

# AVTRON™ ENCODERS



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Avtron Encoders, a Nidec Brand, develops, produces and sells top-quality American engineered encoders for industrial applications worldwide.

Avtron Manufacturing Inc., was established in 1953 providing valuable test solutions to the aerospace industry, and began developing our feedback devices in 1964 with a total focus on reliability. We are driven to maximize customer uptime, which is manifested in the durability of our designs and the responsiveness of our service.

Avtron Encoders are the world's largest-selling brand of heavy-duty encoders. We sell to a wide range of industries, from paper mills to metals, mining, wind power, oil and gas drilling. Anywhere an encoder failure would cost money and

downtime, you need an Avtron Encoder. Avtron became part of Nidec Corporation, a \$22Bn global industrial manufacturing and technology company, in 2012, and as such we have expanded our reach and ability to service customers worldwide. We proudly mark every one of our encoders with our Avtron Encoders brand, symbolizing quality, reliability, service and value.

**Why Avtron Encoders?**

Avtron Encoders are far more durable than competitor's units. They feature cast aluminum housings, potted electronics, and huge bearings. For maximum reliability select our modular models with no bearings at all and Wide-Gap™ technology. Avtron Encoder magnetic sensors also increase reliability by being impervious to the dirt, dust, oil

and liquids that disable optical encoders. Every Avtron Encoder is 100% tested - not sampled or randomly selected. Some Avtron Encoder models have experienced over 4,500,000 hours Mean-Time-Between-Failure in outdoor applications!

Many of our encoders come with on-board diagnostics. They digitally self-tune for best signal, and a remote alarm contact and LED notify you if there is a problem. Yet our encoders keep working as long as they can, giving you time to schedule maintenance.

We back our encoders with 24/7/365 no-charge engineering technical support (in English) to ensure you can get the help you need, when you need it.

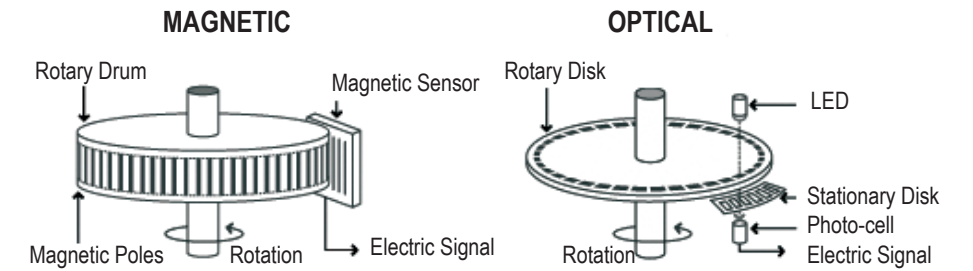
**ULTRA-DURABLE SENSORS**

Depending on the needs and construction of the application we use optical and magnetic sensor technologies to generate the signals in our encoders.

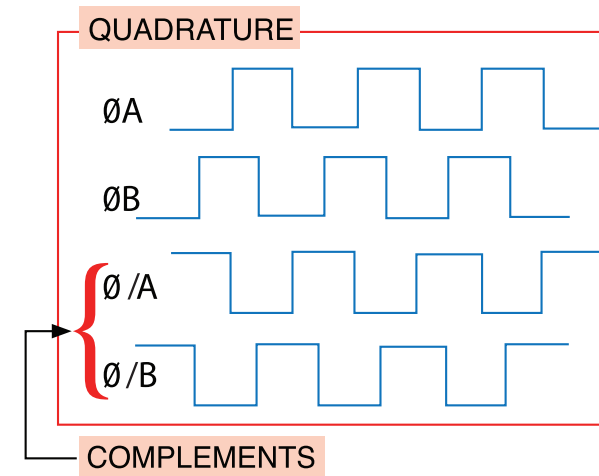
Follow this approach when selecting an encoder to ensure that you are focusing on the right solution for your application.

1. Determine your signal needs: Incremental or Absolute
2. Consider mechanical mounting requirements
3. Consider environmental factors

**MAGNETIC - vs - OPTICAL**



**Incremental**



**Absolute**



**Incremental encoders** create a series of square wave pulses to represent the measured motion. Each incremental pulse is the same. The principal difference lies in the electrical characteristics of the line driver; namely: HTL (5V-24V in/out) or TTL (5V-24V in, 5V-out)

Most incremental Avtron Encoders create a marker pulse once per revolution. The only way to measure position with an incremental encoder is to measure from a starting position and keep track of the number of pulses observed. Therefore, most incremental encoders are used to measure and control velocity.

Look for our incremental models with high-power, fully short-circuit protected outputs. These encoders can drive the longest cables, yet they are protected from wiring errors.

Our incremental magnetic sensor technology enables us to completely embed all the electronics in a solid brick of potting material, making them impervious to dirt, dust, oil, and water.

**Absolute encoders** create a digital message to represent a position, which is sent to the controller. There are a huge number of communication output options for absolute encoders, and Nidec has industry-leading coverage.

The absolute position information is retained by the encoder, regardless of power interruptions. Absolute encoder messages typically have small communication-related delays which could affect velocity control. Therefore, most absolute encoders are used to measure and control position.

Nidec features a number of key innovations in our absolute encoders including Wiegand wire technology and solid state memory to enable multi-turn encoders without unreliable fragile glass disks, optical sensors, gears, batteries or super-capacitors.

Our industry-first severe duty absolute encoders include huge bearings and seals for maximum durability.



**MECHANICAL CONSIDERATIONS**

Determine if your motor/mounting requires a "shafted" encoder (works with a flexible coupling to mate to a motor stub shaft) or if a "hollow shaft" encoder is needed. We also offer modular encoders that feature a bearingless design!

**OEM COMPONENTS**

Require additional physical protection.

**LIGHT MILL DUTY**

For use in dry commercial and industrial environments with temperature controlled spaces.

**MILL DUTY**

For use in typical industrial environments. More mechanically robust than light mill duty. Not recommended for environments with frequent temperature changes and chronically wet conditions.

**HEAVY MILL DUTY**

For more rugged environments with frequent temperature fluctuations and increased levels of contamination and moisture.

**SEVERE DUTY**

This rating is for very wet or dusty environments with large and frequent temperature extremes including outdoor applications.

**FUNCTIONAL SAFETY**

Select Avtron Encoders are available for SIL required applications. Safety rated encoders have been evaluated to SIL 2 certifications.

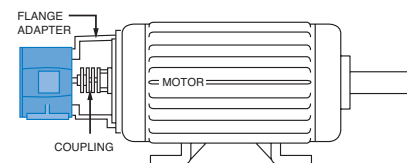
**HAZARDOUS DUTY**

Avtron Encoders are available for use in explosive atmospheres; these models are also extremely rugged. For applications that require an intrinsic safety isolator, Nidec offers the XRB3 (see pg 103).

**ENVIRONMENTAL CONSIDERATIONS**

Avtron Encoders are classified for overall durability according to the general harshness of the Duty Environment. This correlates roughly to temperature, humidity, contamination, causticity, risk of getting hit or stood upon, etc. Within each of the following Duty Environments Avtron Encoders are available with a range of IP (Ingress Protection) ratings.

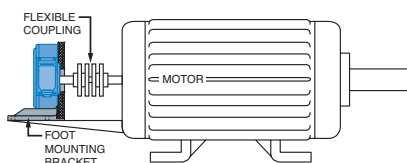
**SHAFTED**



**Flange Mounting**

(Solid Shaft Coupled) Requires flange adapter with coupling.

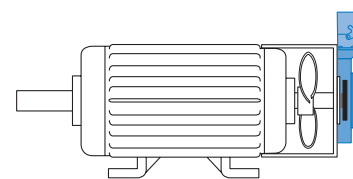
**SHAFTED**



**Foot Mounting**

Used when encoders are coupled directly to rolls, gear boxes, or motors without C-Faces.

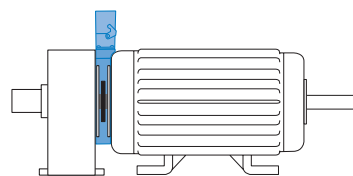
**FAN COOLED**



**Fan cooled or Blower cooled**

Requires a flange or a flange adapter to mount.

**GEARBOX**



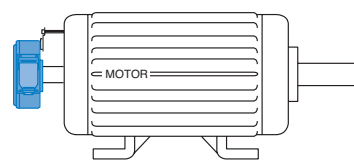
**Gearmotor**

Requires a C-Flange between the motor and the gear.

**ENVIRONMENTAL RATINGS**

Avtron Encoders environmental ratings don't mean IP sealing. Seals may break down quickly in applications with temperature changes or small, sealed bearings can be destroyed by loads. Instead, Avtron rates encoders for overall durability.

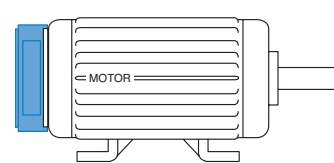
**HOLLOW SHAFT**



**Hollow Shaft/Tether Mounting**

Stub shaft required. Shaft requirements depend on the encoder selected.

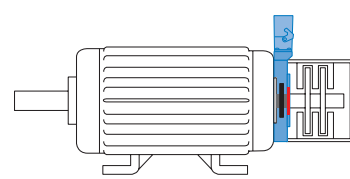
**MODULAR**



**C/FC Face Mounting**

Requires motor stub shaft and one of the following: 115mm, 4.5", 6.75", 8.5", 12.5" C/FC-Face.

**BREAK**



**Break-Motor**

Requires a C-Flange between the motor and the break.

**DURABILITY**

The Avtron Encoders "DNA" of performing in heavy and severe-duty applications – ensuring uptime with fully potted electronics, magnetic sensor technology and over-spec bearings (or no bearings at all!) – is present in our SMARTSafe™ XR and XP families. These are not simply the repackaged or relabeled fragile optical encoders you will find from our competitors.

Nidec offers a full line of rugged UL, ATEX, and IECEx certified Avtron Encoders for hazardous locations. We offer Intrinsically Safe and Explosion Proof options for UL Class 1 / Div 1 / ATEX Zone 1, including the industry's ONLY modular Bearingless, No-Barrier, Magnetic, Incremental encoders – the SMARTSafe XP line.

**Class I & II / Div 1**

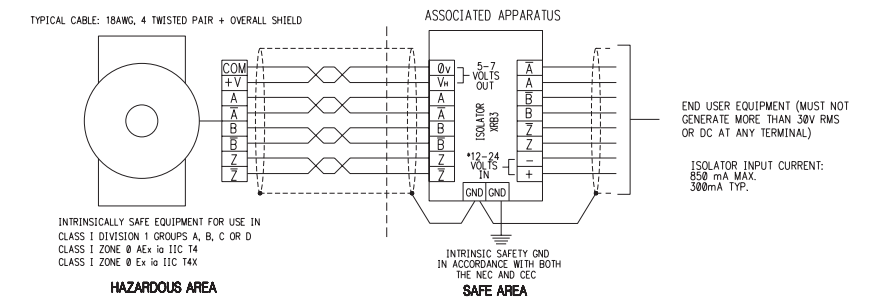
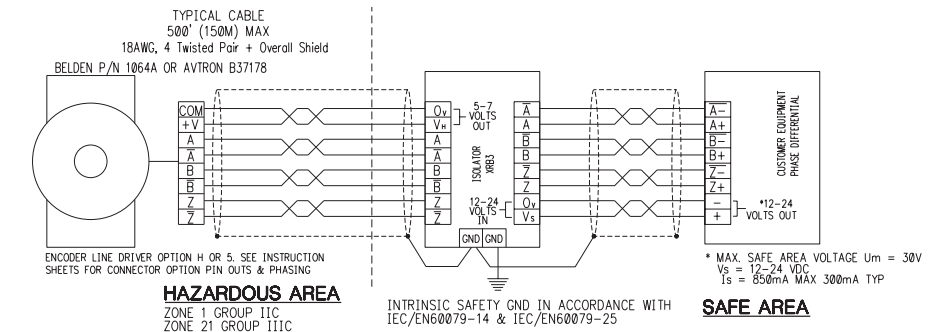
A location in which ignitable flammable gases or combustible vapors or dust are **Likely to exist under Normal Operating Conditions.**

Typically use Explosion Proof or Intrinsically Safe protection.

**Class I & II / Div 2**

A location in which ignitable flammable gases or combustible vapors or dust are **Not Likely to exist under Normal Operating Conditions.**

Typically use Non-Incendive protection or energy-limited supply.



	North America - UL "Class / Div" or "Class / Zone" system				Europe, Rest of World* cUL, ATEX, IECEx	
	GAS	DUST	GAS	DUST	GAS	DUST
<b>Hazards LIKELY TO EXIST under normal operating conditions</b>	Class I Div 1	Class II Div 1	Class I Zone 1	Class II Zone 1	Zone 0 Zone 1	Zone 20 Zone 21
	Acetylene - A	Metal - E	Acetylene, Hydrogen - II C	Conductive Dust II	Acetylene, Hydrogen - II C	Conductive Dust II
	Hydrogen - B	Carbonaceous - F		Carbonaceous - IIIB		Carbonaceous - IIIB
	Ethylene - C	Agricultural - G	Ethylene - II B	Non-Conductive Dust III B	Ethylene - II B	Non-Conductive Dust III B
Propane - D		Propane - II A		Propane - II A		
<b>Hazards NOT LIKELY TO EXIST under normal operating conditions</b>	Class I Div 2	Class II Div 2	Class I Zone 2	Class II Zone 2	Zone 2	Zone 22
	Acetylene - A	Carbonaceous - F	Acetylene, Hydrogen - II C	Conductive Dust IIIC	Acetylene, Hydrogen - II C	Conductive Dust IIIC
	Hydrogen - B	Agricultural - G		Carbonaceous - IIIB		Carbonaceous - IIIB
	Ethylene - C		Ethylene - II B	Non-Conductive Dust III B	Ethylene - II B	Non-Conductive Dust III B
Propane - D		Propane - II A		Propane - II A		

\*Other local jurisdictions may apply

If an encoder is installed in a hazardous location (as defined by National Electric Code (NEC), Chapter 5), it needs to have a hazardous location approval.

Please refer to the NEC or other regional/local codes, guidelines, definitions and requirements for area classification and any wiring, enclosure, equipment and/or protection techniques that may apply to your installation and application.

**COMPETITIVE MODELS**

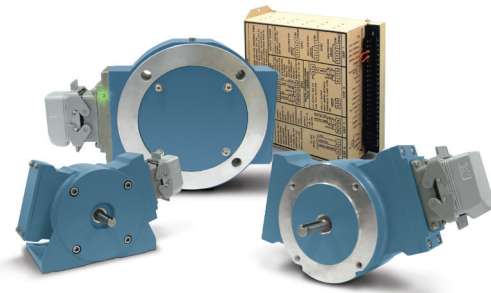
Nidec offers 100% compatible versions to replace competitors' models. Enjoy the superior durability of Avtron Encoders with no wiring changes!

www.avtronencoders.com has a conversion assistant to help you convert model numbers.

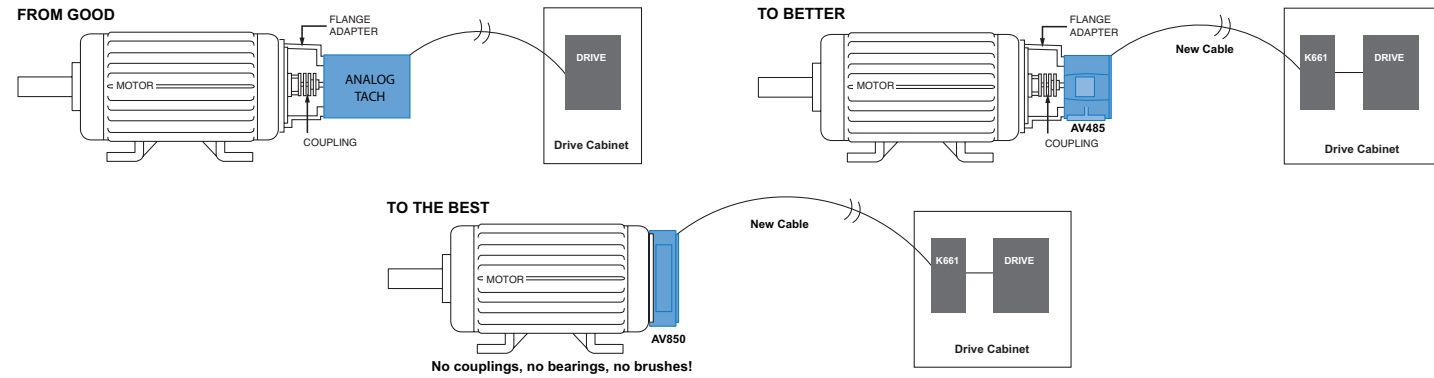
Note that for some models such as HS35, Avtron Encoders offers "good" (HS35A), "better" (HS35X), and "best" (HS45) drop-in replacements!

**ANALOG RETROFITS**

Avtron Encoders' retrofit solutions directly replace obsolete tachogenerators such as GE 5PY, 5BC42, 5BC46, & 5BC66 with durable magnetic encoders and signal converters, without any drive changes. Enjoy the benefits of more-linear and more-reliable operation, combined with widely interchangeable spare parts. See our website for more details.

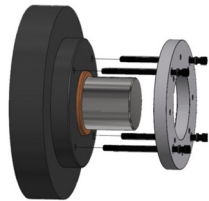


Model AV485 with footmount, AV850, K661, AV485.



**CUSTOM DESIGNS TAILORED TO YOUR UNIQUE SPECIFICATIONS**

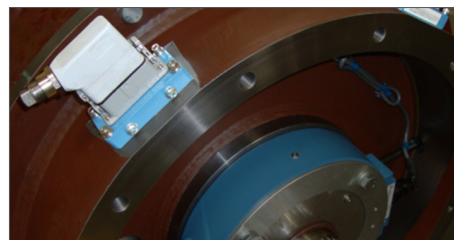
We understand that every project comes with its distinct requirements. That's why we offer custom designs crafted to meet your specific needs. Here are some unique designs we've developed:



**Special Flanges** to accommodate unique mounting requirements. Whether you need a compact design or a flange with unconventional dimensions, we can create a solution that fits seamlessly into your system.



**Custom Shafts** compatible with a wide range of dimensions. Whether it's a specific length, diameter, or material requirement, we can engineer a shaft that aligns perfectly with your project's specifications.



**Unique connectors or connections** to ensure a reliable and efficient interface between the encoder and your equipment.

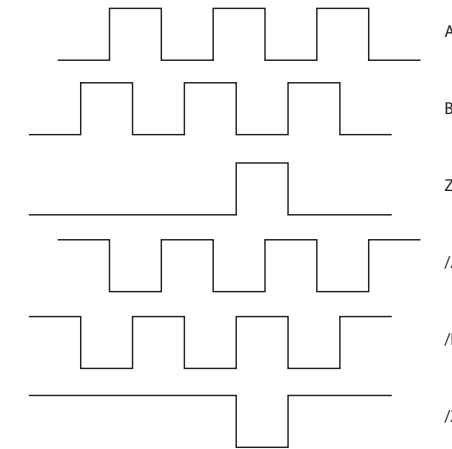
We pride ourselves on delivering Avtron Encoder solutions that go beyond the ordinary.

**OUTPUT DESCRIPTION**

Most incremental Avtron Encoders have square wave outputs: A Leads B (A, B) 90° out of phase, with complements at 180° (/A, /B), and marker pulses (Z, /Z) available on most units depending on the connector.

**OUTPUT WAVEFORMS**

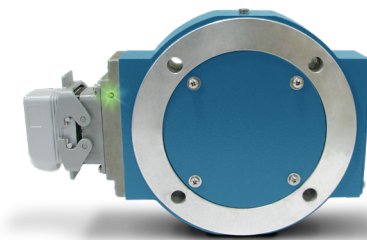
A Quad B: Two Square Waves 90° out of Phase with Complements



Direction Sensing  
Zero Speed  
Marker Pulse

**ADVANCED DIAGNOSTICS**

Many Avtron Encoders feature our self-diagnostic system. The microprocessor-based system continuously monitors the output of the encoder for signal quality. A red/orange/green LED and an alarm contact indicate if the signal is nearing specification limits. Operators can replace the removable sensor module or correct mechanical issues before an actual failure occurs.



SMARTach III Diagnostic LED (AV850 shown)

OUTPUT CHART A		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
AV4, HS4	6	5-30 VDC	Short Circuit	1000 ft @ 5V, 500 ft @ 12V, 200 ft @ 24V
	9	5-30 VDC (5V out)		1000ft
OUTPUT CHART B		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
AV20, AV25, HS25A, HS35A	1	5-28 VDC	Reverse Voltage, Transient, Short Circuit	500 ft @ 5V, 250 ft @ 12 V, 125 ft @ 24V
	2	5-28 VDC Open Collector		500 ft
	3*	5-15 VDC		1000 ft
	4	5-28 VDC (5V out)		500 ft
*Only available on AV25				
OUTPUT CHART C		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
M3, M6C, M7	1	5-24 VDC	Reverse Voltage, Transient, Short Circuit	1000 ft @ 5V, 500 ft @ 12 V, 200 ft @ 24V
	2*	5-18 VDC	Reverse Voltage, Transient	2000 ft
	3*	12-24 VDC	Reverse Voltage, Transient, Short Circuit (Low)	1000 ft
	4**	5-24 VDC	Reverse Voltage, Transient, Short Circuit	
	8***	6.5-24 VDC	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	
*M3, M7 only **M3 only ***M6C only				
OUTPUT CHART D		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
AV32	Standard	5-24 VDC	Reverse Voltage, Transient, Short Circuit	1000 ft @ 5V, 500 ft @ 12 V, 200 ft @ 24V
	H00	5-24 VDC Hi-Power		1000 ft
OUTPUT CHART E		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
HS35X, HS44, AV44	1	5-30 VDC Hi-Power	Reverse Voltage, Transient, Short Circuit	1000 ft
	2	5-30 VDC (5V out)		
	3	5V In/Out		
OUTPUT CHART F		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
AV5, AV12, AV45, AV56A, AV56S, AV67A, AV85A, AV115, AV125, AV485, AV685, AV850, HS35M, HS45, SV850	6	5-24 VDC	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft @ 5V, 500 ft @ 12 V, 250 ft @ 24V
	8	5-24 VDC Hi-Power		1000 ft
	9	5-24 VDC (5V out)		
OUTPUT CHART G		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
XR5, XR12, XR4F, XR45, XR56A, XR85A, XR115, XR125, XR485, XR685, XR850	F, H	Level 1 *(5-7 VDC in 5V out)	Reverse Voltage, Transient, Short Circuit	500 ft
	G, 7	Level 2 (5-15V in-500ft, 24V in -250ft)		500 ft @ 5V, 500 ft @ 12 V, 200 ft @ 24V
OUTPUT CHART H		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
XPH1, XPH8, XP5	8	5-24 VDC Hi-Power	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft
OUTPUT CHART I		VOLTAGE INPUT	PROTECTION	MAXIMUM CABLE DRIVE
XR3	N/A	12-24 VDC	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft to equipment (Safe Area), 500 ft to encoder (Hazardous Area)

\*Requires XR3 Isolator

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 10 - 30 VDC **Current:** 230 mA at 10 V, 100 mA at 24 V maximum\*

**Output Formats:** Ethernet/IP, Modbus TCP, Profinet, POWERLINK, Profibus, CANopen, DeviceNet, SSI, Parallel\*, EtherCAT

**Accuracy:** +/-0.02° (+/-1 arc-min)

**Shaft Loading:** axial 9 lb [40 N], radial 25 lb [110 N]

**Temperature:** -40°C to 85°C

**Environment:** Up to IP67\*\*

**Vibration:** 10G, 10-1000Hz

**Shock:** 100 G, 11 ms duration

**Weight:** 1.21 lb [550 g]; stainless option 2.7 lb [1200 g]

**Certifications:** CE

**Warranty:** 2 Year No-Hassle

\*Parallel requires 400mA @ 10V or 180mA @ 24V

\*\*With certain stainless steel housing configurations



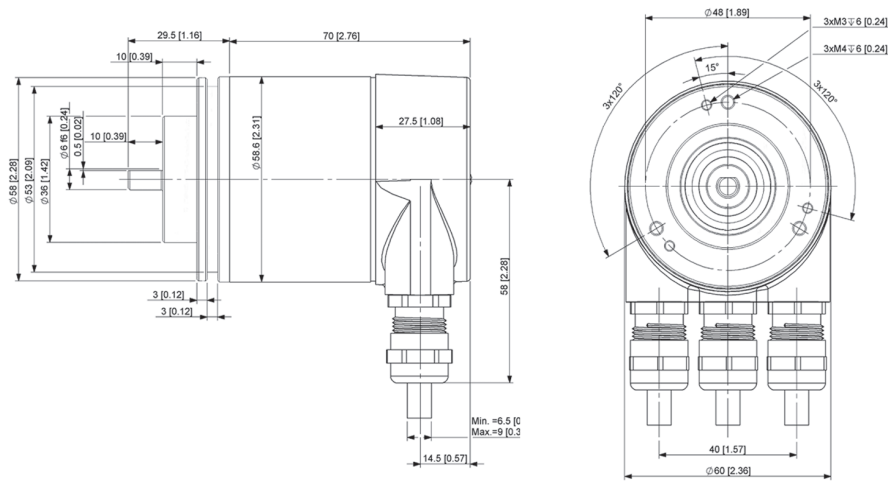
AV6A absolute rotary encoders fit industry standard 58mm flanges, yet are superior to ordinary absolute encoders. Also available: HS6A hollow shaft models, AV6M magnetic absolute encoders, AV30 severe-duty absolute magnetic encoders with 58mm, 2.5", and 85mm flange mounting.

AV6A encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, despite temperature cycles or liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure. The superior bearings of Avtron Encoders permit much larger side and axial loads.

Many competitive optical encoder designs risk sensor damage from any vibration or shock. Some competitors designs even use thin glass disks in "industrial" products! We use only unbreakable disks in Avtron Encoders.

The AV6A offers a broad range of communication options, from parallel output and SSI to the latest Profibus and Ethernet standards.

Our optical AV6A encoders use superior sensor, disk, bearing, and seal technology to give top performance in industrial conditions. Select an AV6A Avtron Encoder today!



MODEL	BUS	FLANGE	SHAFT SIZE	TURNS/BITS	PPR/BITS PER TURN	CONNECTOR	CONNECTOR EXIT	OUTPUT	IP RATING	SPECIAL OPTIONS
<b>AV6A</b>	C - CANopen D - DeviceNet K - POWERLINK L - Parallel M - ModbusTCP N - Profinet P - Profibus R - EtherNet/IP S - SSI T - EtherCAT	1 - 58mm "servo/clamp" flange, 36mm male pilot, 3X M3, X M4 at 48mm 2 - 58mm "synchro" flange, 50mm male pilot, 3X M4 at 42mm 4 - 2.5" square flange w/1.25" male pilot	B - 3/8" dia. x 5/8" w/flat C - 10mm dia. x 20mm w/flat T - 6mm dia., x 10mm, no flat	X - 0/0-single turn A - 16/4** E - 256/8** 2 - 4096/12 4 - 16384/14	E - 256/8** F - 512/9** 0 - 1024/10** 2 - 4096/12 3 - 8192/13 6 - 65536/16	A - 1xM12/5 pin B - 2xM12/5 pin C - 3xM12 4/4/5 or 4/4/4 pins D - 2xM12/4/5 pin E - M12/8 pin F - M23/12 pin G - M27/26 pin H - RJ45, 1m J - 2x cable entry K - 3x cable entry Q - M23/12 pin Kubler Pinout R - M23/16 pin W - Cable, 1m	A - side/radial E - end/axial	1 - Binary 2 - Gray	X - None, IP54* A - IP65 shaft seals G - IP66 Shaft Seals S - IP67 Shaft Seals, Stainless Steel Housing	000 - none 9xx - special cable length xx=feet [0.3m]

STANDARD CONNECTORS & OUTPUT FORMATS			
Bus	Code	Connectors	Output
CANOpen	C	A, B, C, J, K, W	1
DeviceNet	D	A, B, C, J, K, W	1
POWERLINK	K	C	1
Parallel	L	G, R, W	1, 2
Modbus TCP	M	D	1
Profinet	N	C	1
Profibus DP	P	C, K	1
EtherNet/IP	R	C	1
SSI	S	E, F, Q, W	1, 2
EtherCAT	T	C	1

FLANGE COMPATIBILITY		
Flange	Shaft	IP/Sealing
1	C, T	X*, A, G, S
2	C, T	X*, A, G, S
4	B	X*, A, G

\* no seal option not recommended

**SPECIFICATIONS**

**Operating Power:**

SSI: 4.5-30VDC; 43mA @ 24V

Analog V Out: 8-32 VDC; 15 mA @ 24 V

Analog I Out: 8-32 VDC; 20 mA @ 24 V

**Output Format:** Analog, CANopen, J1939, Profinet, Profibus, SSI, EtherCAT

**Accuracy:** +/-0.0878° (+/-5.268 arc-min)

**Temperature:** -40°C to 85°C\* (Std -30°C to +85°C)

**Environmental:** IP69K\* (Std IP65)

**Shaft Load:** 300 N axial, 300 N radial\* (std. 40 N axial, 110 N radial; flange 6 180 N axial, 180 N radial)

**Vibration:** 5-1000 Hz, 30 G\*; (Std 10 G)

**Shock:** 200 G, 11 ms (Std 100 G, 3 ms)

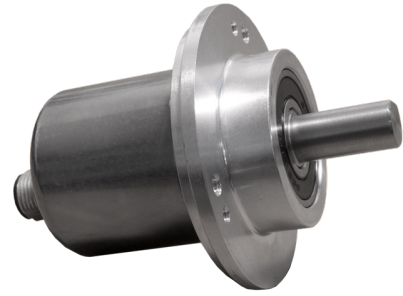
**Weight:** 0.33-0.40 lb [150-180 g]

**Certifications:** CE

**Warranty:** 2 Year No-Hassle

\*Extended temp. range, shaft load capability, shock and vibration rating require flange style "6" or "7"

**NOW FIELD PROGRAMMABLE**

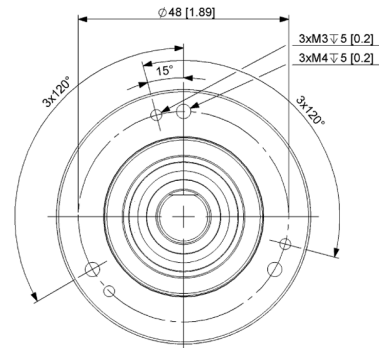
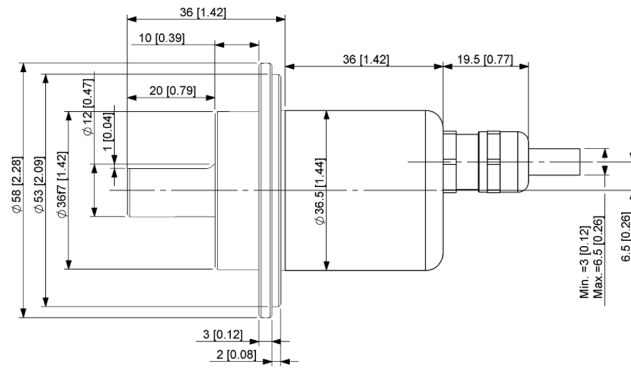


AV6M shafted magnetic absolute rotary encoders offer excellent performance and durability in a cost-effective package. By utilizing Wiegand wire energy harvesting technology combined with magnetic sensors, We have created an absolute encoder design which requires no batteries, long-term capacitors, glass disks, or gears! Also available: hollow shaft model (HS6M), severe duty models (AV30, HS40), as well as optical models (AV6A, HS6A) for ultra-precision applications.

AV6M encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, through temperature cycling and liquid sprays. Moreover, the magnetic sensor can see through oil, dust and dirt that disable ordinary optical absolute encoders.

