING

The AV125 may be installed without the use of the 12.5" C-face housing. The installer must create sturdy brackets to mount the sensor properly oriented to the rotor. Both axial position and radial position must be controlled. Slotted holes and lock washers are strongly recommended. See Figure 4 for mounting dimensions.

Mount the rotor to the shaft per the instructions above.

Position the AV12 sensor and secure the brackets. Use a shim to ensure the sensor face is located 0.050" +0.015"/-0.040" [1.27mm +0.38/-1.02mm] from the rotor surface. Ensure the sensor is properly centered on the rotor surface, using the dimensions in Figure 4.

WIRING INSTRUCTIONS

CAUTION

Remove power before wiring.

Wiring diagrams are shown in Figures 5 and 6.

For bi-directional operation of the 2-phase AV125 SMARTach III encoder, proper phasing of the two output channels is important. Phase A channel leads Phase B channel for clockwise shaft rotation as viewed from the anti-drive or accessory end of the motor (encoder mounting end).

Wiring option "G" provides a pinout compatible with Northstar™ encoders, with a cable shield connection on pin 10. Note that this option does not ground the shield; Avtron still recommends grounding the shield at the drive end of the cable for all wiring options.

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. Refer to the system drawing for specific cable requirements where applicable.

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 thru 16 gauge (Industrial EPIC options can use 14-20 AWG), each wire pair individually shielded with braid or foil with drain wire, 0.05 uF maximum total mutual or direct capacitance, outer sheath insulator, 1,000 ft. max. See WIRE SELECTION CHART in Figure 6 for some suggested cables.

See Figure 6 for examples of alarm output wiring.

NOTE

When using the industrial connector ("G", "P", or "Z" options), the minimum wire size is 20 gage, and 20 gage (only) wire ends must be tinned with solder before

SPECIFICATIONS

ELECTRICAL**

- A. Operating Power (Vin)
 1. Volts.....5-24 VDC
 2. Current100mA, nominal, no load
- B. Output Format
 1. 2 ϕ & CompA, \bar{A} , B, \bar{B} (differential line driver)
 2. Marker1/Rev, Z, Z
- C. Signal TypeIncremental, Square Wave, 50 \pm 10% Duty Cycle.
- D. Direction Sensing..... ϕ A leads ϕ B for CW rotation as viewed from the back of the tach looking at the non-drive end of the motor.
- E. Phase Sep.15% minimum
- F. Frequency Range.....@5V, @1m cable, 250 kHz Max
@24V, @300m cable, #8 output, 45 kHz Max
- G. PPR.....4-100000***
- H. Line Driver Specs.....See table
- I. Connectors.....See connector options on page 1
- J. LED Indicator.....GREEN: power on, unit ok.
RED: alarm on
ORANGE: wiring fault (Thermal Overload; Under-voltage)

MECHANICAL

- A. Rotor Inertia.....1.38-3.38 Oz. In. Sec.²
- B. Acceleration.....5000 RPM/Sec. Max.
- C. Speed:.....5000 RPM Max.
- D. Weight:.....15-18lbs [7-8kg]
- E. Sensor to Rotor
 - Air Gap (nominal):.....0.050" [1.27mm]
 - Tolerance:.....+0.015"/-0.040" [+0.38/-1.02mm]
- F. Rotor Axial Tolerance..... +/-0.100" [+/-2.54mm]

ENVIRONMENTAL

Solid cast aluminum stator and rotor
Fully potted electronics, protected against oil and water spray
V-Ring seals provided on through shaft covers

Operating Temperature:.....-40 to 100°C, 0-100%
condensing humidity. Shock: 1 meter drop test

LINE DRIVER OPTIONS

		LINE DRIVER OPTIONS			
Electrical Specifications		6	8	9	Units
Input Voltage		5-24	5-24	5-24	VDC
Nom Output Voltage		5-24	5-24	5	VDC
Line Driver		7272	Hx	7272	
Output Resistance Typ		13	75	13	ohms
Maximum Peak Current		1500	800	1500	mA
Maximum Average Current		120	200	120	mA
Voh Typ		V _{IN} -1	V _{IN} -1	V _{IN} -1	VDC
Vol Typ		0.5	0.2 @ 10mA line current	0.5	VDC
Cable Drive Capacity		1000' @ 5V 500' @ 12V 200' @ 24V	1000'	1000'	feet
Protection	Reverse Voltage	yes	yes	yes	
	Short Circuit	yes	yes	yes	
	Transient	yes	yes	yes	
	Power to A, Gnd to A/	yes	yes	yes	
Alarm	+V(out)	Output voltage equal to input voltage.			
	Alarm*	Open collector, normally off, goes low on alarm, sink 100mA max, 50VDC max			
	LED	Green=power on, Red=Alarm Orange=Wiring Error (Thermal Overload; Under-voltage)			
Marker		One per revolution. Pulse width approximately 2.8° (1/256 of a revolution)			