The AV6M features a broad range of industry standard communication protocols: from analog outputs to CANopen, J1939, Profinet, Profibus, SSI and EtherCAT, you will find the communication protocol you need.

Our AV6M encoders combine magnetic sensors and superior bearing and seal technology to give top performance in industrial applications. Select an AV6M Avtron Encoder today!



MODEL	BUS	FLANGE	SHAFT SIZE	TURNS/BITS	PPR/BITS PER TURN	CONNECTOR	CONNECTOR EXIT	OUTPUT	IP RATING	SPECIAL OPTIONS
<b>AV6M</b>	<b>A</b> - Analog <b>C</b> - CANopen <b>J</b> - J1939 <b>N</b> - Profinet IO <b>P</b> - Profibus DP <b>S</b> - SSI <b>T</b> - EtherCAT	<b>1</b> - 58mm "servo/ clamp" flange, 36mm male pilot, 3X M3, 3X M4 at 48mm <b>2</b> - 58mm "synchro" flange, 50mm male pilot, 3X M4 at 42mm <b>3</b> - 36.5mm mini-flange w/33mm male pilot, 4X M3 at 26mm BC <b>4</b> - 2.5" square flange w/1.25" male pilot <b>6</b> - 36.5mm HD flange w/30mm male pilot, 4X M4 at 24mm <b>7</b> - 42mm HD flange w/pilot, 4X M4 at 35mm	<b>B</b> - 3/8" dia. x 5/8" w/flat <b>C</b> - 10mm dia. x 20mm w/flat <b>R</b> - 10mm dia. x 20mm w/o flat <b>T</b> - 6mm dia., x 10mm, no flat	<b>X</b> - 0/0- single turn <b>A</b> - 16/4 (analog) <b>2</b> - 4096/12 <b>3</b> - 8192/13 <b>4</b> - 16384/14 <b>5</b> - 32768/15 <b>6</b> - 65536/16	<b>2</b> - 4096/12 <b>3</b> - 8192/13* <b>4</b> - 16384/14 <b>5</b> - 32768/15 <b>6</b> - 65536/16 *use '3' also for analog output	<b>A</b> - 1xM12/5 pin <b>C</b> - 3xM12/5 pin <b>E</b> - 1xM12/8 pin <b>F</b> - M23/12 pin <b>K</b> - 3x cable entry <b>W</b> - Cable, 1m	<b>A</b> - side/radial <b>E</b> - end/axial	<b>Digital</b> <b>1</b> - Binary <b>2</b> - Gray  <b>Analog</b> <b>3</b> - V output 0-5V <b>4</b> - V output 0-10V <b>5</b> - I Output 4-20mA <b>6</b> - I Output 0-20mA	<b>X</b> - no shaft seal, IP54 <b>A</b> - IP65 seals <b>K</b> - IP69K stainless housing	<b>000</b> - none <b>001</b> - push button setpoints <b>9xx</b> - special cable length xx=feet [0.3m]

STANDARD CONNECTORS & OUTPUT FORMATS				
Bus	Code	Connectors	Exits	Output
Analog	A	A, W	A, E	3, 4, 5, 6
CANopen	C	A, W	A, E	1
J1939	J	A, W	A, E	1
SSI	S	E, F, W	A, E	1, 2
Profinet	N	C	A, E	1
Profibus	P	C, K	A, E	1

FLANGE COMPATIBILITY		
Flange	Shaft	IP/Sealing
1	C	X, A
2	C, T	X, A
3	C, T	X, A
4	B	X, A
6	R	K
7	C	K



**SPECIFICATIONS**

**Operating Power:**

**SSI:** 5-30 VDC; 30 mA @ 24 VDC, 125 mA @ 5 VDC

**Analog V Out:** 12-30 VDC; 15 mA @ 24 V

**Analog I Out:** 15-30 VDC; 40 mA @ 24 V

**Output Format:** Analog, SSI, Profibus

**Accuracy:** +/-0.35° (+/-21 arc-min)

**Temperature:** -30°C to +85°C

**Environmental:** IP65

**Shaft Load:** 180 N axial, 180 N radial

**Vibration:** 5-2000 Hz, 30 G

**Shock:** 300 G, 6 ms

**Weight:** 3 lb [1350 g]

**Certifications:** CE

**Warranty:** 3 Year No-Hassle

**NOW FIELD PROGRAMMABLE**

MODEL	BUS	FLANGE	SHAFT SIZE	URNS/BITS	PPR/BITS	CONNECTOR	CONNECTOR EXIT	CODING	ADD'L DRILL PATTERN	SPECIAL OPTIONS
AV30	A - Analog P - Profibus DP S - SSI	1 - 58mm flange, 36mm male pilot, 3X M3, 3X M4 @ 48mm BC 2 - 58mm flange, 50mm male pilot, 6X M4, @ 42mm BC 3 - 3.00" Flange, 2.5" Male Pilot 4 - 2.65" Square flange, 1.25" Male Pilot 5 - 85mm (B10) Pilot 6X M6 @ 100mm 6 - Nema 56 4.5" Male Pilot 0 - Custom Flange	B - 3/8" solid shaft w/flat C - 10mm solid shaft w/flat H - 11mm dia. shaft w/ key T - 6mm solid shaft no flat V - 1/4" Solid Shaft	X - 0/0 single turn A - 16/4 (analog) 2 - 4096/12 3 - 8192/13 4 - 16384/14 5 - 32768/15 6 - 65536/16	2 - 4096/12 3 - 8192/13 6 - 65536/16	C - 3xM12 4/5/5 pin E - M12/8 pin F - M23/12 pin K - 3x cable entry W - Cable, 1m S - Single cable entry	A - side/radial	<b>Digital</b> 1 - Binary 2 - Gray  <b>Analog</b> 3 - 0-5V 4 - 0-10V 5 - 4-20mA 6 - 0-20mA 7 - .5 to 4.5VDC 8 - .5 to 9.5VDC	X - No Additional Face Drill Holes	000 - None 9xx - Special cable length (xx-feet [0.3m])

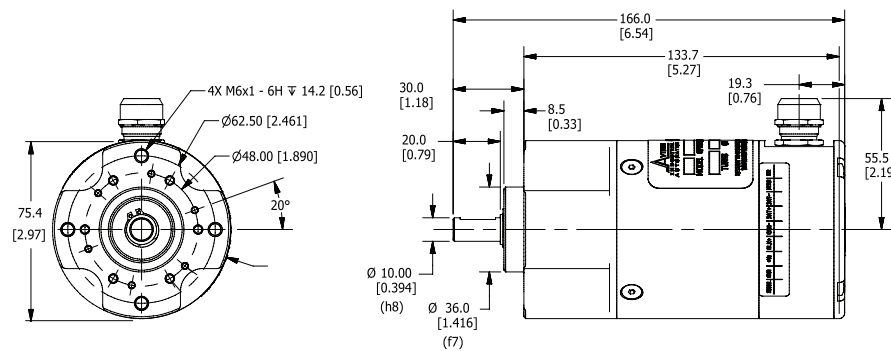
AV30 shafted magnetic absolute rotary encoders offer a completely new level of durability, never seen before in absolute encoders. Yet the AV30 encoder will fit existing flanges and mounts, enabling easy upgrades from low durability encoders. Also available: hollow shaft model (HS40) and optical models (AV6A, HS6A) for ultra-precision applications.

The AV30 features massive bearings with over 10X the load rating of the competition. Industry-leading seal systems stay sealed to keep contaminants out through temperature cycling and liquid sprays. Moreover, the magnetic sensor is not fazed by oil, dust and dirt that disable ordinary optical absolute encoders.

By utilizing Wiegand wire energy harvesting technology, combined with magnetic sensors, we have created an absolute encoder design which requires no batteries, super capacitors, glass disks, or gears!

The AV30 features a broad range of industry standard communication protocols: from analog outputs to Profibus and SSI, you will find the communication protocol you need.

Stop suffering costly downtime due to absolute encoder failures--upgrade to AV30 today!





**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-30 VDC **Current:** 140 mA @ 5 V, 70 mA @ 10 VDC, 40 mA @ 24 VDC, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z) standard

**Frequency Range:** 0 to 1 MHz

**PPR:** 1 - 16,384 Standard (for other PPR needs consult factory)

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Axial Load:** 9 lb [40 N], Radial 25 lb [110 N]

**Temperature:** -40°C to +85°C

**Environment:** up to IP69K (when provided with shaft seals, SST housing)

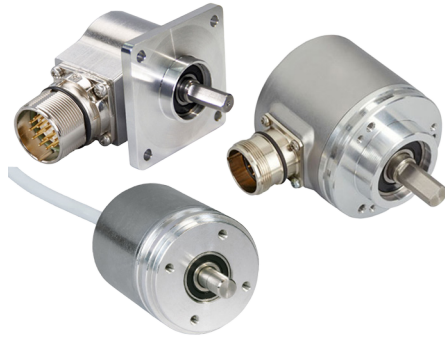
**Vibration:** 10 G (10 Hz – 1000 Hz, EN 60068-2-6)

**Shock:** 100 G (half sine 6 ms, EN 60068-2-27)

**Weight:** 0.44-1.76 lb [200-800 g]

**Warranty:** 2 Year No-Hassle

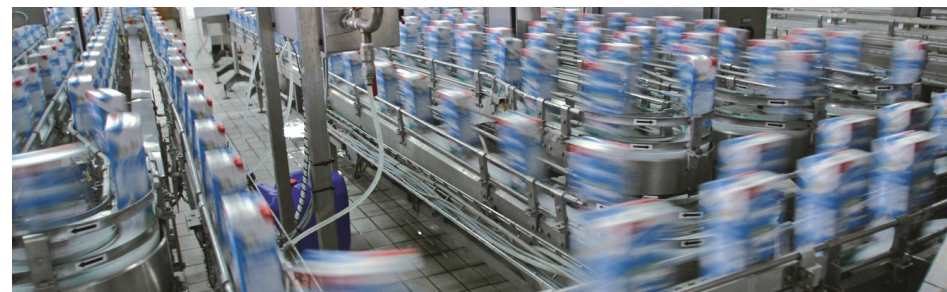
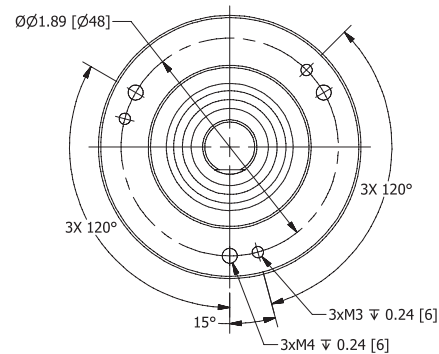
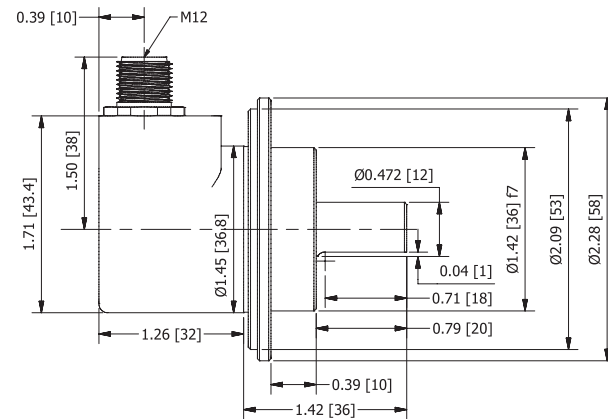
**NOW FIELD PROGRAMMABLE**



AV4 magnetic encoders are setting the industry standard for incremental quadrature rotary encoders. This versatile lineup fits the same mounting patterns on all motors and machines as competitor optical units, but that's where the similarities end. We've incorporated magnetic sensing technology into this affordable set of encoders which makes them more resistant to dust, dirt, oil and other liquids that make ordinary optical encoders fail.

Our Wide-Gap technology provides for 10-20X larger air gap between sensor and rotor than ordinary optical encoder designs. Our high-accuracy magnetic sensors provide high quality quadrature signals for precise velocity and position control with the durability of magnetic sensing technology.

Our magnetic AV4 model encoders are setting a new standard for quality, durability, and performance. Select an AV4 Avtron Encoder today!



MODEL	PPR	LINE DRIVER	SHAFT SIZE	CONNECTOR	CONNECTOR EXIT	FLANGE STYLE	HOUSING SIZE	SEALS	CHANNELS	MOD CODE
<b>AV4</b>	BA - 30 AA - 32 AK - 80 BC - 100 AH - 120 AC - 128 AM - 200 AL - 240 AN - 256 AE - 360 AG - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AP - 720 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 AV - 1440 AU - 1800 A3 - 2000 A4 - 2048 AT - 3072 A6 - 3600 AD - 4096 A8 - 4800 A9 - 5000 CB - 10000 BL - 16384 ZZ - Field Programmable	6 - 5-30V In/Out (7272) 9 - 5-30V In, 5V out (7272)	A - 0.25" OD x 0.625" long with flat B - 0.375" OD x 0.625" long with flat C - 10mm OD x 20mm long with flat R - 10mm OD x 20mm long w/o flat T - 6mm OD x 10mm long w/o flat	See Table Below <b>Programmable Phasing</b>	R - Radial (side) A - Axial (end)	See Table Below	3 - 36mm 4 - 42mm SST 5 - 58mm	A - IP65 seals, alum housing G - IP67 seals, alum housing K - IP69K seals, SST housing X - IP54 no seals**  **NOT RECOMMENDED	A - All channels (A, /A, B, /B, Z, /Z) B - A, /A, B, /Z, No marker E - A, B, Z, No compliments	000 - None 901 - 1' [0.3m] cable 902 - 2' [0.6m] cable 903 - 3' [0.9m] cable 905 - 5' [1.5m] cable 910 - 10' [3m] cable 915 - 15' [4.5m] cable 920 - 20' [6m] cable 925 - 25' [7.5m] cable 930 - 30' [9m] cable

CONNECTOR									
A - 10 pin MS w/o Plug, Avtron Phasing B - 10 pin MS w/o Plug, Reverse Phasing	C - 10 pin MS w/ plug, Avtron Phasing D - 10 pin MS w/ plug, Reverse Phasing	E - 6 pin MS w/o Plug, Avtron Phasing F - 6 pin MS w/o Plug, Reverse Phasing	G - 6 pin MS w/ plug, Avtron Phasing H - 6 pin MS w/ plug, Reverse Phasing	J - 7 pin MS w/o Plug, Avtron Phasing K - 7 pin MS w/o Plug, Reverse Phasing	M - 7 pin MS w/ plug, Avtron Phasing N - 7 pin MS w/ plug, Reverse Phasing	Q - 10 Pin Mini Twistlock w/ plug, Reverse Phasing R - 10 Pin Mini Twistlock w/ plug, Avtron Phasing T - M12-8 pin w/o Plug, Global Pinout, Avtron Phasing	U - M12-8 pin w/o Plug, USA Pinout, Avtron Phasing 2 - M23-12 Pin CCW w/o Plug, Avtron Phasing	3 - M23-12 Pin CCW w/o Plug, Reverse Phasing 5 - M12-5 Pin w/o Plug	7 - M12-8 pin w/o Plug, Global Pinout (Rev Phasing) W - 3.2ft [1m] Cable (also use with special mod 9XX)

FLANGE STYLE									
1 - 58mm Round Flange w/36mm Pilot, 3x M3 & M4 on 48mm BC	2 - 58mm Round Flange w/50mm Pilot, 3x M4 on 42mm BC	3 - 36.5mm Round Flange w/33mm Pilot, 4xM3 on 26mm BC	4 - 2.63" Square Flange, 1.25" Pilot, 4x 0.22 on 2.06 Sq.	5 - 2.63" Round Flange, 2.50" Pilot, 3x 10-32 on 1.88 BC & 4x 4-40 on 1.27 BC	7 - 42mm HD 316 SST Round Flange, 42mm Pilot, 4x M4 on 35mm BC	9 - 2.50" Round Flange, 1.25" Pilot, 3x 10-32 & 8-32 on 1.88 BC, 3x 6-32 & 4x 4-40 on 2.00 BC	A - 2.06" Square Flange, 1.25" Pilot, 4x 0.16 on 1.75" SQ	B - 2.0" Round Flange, 1.25" Pilot, 3x4-40 on 1.5" BC & 4x10-32 on 1.625" BC	C - 2.0" 'B' Flange with stand-off adapter + 3/8"-3/8" coupling for NEMA 34/42 motors
D - 2.0" 'B' Flange for NEMA 34/42 Motors with 1/4"-1/4" coupling option	E - NEMA PY Flange (2.5" pilot, 4x0.281 on 3.978 BC)	G - B10 Flange							

VALID PRODUCT CONFIGURATION									
SHAFT OPTION	HOUSING	SEALS (IP RATING)	CONNECTOR CODES	HOUSING	CONNECTOR EXIT	CONNECTOR CODES	CHANNEL		
A	3, 5	A, G	A, B, C, D, E, F, G, H, J, K, M, N, R	3 - 36mm	R - Radial (side) ONLY	A, B, C, D, R, T, U, 2, 3, 7, W	A		
B	3, 5	A, G		5 - 58mm	A - Axial (end) ONLY	E, F, G, H, J, K, M, N	B, E		
C	All (3, 4*, 5)	A, G, K	2, 3, 5, T, U, W	3, 4, 5	A, R	5	E		
R	3, 5	A, G							
T	3, 5	A, G							

\* '4' Housing only available with 'K' seals

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 28 VDC **Current:** 50 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z) available.

**Frequency Range:** 0 to 125 kHz

**PPR:** 1 - 3600 Standard (for other PPR needs consult factory)

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Axial Load:** 100 lb [45 kg] max.

**Radial Load:** 100 lb [45 kg] max.

**Temperature:** -40°C to 100°C

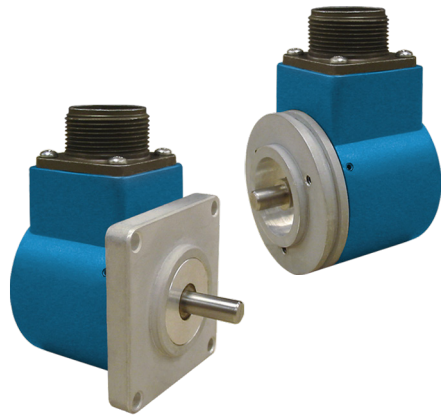
**Environment:** IP65 (when provided with shaft seals)

**Vibration:** 5-2000 Hz

**Shock:** 50 G, 11 ms duration

**Weight:** 0.575 lb [260 g]

**Warranty:** 2 Year No-Hassle



AV20 encoders are industry standard incremental quadrature rotary encoder units, and fit the same mounting patterns on all machines. That's where the similarity ends. Our AV20 encoders can withstand conditions that make other encoders fail. The solid aluminum housing and stainless steel shaft offer increased durability in tough environments.

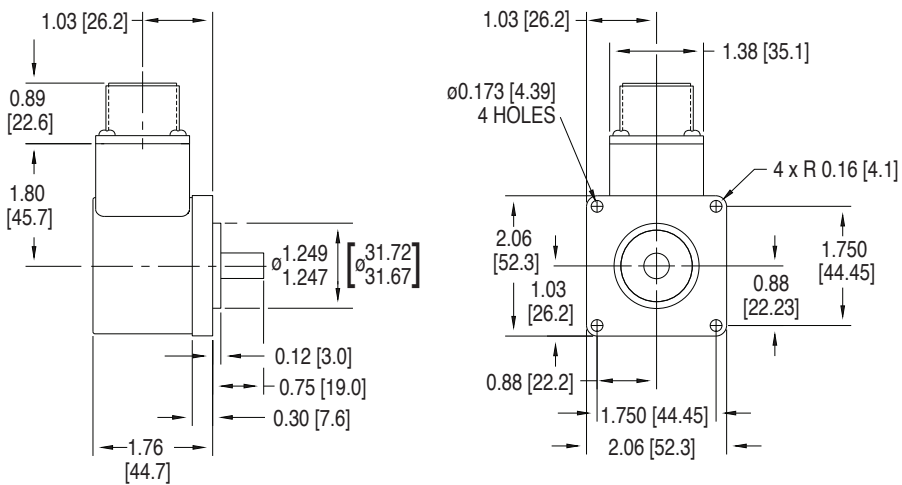
Also available: AV25 for 2.5" flanges; AV44 for PY flanges; and AV44 & AV45 for B10 85mm flanges.

AV20 Avtron Encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, through temperature cycling and liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure. Avtron Encoders' superior bearings permit much larger side and axial loads for pulley and belt applications, and feature synthetic lubricants for even longer life in all applications.

Many competitive optical encoder designs risk sensor damage from any vibration or shock: sensors ride less than four thousandths of an inch from the thin, often flexible, optical disk spinning at full motor speeds. Some designs even use thin glass disks in "industrial" products! Avtron Encoders use only unbreakable disks and a sensor to disk gap over 8X larger than the competition.

Our optical AV20 encoders are setting a new standard for quality, durability, and performance.

**MOUNTING STYLE "1"**



MODEL	PPR	LINE DRIVER	SHAFT SIZE	CONNECTOR OPTIONS	WIRING	MOUNTING STYLE	FACE/BOLT PATTERN	SEALS	CHANNELS	SPECIAL OPTIONS
<b>AV20</b>	A - 1 C - 25 F - 60 G - 100 H - 120 K - 200 L - 240 M - 250 N - 256 P - 300 E - 360 Q - 500 R - 512 S - 600 T - 625 U - 720 W - 1000 Y - 1024 Z - 1200 1 - 1250 2 - 1440 3 - 2000 4 - 2048 5 - 2500 6 - 2540 7 - 3600	1 - 5-28V (7272) 2 - 5-28V, open collector (7273) 4 - 5-28V in, 5V out (7272)	<b>With Flat</b> A - 0.25" B - 0.375" <b>Without Flat</b> N - 0.25" P - 0.375" R - 10mm	See Table Below	A - Side (Radial)	1 - Sq. Flange 2.06" w/ 1.25" male pilot 2 - Rnd. Flange 2.0" w/ 1.25" male pilot 3 - Sq. Flange 2.06" w/ 1.181" female pilot 4 - Rnd. Flange 2.0" w/ 1.181" female pilot	X - None 5 - 4x 6-32 @ 2" 1.625" 6 - 4x 10-32 @ 1.625" 7 - 3x 4-40 @ 1.5"	A - Shaft Sealed** B - Sealed Bearings X - None^^	<b>With Comp.</b> A - A, /A, B, /B, Z, /Z*** B - A, /A, B, /B D - A, /A <b>Without Comp.</b> E - A, B, Z F - A, B	000 - None 00W - Connector on 18" cable* 9xx - Specify cable length xx=feet (use w/ Option "W")

\* only available with "T" & "U" connectors - \*\* recommended, N/A with Mounting Styles "3" & "4" - \*\*\* N/A with MS 6 or 7 Pin Connector. - ^^ not recommended for industrial applications

CONNECTOR				
10 Pin MS	6 Pin MS	7 Pin MS	8 Pin M12^	Cable
A - w/o plug (std. phasing) B - w/o plug (reverse phasing) C - w/ plug (std. phasing) D - w/ plug (reverse phasing)	E - w/o plug (std. phasing) F - w/o plug (reverse phasing) G - w/ plug (std. phasing) H - w/ plug (reverse phasing)	J - w/o plug (std. phasing) K - w/o plug (reverse phasing) M - w/ plug (std. phasing) N - w/ plug (reverse phasing)	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	W - 18" cable

^ only available with channel option "A"

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 28 VDC **Current:** 50 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z) available.

A leads B to CW rotation as viewed from the back of the encoder

**Frequency Range:** 0 to 125 kHz

**PPR:** 1 - 5000 Standard

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -40°C to 100°C

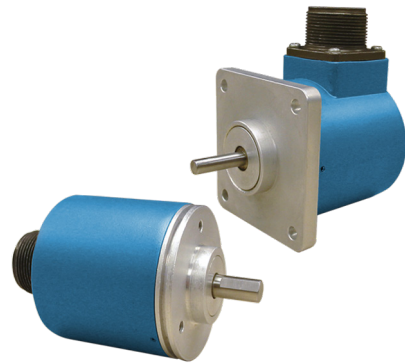
**Environment:** IP65

**Vibration:** 5-2000 Hz

**Shock:** 50 G, 11 ms duration

**Weight:** 0.95 lb [431 g]

**Warranty:** 2 Year No-Hassle



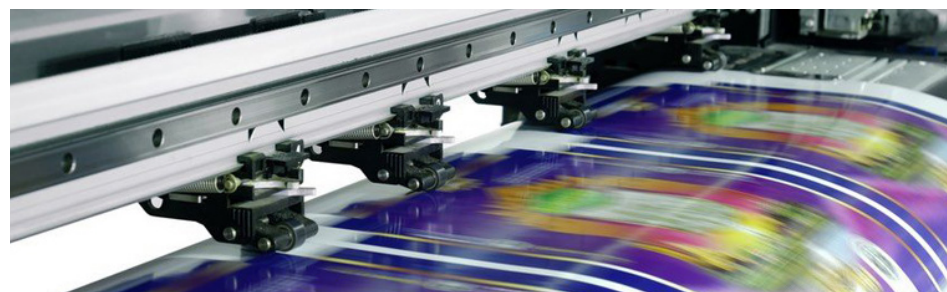
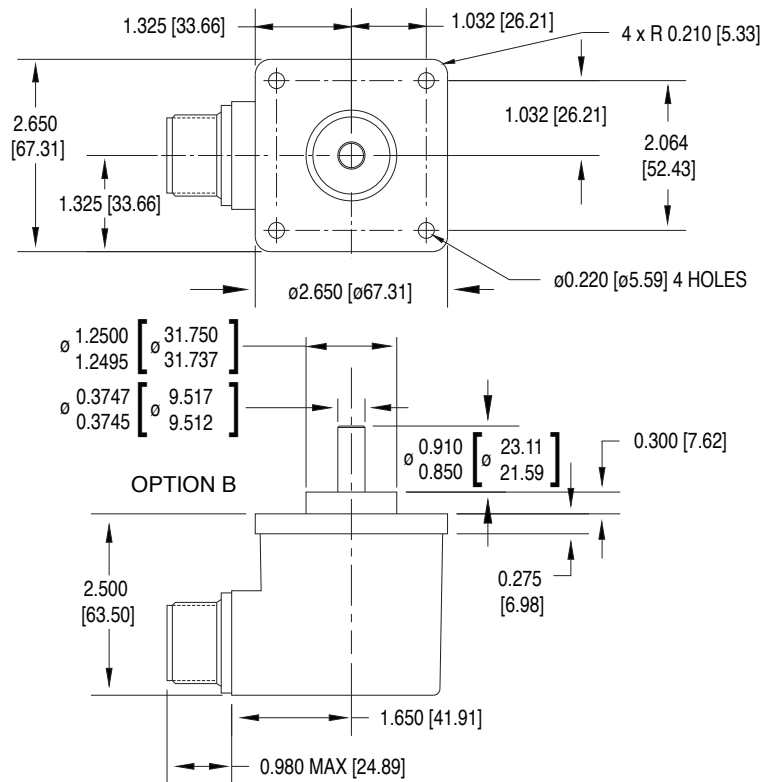
AV25 incremental quadrature rotary encoders fit a vast array of applications, from coupled AC and DC motor shafts, servos, conveyors, to most other machines. The solid aluminum housing, and stainless steel shaft offer increased durability in tough environments.

Also available: AV20 encoders for 2.0" flanges and AV45 for 85mm flanges.

Rotary Avtron Encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, through temperature cycling and liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure. Superior Avtron Encoder bearings permit much larger side and axial loads for pulley and belt applications, and feature synthetic lubricants for even longer life in all applications.

Many competitive optical encoder designs risk sensor damage from any vibration or shock: sensors ride less than four thousandths of an inch from the thin, often flexible, optical disk spinning at full motor speeds. Some designs even use thin glass disks in "industrial" products! Avtron Encoders use only unbreakable disks and a sensor to disk gap over 8X larger than the competition.

Our optical AV25 encoders use superior sensor, disk, bearing, and seal technology to give top performance in industrial conditions. Select an AV25 today!



MODEL	PPR	LINE DRIVER	SHAFT SIZE	CONNECTOR OPTIONS	WIRING	MOUNTING STYLE	FACE/BOLT PATTERN	SEALS	CHANNELS	SPECIAL OPTIONS
AV25	A - 1 C - 25 F - 60 G - 100 H - 120 K - 200 L - 240 M - 250 N - 256 P - 300 E - 360 Q - 500 R - 512 S - 600 T - 625 U - 720 V - 900 W - 1000 Y - 1024 Z - 1200 1 - 1250 2 - 1440 3 - 2000 4 - 2048 5 - 2500 6 - 2540 7 - 3600 D - 4096 9 - 5000	1 - 5-28V (7272) 2 - 5-28V, open collector (7273) 3 - 5-15V (4469) 4 - 5-28V in, 5V out (7272)	<u>With Flat</u> A - 0.25" B - 0.375" C - 10mm <u>Without Flat</u> N - 0.25" P - 0.375" R - 10mm	See Table Below	A - Side (Radial) E - End (Axial)	1 - Sq. Flange 2.625" w/ 1.25" male pilot 2 - Rnd. Flange 2.5" w/ 1.25" male pilot 3 - Rnd. Flange 2.62" 2.5" pilot	X - None 1 - 3x 10-32 @ 1.875" 2 - 4x 4-40 @ 1.272" 3 - 4x 4-40 @ 2" 4 - 3x 6-32 @ 2"	A - Shaft Sealed** B - Sealed Bearings X - None**	<u>With Comp.</u> A - A, /A, B, /B, Z, /Z*** B - A, /A, B, /B D - A, /A <u>Without Comp.</u> E - A, B, Z F - A, B	000 - None 00W - Connector on 18" cable* 9xx - Specify cable length xx=feet (use w/ Option "W")

\* only available with "T" & "U" connectors - \*\* recommended, N/A with Mounting Style "3" - \*\*\* N/A with MS 6 or 7 Pin Connector. - \*\* not recommended for industrial applications

CONNECTOR				
10 Pin MS	6 Pin MS	7 Pin MS	8 Pin M12 <sup>^</sup>	Cable
A - w/o plug (std. phasing) B - w/o plug (reverse phasing) C - w/ plug (std. phasing) D - w/ plug (reverse phasing)	E - w/o plug (std. phasing) F - w/o plug (reverse phasing) G - w/ plug (std. phasing) H - w/ plug (reverse phasing)	J - w/o plug (std. phasing) K - w/o plug (reverse phasing) M - w/ plug (std. phasing) N - w/ plug (reverse phasing)	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	W - 18" cable (pigtail)

<sup>^</sup> only available with channel option "A"

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-30 VDC **Current:** 80 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz @ 5 V & 1 m cable

**PPR:** 1 - 10000 standard (for other PPR needs, consult factory)

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -30°C to 85°C std, \*optional: -40°C to 100°C

**Environmental:** IP66 housing

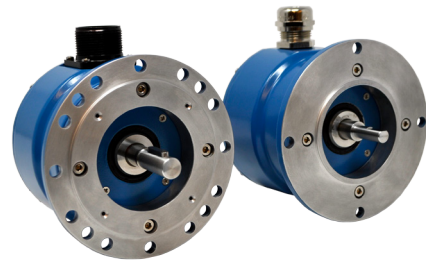
**Vibration:** 10-2000 Hz, 17 G

**Shock:** 275 G, 6 ms duration

**Weight:** 2.5 lb [635 g] approx

**Certifications:** CE, UL

**Warranty:** 2 Year No-Hassle



MODEL	SHAFT	FLANGE	CONNECTOR	MARKER GATING	LINE DRIVER	PPR* (SINGLE)	PPR (DUAL)	SPECIAL OPTIONS
<b>AV44</b>	1 - 11mm w/key; Standard Bearings 5 - 5/16" w/flat; Standard Bearings	<b>B</b> - B10 Euroflange (w/shaft "1") <b>P</b> - PY Flange (w/shaft "5")	<b>A</b> - 10-pin MS, w/o Plug; Standard Phasing <b>B</b> - 10-pin MS, w/o Plug; Reverse Phasing <b>2</b> - M23/12 pin (CW pin#s) Standard Phasing <b>3</b> - M23/12 pin (CW pin #s) Reverse Phasing <b>T</b> - M12-8 pin Turck Pinout <b>U</b> - M12-8 pin U.S. Pinout <b>W</b> - M20 Cord Grip w/ 0.5M (20') Cable <b>Y</b> - M20 Cord Grip w/o Cable	<b>K</b> - 1/4 AB Cycle, Sync w/A&B High <b>L</b> - 1/2 AB Cycle, Sync w/B Low <b>M</b> - 1 AB Cycle, Sync w/A <b>U</b> - Raw Wide Marker (Ungated)	1 - 5-30V in/out 2 - 5-30V in / 5V out 3 - 5V in/out	<b>AN</b> - 256 <b>AR</b> - 512 <b>AY</b> - 1024 <b>A3</b> - 2000 <b>A4</b> - 2048 <b>AT</b> - 3072 <b>AD</b> - 4096 <b>A2</b> - 8192 <b>K1</b> - 10000  *Contact Factory for Additional PPRs	<b>XX</b> - None	<b>000</b> - No Special Mods <b>9xx</b> - Custom Cable Length^ <b>068</b> - Remote Alarm Output <b>070</b> - Expanded Temp Range (-40 to +100C) <b>077</b> - 4500 to 6000 RPM  ^ Custom Cable Length in meters; whole meter increments up to 99m

The AV44 offers high performance, magnetic durability and moisture resistance in a compact package with drop-in ease of replacement at a great value.