* Alarm not available on connector option "G" (Northstar™ compatible pinout)

** Electrical specifications for SMARTach III model consult Nidec Industrial Solutions for earlier model specifications.

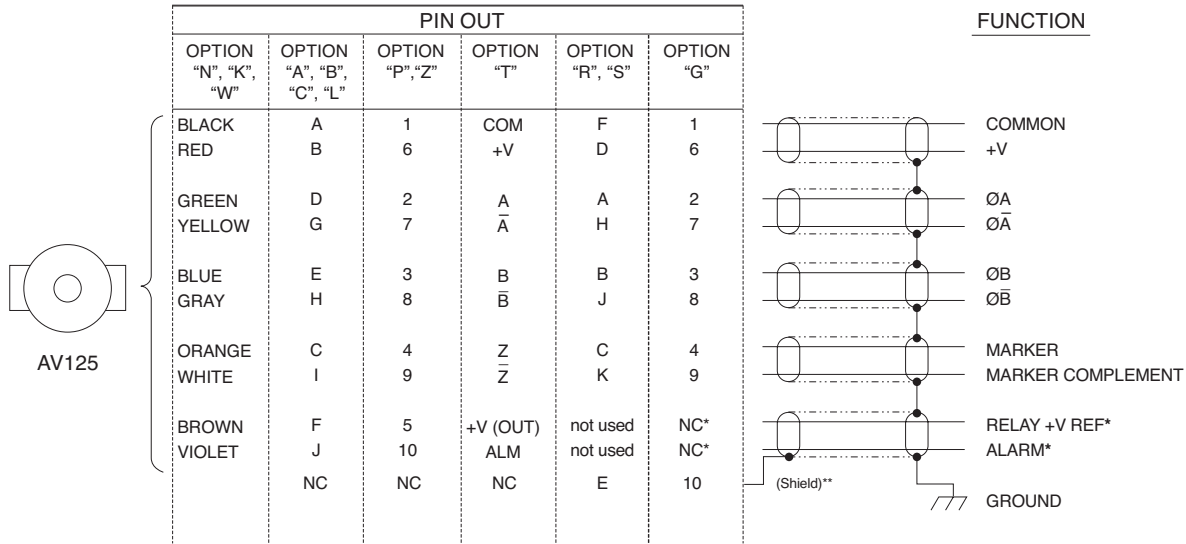
***(PPR) Standard maximum PPR is 5000. Consult Factory with your application for PPRs up to 50,000.

**** (Speed) Maximum RPM may be limited for PPR > 2,500. Consult Factory with your application.

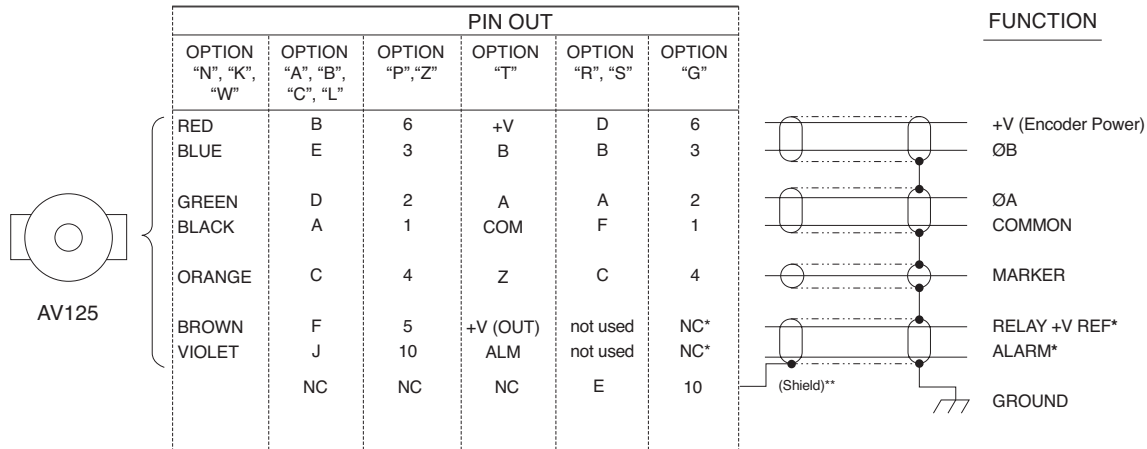
WIRING DIAGRAMS

FIGURE 5

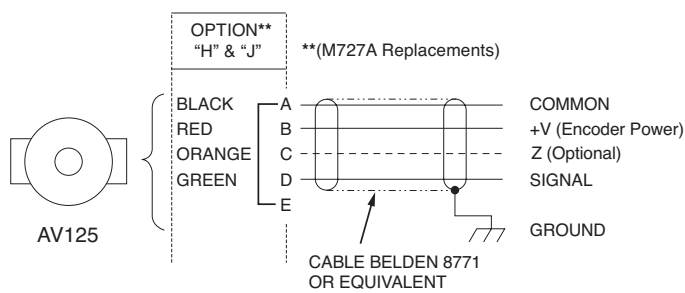
FOR DIFFERENTIAL APPLICATIONS



FOR SINGLE ENDED APPLICATIONS



FOR SINGLE ENDED SINGLE PHASE WIRING APPLICATIONS



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

	BELDEN	ALPHA
2 PAIR	9368	6062
3 PAIR	9369	6063
4 PAIR	9388	6064
6 PAIR	9389	6066

* See Figure 6 for examples of alarm output wiring.

** Avtron recommends shield grounding at drive end. Shield pin does not ground the shield.



EU Declaration of Conformity

AV125 SMARTach™ III

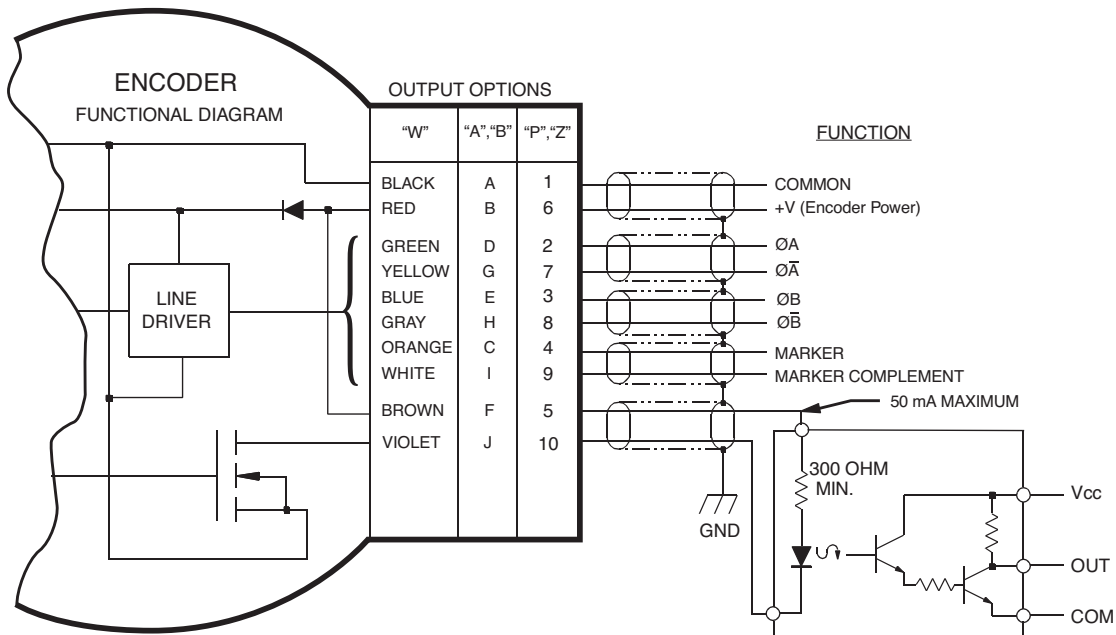
Application Examples

Applies to all Model AV125 Encoders except connector styles G, R, S.