Avtron AV44 encoders offer an 11mm shaft with a "B10 Euroflange" or a 5/16" shaft with "PY" flange, or the option to foot-mount for a wide range of industrial applications.

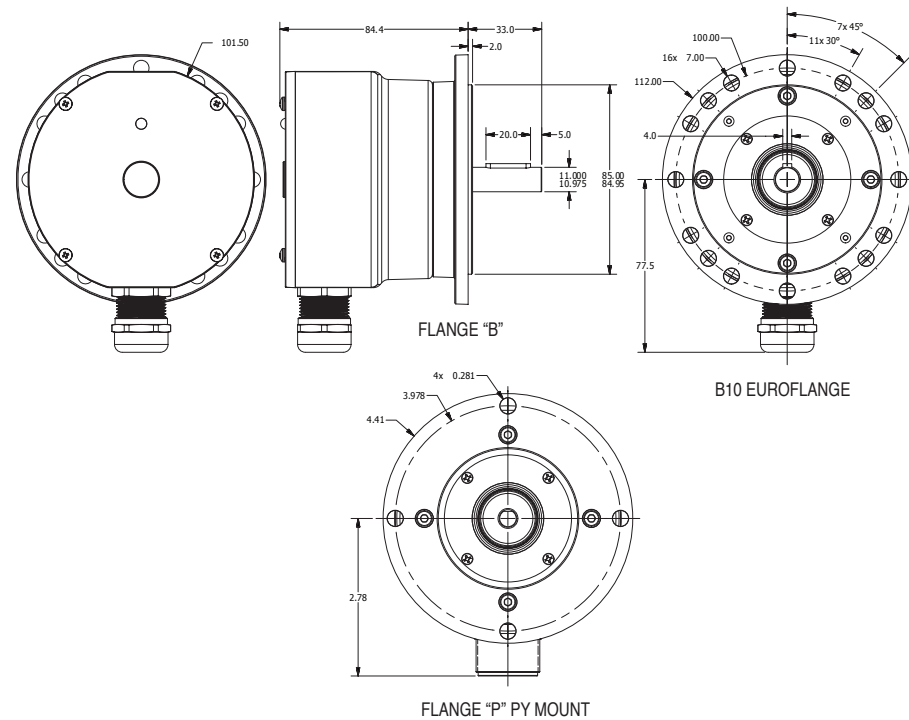
Avtron Encoders have superior shaft seals and bearings that stay sealed to keep out contamination caused by temperature cycling and liquid sprays.

The AV44 offers high power outputs that can drive cables up to 1000' [300m] with full short circuit and over-voltage protection!

On-board diagnostics check all aspects of the encoder - from the sensor to the output line driver circuit - and provide a clear indicator that the encoder is working well. No more fumbling with a PC or oscilloscope to determine if your encoder is working properly!

Often, optical encoders fail because of dust or water contamination that prevents the sensor from seeing the optical disk. The AV44 advanced magnetic technology sees through contamination. The fully potted circuit board ignores water, oil, dust and dirt. This ensures your machine keeps working, even in the toughest application environments.

Select an Avtron AV44 and upgrade your machine today!





**SPECIFICATIONS**

**Operating Power:**

Volts: 5-24 VDC Current: 100 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-5000

**Speed:** 5000 RPM Max. std., for higher speeds, consult factory

**Enclosure:** IP65

**Electronics:** Fully Encapsulated, IP67\*\*

**Temperature:** -40°C to +100°C

**Vibration:** 18 G

**Shock:** 100 G

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Warranty:** 3 Year No-Hassle

\*\*Connector option "W", connector options may reduce IP rating.

AV45 EUROSART™ heavy mill duty solid shaft magnetic incremental quadrature rotary encoders fit European B10 (85mm) flanges with 100mm bolt circles, and offer 10 or 11mm shaft sizes. AV45 also offers foot mounting, with bolt patterns to match Hubner POG/OG styles, PGH4 styles, and Toshiba foot-mounted resolvers.

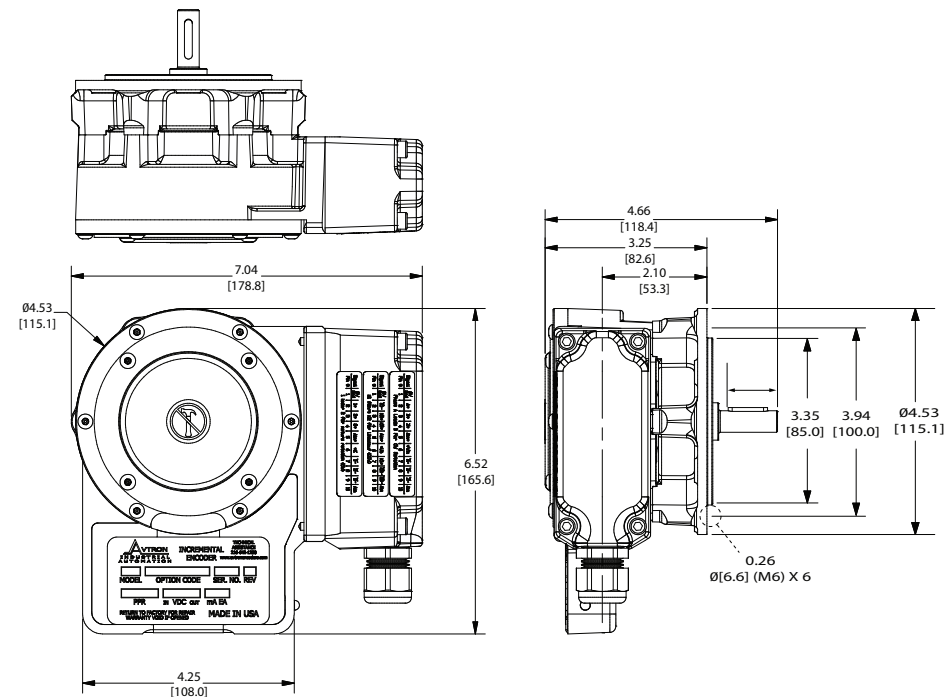
Also available: AV115 modular magnetic to fit flanges using a no-bearing design & HS45 EUROSART™ hollow shaft models.

EURO SMART™ encoders feature durable construction, simple installation, and clear diagnostics to eliminate encoder-related downtime:

AV45 built-in magnetic sensors are fully potted to withstand dirt and liquids and extreme temperature changes. No glass disks, no optics to clog. Bigger bearings and superior seals far outlast any comparable model.

The AV45 enables you to change the electrical connector in the field or at your Avtron Encoders distributor for maximum flexibility and the shortest delivery times! The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

The AV45 easily replaces competitive models, and the incredible durability ensures it is the last replacement encoder you will ever need!



MODEL	SHAFT SIZE	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	LINE DRIVER	CONNECTOR OPTIONS	FOOT MOUNT BRACKET	CHANNELS	SPECIAL OPTIONS
AV45	N - 10mm shaft, k6 H - 11mm shaft, k6 P - 12mm shaft, h6 S - 16mm shaft, h6 T - 18mm shaft, h6 Q - 0.500**	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 BA - 2400 A5 - 2500 CG - 3000 AT - 3072 A7 - 3600 BB - 4000 AD - 4096 A8 - 4800 A9 - 5000 A0 - Special	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 BA - 2400 A5 - 2500 CG - 3000 AT - 3072 A7 - 3600 BB - 4000 AD - 4096 A8 - 4800 A9 - 5000 A0 - Special	6 - 5-24V in/out (7272) 8 - 5-24V in/out (HX) 9 - 5-24V in, 5V out (7272)	See Table Below	X - None (for B10 flange mount) 1 - Toshiba T52113N bolt pattern (recommend "T" 18mm shaft) (B35529 bracket) 2 - POGxx, OGxx Hubner (Baumer) bolt pattern (B35555 bracket) 3 - FG4 Johannes Hubner bolt pattern (B35338 bracket) 4 - Foot mount for Toshiba type MSP 5 - 2.50" pilot flange	A - A, /B, /A, B, /Z, Z (req'd for 8, 10 pin connectors) B - A, /B, /A, B (no marker) D - A, /A E - A, B, Z (single ended) F - A, B (single ended, no marker)	000 - None 001 - Isolated ceramic bearings** 004 - Super Magnetic Shielding 6xx - Add over speed switch xx= speed code 9xx - Specify cable length xx=feet max 33ft (use w/Option "W")

\* not available with over speed - \*\* not available on shaft options "S" & "Q"

CONNECTOR								
10 Pin MS Connector- Small Encoder Pinout	10 Pin MS Connector- Large Encoder Pinout	6 Pin MS Connector- Small Encoder Pinout	7 Pin MS Connector- Small Encoder Pinout	Small EPIC Connector	Terminal Box w/ terminal strip	8 Pin M12 Connector	12 Pin M23 Connector	Other
A - Avtron/BEI Phasing, w/o plug B - Dynapar HS35 Phasing, w/o plug C - Avtron/BEI Phasing, mating plug D - Dynapar HS35 Phasing, mating plug Y - 12" cable w/plug	4 - Avtron/ Northstar Pinout, mating plug	E - Avtron/BEI Phasing, w/o plug F - Dynapar HS35 Phasing, w/o plug	J - Avtron/BEI Phasing, w/o plug K - Dynapar HS35 Phasing, w/o plug M - 4 foot cable w/o plug, channel B	P - Avtron pinout, w/mating plug G - Northstar pinout w/plug Q - Avtron pinout on remote base, 18" cable w/plug Z - Avtron pinout on 18" cable w/ plug	H - USA, 1/2" conduit L - Europe w/ cord grip 5 - Conduit Box	T - Global pinout, w/o plug U - USA Pinout, w/o plug	2 - Leine and Linde pinout, w/o plug 3 - Hubner Pinout w/o plug	R - Mini Twist Lock (Mini MS) w/ mating plug W - Cable 3' (or special length)

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA nom, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 5000 RPM Max

**Electronics:** Fully Encapsulated, IP67

**Temperature:** -40°C to 120°C

**Vibration:** 18 G

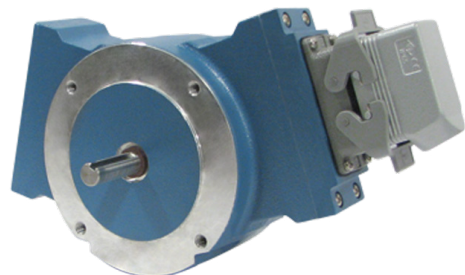
**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 14 lb [6.4 kg] / 16 lb [7.3 kg] dual output

**Warranty:** 1 Year No-Hassle

**Uses AV5 Sensor - See Page 67**



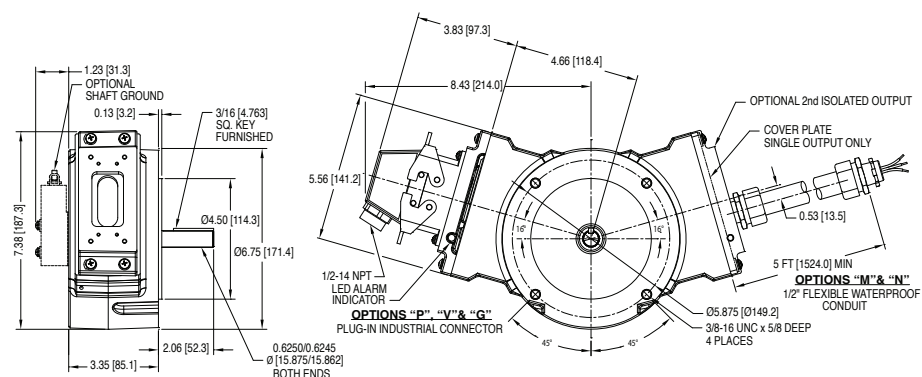
AV485 SMARTach™ III severe duty magnetic encoders can be foot or NEMA 56C face/flange mounted. They feature our largest bearings on an ultra-wide stance for pulley and other rough applications. Also available: AV685 for hollow shaft mounting, and AV850 encoders for complete flowerpot/flange/coupling elimination. The AV485 is designed to withstand the worst environments: buried in slag, coated in pulp, sprayed with salt water or cutting coolants, it keeps working. The modular, gull-winged design makes it easy to install and service; the base can be bolted in place without removing the encoder, and the AV5 wide-gap removable electronics require no adjustment or shimming.

The sensors are fully potted to protect against liquids, and are interchangeable between AV850, AV485, and AV685 encoders. The universal 5-24V design drives longer cables and is protected against wiring errors and surges. A second backup output is available with the same or different PPR, and offers completely separate electronics for maximum uptime.

Adaptive Electronics: at power-up you know you installed it right! The green LED tells you your AV5 Sensor is aligned with the rotor and reading signal. If at any time, the AV5 cannot produce consistent signals, the LED changes to red and the optional remote alarm contact activates. However, the encoder keeps working to give you time to schedule service. Even wiring errors and short circuits that cause an over-temp situation will be detected and indicated by changing the LED to orange.

For easy upgrades, the AV485 matches the bolt pattern and shaft location of older analog and digital models.

Keep your mill running today, and for years to come: install AV485!



MODEL	TEMP RATING	FOOT BRACKET	MOUNTING STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
AV485	N - -20°C to 80°C C - -40°C to 80°C H - -20°C to 120°C (w/Vortex Cooler)	X - None 1 - Avtron Standard (A36261) 2 - BC42/46 style (A25448)	S - Single shaft D - Dual shaft G - Grounding O - Overspeed Switch	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	See Table Below	000 - None 003 - Include analog signal converter (K661) 004 - Super magnetic shielding 4xx - Special PPR 9xx - Special cable length

CONNECTOR OPTIONS							
Mounted on Encoder						Cable	Flexible Conduit
10 pin MS	10 pin EPIC	10 pin mini EPIC	10 pin mini	5 pin MS	6 pin MS		
A - w/o plug B - w/ plug C - w/ plug & flex conduit adapter L - with right angle plug 5 - w/o plug (Dynapar pinout)	P - w/ plug G - w/ plug (Northstar™ Pinout) V - w/ plug, w/ insulated adapter	1 - w/ plug	R - w/ plug	E - w/o plug (M737) F - w/ plug (M737) H - w/o plug (M727) J - w/ plug (M727)	3 - w/ plug	W - 3' flex sealed Q - 18' flex 10 pin EPIC w/ plug, adapter block Z - 3' flex w/ EPIC and plug S - 10 pin mini w/ plug, 3'	D - 10 pin MS, w/ plug, 5' adapter M - Wire leads only, 5' w/ adapter K - Wire leads only N - Wire leads only, 5' T - Terminal box 5' Y - Terminal box, 5' w/ adapter

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 10 - 30 VDC **Current:** 230 mA at 10 V, 100 mA at 24 V maximum\*

**Output Formats:** Ethernet/IP, Modbus TCP, Profinet, POWERLINK, Profibus, CANopen, DeviceNet, SSI, Parallel\*, EtherCAT

**Accuracy:** +/-0.02° (+/-1 arc-min)

**Shaft Loading:** axial 9 lb [40 N], radial 25 lb [110 N]

**Temperature:** -40°C to 85°C

**Environment:** Up to IP67\*\*

**Vibration:** 10 G, 10-1000 Hz

**Shock:** 100 G, 6 ms duration

**Weight:** 1.21 lb [550 g]; stainless option 2.7 lb [1200 g]

**Warranty:** 2 Year No-Hassle

\*Parallel requires 400mA @ 10V or 180mA @ 24V

\*\*With certain stainless steel housing configurations

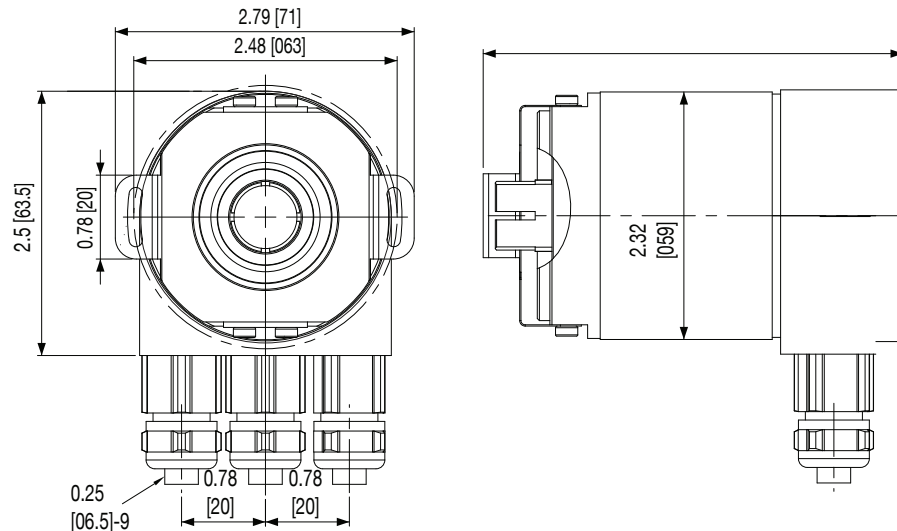
HS6A absolute rotary hollow shaft encoders fit shafts from 0.25" to 0.6" [6-15mm], and offer superior durability compared to ordinary optical absolute encoders. Also available: AV6A solid shaft flange-mounted models, HS6M magnetic absolute encoders, HS40 severe-duty absolute magnetic encoders that fit shafts 5/8 - 1 1/8" [16-30mm].

HS6A encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, despite temperature cycles or liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure. Superior Avtron Encoder bearings outlast the competition, even when mounting stub shafts have increased run out.

Many competitive optical encoder designs risk sensor damage from any vibration or shock. Some designs even use thin glass disks in "industrial" products! Avtron Encoders uses only unbreakable disks.

The HS6A offers a broad range of communication options, from parallel output and SSI to the latest Profibus and Ethernet standards.

Our optical HS6A encoders use superior sensor, disk, bearing, and seal technology to give top performance in industrial conditions. Select an HS6A today!



MODEL	BUS	FLANGE	BORE SIZE	TURNS/BITS	PPR/BITS PER TURN	CONNECTOR	MOUNTING STYLE	OUTPUT CODE	SEALS	SPECIAL OPTIONS
<b>HS6A</b>	C - CANopen D - DeviceNet K - POWERLINK L - Parallel M - Modbus TCP N - Profinet P - Profibus DP R - EtherNet/IP S - SSI T - EtherCAT	1 - 58mm housing A - 58mm housing with protective basket (SSI)	A - 3/8" B - 1/2" D - 1/4" L - 6mm M - 8mm N - 10mm P - 12mm Q - 14mm (EOS only) R - 15mm Z - All metric sizes (15mm native bore) Y - All US sizes (5/8" native bore)	X - 0/0 single turn A - 16/4** E - 256/8** 2 - 4096/12 4 - 16384/14	E - 256/8** F - 512/9** 0 - 1024/10** 2 - 4096/12 3 - 8192/13 6 - 65536/16 **Parallel Bus Only	A - 1xM12/5 pin B - 2xM12/5 pin C - 3xM12 4/5/5 pin D - 2xM12/4 pin E - M12/8 pin F - M23/12 pin G - M27/26 pin J - 2x cable entry K - 3x cable entry Q - M23/12 pin Kubler Pinout R - M23/16 pin w/o plug W - Cable, 1m	A - Radial (EOS only) E - Axial (EOS only) U - EOS or Thru (SSI only, radial exit)	1 - Binary 2 - Grey	X - IP54 A - IP65 shaft seals G - IP66 seals S - IP67 seals, stainless housing	000 - No special features 9xx - Specify cable length xx=feet [0.3m]

BUS	BUS CODE	CONNECTOR	OUTPUT
CANopen	C	A, B, C, J, K, W	1
DeviceNet	D	A, B, C, J, K, W	1
POWERLINK	K	C	1
Parallel	L	G, R, W	1, 2
Modbus	M	D	1
Profinet	N	C	1
Profibus	P	C, J, K	1
EtherNet/IP	R	C	1
SSI	S	E, F, Q, W	1, 2
EtherCAT	T	C	1

**SPECIFICATIONS**

**Operating Power:**

SSI: 4.5-30VDC; 43mA @ 24V

Analog V Out: 8-32VDC; 15mA @ 24VDC

Analog I Out: 8-32VDC; 20mA @ 24V

**Output Format:** Analog, CANopen, J1939, Profinet, Profibus, SSI, EtherCAT

**Accuracy:** +/- 0.0878° (+/- 5.268 arc-min)

**Temperature:** -30°C to +85°C

**Environmental:** IP65

**Vibration:** 10 G, 10-1000 Hz

**Shock:** 100 G, 6 ms

**Weight:** 0.33 lb [150 g]

**Certifications:** CE

**Warranty:** 2 Year No-Hassle



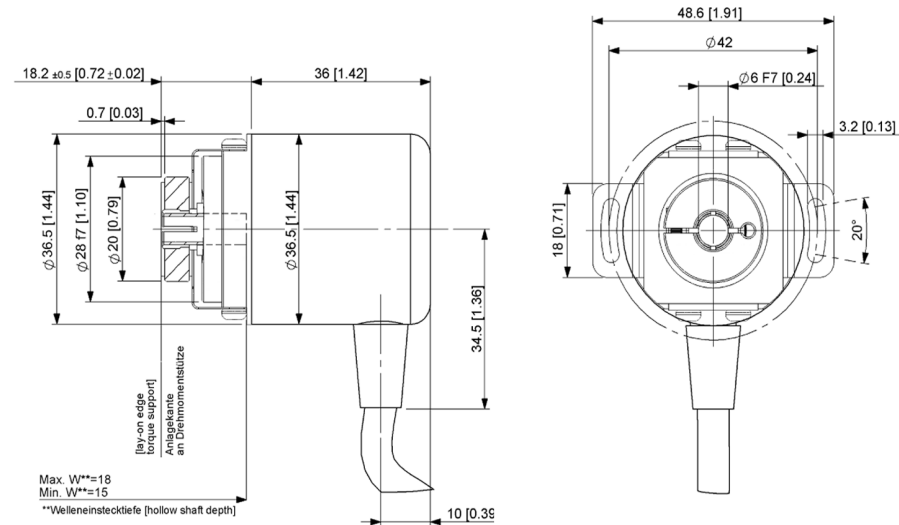
**NOW FIELD PROGRAMMABLE**

HS6M hollow shaft magnetic absolute rotary encoders offer excellent performance and durability in a cost-effective package. By utilizing Wiegand wire energy harvesting technology combined with magnetic sensors, we have created an absolute Avtron Encoder design which requires no batteries, long-term capacitors, glass disks, or gears! Also available: solid shaft model (AV6M), severe duty models (AV30, HS40), as well as optical models (AV6A, HS6A) for ultra-precision applications.

HS6M encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, through temperature cycling and liquid sprays. Moreover, the magnetic sensor can see through oil, dust and dirt that disable ordinary optical absolute encoders. Optional coated circuit boards and GORE-TEX® weep/breather drain configurations are available for the roughest locations.

The HS6M features a broad range of industry standard communication protocols: from analog outputs to CANopen, J1939, Profinet, Profibus DP, SSI, and EtherCAT you will find the communication protocol you need.

Our HS6M encoders combine magnetic sensors and superior bearing and seal technology to give top performance in industrial applications. Select HS6M today!



MODEL	BUS	HOUSING	BORE SIZE	TURNS/BITS	PPR/BITS PER TURN	CONNECTOR	MOUNTING STYLE	OUTPUT	IP RATING	SPECIAL OPTIONS
HS6M	A - Analog C - CANopen J - J1939 N - Profinet P - Profibus DP S - SSI T - EtherCAT	1 - 58mm 3 - 36mm 7 - 42mm A - 58mm w/ protective basket	A - 3/8" B - 1/2" C - 5/8" D - 1/4" L - 6mm M - 8mm N - 10mm P - 12mm Q - 14mm R - 15mm Z - All metric sizes (15mm native bore) Y - All US sizes (5/8" native bore)	X - 0/0 single turn A - 16/4 (analog) 2 - 4096/12 3 - 8192/13 4 - 16384/14 5 - 32768/15 6 - 65536/16	2 - 4096/12 3 - 8192/13* 6 - 65536/16 *use '3' also for analog output	A - 1xM12/5 pin C - 3 x M12/4 pin E - 1xM12/8 pin F - M23/12 pin K - 3x cable entry W - Cable, 1m	A - Radial (EOS only) E - Axial (EOS only)	<b>Digital</b> 1 - Binary 2 - Gray  <b>Analog</b> 3 - 0-5V 4 - 0-10V 5 - 4-20mA 6 - 0-20mA	X - IP54, no seal, aluminum housing A - IP65 seals, aluminum housing	000 - None 002 - coated circuit brds Gore-TEX® weep drain for outdoor applications 9xx - special cable length xx=feet [0.3m]

STANDARD CONNECTORS & OUTPUT FORMATS			
BUS	CODE	CONNECTORS	OUTPUT
Analog	A	A, W	3, 4, 5, 6
CANopen	C	A, W	1
J1939	J	A, W	1
Profinet	N	C	1
Profibus DP	P	C, K	1
SSI	S	E, F, W	1, 2
EtherCAT	T	C	1

HOUSING COMPATIBILITY	
HOUSING	BORE SIZE
1	All
3	L, M, N, P, D, A, B - Only
7	M, N, P - Only
A	All



**SPECIFICATIONS**

**Operating Power:**

**SSI:** 5-30 VDC; 30 mA @ 24 VDC, 125 mA @ 5 VDC

**Analog V Out:** 12-30 VDC; 15 mA @ 24 V

**Analog I Out:** 15-30 VDC; 40 mA @ 24 V

**Output Format:** Analog, Profibus and SSI

**Accuracy:** +/-0.35° (+/-21 arc-min)

**Temperature:** -30°C to +85°C

**Environmental:** IP65

**Vibration:** 10-1000 Hz, 10 G

**Shock:** 200 G, 3 ms

**Weight:** 4.8 lb [2200 g]

**Certifications:** CE

**Warranty:** 2 Year No-Hassle

**NOW FIELD PROGRAMMABLE**



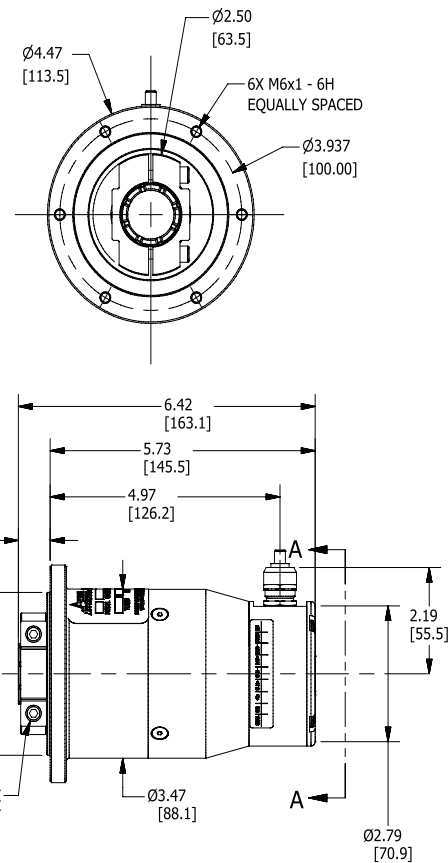
HS40 hollow shaft severe duty magnetic absolute rotary encoders offer unequalled durability. HS40 features massive bearings and the best shaft sealing system in the industry to keep your process running, through temperature cycling and liquid sprays. Moreover, the magnetic sensor can see through oil, dust and dirt that disable ordinary optical absolute encoders. Also available: solid shaft model (AV30) and optical models (AV6A, HS6A) for ultra-precision applications.

By utilizing Wiegand wire energy harvesting technology combined with magnetic sensors, Avtron has created an absolute encoder design which requires no batteries, long-term capacitors, glass disks, or gears!

Unlike other absolute encoders, HS40 allows a full size shaft fit; this allows it to easily fit on both NEMA and IEC frame motors with no special modification needed. Isolation from shaft currents is standard, and the interchangeable bore sizing inserts allow easy modification.

The HS40 features a broad range of industry standard communication protocols: from Analog outputs to Profibus and SSI, you will find the communication protocol you need.

Get the absolutely best hollow shaft encoder available for your positioning application--pick HS40!



MODEL	BUS	HOUSING	SHAFT BORE	URNS/BITS	PPR/BITS	CONNECTOR	MOUNTING STYLE	CODING	TETHERS	SPECIAL OPTIONS
HS40	A - Analog P - Profibus DP S - SSI	X - Standard 1 - Aluminum housing w/ Steel-IT® stainless paint	C - 5/8" D - 3/4" E - 7/8" F - 1" G - 1 1/8" U - All USA sizes "C, D, E, F, G" S - 16mm V - 19mm W - 20mm Y - 25mm 3 - 30mm Z - All Metric sizes "S, V, W, Y, 3"	X - 0/0 Single turn A - 16/4 (analog) 2 - 4096/12 3 - 8192/13 4 - 16384/14 5 - 32768/15 6 - 65536/16	2 - 4096/12 3 - 8192/13 6 - 65536/16	C - 3x M12 4/5/5 pin E - M12/8 pin F - M23/12 pin K - 3x cable entry W - Cable, 1m S - Single cable entry	E - EOS only	<b>Digital</b> 1 - Binary 2 - Gray  <b>Analog</b> 3 - 0-5V 4 - 0-10V 5 - 4-20mA 6 - 0-20mA 7 - 0.5-4.5V 8 - 0.5-9.5V	X - No Tether E - 4.5" NEMA C-Face tether F - 8.5" NEMA C-Face tether G - Threaded rod arm kit, adjustable 70-500mm (4.25"-12") H - Fan cover T-bolt and 8.5" NEMA C-face tethers M - Fan cover T-bolt and 4.5"/6.75" NEMA C-face tethers P - Threaded rod arm kit, fixed 70mm length T - Threaded rod arm kit, adjustable 70-500mm w/T-bolt for fan cover U - Universal Tether/Arm Kit (includes all)	000 - None 9xx - special cable length xx-feet [0.3m]

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-30 VDC **Current:** 140 mA @ 5 V, 70 mA @ 10 VDC, 40 mA @ 24 VDC, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z) standard

**Frequency Range:** 0 to 1 MHz

**PPR:** 1 - 16,384 Standard (for other PPR needs consult factory)

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Axial Load:** 9 lb [40 N], Radial 25 lb [110 N]

**Temperature:** -40°C to +85°C

**Environment:** Up to IP69K (when provided with shaft seals, SST housing)

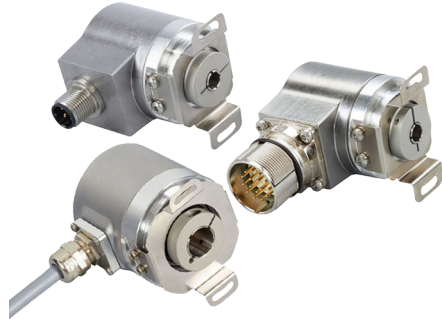
**Vibration:** 10 G (10 Hz – 1000 Hz, EN 60068-2-6)

**Shock:** 100 G (half sine 6 ms, EN 60068-2-27)

**Weight:** 0.44-1.76 lb [200-800 g]

**Warranty:** 2 Year No-Hassle

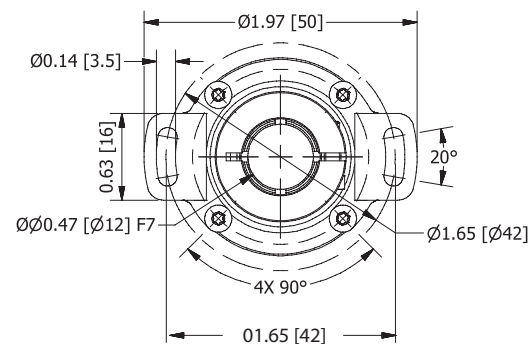
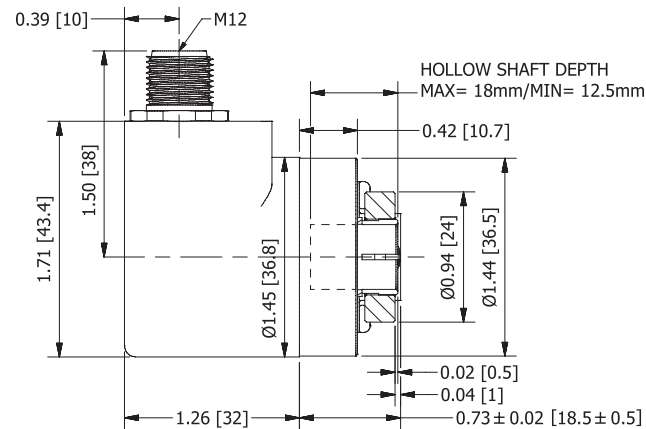
**NOW FIELD PROGRAMMABLE**



HS4 magnetic encoders are setting THE industry standard for incremental quadrature rotary encoders. This versatile lineup fits the same mounting patterns on all motors and machines as competitor optical units, but that's where the similarities end. We've incorporated magnetic sensing technology to this affordable set of encoders which makes them more resistant to dust, dirt, oil and other liquids that make ordinary optical encoders fail.

Our Wide-Gap technology provides for 10-20X larger air gap between sensor and rotor than ordinary optical encoder designs. Consider the resistance to vibration when you compare our 0.060" air gap to the typical 0.004" clearance from the thin, often flexible, optical disk spinning at full motor speeds. Our high-accuracy magnetic sensors provide high quality quadrature signals for precise velocity and position control with the durability of magnetic sensing technology.

Our magnetic HS4 model encoders are setting a new standard for quality, durability, and performance. Select an HS4 Avtron Encoder today!



MODEL	PPR	LINE DRIVER	SHAFT SIZE	CONNECTOR	SEALS	HOUSING SIZE	PROTECTION	TETHER	CHANNELS	MOD CODE
<b>HS4</b>	BA - 30 AA - 32 AK - 80 BC - 100 AH - 120 AC - 128 AM - 200 AL - 240 AN - 256 AE - 360 AG - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AP - 720 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 AV - 1440 AU - 1800 A3 - 2000 A4 - 2048 AT - 3072 A6 - 3600 AD - 4096 A8 - 4800 A9 - 5000 CB - 10000 BL - 16384 ZZ - Field Programmable	6 - 5-30V In/Out (7272) 9 - 5-30V In, 5V out (7272)	D - 1/4" A - 3/8" B - 1/2" C - 5/8" L - 6mm M - 8mm N - 10mm 2 - 11mm P - 12mm Q - 14mm R - 15mm* Y - All std inserts 1/4"-1/2" Z - All metric inserts 6mm-14mm *Native Bore / No Insert	See Table Below <b>Programmable Phasing</b>	A - IP65 Seals, Alum G - IP67 Seals, Alum K - IP69K Seals, SST	3 - 36mm 4 - 42mm 5 - 58mm	0 - No Basket 1 - Protective Basket	See Table Below	A - All channels (A, /A, B, /B, Z, /Z) B - A, /A, B, /B, No marker E - A, B, Z, No compliments	000 - None 901 - 1' [0.3m] cable 902 - 2' [0.6m] cable 903 - 3' [0.9m] cable 905 - 5' [1.5m] cable 910 - 10' [3m] cable 915 - 15' [4.5m] cable 920 - 20' [6m] cable 925 - 25' [7.5m] cable 930 - 30' [9m] cable

Note: Some combinations of seals, bore size and housing size are not possible. See online Configurator for option selections.

CONNECTOR									
A - 10 pin MS w/o Plug, Avtron Phasing B - 10 pin MS w/o Plug, Reverse Phasing	C - 10 pin MS w/ plug, Avtron Phasing D - 10 pin MS w/ plug, Reverse Phasing	E - 6 pin MS w/o Plug, Avtron Phasing F - 6 pin MS w/o Plug, Reverse Phasing	G - 6 pin MS w/ plug, Avtron Phasing H - 6 pin MS w/ plug, Reverse Phasing	J - 7 pin MS w/o Plug, Avtron Phasing K - 7 pin MS w/o Plug, Reverse Phasing	M - 7 pin MS w/ plug, Avtron Phasing N - 7 pin MS w/ plug, Reverse Phasing	Q - 10 Pin Mini Twistlock w/ plug, Reverse Phasing R - 10 Pin Mini Twistlock w/ plug, Avtron Phasing T - M12-8 pin w/o Plug, Global Pinout, Avtron Phasing	U - M12-8 pin w/o Plug, USA Pinout, Avtron Phasing 2 - M23-12 Pin CCW w/o Plug, Avtron Phasing	3 - M23-12 Pin CCW w/o Plug, Reverse Phasing 5 - M12-5 Pin w/o Plug	7 - M12-8 pin w/o Plug, Global Pinout (Rev Phasing) W - 3.2ft [1m] Cable (also use with special mod 9XX)

TETHER OPTIONS			
A - Dual-Tab Tether: 1.65" [42mm] BC, 0.14" [3.5mm] slot	B - Dual-Tab Tether: 2.48" [63mm] BC, 0.13" [3.2mm] slot	C - Dual-Tab Tether: 1.65"-2.48" [42-63mm] BC, 0.14" [3.6mm] slot	D - Fan Cover Tether: 1.57-2.95" [40-75mm] BC, 0.45" [11.4mm] slot

CONNECTOR CODES	HOUSING	CONNECTOR EXIT
A, B, C, D, E, F, G, H, J, K, M, N, R	3 - 36mm	R - Radial (side) ONLY
	5 - 58mm	A - Axial (end) ONLY
2, 3, 5, 7, T, U, W	3, 4, 5	A, R

CONNECTOR CODES	CHANNEL
A, B, C, D, R, T, U, 2, 3, 7, W	A
E, F, G, H, J, K, M, N	B, E
5	E

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 28 VDC **Current:** 50 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 125 kHz

**PPR:** 1 - 3600 standard

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -20°C to 100°C

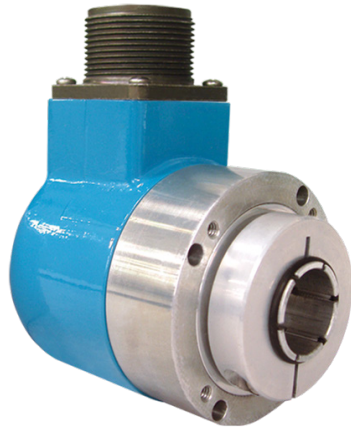
**Environmental:** IP65

**Vibration:** 5-2000 Hz

**Shock:** 50 G, 11 ms duration

**Weight:** 0.95 lb [431 g]

**Warranty:** 2 Year No-Hassle

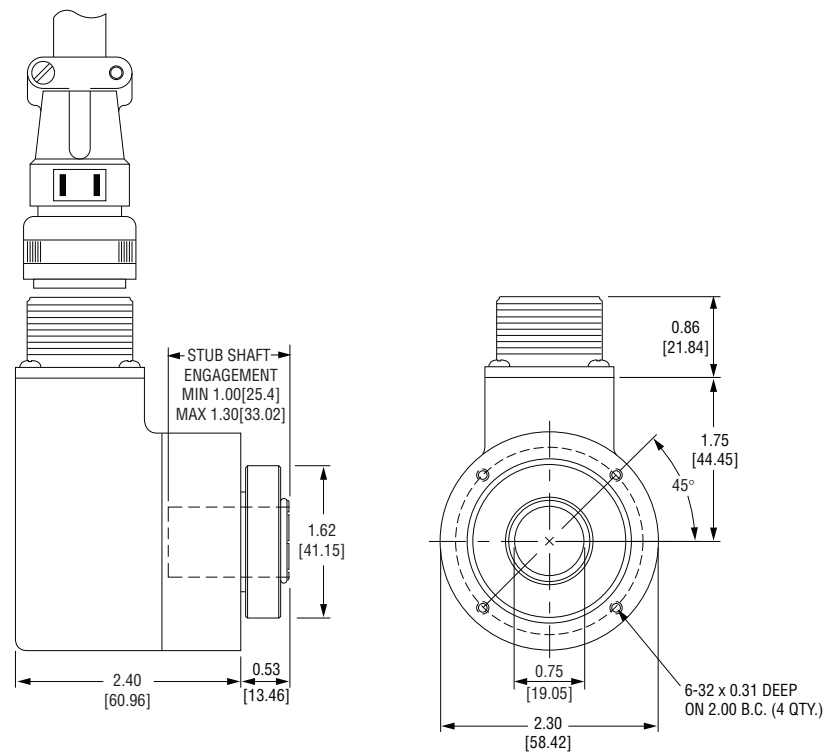


HS25A encoders fit shafts from 3/8" - 3/4" and from 6 mm - 16 mm using a durable shaft insert; units may be resized by replacing or removing the insert, enabling our factory, distributors, and customer stockrooms to swiftly meet any need. The shaft insert provides isolation from motor shaft currents, while permitting case grounding to meet NEC requirements.

Avtron Encoders have superior shaft seals and bearings that stay sealed to keep contaminants out, through temperature cycling and liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure, and Avtron Encoders' superior bearings feature synthetic lubricants for even longer life.

Many competitive optical encoder designs risk sensor damage from any vibration or shock: sensors ride less than four thousandths of an inch from the thin, often flexible, optical disk spinning at full motor speeds. Some designs even use thin glass disks in "industrial" products! Avtron Encoders use only unbreakable disks and a sensor to disk gap over 8X larger than the competition.

Our optical HS25A encoders use superior sensor, disk, bearing, and seal technology to give top performance in industrial conditions. Select an HS25A today!



MODEL	PPR	LINE DRIVER	SHAFT BORE	CONNECTOR OPTIONS	MOUNTING STYLE	PROTECTION	ANTI-ROTATION TETHER OPTION	CHANNELS	SPECIAL OPTIONS
HS25A	A - 1 C - 25 F - 60 G - 100 H - 120 K - 200 P - 300 E - 360 Q - 500 R - 512 S - 600 T - 625 U - 720 V - 900 W - 1000 Y - 1024 Z - 1200 1 - 1250 3 - 2000 4 - 2048 5 - 2500 6 - 2540 7 - 3600	1 - 5-28V 2 - 5-28V, Open Collector 4 - 5-28V in, 5V out	A - 3/8" B - 1/2" C - 5/8" D - 3/4" (Native Bore) U - Universal 3/8" to 3/4" (all inserts) L - 6mm M - 8mm N - 10mm P - 12mm S - 16mm U - Universal 3/8" to 3/4" (all inserts) Z - Metric 6mm to 16mm (all inserts)	See Table Below	E - End of shaft only	0 - None 1 - Protective Basket	X - None A - 1/4-20 T-Bolt Fan Cover B - 5/16-18 T-Bolt Fan Cover C - 3/8-16 T-Bolt Fan Cover D - All T-Bolt Fan Cover E - 4.5" C-Face F - 8.5" C-Face G - 12" Threaded Rod Tether U - A-F Tethers	8,10 Pin Cons: A - A,/A,B,/B,Z,/Z  6,7 Pin Cons: B - A,/A,B,/B D - A,/A E - A,B,Z F - A,B	000 - None 9xx - Specify cable length xx=feet (use w/ Connector Option "W") 00W - Connector on 18" cable, see list below

CONNECTOR OPTIONS					
10 Pin MS	6 Pin MS	7 Pin MS	8 Pin M12	10 Pin Mini Twist Lock	Cable
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	E - w/o plug (std. phasing) F - w/o plug (Dynapar HS35 phasing) G - "E" w/ plug H - "F" w/ plug	J - w/o plug (std. phasing) K - w/o plug (Dynapar HS35 phasing) M - "J" w/ plug N - "K" w/ plug	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	R - 10 pin mini w/o plug (std. phasing) S - 18" flex cable w/o plug (std. phasing)	W - 18" flex cable

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 28 VDC **Current:** 50 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 125 kHz

**PPR:** 100 - 5000 standard

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -20°C to 100°C

**Environmental:** IP65

**Vibration:** 5-2000 Hz

**Shock:** 50 G, 11 ms duration

**Weight:** 1.6 lb [730 g]

**Warranty:** 2 Year No-Hassle

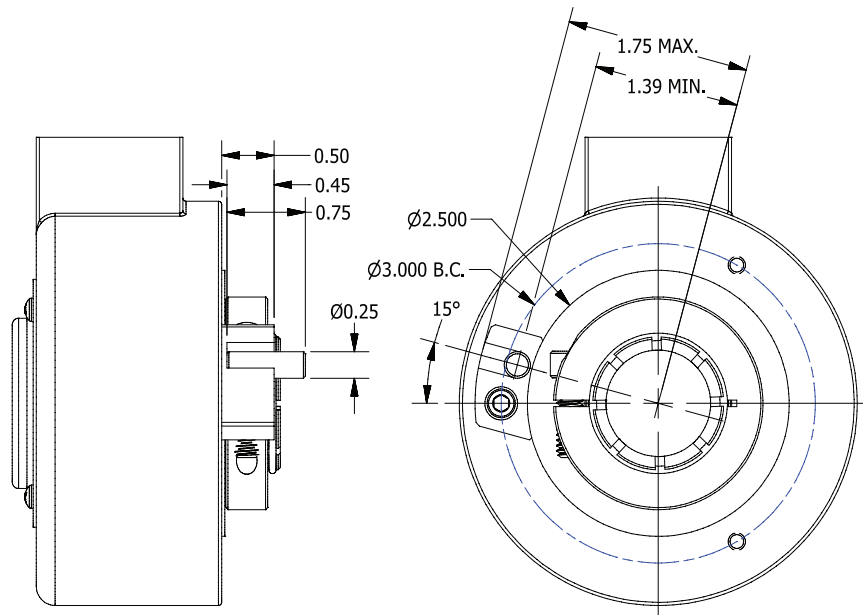


HS35A encoders fit shafts from 1/2" to 1" and 12mm-20mm using a durable shaft insert. Units may be resized by replacing or removing the insert, enabling our factory, distributors, and customer stockrooms to swiftly meet any need. The shaft insert and insulated bearings also provide isolation from motor shaft currents, while permitting case grounding to meet NEC requirements.

Avtron Encoders have superior shaft seals and bearings that stay sealed to keep out contamination caused by temperature cycling and liquid sprays. Our encoder seals are protected by mechanical barriers to prevent flexing or failure, and Avtron Encoders use superior bearings feature synthetic lubricants for even longer life.

Many competitive optical encoder designs risk sensor damage from any vibration or shock: sensors ride less than four thousandths of an inch from the thin, often flexible, optical disk spinning at full motor speeds. Some designs even use thin glass disks in "industrial" products! Avtron Encoders use only unbreakable disks and a sensor to disk gap over 8X larger than the competition.

Our optical HS35A encoders use superior sensor, disk, bearing, and seal technology to give top performance in industrial conditions. Select an HS35A Avtron Encoder today!



MODEL	PPR	LINE DRIVER	BORE OPTIONS	CONNECTOR OPTIONS	MOUNTING STYLE	PROTECTION	ANTI-ROTATION TETHER OPTION	CHANNELS	SPECIAL OPTIONS
<b>HS35A</b>	G - 100 K - 200 L - 240 M - 250 E - 360 S - 600 V - 900 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 8 - 4000 D - 4096 9 - 5000	1 - 5-28V (7272) 2 - 5-28V, open collector (7273) 4 - 5-28V in, 5V out (7272)	B - 1/2" C - 5/8" D - 3/4" E - 7/8" F - 1" U - U.S. Universal (all inserts, 1/2"-1") P - 12mm Q - 14mm R - 15mm S - 16mm V - 19mm W - 20mm Y - 25mm Z - Universal 12mm to 20mm (all metric inserts)	See Table Below	U - Universal End-of-Shaft & Thru Shaft X - No rear cover	0 - None 1 - Protective Basket	X - None A - 1/4-20 T-Bolt Fan Cover B - 5/16-18 T-Bolt Fan Cover C - 3/8-16 T-Bolt Fan Cover D - All T-Bolt Fan Cover E - 4.5" C-Face F - 8.5" C-Face G - 12" Threaded Rod M - D and E Tether Kits N - Marker pulse orienting tether R - Pin and block U - A-F Tethers	<b>With Comp.</b> A - A, /A, B, /B, Z, /Z B - A, /A, B, /B D - A, /A <b>Without Comp.</b> E - A, B, Z F - A, B	<b>000</b> - None <b>9xx</b> - Specify cable length xx=feet (use w/ option "W") <b>Wxx</b> - Connector on cable, xx=feet, 00=std. 18" length

CONNECTOR OPTIONS						
10 Pin MS	6 Pin MS	7 Pin MS	8 Pin M12	10 Pin Mini Twist Lock	Mini-Epic	Cable
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	E - w/o plug (std. phasing) F - w/o plug (Dynapar HS35 phasing) G - "E" w/ plug H - "F" w/ plug	J - w/o plug (std. phasing) K - w/o plug (Dynapar HS35 phasing) M - "J" w/ plug N - "K" w/ plug	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout) V - w/ plug (US Pinout) 2 - w/ plug (Turck Pinout, Reverse Phasing)	R - 10 pin mini w/o plug S - 18" flex cable w/o plug	Z - w/ plug, on 18" cable	W - 18" flex. cable Y - 18" flex. cable BEI wire colors

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 30 VDC **Current:** 80mA, no load; 5V option

**Output Format:** A Quad B with gated marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz

**PPR:** 4 - 10000 standard

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -40° to 100°C

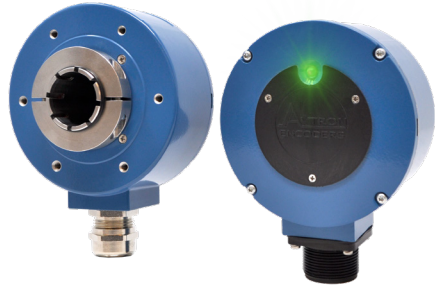
**Environmental:** Up to IP66

**Vibration:** 10-2000Hz

**Shock:** 275G, 6 ms duration

**Weight:** 2.5 lbs. [635 g]

**Warranty:** 2 Year No-Hassle



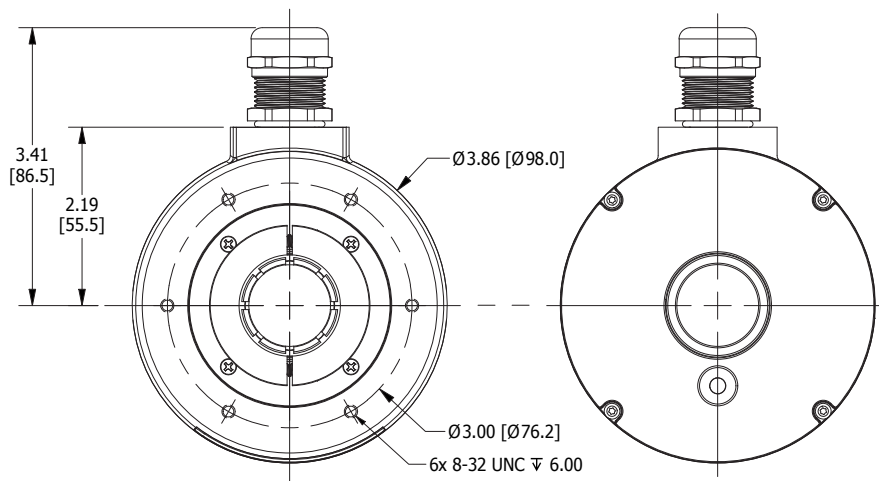
Finally--the breakthrough you have been waiting for--a HS35 magnetic encoder, high IP rating AND a super-competitive price! The HS35X is drop-in compatible with all competitive HS35 size encoders, making replacements a breeze!

HS35X encoders fit shafts from 1/2" to 1" [11mm-25mm] easily, using a durable shaft insert. Units may be resized by replacing or removing the insert, enabling our factory, distributors, and customer stockrooms to swiftly meet any need. The shaft insert and isolated bearings also provide isolation from motor shaft currents.

Optical encoders suffer so many failures--broken glass disks, misaligned masks, vibration problems, condensing liquids that confuse the optics...the list never ends! Our magnetic technology is fully protected against dust, dirt, liquids and condensation. Our Wide-Gap electronics prevent rotor-sensor crashes too!

Wondering if your encoder is working right? The HS35X has full diagnostics, informing you of signal quality, and ensuring there are no shorts in the wiring to or from the encoder.

Step up to the HS35X without paying more than your current price for a weak optical encoder!



MODEL	PPR	LINE DRIVER	BORE OPTIONS	CONNECTOR OPTIONS	MOUNTING	PROTECTION	ANTI-ROTATION TETHER OPTION	CHANNELS	SPECIAL OPTIONS
<b>HS35X</b>	<b>G</b> - 100 <b>H</b> - 120 <b>K</b> - 200 <b>L</b> - 240 <b>M</b> - 250 <b>E</b> - 360 <b>K</b> - 400 <b>Q</b> - 500 <b>R</b> - 512 <b>S</b> - 600 <b>V</b> - 900 <b>W</b> - 1000 <b>Y</b> - 1024 <b>Z</b> - 1200 <b>U</b> - 1800 <b>3</b> - 2000 <b>4</b> - 2048 <b>5</b> - 2500 <b>8</b> - 4800 <b>D</b> - 4096 <b>9</b> - 5000 <b>2</b> - 8192 <b>1</b> - 10000 <b>0</b> - Special	<b>1</b> - 5-30V in / out <b>2</b> - 5-30V in / 5V out <b>3</b> - 5V in / 5V out	<b>USA</b> <b>B</b> - 1/2" <b>C</b> - 5/8" <b>D</b> - 3/4" <b>E</b> - 7/8" <b>F</b> - 1" (Native Bore) <b>U</b> - Universal USA 1/2"-7/8" via inserts (Native 1" bore)  <b>METRIC</b> <b>N</b> - 11mm <b>P</b> - 12mm <b>Q</b> - 14mm <b>R</b> - 15mm <b>S</b> - 16mm <b>V</b> - 19mm <b>W</b> - 20mm <b>Y</b> - 25mm (Native Bore) <b>Z</b> - Universal Metric 12-20mm via inserts (Native 1" Bore)	<b>A</b> - 10 Pin MS, w/o Plug, Avtron Phasing <b>B</b> - 10 Pin MS, w/o Plug, Reverse Phasing <b>C</b> - 10 Pin MS, w/ Plug, Avtron Phasing <b>D</b> - 10 Pin MS, w/ Plug, Reverse Phasing <b>E</b> - 6 Pin MS, w/o Plug, Avtron Phasing <b>P</b> - 12mm Phasing <b>F</b> - 6 Pin MS, w/o Plug, Reverse Phasing <b>G</b> - 6 Pin MS, w/ Plug, Avtron Phasing <b>H</b> - 6 Pin MS, w/ Plug, Reverse Phasing <b>T</b> - M12/8 Pin Turck Pinout, w/o Plug, Avtron Phasing <b>U</b> - M12/8 Pin US Pinout, w/o Plug, Avtron Phasing <b>V</b> - M12/8 Pin US Pinout, w/ Plug, Avtron Phasing <b>2</b> - M12/8 Pin US Pinout, w/ Plug, Reverse Phasing <b>W</b> - M20 Cord Grip w/ 18" Cable	<b>U</b> - Universal End-of-Shaft & Thru-Shaft <b>X</b> - Thru-Shaft (No Cover)	<b>0</b> - None <b>1</b> - Protective Basket	<b>X</b> - None <b>A</b> - 1/4-20 T-Bolt Fan Cover <b>B</b> - 5/16-18 T-Bolt Fan Cover <b>C</b> - 3/8-16 T-Bolt Fan Cover <b>D</b> - All T-Bolt Fan Cover <b>E</b> - 4.5" C-Face <b>F</b> - 8.5" C-Face <b>G</b> - 12" Threaded Rod Tether <b>M</b> - D + E <b>P</b> - 115mm Threaded Rod Torque Arm <b>R</b> - Pin & Block <b>T</b> - 3 in. (76mm) Threaded Rod Torque Arm <b>U</b> - A-F	<b>A</b> - A, /A, B, /B, Z, /Z <b>B</b> - A, /A, B, /B <b>D</b> - A, /A <b>E</b> - A, B, Z <b>F</b> - A, B	<b>000</b> - None <b>4xx</b> - Special PPR <b>9xx</b> - Special Cable Length xx=Feet <b>090</b> - IP66 Rated Sealing

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 80 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**PPR:** 1 - 5000 standard (for other PPR needs, consult factory)

**Speed:** 4700 RPM Max., (for higher speeds, consult factory)

**Temperature:** -20°C to 85°C

**Environmental:** IP65

**Vibration:** 5-2000 Hz, 20 G

**Shock:** 50 G, 11 ms duration

**Weight:** Single: 1.4 lb [635 g] Dual: 2.0 lb [905 g]

**Certifications:** CE

**Warranty:** 2 Year No-Hassle



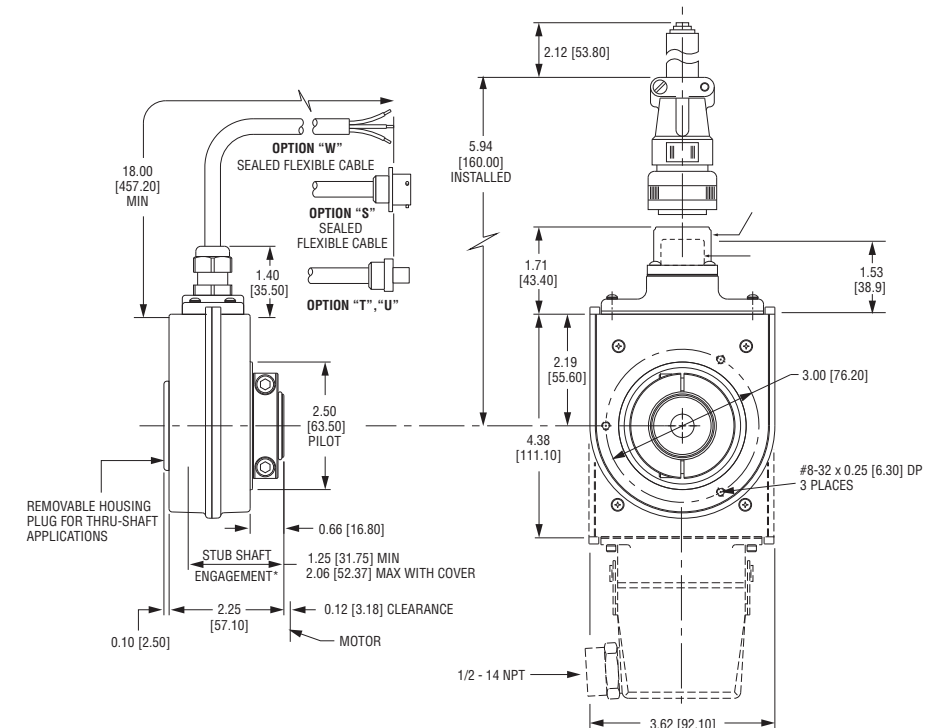
HS35M encoders fit shafts from 1/2" to 1 1/8" and 12mm to 30mm using a durable shaft insert. Models from 1/2" to 1" [12mm to 20mm] may be resized by replacing the insert, enabling our factory, distributors, and customer stockrooms to swiftly meet any need. The engineered composite housing is immune to most chemicals, and eliminates shaft current and grounding problems.

Avtron Encoders have superior shaft seals and bearings that stay sealed to keep out contamination caused by temperature cycling and liquid sprays. The HS35M offers high power outputs that can drive cables over 1000' [300m] with full short circuit and over-voltage protection!

The HS35M features two large bearings, one at each end of the enclosure for strength and resistance to damage. Many competitors use only a single bearing, or two tiny bearings side by side.

Often, optical encoders fail because of dust or water contamination that prevents the sensor from seeing the optical disk. The HS35M advanced magnetic technology sees through contamination and the fully sealed circuit design ensures your machine keeps working, even in mill environments.

The HS35M offers magnetic performance and moisture resistance, in a compact package, and for a great price. Select an HS35M Avtron Encoder and upgrade your machine today!



MODEL	LEFT OUTPUT	RIGHT OUTPUT	LINE DRIVER	BORE SIZE	CONNECTOR OPTIONS	MOUNTING STYLE	PROTECTION	ANTI-ROTATION TETHER OPTION	CHANNELS	SPECIAL OPTIONS
HS35M	F - 60 T - 80 G - 100 H - 120 K - 200 L - 240 M - 250 N - 256 P - 300 E - 360 Q - 500 R - 512 S - 600 U - 720 V - 900 W - 1000 Y - 1024 Z - 1200 1 - 1250 2 - 1440 B - 1500 3 - 2000 4 - 2048 5 - 2500 C - 3072 9 - 5000 X - None 0 - Special PPR	F - 60 T - 80 G - 100 H - 120 K - 200 L - 240 M - 250 N - 256 P - 300 E - 360 Q - 500 R - 512 S - 600 U - 720 V - 900 W - 1000 Y - 1024 Z - 1200 1 - 1250 2 - 1440 B - 1500 3 - 2000 4 - 2048 5 - 2500 C - 3072 9 - 5000 X - None 0 - Special PPR	6 - 5-24V (7272) 8 - 5-24V Hi-Power (Hx) 9 - 5-24V in 5V out (7272)	B - 1/2" C - 5/8" D - 3/4" E - 7/8" F - 1" G - 1-1/8" P - 12mm Q - 14mm R - 15mm S - 16mm V - 19mm W - 20mm Y - 25mm* 3 - 30mm* U - U.S. Universal (all inserts, 1/2"-1") Z - Metric (all inserts, 12mm-20mm)	See Table Below	U - Universal End-of-Shaft & Thru Shaft	0 - None 1 - Basket**	X - None 1 - 10mm Square Grid Fan Cover Tether A - 1/4-20 T-Bolt Fan Cover B - 5/16-18 T-Bolt Fan Cover C - 3/8-16 T-Bolt Fan Cover D - All T-Bolt Fan Cover E - 4.5" C-Face F - 8.5" C-Face G - 12" [300mm] Threaded Rod Tether H - A & F Tether Kits M - D & E Tether Kits N - Clamp for adjusting marker pulse position P - 4.5" [115mm] Threaded Rod Tether, replaces Northstar HS35M, HSD35 U - Universal (D, E, & F Kits)	A - A, /A, B, /B, Z, /Z B - A, /A, B, /B, Z, /Z D - A, /A, Z E - A, B, Z F - A, B J - All Signals, 1/4 pulse marker to A-High/B-High 4 - Custom PPR with all channels present 9 - Custom length cable with all channels (Use w/ conn. W option)	00 - None 0W - Connector on 18" cable: See Table Below

\*No insert used for Options "F", "G", "Y", "3", \*\* Not applicable on dual output. - « Only available with 0W modification.