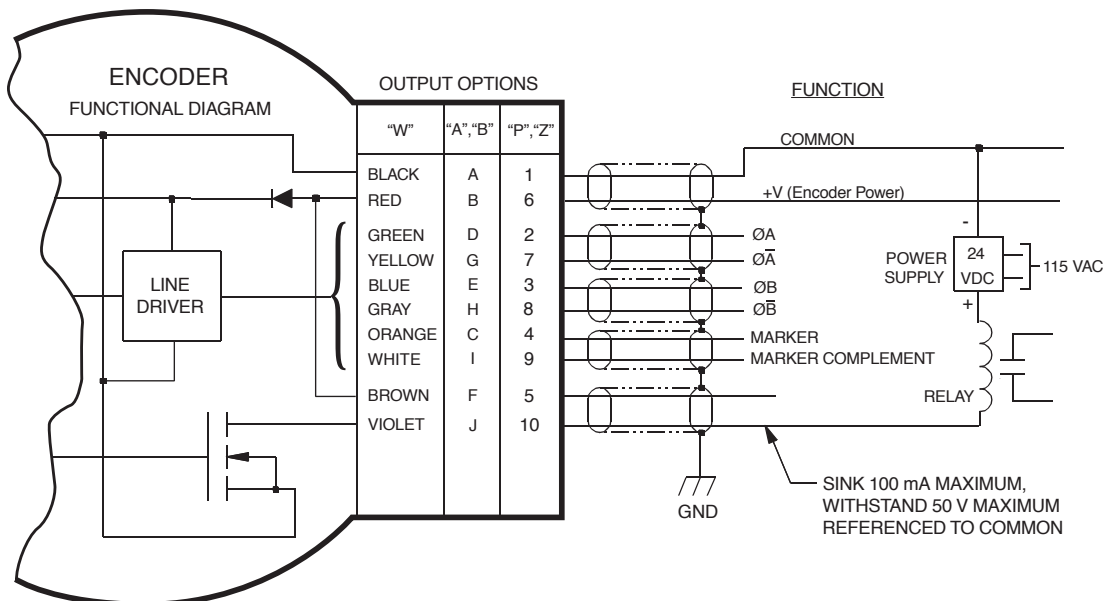
ALARM OUTPUT CONNECTION

Avtron SMARTach III encoders provide an alarm signal if maintenance is required under specific circumstances. An optional internal alarm LED indicator is also available. Green indicates power on, red indicates alarm on. Following are application examples provided to help install the alarm output.

Example 1. Alarm output using +V(OUT). +V(OUT) is equal to +V, the encoder power supply.



Example 2. Alarm Output Using Separate 24 VDC Power Supply and Relay.



Note: Alarm output is "low true" ; i.e. it goes to ØV when activated

connection at the screw terminals.
MAINTENANCE

GENERAL

This section describes routine maintenance for the Avtron AV125 Encoder. For support, contact field service for Avtron Encoders at 216-642-1230. For emergency after hours service contact us at 216-641-8317.

The AV125 SMARTach III circuitry includes a diagnostic package that includes Adaptive Electronics and a Fault-Check output.

ADAPTIVE ELECTRONICS

A perfect duty cycle consists of a waveform whose "high" and "low" conditions are of the same duration (50%/50%). It is possible over time for the duty cycle and edge separation to change due to component drift, temperature changes, or mechanical wear. The Adaptive Electronics extend the life of the AV125 by constantly monitoring and correcting duty cycle and edge separation over time.

FAULT-CHECK

After power-up and the rotor position is checked by the sensor, the Fault-Check LED will turn GREEN.

If the Adaptive Electronics reach their adjustment limit for any reason, the Fault-Check alarm and LED will notify the drive and operator of an impending failure. The LED will turn red if the Adaptive Electronics reach their adjustment limit. This output occurs before an actual failure, allowing steps to be taken to replace the unit before it causes unscheduled downtime. Fault-Check annunciation is available as an "alarm" output through the connector and as an integral LED.

TROUBLESHOOTING:

If the drive indicates a loss of encoder/tach fault and the AV125 fault-check LED is not illuminated, check the encoder power supply. If power is present, check polarity: one indicator of reversed power supply is that all outputs will be high at the same time. If the drive indicates encoder fault, but the LED shows GREEN, then check the wiring between the drive and the encoder. If the wiring appears correct and in good shape, test the wiring by replacing the AV12 sensor module. If the new module shows GREEN, and the drive still shows encoder loss/tach fault, then the wiring is faulty and should be repaired or replaced.