CONNECTOR OPTIONS					
10 Pin MS	10 Pin EPIC	10 Pin Mini MS	12 Pin M23	Cable	Terminal Box
A - w/o plug (Std. Phasing) B - w/o plug (Dynapar Phasing) C - w/ plug (Std. Phasing) D - w/ plug (Dynapar Phasing)	P - w/ plug (Hubner Pinout) V - w/o plug L - w/ plug (Leine Linde Pinout, Reverse Phasing)	R - w/ plug S - Connector on 18" cable w/ plug	2 - w/o plug (Reverse Phasing) 4 - 90° w/o plug (Reverse Phasing)	W - 18" cable (Std. Pinout) 9 - 18" cable (Hubner Pinout) Y - 12" cable w/ 10 Pin MS conn. & plug	Z - 18" cable w/ EPIC conn. & plug Q - 18" cable w/ Mini EPIC conn. & plug w/ adapter block 1 - 15 pin D-Sub conn. on 48" cable

0W Mod Code Connectors (Only available on 18" cable)

6 Pin MS «	7 Pin MS «	8 Pin M12 «
E - w/o plug (Std. Phasing) F - w/o plug (Dynapar Phasing) G - w/ plug (Std. Phasing) H - w/ plug (Dynapar Phasing)	J - w/o plug (Std. Phasing) K - w/o plug (Dynapar Phasing) M - w/ plug (Std. Phasing) N - w/ plug (Dynapar Phasing)	T - Turck Pinout on cable U - US Pinout on cable 6 - Turck Pinout, Dynapar Phasing

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-30 VDC **Current:** 80 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz @ 6 V & 1 m cable

**PPR:** 1 - 10000 standard (for other PPR needs, consult factory)

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -30°C to 85°C std, \*optional: -40°C to 100°C

**Environmental:** IP66 housing

**Shaft Current Isolation:** 2700 V RMS

**Vibration:** 10-2000 Hz, 17 G

**Shock:** 275 G, 6 ms duration

**Weight:** 2.5 lb [635 g] approx

**Certifications:** CE, UL

**Warranty:** 2 Year No-Hassle



The HS44 offers high performance, magnetic durability and moisture resistance in a compact package with drop-in ease of replacement at a great value.

Avtron HS44 encoders are a direct fit for 12mm, 16mm and 17mm (10:1 taper) generator (and motor) center-bolt shaft systems.

The isolated bearings offer high voltage isolation from shaft currents.

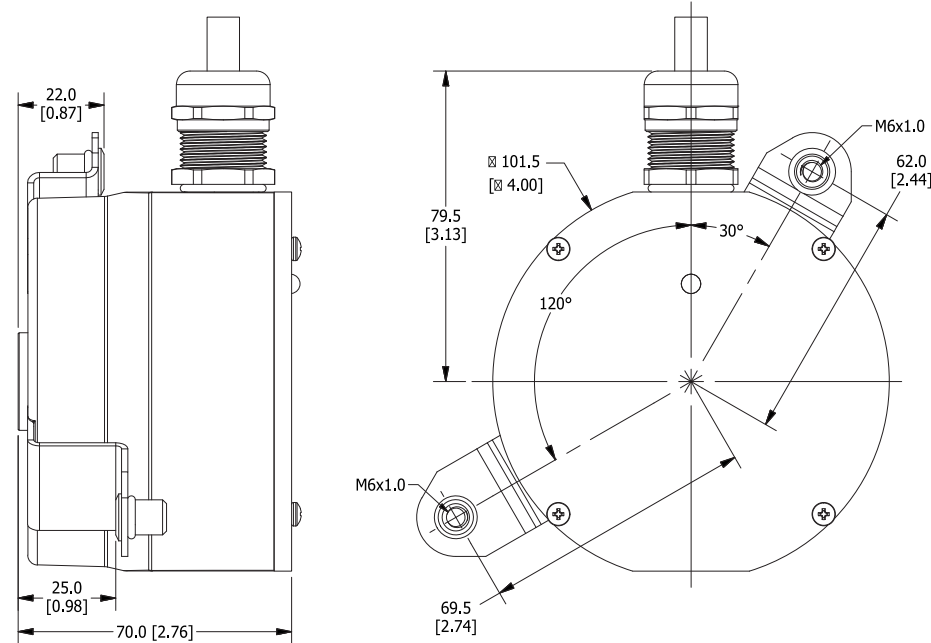
The HS44 is engineered to be a drop-in replacement for Baumer Hubner HOG 8, & 9 models, as well as Leine & Linde 861, 862 & 865 models. And it adds superior durability and diagnostics!

The HS44 offers high power outputs that can drive cables up to 1000' [300m] with full short circuit and over-voltage protection!

On-board diagnostics check all aspects of the encoder - from the sensor to the output line driver circuit - and provide a clear indicator that the encoder is working well. No more fumbling with a PC or oscilloscope to determine if your encoder is working properly!

Often, optical encoders fail because of dust or water contamination that prevents the sensor from seeing the optical disk. The HS44 advanced magnetic technology sees through contamination.

Select an Avtron HS44 and upgrade your machine today!



MODEL	BORE SIZE	TETHER	CONNECTOR	MARKER GATING	LINE DRIVER	PPR (SINGLE)	PPR (DUAL)	MODS
HS44	2 - 12mm End-of-Shaft (EOS) Straight; Standard bearings 6 - 16mm EOS Straight; Standard bearings 7 - 17mm EOS 10:1 Taper; Standard bearings	X - No Tether 1 - Bracket Only 120°(25mm from shaft to inboard mount) 2 - Bracket Only 330°(22mm from shaft to outboard mount) 3 - Bracket 330° w/ 90mm Tether Arm	1 - M20 cord grip w/o cable, special wiring 2 - M23-12 pin (cw pin #s) - standard phasing 3 - M23-12 pin (cw pin #s) - reverse phasing 4 - M20 cable gland (12.7-15.7mm) w/o cable, with ground block on cover 5 - M23-17 pin (cw pin#s) T - M12-8 pin - Turck pinout U - M12-8 pin - U.S. Pinout V - M25 cord grip w/o cable for 12.5mm to 20.5mm OD cable W - M20 cord grip with 0.5m (20') cable Y - M20 cord grip w/o cable Z - M20 cord grip w/o cable, special wiring	K - ¼ AB Cycle, Sync w/A&B High L - ½ AB Cycle, Sync w/B Low M - 1 AB Cycle, Sync w/A High U - Ungated Wide Marker	1 - 5-30V in/out Hi-Power (HX) 2 - 5-30V in/5V out Hi-Power (HX) 3 - 5V in/out Hi-Power (HX)	AM - 250 AN - 256 AQ - 500 AR - 512 AW - 1000 AY - 1024 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 AD - 4096 A9 - 5000 A2 - 8192 K1 - 10000	XX - None	000 - None 068 - Fault Output 069 - 250mm grounding strip 070 - Expanded Temp Range (-40°C to 100°C) 077 - High Speed (>4500 RPM) 081 - High Speed & High Temp Range Options (>4500 RPM & -40°C to 100°C) 9XX - Cable Length Mod <sup>A</sup> TXX - Anti-Rotation Arm Length*

\*Anti-Rotation Arm length =XXmm/10; in 10mm increments <sup>A</sup>Custom Cable Length in meters; whole meter increments up to 99m

**SPECIFICATIONS**

**Operating Power:**

Volts: 5-24 VDC Current: 100 mA, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-25000

**Speed:** 5000 RPM Max. std., for higher speeds, consult factory

**Enclosure:** IP65

**Electronics:** Fully Encapsulated, IP67

**Temperature:** -40°C to +100°C

**Vibration:** 18 G

**Shock:** 100 G

**Weight:** 10-12 lb [4.5 - 5.5 kg]

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

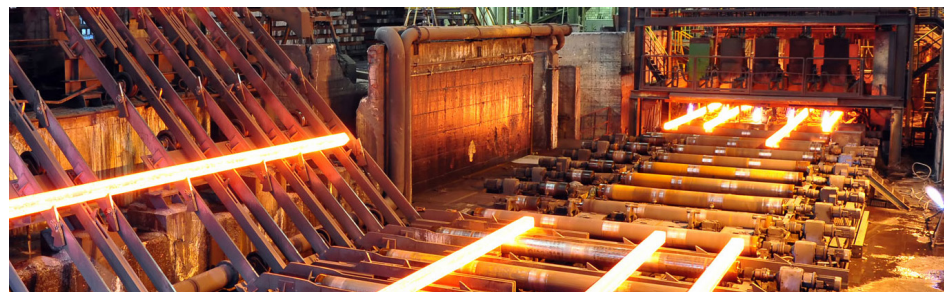
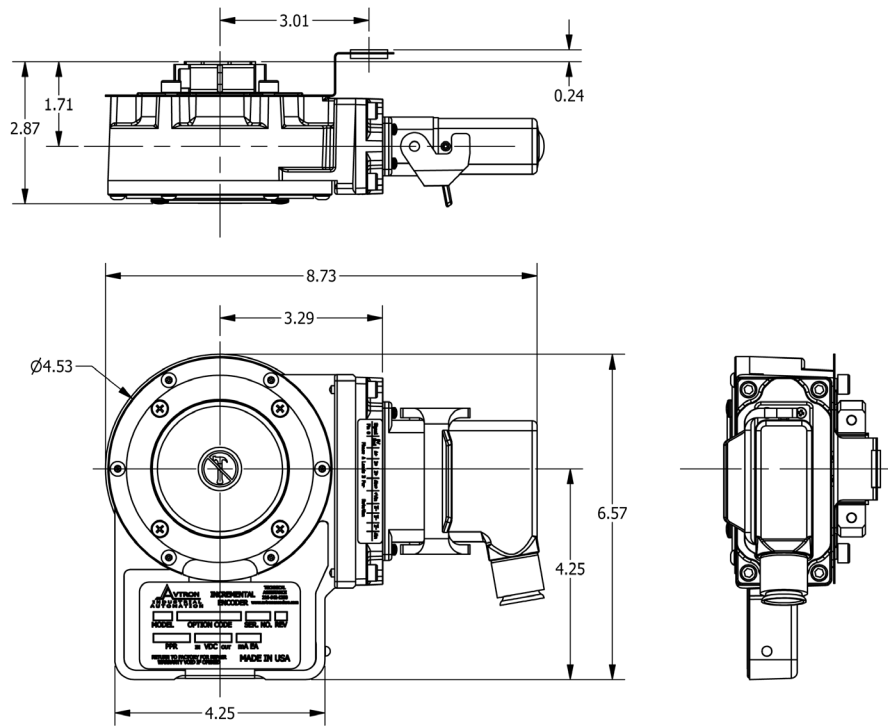
**Warranty:** 3 Year No-Hassle



HS45 EUROSMT™ encoders are magnetic, hollow shaft, heavy duty encoders (incremental rotary quadrature encoders) for any mounting application including NEMA motors (incl. GE, Marathon, US Motors) and European-style motors such as ABB and Siemens. Also available: AV45 solid shaft encoder to fit European B10 flanges (85mm), and foot mount applications and severe duty AV685 encoders.

The HS45 offers clamp-style and (rear) center-bolt mounting options. Clamp-style fits shafts from 5/8" to 1 1/8" [16mm-30mm]; center-bolt mounting is available for 16mm (straight) and 17mm (cone/taper shaft). Clamp-style mounting utilizes a convenient field-changeable sizing sleeve and provides shaft current isolation. Center-bolt styles feature insulated ceramic ball bearings to prevent shaft current damage.

The HS45 is designed for use in rough environments with constant exposure to temperature extremes, water, oil, and dirt. Its high-power output circuits with universal 5-24V power are fully protected against surges and wiring errors. The on-board diagnostics warn of any signal quality issues before these problems cause downtime on your machine.



H	S	4	5						
MODEL	BORE SIZE	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	LINE DRIVER	CONNECTOR OPTIONS	TETHER	CHANNELS	SPECIAL OPTIONS	
HS45	<b>Clamping</b> <b>Collar Mount</b> <b>U.S.</b> C - 5/8" D - 3/4" E - 7/8" F - 1" G - 1 1/8" U - All US Sizes K - 1.375" N - 1.118"  <b>Clamping</b> <b>Collar Mount</b> <b>Metric</b> S - 16mm T - 18mm V - 19mm W - 20mm Y - 25mm 3 - 30mm Z - All Metric Sizes  <b>End of Shaft:</b> <b>Center Bolt Mount</b> L - 16mm (no taper) M - 17mm (10:1 taper) P - 20mm J - 30mm	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 A0 - Special	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 A0 - Special	6 - 5-24V in/out (7272) 8 - 5-24V in/out (HX) 9 - 5-24V in, 5V out (7272)	See Table Below	See Table Below	A - A, B, /A, /B, Z, /Z (req'd for 8, 10 pin connectors)  <b>For 6,7 pin conns only</b>  B - A, B, /A, /B (no marker) E - A, B, Z (single ended) F - A, B (single ended, no marker) D - A, /A	000 - None 004 - Super Magnetic Shielding 500 - Add 100C temperature range to shaft bores 5/8-1" and 16mm- 25mm 6xx - Add over speed switch xx= speed code 9xx - Specify cable length xx=feet max 33ft (use w/ Option "Q", "W", "Z")	

CONNECTOR OPTIONS									
Mounted on Encoder							12" Cable	18" Cable	
10 Pin MS	10 Pin EPIC	10 Pin mini MS	12 Pin M23	6 Pin MS	7 Pin MS	8 Pin M12	10 Pin MS	10 Pin mini MS	10 Pin EPIC
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug 4 - w/o plug (M3/M4 Larger Encoder Pinout)	P - w/ plug G - w/ plug (Northstar pinout)	R - w/ plug N - w/o plug (reverse phasing) V - w/ plug (reverse phasing)	2 - w/o plug (L&L pinout) 3 - w/o plug (Hubner pinout)	E - w/ plug (std. phasing) F - w/ plug (Dynapar phasing)	J - w/ plug (std. phasing) K - w/ plug (Dynapar phasing)	T - w/o plug (Turck Pinout) U - w/o plug (U.S. Pinout)	Y - w/ plug	S - w/ plug	Q - Small EPIC w/ plug on adaptor block Z - Small EPIC w/ plug base mounted 1 - Large EPIC Base mounted

CONNECTOR OPTIONS (CONTD)		
7 Pin MS	3' Cable	Conduit Box
M - 4' Cable w/o plug	W - Cable w/ flying leads	H - w/ terminal strip L - w/ terminal strip & cord grip 5 - w/ terminal strip (Hubner Pinout)

TETHER						
Fan Covers	C-Face Mounting	Threaded Rod Styles	Combinations	Dual/Ganged Encoders	Adaptor Flange	No Tether
D - Fan Cover (T-bolt)	E - 4.5" NEMA C-face F - 8.5" NEMA FC-face	G - 70-500mm w/ bracket P - 70mm fixed w/screw T - 70-500mm w/T-bolt	H - Fan Cover & 8.5" C-face M - Fan Cover & 4.5" C-Face U - Universal (includes all styles)	Y - Tether 2nd encoder to 1st (select any tether from above list for first encoder)	2 - 68mm tapered pilot (end of shaft only)	X - None



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC, 5-18 V, 12-24 V **Current:** 120 mA, no load

**Output Format:** A, /A, B, /B, C, /C Marker Z, /Z

**Frequency Range:** 0 to 150 kHz

**PPR:** 80-2500

**Speed:**

5000 RPM Max. Std., shafts 1 1/2" to 1 5/8"

3600 RPM Max. Std., shafts 2" to 2 3/8"

(for higher speeds, consult factory)

**Temperature:** -40°C\* to 85°C

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Weight:** 7 lb [3.2 kg]

**Warranty:** 1 Year No-Hassle

\*-20°C standard



M3 large bore hollow shaft mill duty optical hollow shaft Avtron Encoders fit motors or load shafts from 1 1/2" to 2 3/8" [48mm-60mm].

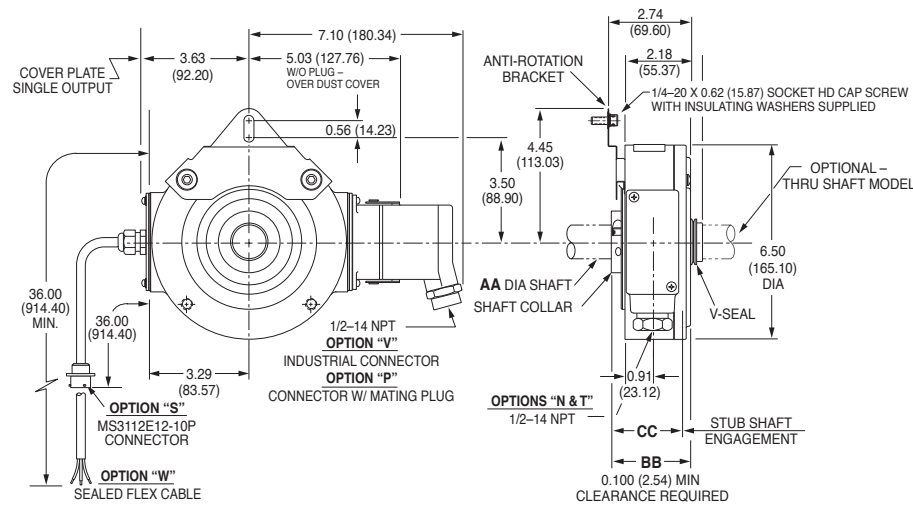
Looking for solid shaft M3-1 and M3-2 models or small-bore M3 models? Use our cross reference page to replace these models with the latest Avtron Encoders models.

Forget tiny hollow shaft encoders that require shaft reduction and special protection! M3 mill duty encoders can accommodate up to a 2 3/8" shaft directly and are designed for use in rougher applications than ordinary optical encoders.

M3 has bigger bearings than light duty and commercial grade encoders to withstand more shaft vibration and stress. M3 encoders are designed with bigger, heavy-duty seals to keep contamination out of the encoder and keep your machines working.

M3 encoders offer a large variety of connector and mounting options to replace virtually any existing encoder or tachometer. When you install an M3 Avtron Encoder, you've upgraded to the most durable optical encoder available anywhere!

Also available: Heavy mill duty HS45 and severe duty AV685 encoders.



MODEL	BORE SIZE	MOUNTING STYLE	LINE DRIVER	OUTPUT LOCATION	PPR	CONNECTOR	SPECIAL OPTIONS
M3-	8 - 1 1/2" 9 - 1 5/8" 6 - 2" J - 2 1/8" 7 - 2 3/8" G - 48mm K - 50mm D - 52mm E - 58mm H - 60mm	S - Standard End-of-Shaft mounting T - Thru shaft w/ V-Ring Seal G - Shaft grounding w/ standard end-of-shaft mounting	1 - 5 to 24 VDC 2 - 5 to 18 VDC 3 - 18 to 24 VDC 4 - 5 to 24 V in, 5 V out	R - Right (Single) L - Left (Single) D - Dual	80 120 180 240 256 360 480 500 512 600 1024 1200 2000 2048 2500	See Table Below	000 - None 003 - 12" Threaded Rod Torque Arm Kit 005 - -40° C Rating 008 - 4.5" C-Face Mount Bracket 009 - Northstar Pinout 016 - 8.5" C-Face Mount 042 - 4.5" + 8.5" mounting brackets, Finger Guard Kit

CONNECTOR								
Mounted on Encoder			M940 Replacement	M737A Replacement	M727A Replacement	18" Cable	Conduit Box	3 ft. Flex. Cable
10 Pin MS	10 Pin MS mini	10 Pin EPIC	6 Pin MS	5 Pin MS	5 Pin MS	10 Pin EPIC	N - with color coded leads T - with Terminal Block	W - Sealed, Pigtail X - Sealed, Industrial Connector w/o plug Z - Sealed, Industrial Connector w/ plug
A - w/o plug B - with Flex. Conduit Adapter C - w/ plug K - with Flex. conduit L - w/ plug M - w/o plug	R - Baldor Twist Lock w/o plug S - Baldor Twist Lock on 3 ft. Pigtail	P - w/ plug V - w/o plug	D - w/ plug	E - w/o plug F - w/ plug	H - w/o plug J - w/ plug	Q - w/ plug and adaptor block		

s - Side Exit b - Bottom Exit

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC\* **Current:** 100 mA, nominal, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000\*\*\*

**Speed:** 5400 RPM Max\*\*\*\*

**Electronics:** Fully Encapsulated, IP67\*\*

**Temperature:** -40°C to 120°C (150°C rotor - Intermittent)^

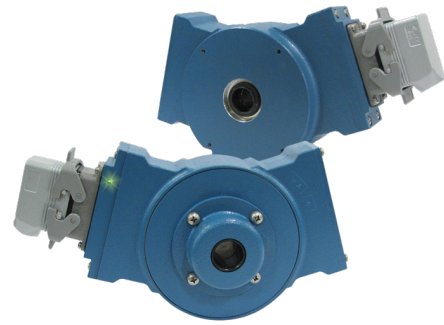
**Environmental:** Electronics: Fully Encapsulated; IP66

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Weight:** 15-17 lb [6-8 kg]

**Warranty:** 1 Year No-Hassle

**Uses AV5 Sensor - See Page 67**



\* Electrical specifications for SMARTach III model (serial #30,000 or higher), consult Avtron for earlier model specifications.

\*\* Certain connector options may reduce IP rating

\*\*\* (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.

^ -20°C to 80°C Standard, requires high-temperature model and instrument air feed for 120°C rating

SMARTach™ III Magnetic Encoder, 1-1/8" Hollow Shaft Mount

AV685 hollow shaft encoders survive the worst conditions: dust, dirt, liquid sprays, and temperature extremes from -40°C^ to +120°C^

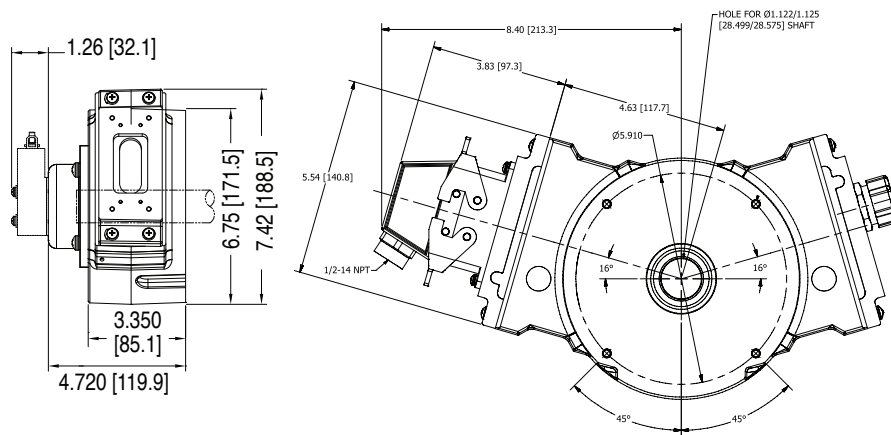
The durable hollow shaft design tolerates huge axial movements, and withstands more shaft run-out than any other encoder available.

The dual, replaceable sensors have fully potted electronics and are interchangeable between AV485, AV685, and AV850. And, they feature high-power outputs that drive long cable lengths easily. These AV5 SMARTach III sensors have the best protection of any encoder—from surges, wiring outputs to power, ground, between phases, or even short circuits!

The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

Adaptive Electronics: at power-up you know you installed it right! The green LED tells you your AV5 Sensor is aligned with the rotor and reading signal. If at any time, the AV5 cannot produce consistent signals, the LED changes to red and the optional remote alarm contact activates. However, the encoder keeps working to give you time to schedule service. Even wiring errors and short circuits that cause an over-temp situation will be detected and indicated by changing the LED to orange.

So if you want the most durable and reliable encoder in your mill, select AV685.

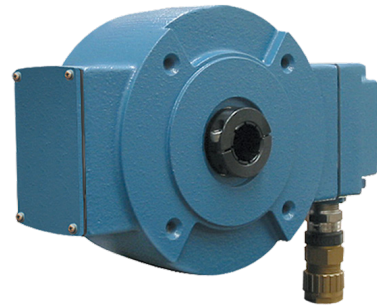


MODEL	TEMP RATING	FOOT BRACKET	MOUNTING STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
AV685	N - -20°C to 80°C C - -40°C to 80°C H - -20°C to 120°C	X - None 1 - Avtron Standard (A36261) 2 - BC42/46 style (A25448)	E - Standard (EOS) T - Through shaft G - Grounding O - Over speed switch*	X - None 6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	X - None F - 60 C - 64 G - 100 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 Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	X - None F - 60 C - 64 G - 100 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	See Table Below	000 - None 003 - Include analog signal converter (K661) 004 - Super magnetic shielding 4xx - Special PPR 6xx - Over speed switch 9xx - Special cable length in feet**

\* Requires 6xx mod codes - \*\* 9xx only works with specified connector options

Connector Options							
Mounted on Encoder Body				3' Cable**			5' Flexible Conduit
Industrial EPIC Connector	5 pin MS	10 pin MS	Other	Industrial EPIC Connector	Twist Lock	Other	
G - (Northstar™ Pinout) w/ plug P - w/ plug V - w/ plug, w/insulated adapter 1 - Mini-Epic w/ plug	E - (M737 Pinout) w/o plug F - "E" w/ plug H - (M727 Pinout) w/o plug J - "H" w/ plug	A - w/o plug B - w/ plug & clamp C - w/ plug & Flex. Adapter L - with Right Angle Plug 5 - 10 Pin ms w/o plug (Dynapar pinout)	K - Condulet R - Twist Lock Mini MS w/ plug	Z - w/ plug Q - 18" Flex Cable on Remote Base	S - Mini MS with Plug	W - Leads only	D - 10 pin MS, w/ins. adapter M - w/ins. adapter N - In Flextight T - Terminal box Y - Terminal box, w/ins. adapter

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC **Current:** 120 mA per output, no load 24 VDC  
770 mA @24 VDC heater current required for operation below -40°C

**Output Format:** A, /A, B, /B Optional Marker Z, /Z

**Frequency Range:** 0 to 100 kHz

**PPR:** 240-1200

**Speed:** 5000 RPM Max. Std., 1" to 1 1/8" shaft

**Temperature:** -45°C to 80°C (internal heater option required below -40°C)

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Weight:** 16 lb [7 kg]

**Warranty:** 1 Year No-Hassle

MODEL	BORE SIZE	MOUNTING STYLE	LINE DRIVER	LEFT OUTPUT	RIGHT OUTPUT	PPR	MARKER	CONNECTOR	SPECIAL OPTIONS
M7-	4 - 1" 5 - 1 1/8"	S - End-of-shaft	3 - 12-24V In/Out	X - None L - Low (Base PPR/2) M - Medium (Base PPR) H - High (Base PPR x 2)	X - None L - Low (Base PPR/2) M - Medium (Base PPR) H - High (Base PPR x 2)	48 - 480 51 - 512 60 - 600	Z - Marker - - None	T - Conduit Box, Terminal Block, 3/4" NPT W - Conduit Box, Terminal Block and Wire Gland	000 - None 003 - Torque arm kit

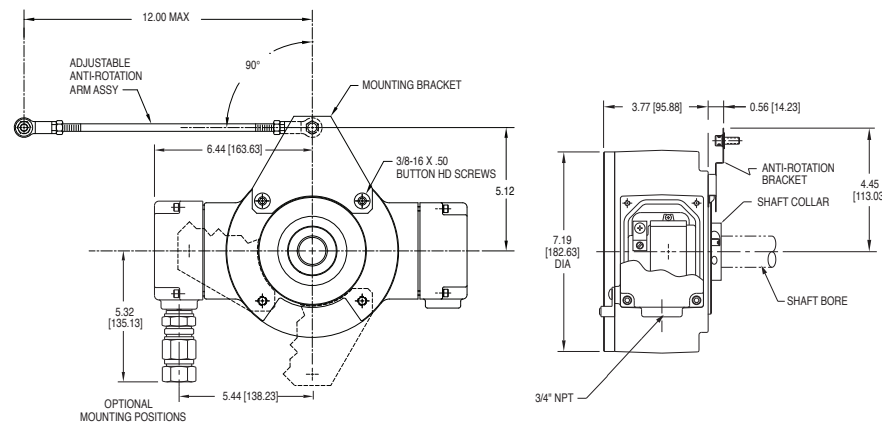
	AVAILABLE RESOLUTIONS		
	-48 OPTION	-51 OPTION	-60 OPTION
LOW	240	256	300
MEDIUM	480	512	600
HIGH	960	1024	1200

M7-4 and M7-5 heavy mill duty encoders are designed for direct mounting on motor or load shafts, from 1" to 1 1/8".

Forget fragile glass disk encoders! The M7 features Avtron Encoders' rugged magnetic sensor and solid metal rotor technology. Our shatterproof, moisture proof systems ensure your application has maximum uptime.

No more tiny stub shafts on big motors or load shafts! The hollow shaft (tethered) models offer direct mounting on big shafts, 1" or 1 1/8", without flanges, reducers, couplings, or other hardware. No rework is needed; just mount the encoder directly on the shaft, and secure the tether arm. The heavy duty bearings withstand run-out and vibration that destroy lesser encoders.

If you have a rough application in a cold location, select an M7 encoder!





**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 60 mA, no load

**Output Format:** A Quad B with gated marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz

**PPR:** 32 - 5000

**Speed:** 6000 RPM Max., (for higher speeds, consult factory)

**Temperature:** -40°C to 100°C

**Environmental:** IP65 Electronic Protection

**Vibration:** 5-2000 Hz

**Shock:** 50 G, 11 ms duration

**Weight:** 0.7 lb [350 g]

**Warranty:** 2 Year No-Hassle

Want a super-simple, ultra-reliable OEM encoder? Bullseye!

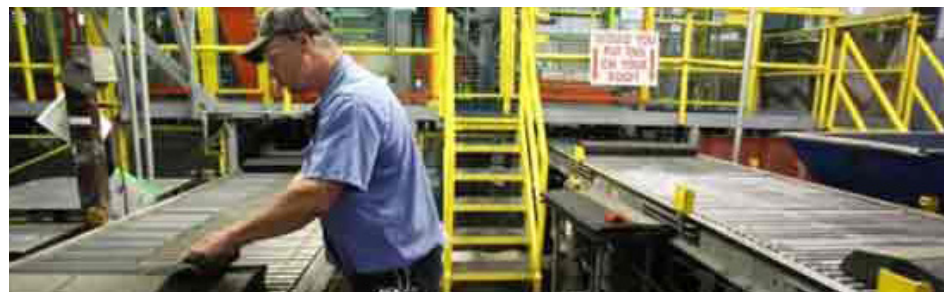
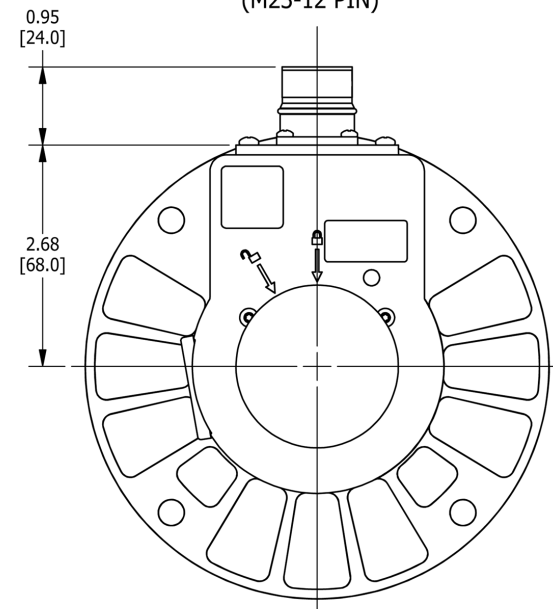
AV32 Avtron Encoders eliminate the top culprits that cause encoder failures: there are no bearings, no seals, no optics, no glass disks! And they don't require expensive mounting flanges like other no-bearing encoders.

AV32 mounts in seconds: Tighten the rotor clamp on the shaft, bolt the housing in place, and unlock the patented centering mechanism by removing the red end cap. Top it off with the shaft cap.

AV32 is protected against dust, dirt and water. Why waste installation time protecting encoders with baskets? How about a Bullseye instead - it's tougher than most "protective baskets"! And AV32 includes complete self-diagnostics, right down to the signal quality and wiring!

So if you are a motor, drive, or machine-builder OEM, switch to AV32 and find out what a true revolution in encoding can do for you!

**-2 & 3 CONNECTOR (M23-12 PIN)**



MODEL	ROTOR BORE	PPR	MOUNTING STYLE	CONNECTOR OPTIONS	CHANNELS	SPECIAL OPTIONS
AV32	<b>US</b> AC - 1/4" AE - 5/16" AF - 3/8" AH - 7/16" AK - 1/2" AL - 9/16" AN - 5/8" AP - 11/16" AR - 3/4" AT - 13/16" AV - 7/8" AY - 15/16" AZ - 1"  <b>METRIC</b> MA - 4mm MB - 5mm MC - 6mm MD - 7mm ME - 8mm MF - 9mm MG - 10mm MH - 11mm MJ - 12mm MK - 13mm ML - 14mm MM - 15mm MN - 16mm MP - 17mm MQ - 18mm MR - 19mm MT - 20mm MU - 21mm MV - 22mm MW - 23mm MY - 24mm MZ - 25mm	AA - 32 PPR AK - 80 PPR AH - 120 PPR AC - 128 PPR AM - 200 PPR AL - 240 PPR AN - 256 PPR AE - 360 PPR AG - 400 PPR AB - 480 PPR AR - 512 PPR AS - 600 PPR AP - 720 PPR AJ - 960 PPR AW - 1000 PPR AY - 1024 PPR AZ - 1200 PPR AV - 1440 PPR AU - 1800 PPR A3 - 2000 PPR A4 - 2048 PPR AT - 3072 PPR A6 - 3600 PPR AD - 4096 PPR A8 - 4800 PPR A9 - 5000 PPR A0 - Special	B2 - 3x 5-40 on 3.75 B.C. B3 - 4xM6 on 140mm B.C. with stand-offs B5 - 4x 1/4-20 on 5" B.C. F1 - Fan Cover 10mm straight slots F2 - Fan Cover 10mm square grid F3 - Fan Cover 1/4" arced slots F5 - Fan Cover 5/16" straight slots F9 - Fan Cover 8mm" square grid FA - Fan Cover, universal for 5/16" (8mm) slots/squares P4 - 4.5" NEMA 56C flange P6 - 6.75" Recessed flange P8 - 8.50" FC flange	See Table Below	AA - All Signals: A, /A, B, /B, Z, /Z (Z = B/ = 1/2 Pulse) AD - All Signals: A, /A, B, /B, Z, /Z (Z = A & B = 1/4 Pulse) BX - A, /A, B, /B (complements, no marker) EA - A, B, Z (no compliments, marker) Z = B/ = 1/2 Pulse	000 - No Special Features 9xx - Special cable length, xx- ft/0.3m Wxx - Connector on cable, length, xx- ft/0.3m H00 - Hx line driver, no other special features Hxx - Hx line driver, special cable length, xx=ft

**CONNECTOR OPTIONS**

<b>C</b> - 10 pin MS style w/Plug, Avtron Phasing	<b>G</b> - 6 pin MS style w/plug, Avtron Phasing	<b>M</b> - 7 pin MS style w/plug, Phasing	<b>R</b> - 10 pin Mini-MS style (Bayonet) w/ plug	<b>T</b> - M12 8 pin, Turck pinout w/o plug	<b>3</b> - M23 12 pin w/o plug, pinout (Hubner)	<b>W</b> - Side Exit Cable (18" or special length)*
<b>D</b> - 10 pin MS style w/plug, Reverse Phasing (Dynapar HS35)	<b>H</b> - 6 pin MS style on cable w/ plug, Reverse Phasing	<b>N</b> - 7 pin MS style w/plug, Reverse Phasing	<b>S</b> - 10 pin Mini-MS style (Bayonet) on 18" cable w/plug	<b>2</b> - M23 12 pin w/o plug, L&L pinout		<b>Y</b> - Top Exit Cable (18" or special length)

\*\*"W" N/A w/mounting F1,F2,F3,F5



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 5400 RPM Max. std., for higher speeds, consult factory

**Electronics:** Fully Encapsulated, IP67 (see manual for details)

**Temperature:** -40°C to 100°C (150°C rotor - Intermittent)

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 2 - 3 lb [0.9 - 1.36 kg]

**Warranty:** 3 Year No-Hassle

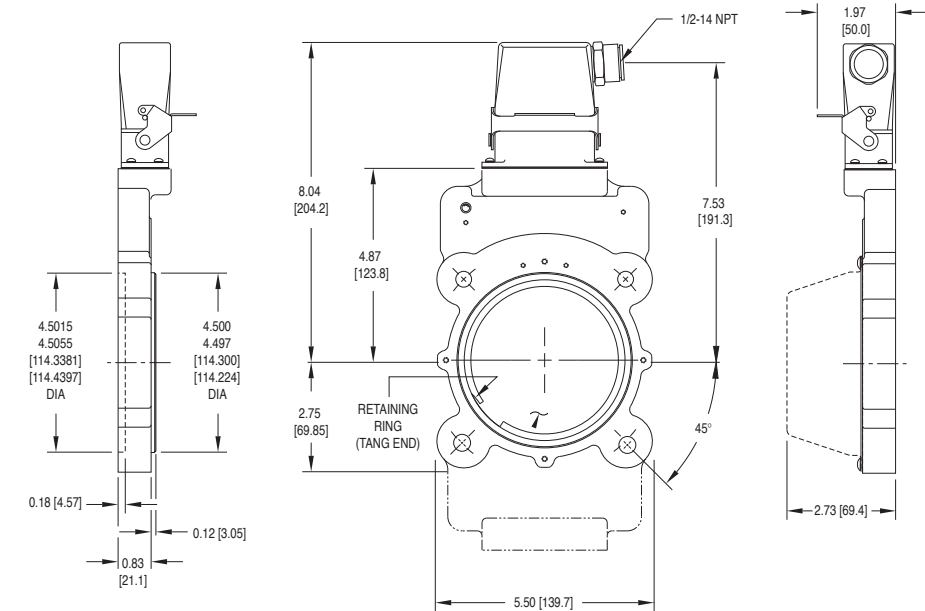
AV56A THIN-LINE III™ heavy mill duty modular magnetic encoders fit standard 4.5" C-Face motors such as Marathon Blue and Black Max, as well as Baldor Reliance models. The stainless steel AV56S is designed for wash-down and marine duty. Other THIN-LINE III models, ranging from 115mm to 8.5", are available to fit other motor sizes.

First, the magnetic sensors are fully potted, to withstand dirt and liquids. No glass disks, no optics to clog. There are no moving, wearing parts!

The patented Wide-Gap™ Cam Screw Rotors™ put an end to sensor damage, are simpler to install, and stay securely mounted to the shaft.

The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

With a real-world installation history of over 4,500,000 hour MTBF, AV56A encoders will keep your machine running 24/7/365!



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
AV56A	1 - Single Output 2 - Dual Output	<b>XX</b> - None <b>US</b> CA - 0.500 CB - 0.625 CC - 0.875 CD - 0.938 CE - 1.000 C3 - 1.112 CF - 1.125 CG - 1.188 EZ - 1.250 CH - 1.375 CT - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 TS - 2.625* TW - 2.750* TU - 2.875* TV - 3.000* T4 - 3.125* T7 - 3.188* TZ - 3.250* KD - 0.938** KF - 1.125**	<b>XX</b> - None <b>Metric</b> D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D4 - 18mm DE - 19mm D7 - 20mm DF - 24mm D5 - 25mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended shaft cover F - Flat cover T - Flat thru-hole cover with shaft seal D - Sealed Extended Flat Cover G - Extended cover w/ gasket X - No cover	6 - 5-24V in/out (7272) 8 - 5-24 V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	F - 60 G - 100 H - 120 A - 128 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - No Modification 003 - Add 85mm Flange Adapter 004 - Add Housing Drain (single output only) 005 - Super Magnetic Shielding 017 - Counter bore mounting holes 4xx - Special PPR-Enter Ø in the PPR code(s), select the special option code below 9xx - Special Cable Length, xx=length in feet 00W - Connector on 18" cable: Use w/ options "T", "U"

\* set screw rotor only - \*\* keyed and single cam screw only

CONNECTOR							
Mounted on Encoder				12" Cable	18" Cable		
10 Pin MS	10 Pin EPIC	10 Pin Mini MS	7 Pin MS	8 Pin M12	10 Pin MS	10 Pin Mini MS	10 Pin EPIC
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	G - w/ plug Northstar pinout P - w/ plug	R - w/ plug	J - w/o plug on a conduit box K - w/o plug on a conduit box (Servoteknik Pinout)	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	Y - w/ plug	S - w/ plug	Q - w/ out plug on remote mount base

36" Cable
Z - 10 Pin EPIC w/ Plug on 36" Cable W - 36" Flex Cable

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	1200	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 80 mA, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'/300 m

**PPR:** 4 - 50000

**Speed:** 5400 RPM Max. std., for higher speeds, consult factory

**Electronics:** Fully Encapsulated, IP67 (see manual for details)

**Temperature:** -40°C to 100°C (150°C rotor - Intermittent)

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 5 - 6 lb [2.2 - 2.7 kg]

**Warranty:** 3 Year No-Hassle

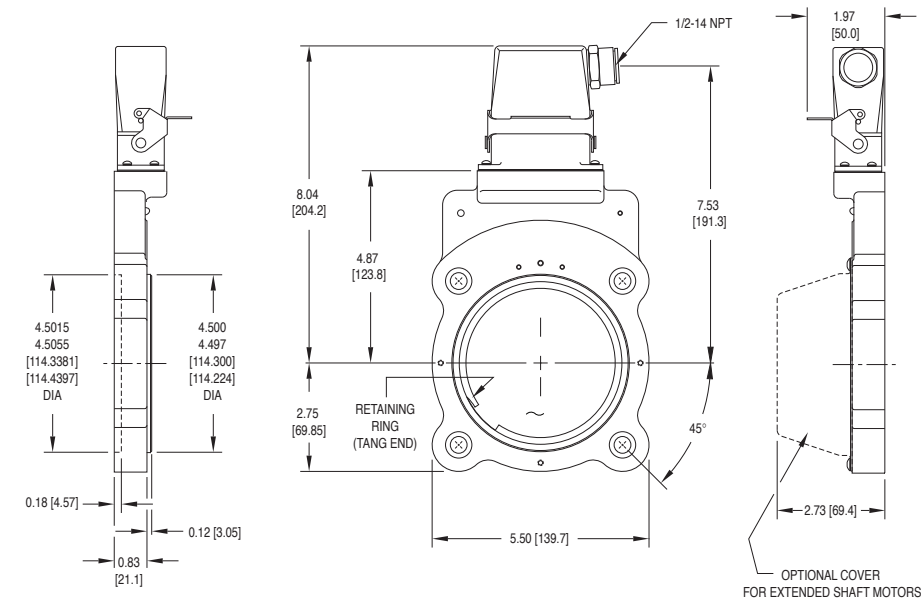
AV56S THIN-LINE III™ heavy mill duty modular magnetic encoders are designed for wash-down and marine duty and fit a standard 4.5" motor flange. Other THIN-LINE III models, ranging from 115mm to 8.5", are available to fit other motor sizes.

First, the magnetic sensors are fully potted to withstand dirt and liquids. No glass disks, no optics to clog. There are no moving, wearing parts!

The patented Wide-Gap™ rotors put an end to sensor damage, are simpler to install, and stay securely mounted to the shaft.

The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

With a real-world installation history of over 4,500,000 hour MTBF, AV56S encoders will keep your machine running 24/7/365!



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
AV56S	1 - Single Output 2 - Dual Output*	<b>XX</b> - None <b>US</b> TA - 0.500 TB - 0.625 TC - 0.875 TD - 0.938 TE - 1.000 TF - 1.125 TG - 1.250 TH - 1.375 TT - 1.500 TJ - 1.625 TK - 1.750 TL - 1.875 TM - 2.000 TN - 2.125 TQ - 2.250 TP - 2.375 TR - 2.500 TS - 2.625 TU - 2.875 TV - 3.000 T4 - 3.125 T7 - 3.188	<b>XX</b> - None <b>Metric</b> M2 - 10mm MA - 11mm M3 - 12mm MB - 14mm MC - 15mm MD - 16mm M4 - 18mm ME - 19mm MF - 24mm MG - 28mm MH - 30mm MT - 32mm MJ - 36mm MK - 38mm ML - 42mm MM - 45mm MN - 48mm MP - 52mm MR - 55mm MS - 60mm MU - 65mm MV - 70mm MW - 75mm MY - 80mm MZ - 85mm	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover with Shaft Seal X - No cover	6 - 5-24V in/out (7272) 8 - 5-24 V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	P - 10 Pin EPIC Industrial w/ Plug G - 10 Pin Industrial w/ Plug (Northstar pinout) 1 - 10 Pin Stainless Steel Epic w/Plug W - 3 Ft. Cable, Sealed R - Mini Twist Lock (Mini MS) w/ mating plug S - Mini Twist Lock (Mini MS) on 3' cable w/ mating plug	<b>000</b> - No Modification <b>004</b> - Add Housing Drain (single output only) <b>053</b> - Add split housing required for dual outputs <b>9xx</b> - Special Cable Length, xx=length in feet

\* requires mod option 053



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Max. Instantaneous Current Output:** 3000 mA

**PPR:** 4 - 50000

**Speed:** 5000 RPM Max. std., for higher speeds, consult factory

**Electronics:** Fully Encapsulated, IP67 (see manual for details)

**Temperature:** -40°C to 100°C (150°C rotor - Intermittent)

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Weight:** 0.9 kg to 1.36 kg.

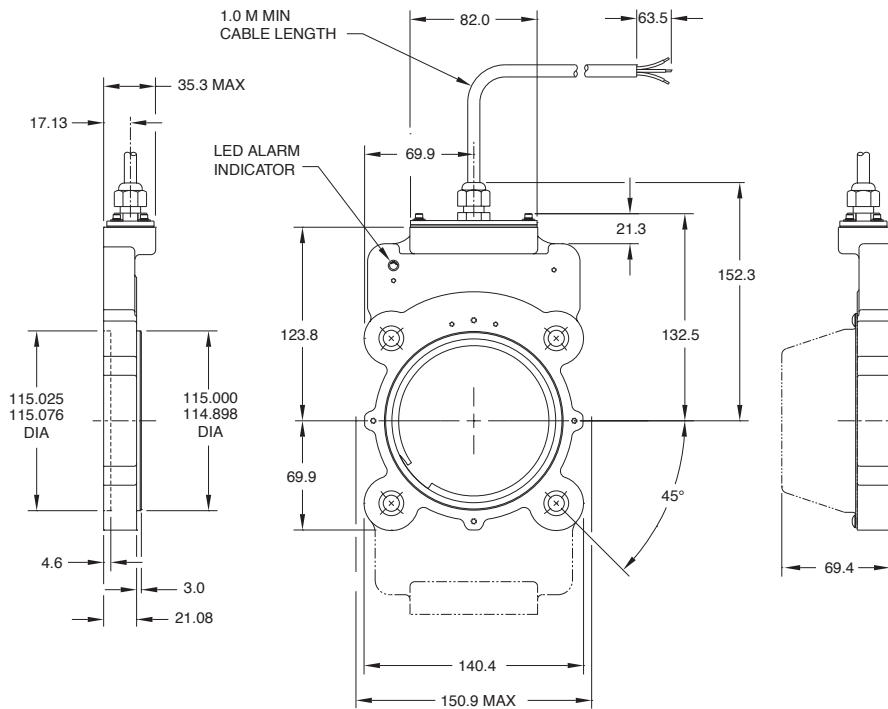
**Warranty:** 3 Year No-Hassle

AV115 THIN-LINE III™ heavy mill duty modular magnetic encoders fit standard 115mm flange motors. Adapters are available to fit European B10-flange (85mm/100mm BC) motors. Other THIN-LINE III models, ranging from 4.5" to 8.5", are available to fit other motor sizes as needed. For Euro B10-flange, AV45 is also available.

First, the magnetic sensors are fully potted to withstand dirt and liquids. No glass disks, no optics to clog. There are no moving, wearing parts! The patented Wide-Gap™ Cam Screw Rotors™ put an end to sensor damage, are simpler to install, and stay securely mounted to the shaft. The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

When you power up an AV115, you know you installed it right: the green light tells you the digital self-tuning has set your AV115 optimally. If at any time, the AV115 cannot produce ideal signals, the light changes to red and the remote alarm contact activates. However, the encoder keeps working to give you time to schedule service. Any time there are wiring errors, the LED changes to orange.

With a real-world installation history of over 4,500,000 hour MTBF, AV115 encoders will keep your machine running 24/7/365!



MODEL	HOUSING TYPE	SHAFT SIZE (METRIC)	COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
AV115	1 - Single Output 2 - Dual Output	XX - None BA - 17mm Keyed Bore  Thru Shaft Rotor: D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm DE - 17mm D4 - 18mm DE - 19mm D7 - 20mm DF - 24mm D5 - 25mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DQ - 50mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover with Shaft Seal V - No Cover Plate	6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - No Modification 004 - Add Housing Drain (single output only) 005 - Super Magnetic Shielding 4xx - Special PPR - Enter Ø in the PPR code(s), select the special option code below 9xx - Special Cable Length, xx=length in feet 00W - Connector on 18" cable: Use w/ options "T", "U"

\* Set Screw Rotor only

CONNECTOR OPTIONS						
Mounted on Encoder				Mounted on 18" Cable		
10 Pin MS	10 Pin EPIC	10 Pin Mini MS	7 Pin MS	8 Pin M12	10 Pin EPIC	10 Pin Mini MS
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	G - w/ plug Northstar pinout P - w/ plug	R - w/ plug	J - w/o plug on a conduit box K - w/o plug on a conduit box (Servotechnik pin-out)	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	Q - w/ plug on remote mount base	S - w/ plug

Other
W - 3 Ft. Cable, Sealed
Y - 10 Pin MS w/ plug on 12" Cable
Z - 10 pin EPIC w/ plug on 3 ft Cable

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** @5, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Max. Instantaneous Current Output:** 3000 mA

**PPR:** 4 - 50000

**Speed:** 5400 RPM Max. std., for higher speeds, consult factory

**Electronics:** Fully Encapsulated, IP67

**Temperature:** -40°C to 100°C (150°C rotor - Intermittent)

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 2-3 lb (0.9 kg to 1.36 kg)

**Warranty:** 3 Year No-Hassle



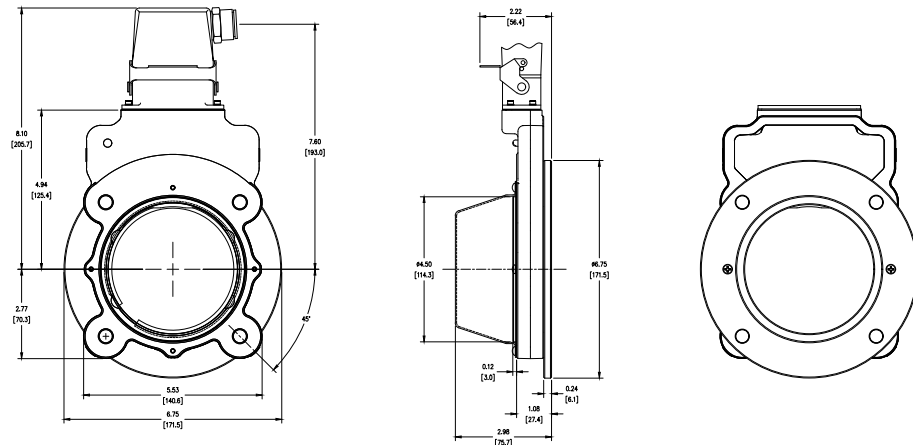
AV67A THIN-LINE III™ heavy mill duty modular magnetic encoders fit 6.75" C-Face flanges typically found on Baldor Reliance motors. Other THIN-LINE III models, ranging from 115mm to 8.5", are available to fit other motor sizes.

First, the magnetic sensors are fully potted, to withstand dirt and liquids. No glass disks, no optics to clog. There are no moving, wearing parts!

The patented Wide-Gap™ Cam Screw Rotors™ put an end to sensor damage, are simpler to install, and stay securely mounted to the shaft.

The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

With a real-world installation history of over 4,500,000 hour MTBF, AV67A encoders will keep your machine running 24/7/365!



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
AV67A	1 - Single Output 2 - Dual Output	<b>US</b> CA - 0.500 CB - 0.625 CC - 0.875 CD - 0.938 CE - 1.000 CF - 1.125 CG - 1.250 CH - 1.375 CI - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CO - 2.250 CP - 2.375 CR - 2.500 TS - 2.625* TW - 2.750* TU - 2.875* TV - 3.000* T4 - 3.125* T7 - 3.188* TZ - 3.25*	<b>Metric</b> D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D4 - 18mm DE - 19mm DF - 24mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover with Shaft Seal. D - Sealed Extended Flat Cover G - Extended Cover w/ gasket X - No Cover	6 - 5-24V in/out (7272) 8 - 5-24 V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - No Modification 004 - Add Housing Drain (single output only) 005 - Super Magnetic Shielding 4xx - Special PPR-Enter Ø in the PPR code(s), select the special option code below 9xx - Special Cable Length, xx=length in feet 00W - Connector on 18" cable: Use w/ options "T", "U"

\* Set Screw Rotor only

CONNECTOR OPTIONS							
Mounted on Encoder				12" Cable	18" Cable		Other
10 Pin MS	10 Pin EPIC	10 Pin Mini MS	8 Pin M12	10 Pin MS	10 Pin Epic	10 Pin Mini MS	3' Cable
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	G - w/ plug Northstar pinout P - w/ plug	R - w/ plug	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	Y - w/ plug	Q - w/ plug on remote mount base	S - w/ plug	W - Cable Z - 10 Pin EPIC w/ plug

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	1200	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 5400 RPM Max. std., for higher speeds, consult factory

**Electronics:** Fully Encapsulated, IP67 (see manual for details)

**Temperature:** -40°C to 100°C (150°C rotor - Intermittent)

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 2 - 3 lb [0.9 - 1.36 kg]

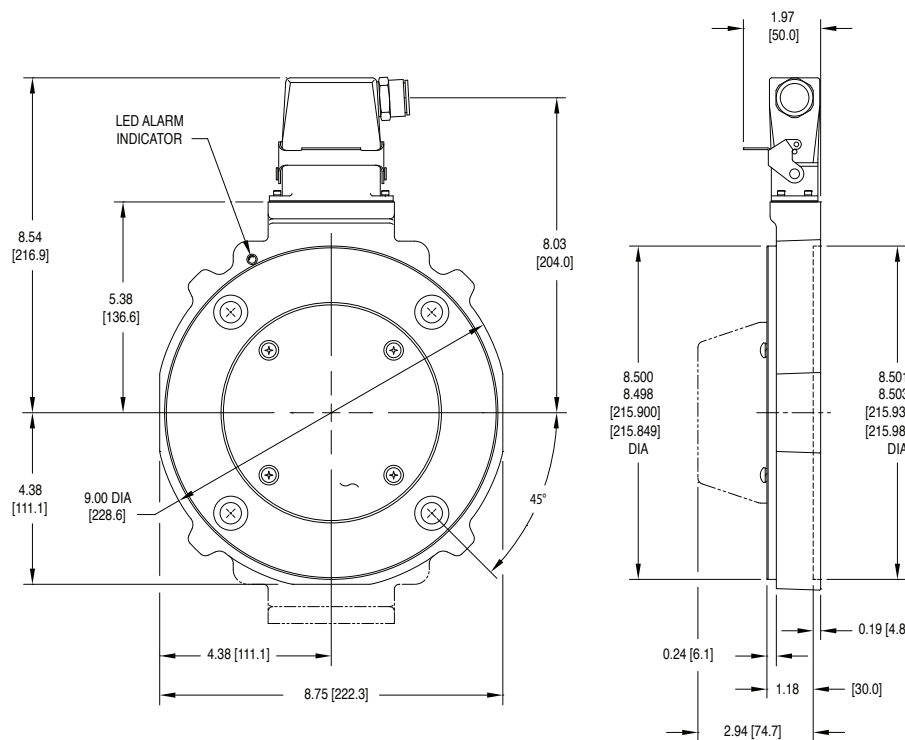
**Warranty:** 3 Year No-Hassle



AV85A THIN-LINE III™ heavy mill duty modular magnetic encoders fit standard 8.5" C-Face motors and 8.5" flanges commonly used for NEMA brake mounting. Other THIN-LINE III models, ranging from 115mm to 6.75", are available to fit other motor sizes, and AV125 is available for 12.5" NEMA brake applications.

THIN-LINE III encoders feature simple installation, durable construction, and clear diagnostics to eliminate encoder-related downtime: First, the magnetic sensors are fully potted to withstand dirt and liquids. No glass disks, no optics to clog. There are no moving, wearing parts! The patented Wide-Gap™ Cam Screw Rotors™ put an end to sensor damage, are simpler to install, and stay securely mounted to the shaft.

The universal 5-24V design drives longer cables and is protected against wiring errors and surges. When you power up an AV85A, you know you installed it right: the green light tells you the digital self-tuning has set your AV85A optimally. If at any time the AV85A cannot produce ideal signals, the LED changes to red and the remote alarm contact activates. However, the encoder keeps working to give you time to schedule service. Any time there are wiring errors, the LED changes to orange. AV85A is the ideal solution to keep your motor and drive system running 24/7/365!



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
AV85A	1 - Single Output 2 - Dual Output	<b>XX</b> - None <b>US</b>  CA - 0.500 CB - 0.625 CC - 0.875 CD - 0.938 CE - 1.000 C3 - 1.112 CF - 1.125 C2 - 1.188 CG - 1.250 CH - 1.375 CT - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 TW - 2.750* TS - 2.625* TU - 2.875* TV - 3.000* T4 - 3.125* T7 - 3.188* TZ - 3.250*	<b>XX</b> - None <b>Metric</b>  D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D6 - 17mm D4 - 18mm DE - 19mm D6 - 20mm DF - 24mm D5 - 25mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover with Shaft Seal G - Extended Cover w/ Gasket X - No Cover	6 - 5-24V in/out (7272) 8 - 5-24 V in/out Hi-Power (HX) 9 - 5-24V in, 5V out (7272)	F - 60 G - 100 H - 120 A - 128 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - No Modification 004 - Add Housing Drain (single output only) 005 - Super Magnetic Shielding 017 - Counter bore Mounting Holes 4xx - Special PPR Enter Ø in the PPR code(s), select the special option code below 9xx - Special Cable Length, xx=length in feet 00W - Connector on 18" cable: Use w/ options "T", "U"

\* Set Screw Rotor only

CONNECTOR OPTIONS							
Mounted on Encoder				12" Cable	18" Cable		
10 Pin MS	10 Pin EPIC	10 Pin Mini MS	7 Pin MS	8 Pin M12	10 Pin MS	10 Pin EPIC	10 Pin Mini MS
A - w/o plug (std. phasing) B - w/o plug (Dynapar HS35 phasing) C - "A" w/ plug D - "B" w/ plug	G - w/ plug Northstar pinout P - w/ plug	R - w/ plug	J - w/o plug on conduit box K - w/o plug on conduit box (Servoteknik Pinout)	T - w/o plug (Turck Pinout) U - w/o plug (US Pinout)	Y - w/ plug	Q - w/ plug on remote mount base	S - w/ plug

Other
3' Cable
W - Cable Z - 10 Pin EPIC w/ plug

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC **Current:** 100 mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 6000 RPM Max

**Rotor Positioning:** Up to +/-0.100" movement/misalignment

**Sensor-Rotor Gap:** 0.045", +0.015/-0.030" [1.14 mm+0.38/0.76]

**Temperature:** -40°C to 100°C (rotor -40°C to 150°C - Intermittent)

**Electronics:** Fully Encapsulated, IP67

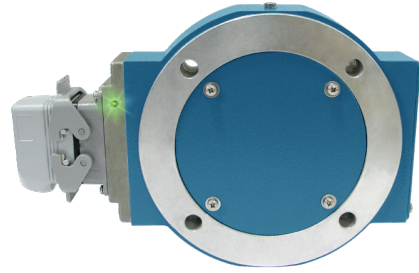
**Vibration:** 18 G

**Shock:** 1 meter drop test

**Weight:** 9 lb [4 kg]; 11 lb [5 kg] dual

**Warranty:** 3 Year No-Hassle

**Uses AV5 Sensor - See Page 67**



AV850 SMARTach III heavy mill duty modular magnetic encoders fit standard 8.5" FC-Face motors. Other models, from 115mm to 12.5", are available to fit other motor sizes, and hazardous duty models: XR850, XPH8 are also available.

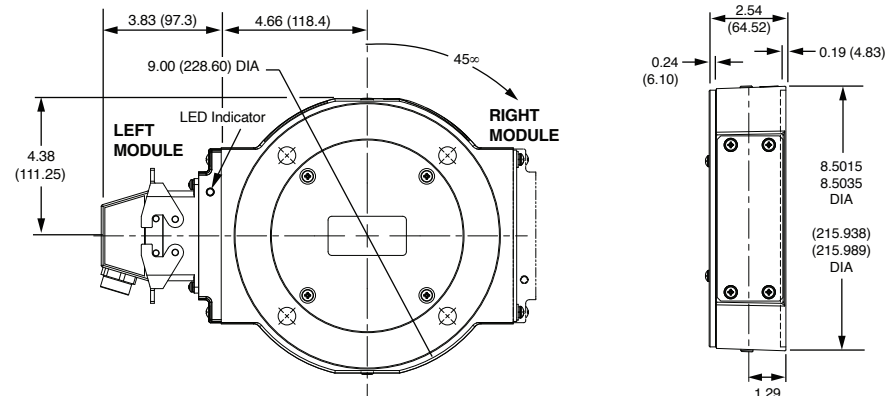
Quite simply, the AV850 is designed to eliminate encoder failures.

All AV850 electronics are fully encapsulated. There are no moving wearing parts. AV850 sensors locate over 4X farther from the rotor than the competition; no more sensor/rotor grinding!

Mis-wiring an encoder is common—and it shouldn't cost you time or money. The AV850 has full output short circuit and reverse voltage protection, plus surge protection. AV850 SMARTach III sensors digitally self-tune the outputs to eliminate drive trips caused by poor encoder signals. The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

Adaptive Electronics: At power-up you know you installed it right! The green LED tells you your AV5 Sensor is aligned with the rotor and reading signal. If at any time, the AV5 cannot produce consistent signals, the LED changes to red and the optional remote alarm contact activates. However, the encoder keeps working to give you time to schedule service. Even wiring errors and short circuits that cause an over-temp situation will be detected and indicated by changing the LED to orange.

If you think you need to replace your drives to end your encoder failures, try a better encoder instead. Specify AV850!