If the alarm output and/or LED indicate a fault (RED):

1. Remove an end sensor plate or the second sensor, and use the built-in gauge to check the location of the rotor (see Figure 1). Ensure the label marked "This side out" is facing away from the

motor.

2. Remove the AV12 sensor from the housing. Clean the housing mounting surface for the AV12 sensor and the AV125 housing. Ensure the AV12 sensor is directly mounted on the AV125 housing, with no sealant, gasketing, or other materials, and is firmly bolted in place.

If the alarm output and/or LED indicate a fault (RED) on a properly mounted AV12 sensor and the rotor is properly located, replace the AV12 sensor.

An oscilloscope can also be used to verify proper output of the AV125 encoder at the encoder connector itself and at the drive/controller cabinet.

If the outputs show large variations in the signals at steady speed (jitter or "accordion effect", figure 8), check rotor position. If the rotor position is correct, the motor or shaft may be highly magnetized. Replace any magnetized shafts with non-magnetic material (stainless/aluminum). Consider replacing the sensors with super-shielded models, option -004.

If the alarm output and/or LED indicate a wiring fault (ORANGE):

Remove all output wires/connections (A, \bar{A} , B, \bar{B} , Z, \bar{Z}). The LED should turn GREEN. If the LED does not turn GREEN, the encoder is not receiving enough voltage at +V to properly operate. Correct input voltage problem at power supply or cabling.

If the LED turns GREEN once all outputs are disconnected, reconnect each output, one at a time, monitoring for ORANGE LED. For partial/resistive short circuits, the LED may take a few minutes to turn ORANGE. To speed the troubleshooting process, if possible, spin the encoder while replacing individual output connections. This will make the ORANGE LED condition occur faster. Once the shorted output(s) are located, correct the shorting condition, and the encoder LED should remain GREEN.

If the LED is OFF, but power is being applied to the encoder, check the output voltage level at A, \bar{A} , B, \bar{B} . If all outputs are ON (\approx +V), the connections to +V and COM are reversed. Swap connections between +V and COM; the LED should turn GREEN.

STATOR HOUSING REMOVAL

To remove the stator housing remove the qty 4 5/8-11 x 4" bolts holding the housing, to the motor. Take care that the housing does not fall from the pilot and cause the sensors to crash into the rotor. Damage

Table 2

AV12 Sensor								
Model	Line Driver	PPR					Connector Options	Modifications
AV12	X- none 6- 5-24V in/out (7272) 8- 5-24V in/out (HX) 9- 5-24V in, 5V out (7272)	X- none F- 60 C- 64 G- 100 H- 120 A- 128	L- 240 N- 256 P- 300 E- 360 B- 480 Q- 500	R- 512 S- 600 U- 720 V- 900 J- 960 W- 1000	Y- 1024 Z- 1200 2- 1500 6- 1800 3- 2000 4- 2048	5- 2500 D- 4096 8- 4800 9- 5000 0- special		000- none 004- Super magnetic shielding 4xx-Special PPR (see table)
Connector Options								
Mounted on Encoder Body				3' Cable			5' Flexible Conduit	
Industrial Connector	10 pin MS	Other	Industrial Connector	Mini MS	Other			
P- with Plug G- (Northstar™ Pinout) with Plug	A- without Plug B- with Plug C- with Plug & Flex. Conduit Adapter L- with Right Angle Plug	K- Condulet with Leads R- Mini MS/ Twist Lock with Plug	Z- with Plug Q- 18" flex cable, with plug	S- Baldor Twist Lock with Plug	W- Leads only	N- Leads only T- Terminal box		

* To Specify this PPR, also specify modification code 002.

to the sensor or rotor could result.

ROTOR REMOVAL

Remove shaft rust and burrs before removing the rotor.
THROUGH-SHAFT TA-T9, MA-M9 styles: Loosen the set or cam screws holding the rotor to the shaft. **DO NOT COMPLETELY REMOVE THE CAM SCREWS.**

Remove the rotor by hand, taking care not to damage the outer magnetized ring.

If the rotor can not be removed by hand, use a gear puller taking care not to damage the outer magnetized ring. **DO NOT APPLY HEAT TO THE ROTOR.**

RENEWAL AND SPARE PARTS

See Tables 2 and 3.
All trademarks (™, ®) are the property of their respective owners and are used for identification purposes only.