MODEL	ROTOR STYLE	SHAFT SIZE	COVER PLATE	LEFT MODULE				CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
AV850	See Table Below	See Table Below	X - None D - Domed Cover B - Inboard and Outboard Covers for Thru-Shaft w/ V-Ring Seals F - Flat Outboard Cover N - Inboard seal plate w/ V-Ring Seal, Flat Outboard Cover T - Outboard Seal Plate for Thru-Shaft w/ V-Ring Seal	X - None 6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (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 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None 6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (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 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - None 003 - Include analog signal converter (K661) 004 - Super magnetic shielding 007 - Marine sealed housing, single output only 4xx - Special PPR (See Table Below) 704 - Large Motor Stator Adapter+ super mag. shielding 9xx - Custom cable length,xx= length in feet

> N/A for End of Shaft rotor styles.

ROTOR STYLE	SHAFT SIZE							
T - Thru Shaft, Set Screw (Inch) C - Thru Shaft, Cam Screw (Inch)	A - 0.750 B - 0.625 C - 0.875 E - 1.000	F - 1.125 H - 1.375 8 - 1.500 J - 1.625	K - 1.750 L - 1.875 M - 2.000 N - 2.125	Q - 2.250 P - 2.375 R - 2.500 T - 2.625	S - 2.771 2 - 2.875 U - 3.000 W - 3.250	Y - 3.375 Z - 3.421 V - 3.438 3 - 3.500	D - 3.625 G - 3.750 4 - 3.875 1 - 4.000	5 - 4.125 6 - 4.500 9 - 4.5105 ** Style "T" only.
M - Thru Shaft (mm) Set Screw D - Thru Shaft (mm) Cam Screw	E - 19mm (h7) F - 30mm (h7) J - 42mm (h7)	P - 60mm (h7) S - 70mm (m6) T - 70mm (h7)	Y - 80mm (f6) 2 - 80mm (g6) Z - 80mm (h7)	3 - 90mm (m6) D - 93mm (g6)* 4 - 95mm (m6)*	5 - 100mm (m6)* 8 - 110mm (g6)*	* Style "M" only		
U - Universal End of Shaft G - Universal End of Shaft w/ Grounding Kit Q - Universal End of Shaft Adapter for Stacked Encoders X - No Rotor	X - No Rotor F - 1.125 GE CD180-320 N - 2.125 GE CD360 P - 2.375 GE CD400 2 - 2.875 GE CD500 Q - GE CD404, 444, 505	R - GE CD507, 509 Z - GE CD680 V - GE CD4300, 4400, 5400, 6400 & 6500 W - GE CD4500, 7500, 7600	Y - GE CD4600, 4700, 8500, & 8600 9 - GE CD6000, 6100, 6200, 6700, 6800, & 6900 4 - ABB 95mm	U - Universal (Includes 1 Rotor & Shaft adapters for all motors except Q, R, Z, 4)				

CONNECTOR OPTIONS					
Mounted on Encoder Body		3' Cable		5' Flexible Conduit	
P - Large EPIC Style Industrial, w/ plug G - Large EPIC (Northstar™ Pinout) w/ plug 1 - Small EPIC w/ plug (M3/M4 Pinout)	E - 5 Pin MS w/o plug (M737 Pinout) F - "E" w/ plug H - 5 Pin MS w/o plug (M727 Pinout) J - "H" w/ plug	A - 10 Pin MS w/o plug B - 10 Pin MS w/ plug C - 10 Pin MS w/ plug & flex conduit adapter L - 10 Pin MS w/ right angle plug 5 - 10 Pin MS w/o plug (Dynapar Pinout)	K - Condulet with leads R - 10 Pin Mini MS Twist Lock w/ plug 3 - 6 Pin MS w/ plug (M940 Pinout) 7 - 7 Pin MS w/o plug	Z - Large EPIC w/ plug Q - Large EPIC w/ plug on remote base, 18" cable	S - 10 Pin Mini MS w/o plug W - Leads only N - Leads only T - Terminal box

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC **Current:** 100 mA nom, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 5000 RPM Max

**Rotor Positioning:** Up to +/-0.100" movement/misalignment

**Sensor-Rotor Gap:** 0.050", +0.015/-0.040" [1.27 mm+0.38/-1.02]

**Temperature:** -40°C to 100°C (rotor -40°C to 150°C - Intermittent)

**Electronics:** Fully Encapsulated, IP67

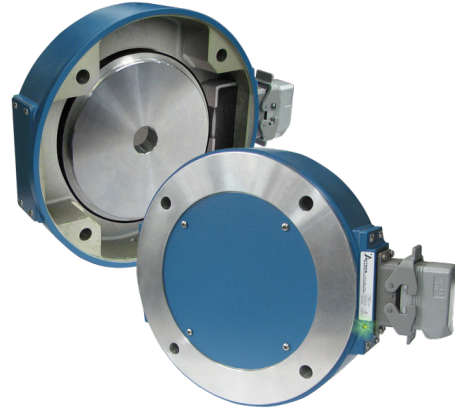
**Vibration:** 18G

**Shock:** 1 meter drop test

**Weight:** 15-17 lb [6.8-8 kg]

**Warranty:** 3 Year No-Hassle

**Uses AV12 Sensor - See Page 67**

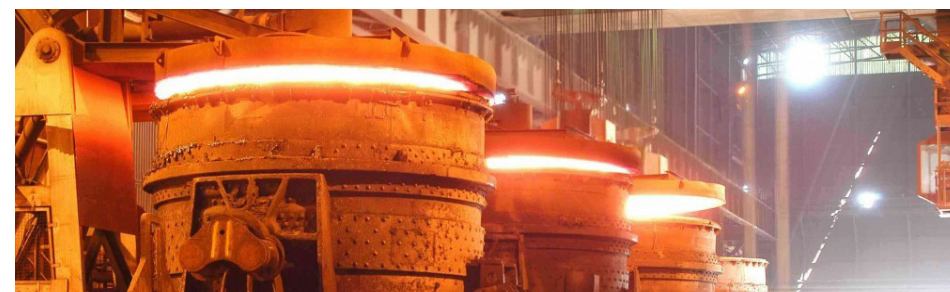
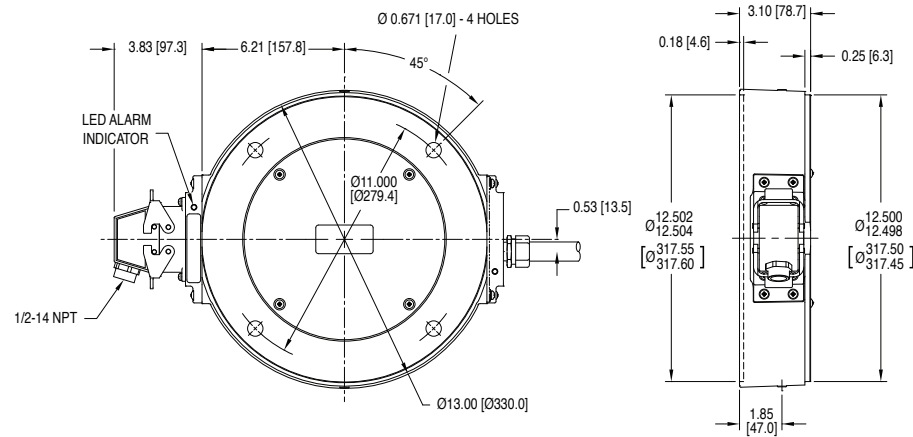


AV125 SMARTach™ III heavy mill duty modular magnetic encoders fit 12.5" motor and NEMA brake flanges. Other models, from 115mm to 8.5", are available to fit other motor sizes.

AV125 is ideal for large motor and brake applications where a large diameter through-shaft is needed. It permits shafts up to 7 7/8" [200mm] to pass through the encoder, facilitating motor-encoder-brake sandwich construction, as well as hollow shafts for water or air cooling systems to pass through the encoder. Because the AV125 is super-reliable and features removable sensors, you can install it in hard-to-access configurations and locations without risk of downtime.

Quite simply, the AV125 is designed to eliminate encoder failures: All AV125 electronics are fully encapsulated. There are no moving wearing parts. AV125 sensors locate over 4X farther from the rotor than the competition; no more sensor/rotor grinding! Miswiring an encoder is common – and it shouldn't cost you time or money. The AV125 has full output short circuit and reverse voltage protection, plus surge protection.

Why risk tiny fragile optical encoders perched precariously behind your large motor or brake. Specify a heavy duty AV125 encoder!



MODEL	SHAFT SIZE (US)	COVER STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
			LINE DRIVER	PPR	LINE DRIVER	PPR		
AV125	See Table Below	X - None F - Flat Outboard Cover T - Outboard Seal Plate for Thru-Shaft w/ V-Ring Seal***	X - None 6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (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 - Non-std.	X - None 6 - 5-24V in/out (7272) 8 - 5-24v in/out Hi-Power (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 - Non-std.	See Table Below	000 - None 004 - Super magnetic shielding 005 - 6000 RPM top speed 006 - Super magnetic shielding w/ sealed/marine housing 4xx - Special PPR (See Table Below) 9xx - Custom cable length, xx= length in feet

\* rotors above 6.75" bore are set screw, all others cam screw style - \*\* m6 tolerance, all other metric rotors are h7 - \*\*\* seals not available on shaft sizes larger than 6.250"

SHAFT SIZE (US)						
XX - No Rotor	CN - 2.125"	C2 - 2.875"	C4 - 3.875"	TU - 6.375"	D4 - 90mm (g6)**	DK - 120mm**
CH - 1.375"	CQ - 2.250"	CV - 3.125"	C1 - 4.000"	C8 - 6.750"	DB - 93mm	D3 - 150mm
CJ - 1.625"	CP - 2.375"	CW - 3.250"	CB - 4.125"	T9 - 7.875**	M1 - 100mm	DF - 160mm
CL - 1.875"	CR - 2.500"	CY - 3.375"	C5 - 4.250"	DG - 25mm	DC - 110mm	D8 - 170mm
CM - 2.000"	CT - 2.625"	CS - 3.750"	CC - 4.375"	DY - 85mm	DE - 120mm	M9 - 180mm *

CONNECTOR OPTIONS						
Mounted on Encoder					Cable	Conduit
10 Pin MS	5 Pin MS	10 Pin MS	10 Pin Mini EPIC	10 Pin Mini MS		
A - w/o plug B - w/ plug C - w/ plug & flex conduit adapter L - with right angle plug 5 - w/o plug (Dynapar Pinout)	E - w/o plug (M737 Pinout) F - "E" w/ plug H - w/o plug (M727 Pinout) J - "H" w/ plug	P - w/ plug G - w plug (Northstar™ Pinout)	1 - w/ plug	R - w/ plug	W - 3' flex sealed Q - 10 Pin EPIC w/ plug and adapter block, 18" flex Z - 10 Pin EPIC w/ plug, 3' flex 4 - 2m flex (Hubner Pinout) S - 10 Pin Mini MS w/ plug, 3' flex	K - Conduit only  FLEX CONDUIT: N - Wire leads only, 5' T - Terminal box 5'

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100 mA nom, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5 V, @1 m cable, 250 kHz Max @24 V, @300 m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000

**Speed:** 5400 RPM Max

**Electronics:** Fully Encapsulated, IP67

**Temperature:** -40°C to 120°C

**Vibration:** 18 G

**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 2 - 3 lb [0.9 - 1.36 kg] (will vary by connector options)

**Warranty:** 1 Year No-Hassle

**AV5 sensors are used on the AV485, AV685 and AV850**

**AV12 sensors are used on the AV125**



AV5 SMARTach III™ sensors are magnetoresistive, severe duty incremental quadrature sensors for the AV485, AV685, or AV850 rotary encoders. The AV5 is also usable in applications where an encoder housing is not needed – simply mount the AV5 with your bracket, and use an AV850 or other rotor. Also available: XR5 and XR12 sensors for hazardous duty applications or XP5 for applications where explosion proof is a requirement.

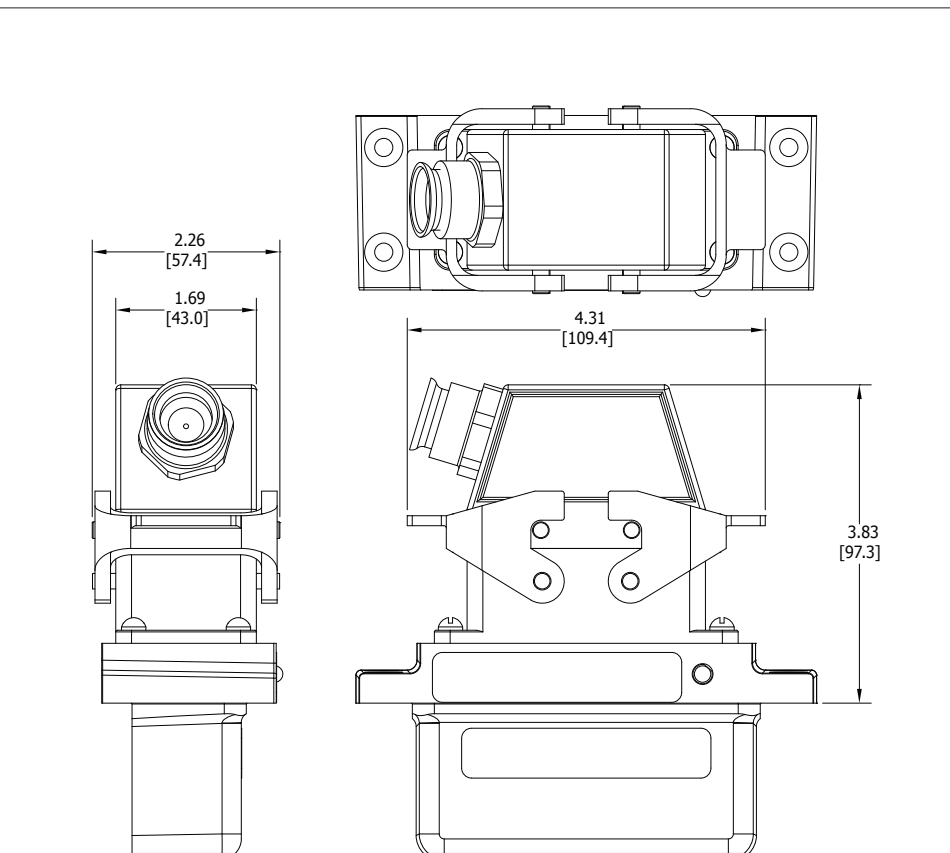
The AV5 is ideal for applications where mounting on a large diameter through-shaft is needed, including large hollow shafts for cooling water or air. The AV5 sensor + AV850 rotor combination permits through-shafts up to 4.5" [115mm].

The AV5 offers a full range of electrical connector options, including IP67 cable, IP66 MS connectors, and IP65 Industrial with built-in terminal strips. The AV5 sensor is fully protected against all types of wiring errors, including short circuits, reverse voltage, and phase-to-phase shorts. It is one tough sensor! For larger bore applications, use AV12 sensors with the AV125 encoder (or as stand-alone).

AV12 SMARTach III™ sensors are magnetoresistive, severe duty incremental quadrature sensors for the AV125 rotary encoder. The AV12 is also usable in applications where an encoder housing is not needed – simply mount the AV12 with your bracket, and use an AV125 or other rotor.

The AV12 + AV125 rotor allows large through-shaft applications up to 7 7/8" [200mm], ideal for large hollow shaft motors, large brakes and applications requiring large bore hollow shafts for application cooling water or cooling air.

The AV12 offers a full range of electrical connector options, including IP67 cable, IP66 MS connectors, and IP65 Industrial with built-in terminal strips. The AV12 sensor is fully protected against all types of wiring errors, including short circuits, reverse voltage, and phase-to-phase shorts. It is one tough sensor! For smaller bore applications, use AV5 sensors with the AV485, AV685 or AV850 encoder (or as stand-alone).



MODEL	LINE DRIVER	PPR	CONNECTOR OPTIONS	SPECIAL OPTIONS
AV5 AV12	6 - 5-24V in/out (7272) 8 - 5-24V in/out Hi-Power (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 - Non-std.	See Table Below	000 - None 004 - Super Magnetic Shielding 4xx - Special PPR (See Table Below) 9xx - Special Cable Length (xx=ft/0.3m)

CONNECTOR OPTIONS						
Mounted on Encoder						
10 Pin MS	10 Pin EPIC	10 Pin Mini EPIC	10 Pin Mini MS	5 Pin MS	6 Pin MS	7 Pin MS
A - w/o plug B - w/ plug C - w/ plug & flex conduit adapter L - with right angle plug 5 - w/o plug (Dynapar Pinout)	P - w/ plug G - w/ plug (Northstar™ Pinout) V - w/ plug and insulated adapter	1 - w/ plug (Replaces M3/M4)	R - w/ plug	E - w/o plug (M737 Pinout) F - w/ plug (M737 Pinout) H - w/o plug (M727 Pinout) J - w/ plug (M727 Pinout)	3 - w/ plug	7 - w/o plug

CABLE	FLEXIBLE CONDUIT
W - 3' flex sealed Q - 10 Pin EPIC w/ plug and adapter block, 18" flex Z - 10 Pin EPIC w/ plug, 3' flex S - 10 Pin Mini MS w/ plug, 3' flex 4 - 2m (Hubner pinout)*	D - 10 pin MS, w/ plug, 5' M - Wire leads only, 5' w/ insulated adapter K - Wire leads only, conduit N - Wire leads only, 5' T - Terminal box 5' Y - Terminal box, 5' w/ insulated adapter 2 - 3/4" NPT, w/ terminal plug*

\*Only Available on AV12

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-15 VDC **Current:** 30 mA

**Output Format:** Wave Shape: Square

**Frequency Range:** 50 Hz

**PPR:** 1

**Speed:** 3000 RPM Max

**Temperature:** 32°F to 150°F

**Impedance:** 1.2 K Pull Up, 10 mA Sink

**Duty Cycle:** Normally high. Switches low when sensing magnet.

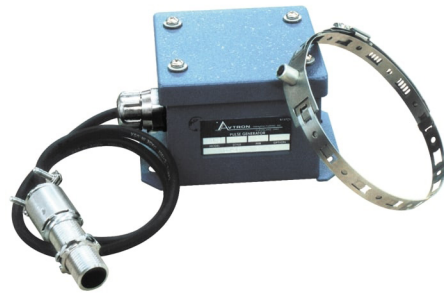
**Shock:** 1 meter drop test

**Weight:**

**Magnet Assembly:** 1 oz.

**Transducer Assembly:** 2.5 lbs

**Warranty:** 3 Year No-Hassle



M 1 8 5	CABLE LENGTH
<b>M185</b>	3 - Standard 3' Cable Assembly w/ Sensor 4 - Optional 4' Cable Assembly w/ Sensor 5 - Optional 5' Cable Assembly w/ Sensor 6 - Optional 6' Cable Assembly w/ Sensor 7 - Optional 7' Cable Assembly w/ Sensor 8 - Optional 8' Cable Assembly w/ Sensor 10 - Optional 10' Cable Assembly w/ Sensor 15 - Optional 15' Cable Assembly w/ Sensor 20 - Optional 20' Cable Assembly w/ Sensor 25 - Optional 25' Cable Assembly w/ Sensor 30 - Optional 30' Cable Assembly w/ Sensor 33 - Optional 33' Cable Assembly w/ Sensor

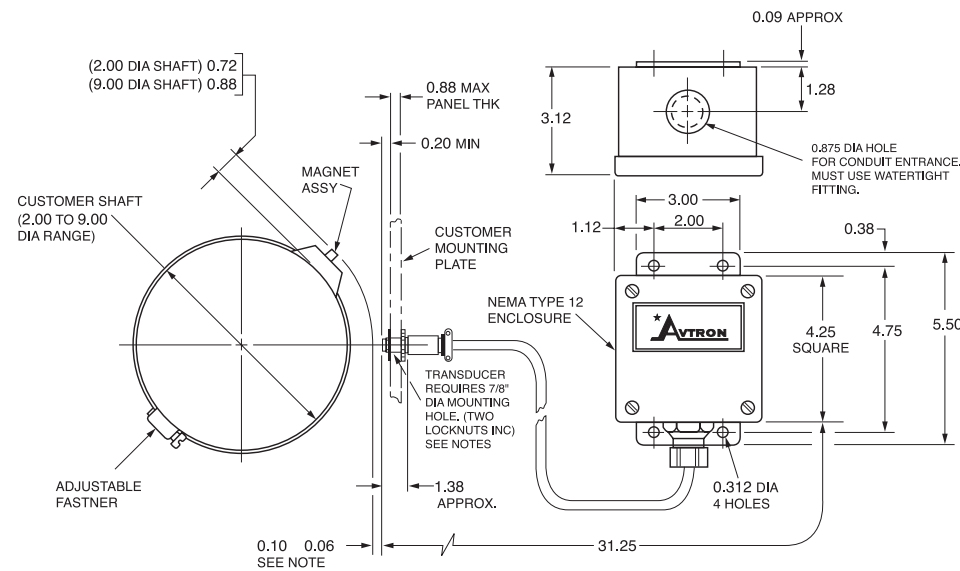
P/N	DESCRIPTION
<b>B16775</b>	- Transducer Assembly
<b>A19404</b>	- Magnet Assembly
<b>A17726</b>	- Magnet Assembly Kit includes: Magnet Assembly Adjustable Fastener 2-foot Band Material*

\*Band Material up to 100 feet can be ordered separately from Avtron.

The Model M185 Unipulser is a single pulse per revolution, zero speed (operational down to zero RPM) pulse generator which requires no coupling to the shaft for which rotational speed is being measured. The pulse generator consists of a magnet assembly which clamps around the shaft and a transducer assembly which mounts in proximity to the magnet assembly. Refer to the Outline Drawing for specific dimensional information.

The Model M185 is designed for applications where an end shaft is not available for coupling to other types of rotary pulse generators.

The magnet assembly is supplied with an adjustable fastener and sufficient band material to accommodate shafts ranging in diameter from 2 inches to 9 inches. For smaller diameter shafts, a hose clamp (not included) with a 0.5 inch wide band may be used. For larger diameter shafts, longer lengths of band material are available from the factory.



**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100mA nom, no load

**Output Format:** A Quad B with Marker (A, /A, B, /B, Z, /Z)

**Second Isolated Output:** Optional

**Frequency Range:** @5V, @1m cable, 250 kHz Max @24V, @300m cable, #8 output, 45 kHz Max

**Maximum Cable Length:** 1000'

**PPR:** 4 - 50000\*\*\*

**Speed:** 5400 RPM Max\*\*\*\*

**Electronics:** Fully Encapsulated, IP67\*\*

**Temperature:** -40° to 100°C (150°C rotor)\*

**Vibration:** 18 g's

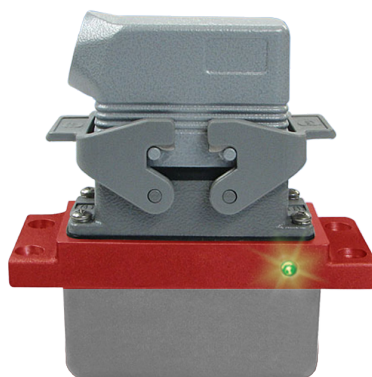
**Shock:** 1 meter drop test

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases.

**Weight:** 2 - 3 lbs [0.9 - 1.36 kg] (will vary by connector options)

**Warranty:** 3 Year No-Hassle

**SV5 sensors are used on the SV850**



\* Rotor may momentarily peak at 150°C, it must maintain a constant temperature of 100°C.

\*\* Certain connector options may reduce IP rating.

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

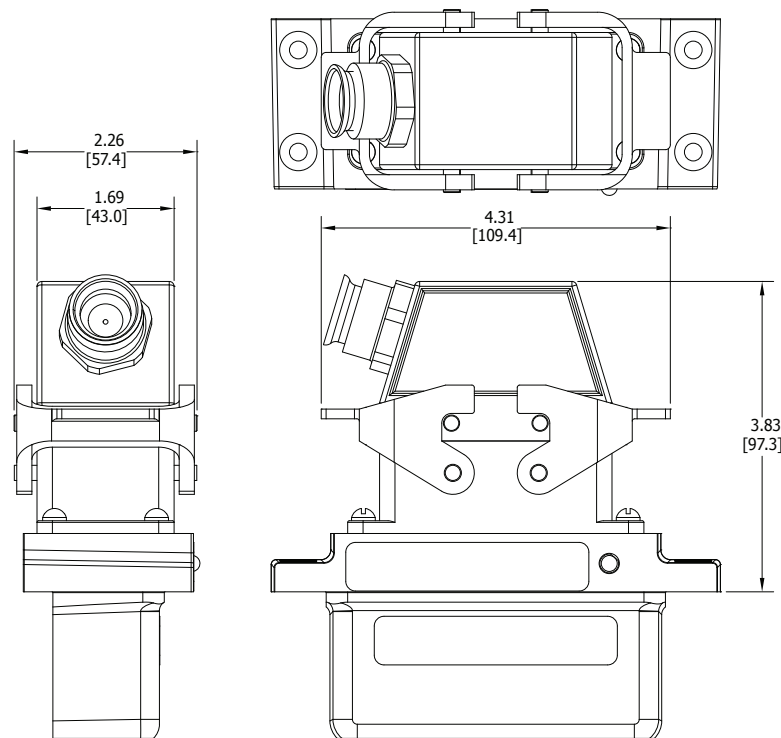
\*\*\*\* (Speed) Maximum RPM may be limited for PPR > 2,500. Consult Factory with your application.

The Avtron SV5 SAFETach™ sensor is the first safety rated magnetoresistive sensor for SIL 2 applications. Often, optical encoders fail because of dust or water contamination that prevents the sensor from seeing the optical disk. The SV5 advanced magnetic technology sees through contamination and the fully sealed circuit design ensures your machine keeps working, even in mill environments. The SV5 offers magnetic performance and moisture resistance!

Avtron SV5 SAFETach III sensors are magnetoresistive, safety rated incremental quadrature sensors for the SV850 rotary encoder. The SV5 is also usable in applications where an encoder housing is not needed – simply mount the SV5 with your bracket, and use an SV850 rotor. All SV5 electronics are fully encapsulated. There are no moving wearing parts.

Miswiring an encoder is common– and it shouldn't cost you time or money. Wiring errors and short circuits that cause an over-temp situation will be detected and indicated by changing the LED to orange. The SV5 has full output short circuit and reverse voltage protection, plus surge protection. SV5 SAFETach III sensors digitally self-tune the outputs to eliminate drive trips caused by poor encoder signals. The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

Adaptive Electronics: At power-up you know you installed it right! The green LED tells you your SV5 Sensor is aligned with the rotor and reading signal. If at any time, the SV5 cannot produce consistent signals, the LED changes to red and the optional remote alarm contact activates. However, the encoder keeps working to give you time to schedule service.



MODEL	LINE DRIVER	PPR	CONNECTOR OPTIONS	SPECIAL OPTIONS
SV5-	6- 5-24V in/out (7272) 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 - Non-std.	G - Large EPIC w/ plug (Northstar™ Pinout) P - Large EPIC w/ plug T - Terminal box	000 - None 004 - Super magnetic shielding 007 - Marine Sealing O-Ring & super magnetic shielding 4xx - Special PPR (see chart)

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5 - 24 VDC **Current:** 100mA nom, no load

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Maximum Cable Length:** 1000' @ 5V, 500' @ 12V, 200' @ 24V

**PPR:** 4 - 50000\*\*

**Speed:** 6000 RPM Max\*\*\*

**Rotor Positioning:** Up to +/-0.100" movement/misalignment

**Sensor-Rotor Gap:** 0.045", +0.015/-0.030" [1.14mm+0.38/-0.76]

**Temperature:** -40° to 100°C (rotor -40° to 150°C peak)

**Electronics:** Fully Encapsulated, IP67\*

**Vibration:** 18G

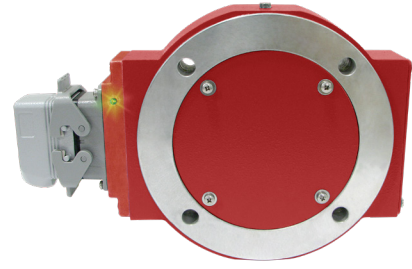
**Shock:** 1 meter drop test

**Weight:** 9lbs. [4kg]; 11lbs. [5kg] dual

**Safety Level:** Evaluated for IEC 61508 SIL 2 metrics at HFT 0

**Warranty:** 3 Year No-Hassle

Uses SV5 Sensor - See Page 71



\* Certain connector options may reduce IP rating.

\*\* (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.

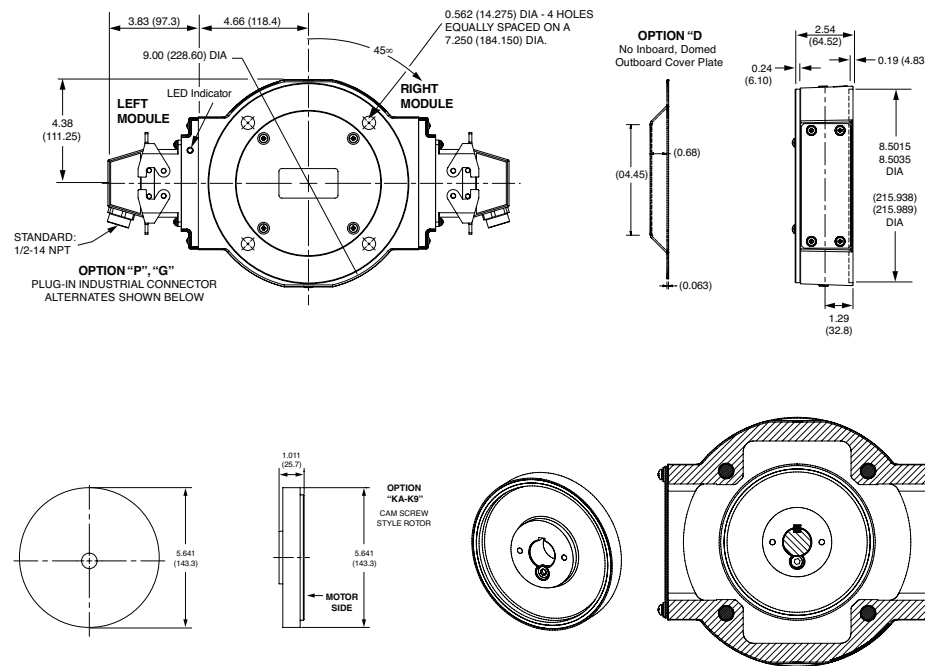
The SV850 is the world's first safety rated no-bearing encoder for SIL 2 applications. Often, optical encoders fail because of dust or water contamination that prevents the sensor from seeing the optical disk. The SV850 advanced magnetic technology sees through contamination and the fully sealed circuit design ensures your machine keeps working, even in mill environments. The SV850 offers magnetic performance and moisture resistance!

SV850 SAFETach™ III safety modular magnetic encoders fit standard 8.5" FC-Face motors. Quite simply, the SV850 is designed to eliminate encoder failures. All SV850 electronics are fully encapsulated. There are no moving wearing parts.

Miswiring an encoder is common—and it shouldn't cost you time or money. Wiring errors and short circuits that cause an over-temp situation will be detected and indicated by changing the LED to orange. The SV850 has full output short circuit and reverse voltage protection, plus surge protection. SV850 SAFETach III sensors digitally self-tune the outputs to eliminate drive trips caused by poor encoder signals. The universal 5-24V design drives longer cables and is protected against wiring errors and surges.

Adaptive Electronics: At power-up you know you installed it right! The green LED tells you your SV5 Sensor is aligned with the rotor and reading signal. If at any time, the SV5 cannot produce consistent signals, the LED changes to red and the optional remote alarm contact activates. However, the encoder keeps working to give you time to schedule service.

What good is a competitors' "safety" encoder if it's optical and fails? Pick the SV850 for safety and reliability!