AV125 SPARE PARTS					
Shaft Size	Cam Screw Rotor	Set Screw Rotor	Thru-Shaft Cover Kit w/Seal	Seal Only	Magnetic Shield Plates (Inboard & Outboard)
1.375	B36168-CH	N/A	A34376-1	471952	B35685-TH
1.625	B36168-CJ	N/A	A34376-2	471969	B35685-TJ
1.875	B36168-CL	N/A	A34376-3	471970	B35685-TL
2.000	B36168-CM	N/A	A34376-17	471971	B35685-TM
2.125	B36168-CN	N/A	A34376-4	471972	B35685-TN
2.250	B36168-CQ	N/A	A34376-5	471972	B35685-TQ
2.375	B36168-CP	N/A	A34376-6	471953	B35685-TP
2.500	B36168-CR	N/A	A34376-18	471954	B35685-TR
2.625	B36168-CT	N/A	A34376-7	471954	B35685-TT
2.875	B36168-C2	N/A	A34376-8	471955	B35685-T2
3.125	B36168-CV	N/A	A34376-9	471957	B35685-TV
3.250	B36168-CW	N/A	A34376-19	471957	B35685-W
3.375	B36168-CY	N/A	A34376-10	471958	B35685-TY
3.875	B36168-C4	N/A	A34376-11	471551	B35685-T4
4.000	B36168-C1	N/A	N/A	471551	B35685-T1
4.125	B36168-CB	N/A	A34376-21	471551	B35685-TB
4.250	B36168-C5	N/A	A34376-12	471552	B35685-T5
4.375	B36168-CC	N/A	A34376-22	471552	B35685-TC
4.500	B36168-C6	N/A	A34376-13	471552	B35685-T6
4.625	B36168-CD	N/A	A34376-23	471553	B35685-TD
4.690	B36168-CE	N/A	A34376-24	471553	B35685-TE
4.875	B36168-CA	N/A	A34376-20	471553	B35685-TA
5.000	B36168-CG	N/A	A34376-16	471554	B35685-TG
5.001	N/A	B31204-TZ	A34376-16	471554	B35685-TG
5.250	B36168-CK	N/A	N/A	N/A	N/A
5.375	B36168-C7	N/A	A34376-14	471555	B35685-T7
6.000	B36168-C3	N/A	N/A	471576	B35685-T3
6.250	B36168-CF	N/A	N/A	408525	B35685-TF
6.375	N/A	B31204-TU	N/A	408525	B35685-TU
6.750	B36168-C8	N/A	A34376-15	N/A	B35685-T8
7.875	N/A	B32087-T9	N/A	N/A	B35685-T9
25 mm	B36168-DG	N/A	N/A	471964	B35685-MG
85 mm	B36168-DY	N/A	N/A	471958	B35685-MY
90 mm g6	B36168-D4	N/A	N/A	471549	B35685-M4
100 mm	N/A	B34535-M1	N/A	471551	B35685-M1
110 mm	B36168-DC	N/A	N/A	471552	B35685-MC
120 mm	B36168-DE	N/A	N/A	471553	B35685-ME
120 mm m6	B36168-DK	N/A	N/A	471553	B35685-ME
160 mm	B36168-DF	N/A	N/A	408525	B35685-MF
170 mm	B36168-D8	N/A	N/A	N/A	B35685-M8

AV125 Flat Cover Plate	
Shaft Size	Cover Kit
Any	A35681

FIGURE 7

ADDITIONAL CONNECTOR OPTIONS

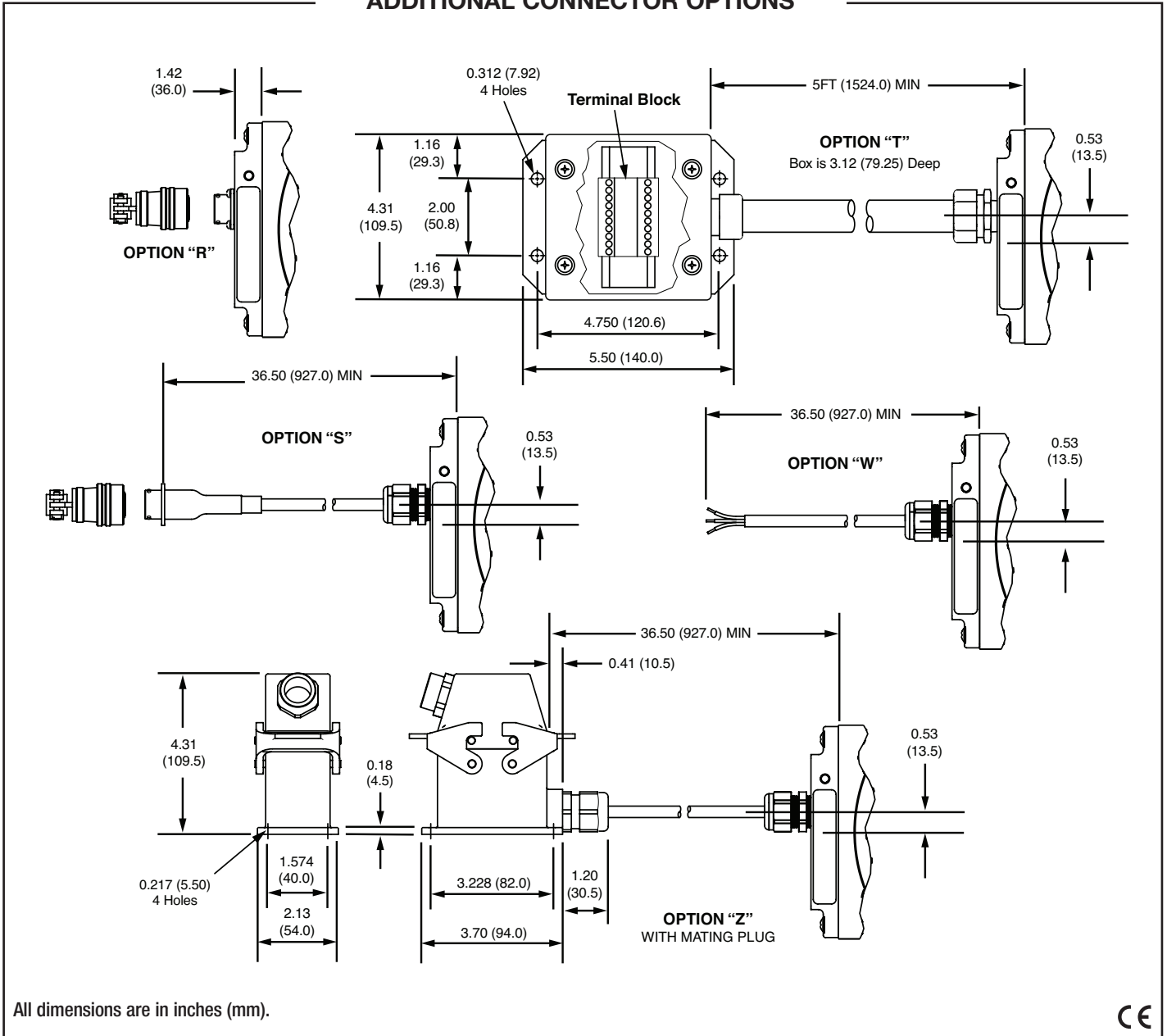
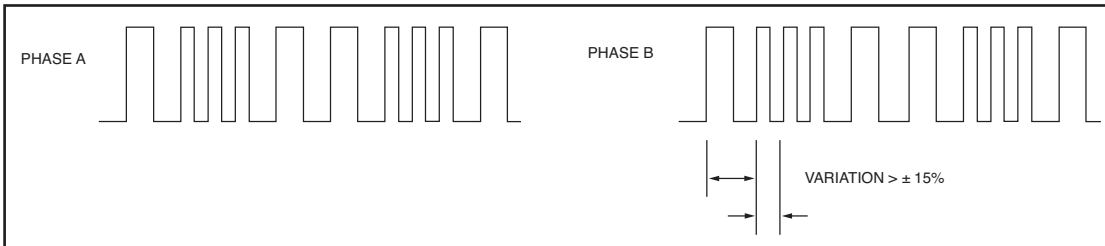


FIGURE 8 Excessive Signal Variation ("Jitter")

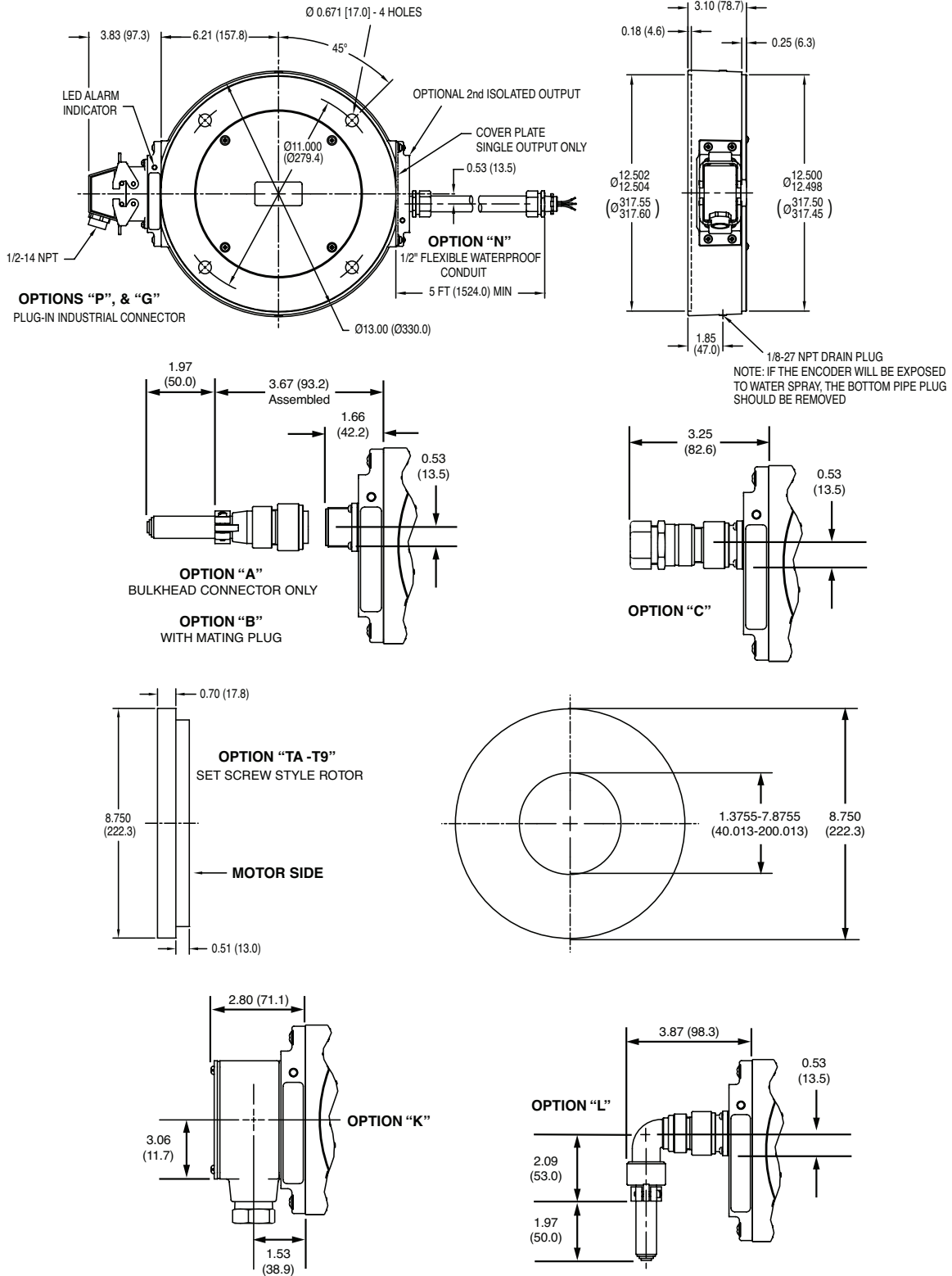


SPECIAL PPR OPTION CODES								
4xx Code	PPR (Left)	PPR (Right)	4xx Code	PPR (Left)	PPR (Right)	4xx Code	PPR (Left)	PPR (Right)
401*	1270	None	408	1400	None	415	3000	None
402*	150	None	409*	30	None	416	3600	None
403*	50	None	410	None	6000	417	1250	None
404	None	16	411	12000	None	418	2400	2400
405	16	None	412	200	None	419	160	160
406	6000	None	413*	30	30	420	450	None
407	2800	None	414	1500	None			

FIGURE 9

OUTLINE DIMENSIONS AND OPTION DETAILS

For additional wiring options see Figure 7.



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 Avtron Encoder standard warranty applies. All dimensions are in inches (mm).



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