MODEL	ROTOR STYLE	SHAFT SIZE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
			LINE DRIVER	PPR	LINE DRIVER	PPR		
SV850	<b>KB</b> - 0.625" Thru-shaft keyway cam screw rotor <b>KE</b> - 1.000" Thru-shaft keyway cam screw rotor <b>UV</b> - GE CD4300/4400/5400/6400/6500/6600 Motor Keyed Shaft Adapter & Universal 17mm Rotor w/ Keyway <b>UW</b> - GE CD4500/7200/7500/7600 Motor Keyed Shaft Adapter & Universal 17mm Rotor w/ Keyway <b>UY</b> - GE CD4600/4700/8200/8500/8600/8700 Motor Keyed Shaft Adapter & Universal 17mm Rotor w/ Keyway <b>U9</b> - GE CD 6000 Series Motor Keyed Shaft Adapter & Universal 17mm Rotor w/ Keyway	<b>X</b> - No cover plate <b>B</b> - Both inboard & outboard covers for thru-shaft w/ v-ring seals <b>D</b> - Domed cover <b>F</b> - Flat outboard cover <b>N</b> - Inboard seal plate w/ v-ring seal, flat outboard cover <b>T</b> - Outboard seal plate for thru-shaft w/ v-ring seal	<b>6</b> - 5-24V in/out (7272) <b>9</b> - 5-24V in, 5V out (7272)	<b>X</b> - None <b>F</b> - 60 <b>C</b> - 64 <b>G</b> - 100 <b>H</b> - 120 <b>A</b> - 128 <b>L</b> - 240 <b>N</b> - 256 <b>P</b> - 300 <b>E</b> - 360 <b>B</b> - 480 <b>Q</b> - 500 <b>R</b> - 512 <b>S</b> - 600 <b>U</b> - 720 <b>V</b> - 900 <b>J</b> - 960 <b>W</b> - 1000 <b>Y</b> - 1024 <b>Z</b> - 1200 <b>2</b> - 1500 <b>6</b> - 1800 <b>3</b> - 2000 <b>4</b> - 2048 <b>5</b> - 2500 <b>D</b> - 4096 <b>8</b> - 4800 <b>9</b> - 5000 <b>0</b> - Non-std.	<b>6</b> - 5-24V in/out (7272) <b>9</b> - 5-24V in, 5V out (7272)	<b>X</b> - None <b>F</b> - 60 <b>C</b> - 64 <b>G</b> - 100 <b>H</b> - 120 <b>A</b> - 128 <b>L</b> - 240 <b>N</b> - 256 <b>P</b> - 300 <b>E</b> - 360 <b>B</b> - 480 <b>Q</b> - 500 <b>R</b> - 512 <b>S</b> - 600 <b>U</b> - 720 <b>V</b> - 900 <b>J</b> - 960 <b>W</b> - 1000 <b>Y</b> - 1024 <b>Z</b> - 1200 <b>2</b> - 1500 <b>6</b> - 1800 <b>3</b> - 2000 <b>4</b> - 2048 <b>5</b> - 2500 <b>D</b> - 4096 <b>8</b> - 4800 <b>9</b> - 5000 <b>0</b> - Non-std.	<b>G</b> - Large EPIC w/ plug (Northstar™ Pinout) <b>P</b> - Large EPIC w/ plug <b>T</b> - Terminal box	<b>000</b> - None <b>004</b> - Super magnetic shielding <b>007</b> - Mechanically sealed housing & super magnetic shielding <b>076</b> - Outboard sealing <b>077</b> - Mechanically sealed housing & super magnetic shielding, outboard sealing <b>4xx</b> - Special PPR (see chart)

SAFETY FUNCTIONS	
<b>SAR</b>	Safe Acceleration Range
<b>SBC</b>	Safe Brake Control
<b>SDI</b>	Safe Direction Indication
<b>SLA</b>	Safe Limited Acceleration
<b>SLI</b>	Safe Limited Increment
<b>SLS</b>	Safe Limited Speed
<b>SOS</b>	Safe Operating Stop
<b>SSM</b>	Safe Speed Monitor
<b>SSR</b>	Safe Speed Range
<b>SS1</b>	Safe Stop 1
<b>SS2</b>	Safe Stop 2
<b>STO</b>	Safe Torque Off

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
<b>401</b>	1270	None
<b>402</b>	150	None
<b>403</b>	50	None
<b>404</b>	512	16
<b>405</b>	16	None
<b>406</b>	6000	None
<b>407</b>	2800	None
<b>408</b>	1400	None
<b>409</b>	30	None
<b>410</b>	None	6000
<b>411</b>	12000	None
<b>412</b>	200	None
<b>413</b>	30	30
<b>414</b>	1500	None
<b>415</b>	3000	None
<b>416</b>	3600	None
<b>417</b>	1250	None
<b>418</b>	2400	2400
<b>419</b>	160	160
<b>420</b>	450	None

**SPECIFICATIONS**

**Operating Power:** (add load and cable drive current as req'd)

Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA

Division 2, Zone 2: 5-24VDC In/Out, 150mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**

Division 1, Zone 1: Encoder 500' Isolator 1000'

Division 2, Zone 2 (5 to 15 VDC in): 500'

Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

**Vibration:** 5-2000 Hz, 20 G, 100 G Shock

**Weight:** 10-12 lb [4.5-5.5 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations

\*\* See manual for environmental details



**Certifications:**

- ATEX/IECEX Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEX Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR4F solid shaft encoders are a unique industry first. By combining Avtron durable magnetic encoder technology with SMARTSafe™ systems, Avtron has created a truly durable solid shaft encoder which can be used in hazardous environments and applications. It is ATEX, IECEX & cULus certified. SMARTSafe encoders can be used in gas and ATEX dust hazard environments. Also available: hollow shaft models (XR45, XR685), NEMA style shafted model (XR485), and no-bearing modular encoders (XR56A, XR85A, XR115, XR125, XR850).

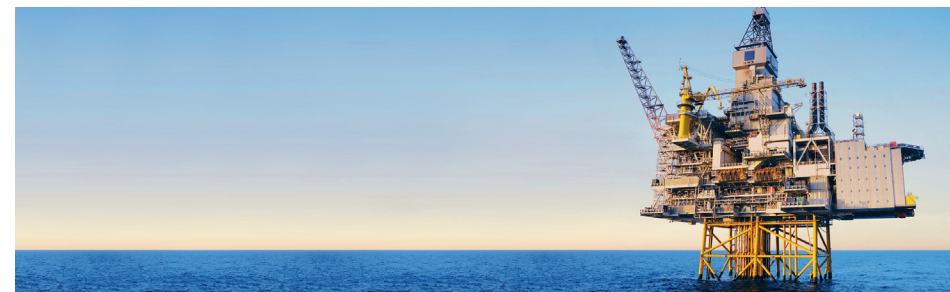
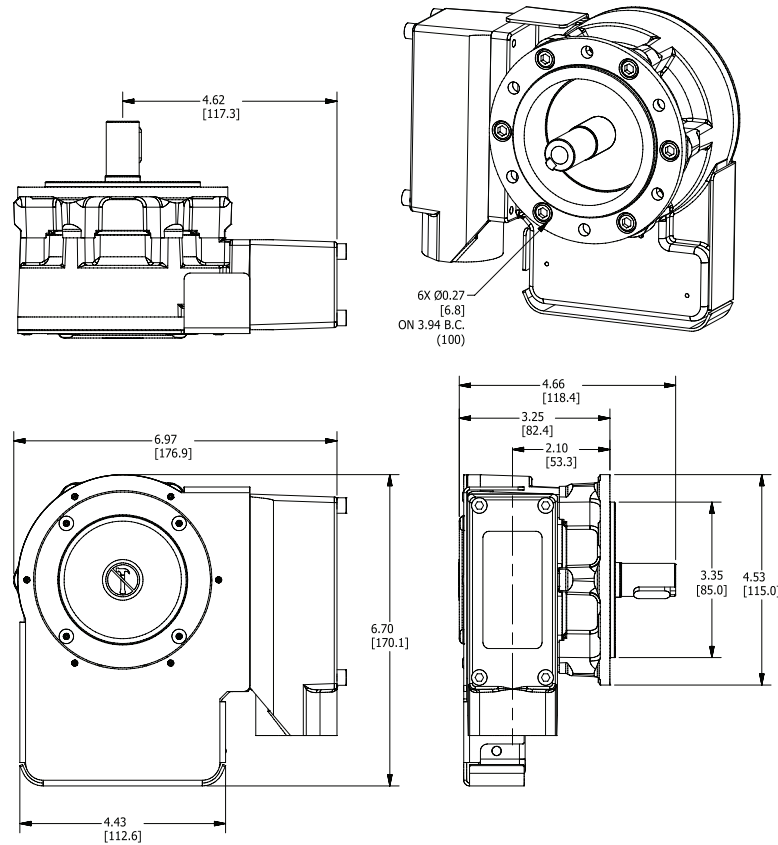
For applications requiring ATEX or IECEX Zone 2 or 22 or UL Class I, Division 2 use the XR4F directly with no barrier, isolator, special connector or cable gland required.

For applications requiring ATEX or IECEX Zone 1 or 21, we offer protection using the XRB3 isolator in your control cabinet to permit intrinsic safety wiring rather than explosion proof conduit or glands. For applications requiring NEC 500 UL Class I, Division 1, or NEC 505 (c) UL Class I, Zone 0, use the XRB3 isolator remotely and intrinsic safety wiring.

Unlike the competition, the Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults. Wiring errors won't harm this system.

Instead of relying on a tiny optical encoder with weak bearings, install the most rugged encoders available. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe encoders! Mud pumps, paint booths, hazardous duty IEC motors...XR4F can keep them all working 24/7/365.

Select the Avtron XR4F SMARTSafe encoder to eliminate encoder problems in your hazardous duty application!



MODEL	SHAFT SIZE	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	LINE DRIVER	CONNECTOR OPTIONS	FOOT MOUNT BRACKET	CHANNELS	SPECIAL OPTIONS
XR4F	N - 10mm k6 H - 11mm k6 S - 16mm h6 T - 18mm h6	XX - None AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 00 - Non-std	XX - None AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 00 - Non-std	See Table Below	See Table Below	X - None (for B10 flange mount) 1 - Toshiba TS2113N Bolt Pattern (recommend "T" 18mm shaft) (B35529 bracket) 2 - POGxx, OGxx Hubner (Baumer) Bolt Pattern (B35555 bracket) 3 - FG4 Johannes Hubner Bolt Pattern (B35338 bracket) 4 - Toshiba Type MSP Bolt Pattern	A - A, /A, B, /B, Z, /Z E - A, B, Z (Single ended)	000 - None 001 - Ceramic Bearings 004 - Super magnetic shielding 018 - Add XRB3 Isolator 9xx - Special cable length xx=length x 0.3m (use w/ Connector Option "W")

Description	ATEX/ IECEX Zone 1 & 21	ATEX / IECEX Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓	✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓	✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓	✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓	✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓	✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓	
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓	
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓	✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓	✓
T	8 Pin M12 Global Pinout	✓	✓	✓	
U	8 Pin M12 US Pinout	✓	✓	✓	
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓	
3	12 Pin M23 Hubner Pinout	✓	✓	✓	
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓	
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓	
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓	
W	18" Flexible Cable with Sealing Gland	✓	✓	✓	
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓	
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓



**SPECIFICATIONS**

**Operating Power:** (add cable drive current as req'd)  
Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150mA  
Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-5000

**Speed:** 5400 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:**  
Division 1, Zone 1: Encoder 500' Isolator 1000'  
Division 2, Zone 2 (5 to 15 VDC in): 500'  
Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (Storage -40°C to 100°C)

**Environmental:** Electronics-IP67, IP66 overall (see manual for details)

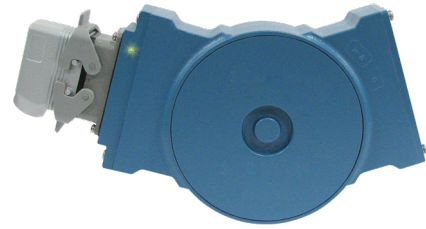
**Vibration:** 5-2000 Hz, 18 G; 100 G Shock

**Weight:** 14 lb [6.4 kg]/16 lb [7.3 kg] dual output

**Warranty:** 1 Year No-Hassle

\* See installation drawings for warnings and limitations

Uses XR5 Sensor - See Page 95



**Certifications:**

- ATEX/IECEx Zone 1 & Zone 21 Group IIC
- cULus Class I, Division 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I, Division 2 Group A,B,C,D

XR485 SMARTSafe™ solid shaft encoders are a breakthrough in hazardous duty encoders for NEMA C-face and foot mount applications. They are ATEX/IECEx and UL approved and offer incredibly reliable construction! SMARTSafe encoders can be used in ATEX/IECEx gas and dust and UL gas hazardous environments. Also available: hollow shaft models (XR45, XR685), Euro shafted models (XR4F), no-bearing modular encoders (XR56A, XR85A, XR115, XR125, XR850), and modular sensors (XR5, XR12).

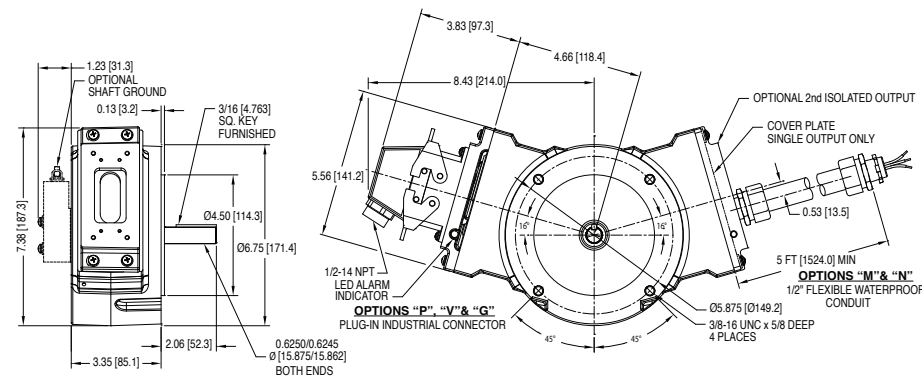
For applications requiring ATEX/IECEx Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D, use the XR485 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEx Zone 1 or 21 use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion proof conduit or glands. XRB3 Isolator Systems enable use in Class I Div 1 and Zone 0 applications.

Unlike the competition, Avtron SMARTSafe encoder systems are fully protected against short circuits, power-to-output wiring, and output-to-ground faults at every point. Wiring errors won't harm this system!

Instead of depending on a tiny optical encoder with weak bearings use XR485. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XR485 encoders! Paint booths, draw works, coil tubing rigs...XR485 can keep them all working 24/7/365.

Eliminate encoder failures in your hazardous environment application-select XR485 today!



MODEL	TEMP RATING	FOOT BRACKET	SHAFT MOUNTING	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
XR485	N - -20°C to 80°C C - -40°C to 80°C	X - None 1 - Std. Avtron Mount 2 - BC42/46 style (A25448)	S - Single Shaft D - Dual Shaft	See Table Below	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std	See Table Below	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std	See Table Below	000 - None 001 - Ceramic Bearings 004 - Super Magnetic Shielding 018 - Add XRB3 Isolator 9xx - Specify cable length xx=feet max 33ft (use w/ Option "Q", "W", "Z")

	Description	ATEX / IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
	Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
	Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:** (add load and cable drive current as req'd)

Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA

Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**

Division 1, Zone 1: Encoder 500' Isolator 1000'

Division 2, Zone 2 (5 to 15 VDC in): 500'

Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

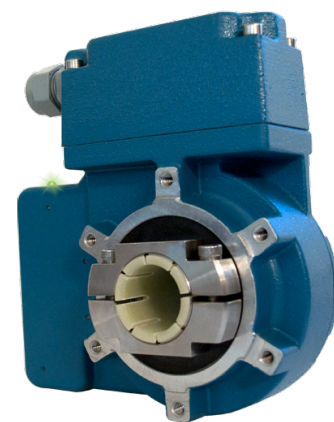
**Vibration:** 5-2000 Hz, 20 G, 100 G Shock

**Weight:** 10-12 lb [4.5-5.5 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations

\*\* See manual for environmental details



**Certifications:**

- ATEX/IECEx Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR45 hollow shaft encoders are a unique industry first. By combining Avtron durable magnetic encoder technology with SMARTSafe™ systems, Avtron has created a truly durable hollow shaft encoder which can be used in hazardous environments and applications. It is ATEX, IECEx and cULus approved. SMARTSafe encoders can be used in gas and ATEX dust hazardous environments. Also available: shafted models (XR4F, XR485), and no-bearing modular encoders (XR56A, XR85A, XR115, XR125, XR850).

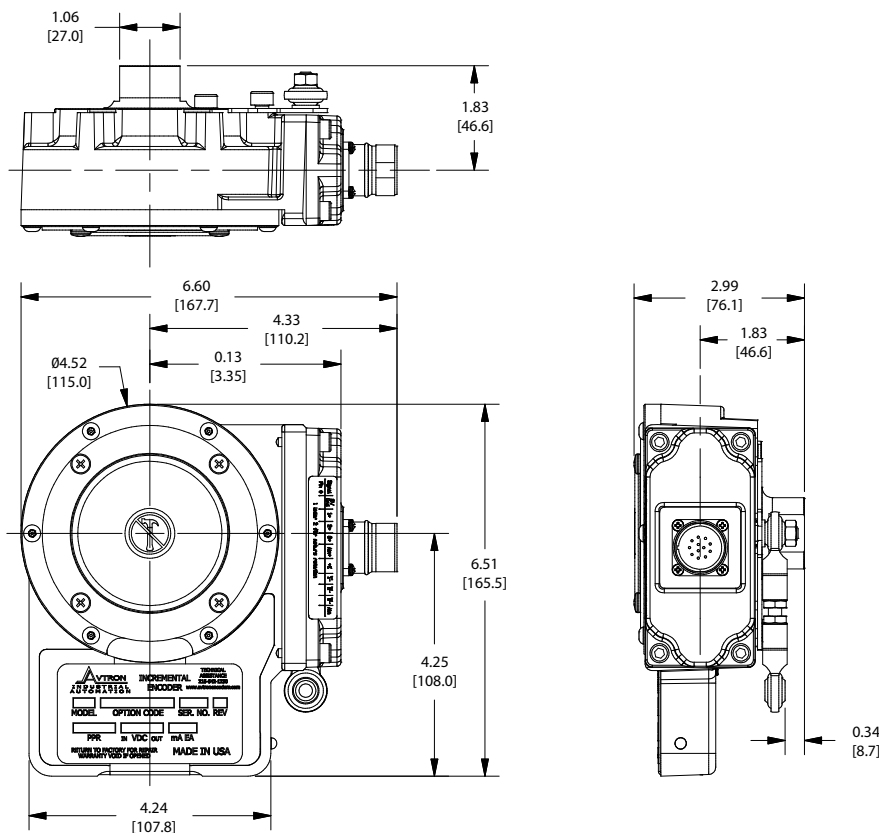
For applications requiring ATEX/IECEx Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D use the XR45 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring ATEX/IECEx Zone 1 or 21 add the XRB3 isolator; XRB3 isolator systems enable use in Class I, Div 1 and Class I, Zone 0 applications. This permits the use of intrinsically safe wiring instead of explosion proof conduit or glands.

Unlike the competition, the Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of relying on a tiny optical encoder with weak bearings install the most rugged encoders available for your drilling or industrial applications. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe encoders! Paint booths, draw works, coil tubing rigs...XR45 can keep them all working 24/7/365.

Select the Avtron XR45 SMARTSafe™ encoder to eliminate encoder problems in your hazardous duty application!



MODEL	BORE SIZE	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	LINE DRIVER	CONNECTOR OPTIONS	TETHER	CHANNELS	SPECIAL OPTIONS
XR45	<b>Clamping Collar Mount U.S.</b> C - 5/8" D - 3/4" E - 7/8" F - 1" G - 1 1/8" K - 1 3/8" U - All US Sizes  <b>Clamping Collar Mount Metric</b> S - 16mm T - 18mm V - 19mm W - 20mm Y - 25mm 3 - 30mm Z - All Metric Sizes  <b>End of Shaft: Center Bolt Mount</b> L - 16mm (no taper) M - 17mm (10:1 taper)	XX - None A0 - Non-std AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A4 - 2048 A5 - 2500 AT - 3072 AV - 3600 AD - 4096 A8 - 4800 A9 - 5000	XX - None A0 - Non-std AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A4 - 2048 A5 - 2500 AT - 3072 AV - 3600 AD - 4096 A8 - 4800 A9 - 5000	See Table Below	See Table Below	X - None Flat Styles: A - Fan Cover - 1/4" Mounting D - Fan Cover (T-bolt) E - 4.5" NEMA C-face F - 8.5" NEMA FC-face Threaded Rod Styles: G - 70-500mm w/bracket P - 70mm fixed w/screw T - Fan Cover 70-500mm w/T-bolt Combinations: H - Fan Cover & 8.5" C-face M - Fan Cover & 4.5" C-Face U - Universal (includes all styles)	A - A, /A, B, /B, Z, /Z (req'd for 8, 10 pin connectors) B - A, B, A, B (no marker) E - A, B, Z (single ended) F - A, B (single ended, no marker) D - A, A (Diff Phase)	000 - None 001 - Ceramic Bearings 004 - Super Magnetic Shielding 018 - Add XRB3 Isolator 9xx - Specify cable length xx=feet max 33ft (use w/ Option "Q", "W", "Z")

	Description	ATEX / IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
	Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
	Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:** (add cable drive current as req'd)  
Division 1, Zone 1 (XR3): 12-24VDC In, 10.6V Out, 150mA  
Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-5000

**Speed:** 5400 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:**  
Division 1, Zone 1: Encoder 500' Isolator 1000'  
Division 2, Zone 2 (5 to 15 VDC in): 500'  
Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (Storage -40°C to 100°C)

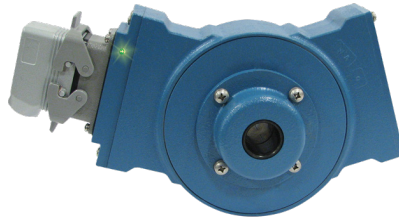
**Environmental:** Electronics-IP67, IP66 overall (see manual for details)

**Vibration:** 5-2000 Hz, 18 G; 100 G Shock

**Weight:** 15 lb [6.4 kg]; 17 lb [7.7 kg] dual output

**Warranty:** 1 Year No-Hassle

\* See installation drawings for warnings and limitations



Uses XR5 Sensor - See Page 95

**Certifications:**

- ATEX/IECEX Zone 1 & Zone 21 Group IIC
- cULus Class I, Division 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEX Zone 2 & 22 Group IIC
- cULus Class I, Division 2 Group A,B,C,D

XR685 SMARTSafe hollow shaft incremental quadrature rotary encoders are a breakthrough in hazardous duty encoders. They are ATEX/IECEX and UL approved and offer huge bearings for maximum life. SMARTSafe encoders can be used in ATEX/IECEX gas and dust and UL gas hazardous environments. Also available: hollow shaft models in other bore sizes (XR45), shafted models (XR4F, XR485), no-bearing modular encoders (XR56A, XR85A, XR115, XR125, XR850), and modular sensors (XR5, XR12).

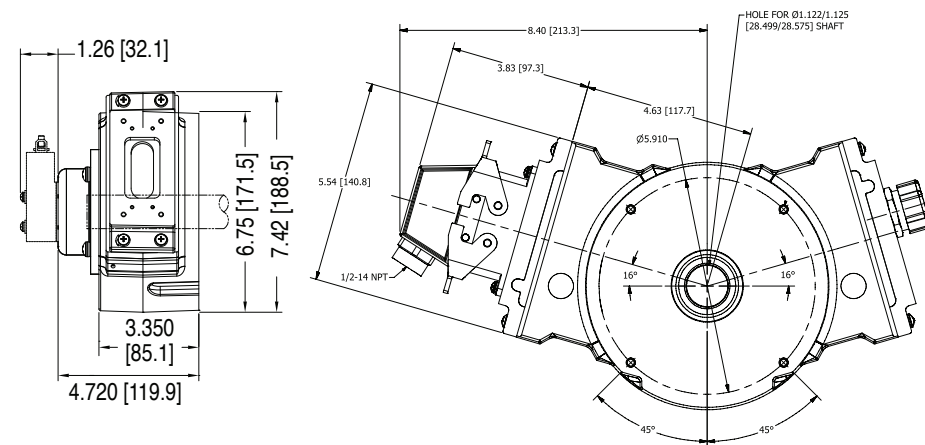
For applications requiring ATEX/IECEX Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D use the XR685 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEX Zone 1 or 21 use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion proof conduit or glands. XRB3 Isolator Systems enable use in Class I Div 1 and Class I Zone 0 applications.

Unlike the competition, Avtron SMARTSafe encoder systems are fully protected against short circuits, power-to-output wiring, and output-to-ground faults at every point. Wiring errors won't harm this system!

Instead of depending on a tiny optical encoder with weak bearings use XR685. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XR685 encoders! Paint booths, draw works, coil tubing rigs...XR685 can keep them all working 24/7/365.

Eliminate encoder failures in your hazardous environment application-select XR685 today!



MODEL	TEMP RATING	TETHER	COVER STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	CONNECTOR OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
XR685	N - -20°C to 80°C C - -40°C to 80°C	X - None 1 - Threded Rod (B32809)	E - Standard (EOS) T - Through Shaft	See Table Below	X - None F - 60 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	See Table Below	X - None F - 60 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	See Table Below	000 - None 004 - Super magnetic shielding 018 - Add XRB3 Isolator 9xx - Special cable length

Description	ATEX / IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
Line Driver Code	H	7	F	G	R

Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC **Current** 120 mA, no load

**Output Format:** A, /A, B, /B, Optional Marker Z, /Z

**Frequency Range:** 0 to 150 kHz

**PPR:** 240-1200

**Speed:** 5000 RPM Max. Std.

**Temperature:** -40°C to 80°C (-20°C standard)

**Chemical:** Polyurethane enamel paint protects against salt spray, mild acids, and bases

**Enclosure Rating:** IP66

**Explosion Protection:**

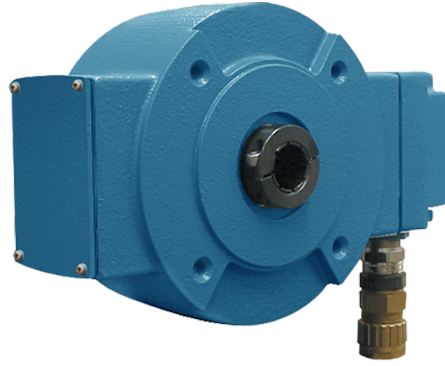
ATEX 0539 II 2 G Ex d e IIB T4 Gb (Tamb = -40/-20°C to +80°C)

IECEX Ex d e IIB T4 Gb (Tamb = -40/-20°C to +80°C)

**Weight:** 18 lb / 8 kg

**Warranty:** 1 Year No-Hassle

\* See installation drawings for warnings and limitations



**Certifications:**

- ATEX/IECEX Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEX Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

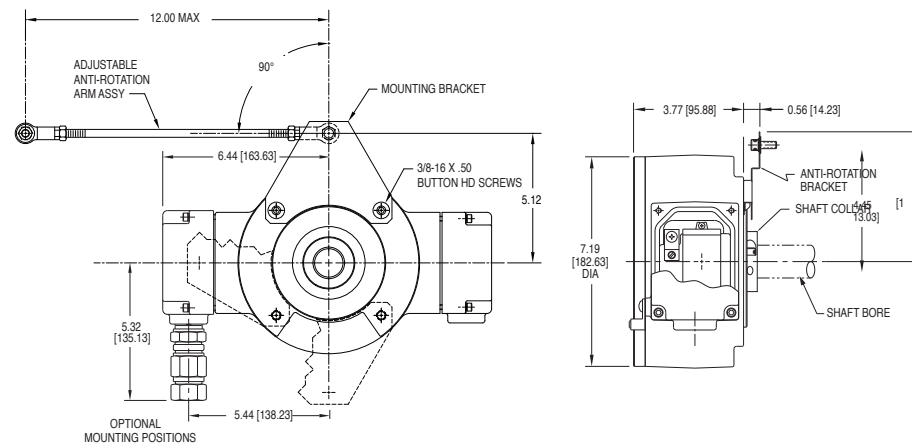
M6C explosion protected ATEX and IECEx rated severe mill duty rotary encoders are designed for direct mounting on motor or load shafts, or 1" or 1 1/8" [25.4mm or 28.6mm]. Other models available include no-bearing units such as XR5, XR56A and XR850, shafted models including XR4F and XR485. These models also include ATEX, IECEx, UL, cUL, NEC and CSA ratings.

The M6C is an updated model which directly replaces our previous M6 encoder. No barrier or isolator is required – mount M6C install directly into any ATEX or IECEx Zone 1 application.

Why take a chance with weak optical encoders on your drilling rig? The M6C features Avtron Encoders' rugged magnetic sensor and solid metal rotor technology. Our shatterproof, moisture proof systems ensure your application has maximum uptime. The hollow shaft (tethered) models offer direct mounting on shafts from 1" or 1 1/8", without flanges, reducers, couplings, or other hardware. No rework is needed; just mount the encoder directly on the shaft, and secure the tether arm. The heavy duty bearings withstand run-out and vibration that destroy lesser encoders.

M6C also includes a complete wiring protection system – it can survive all types of wiring errors and drive signals down the longest cables.

We believe explosion protected encoders should also be ready to withstand the rough drilling environment. Try the M6C today!



MODEL	BORE SIZE	MOUNTING STYLE	LINE DRIVER	LEFT OUTPUT RANGE	RIGHT OUTPUT RANGE	BASE PPR	MARKER	CONNECTOR	SPECIAL OPTIONS
M6C-	4 - 1" 5 - 1 1/8"	S - End of Shaft	1 - 5 to 24 VDC 8 - 6.5 to 24 VDC	X - None L - Low Range (Base PPR x 1/2) M - Medium Range (Base PPR x 1) H - High Range (Base PPR x 2)	X - None L - Low Range (Base PPR x 1/2) M - Medium Range (Base PPR x 1) H - High Range (Base PPR x 2)	48 - 480 51 - 512 60 - 600	Z - Marker - - None	T - Conduit Box, Terminal Block, 3/4" NPT W - Conduit Box, Terminal Block and Wire Gland	000 - None 001 - Low Temp (-40°C) 003 - Torque Arm B28390 005 - Low Temp (-40°C) & Torque Arm

	AVAILABLE PPRs		
	48 OPTION	51 OPTION	60 OPTION
LOW	240	256	300
MEDIUM	480	512	600
HIGH	960	1024	1200

**SPECIFICATIONS**

**Operating Power:** (add cable drive current as req'd)  
 Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA  
 Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**  
 Division 1, Zone 1: Encoder 500' Isolator 1000'  
 Division 2, Zone 2 (5 to 15 VDC in): 500'  
 Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

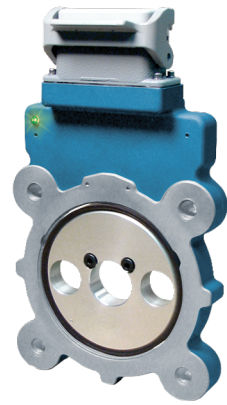
**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

**Vibration:** 5-2000 Hz, 20 G, 100 G Shock

**Weight:** 2-3 lb [.9-1.4 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations  
 \*\* See manual for environmental details



**Certifications:**

- ATEX/IECEx Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR56A SMARTSafe 4.5" modular incremental quadrature rotary encoders are a breakthrough in hazardous duty encoders. They are ATEX and UL approved and offer incredibly reliable no-bearing construction! SMARTSafe encoders can be used in gas and ATEX dust hazardous environments. Also available: hollow shaft models (XR45, XR685), shafted models (XR4F, XR485), and no-bearing modular encoders to fit other flange sizes (XR85A, XR115, XR125, XR850).

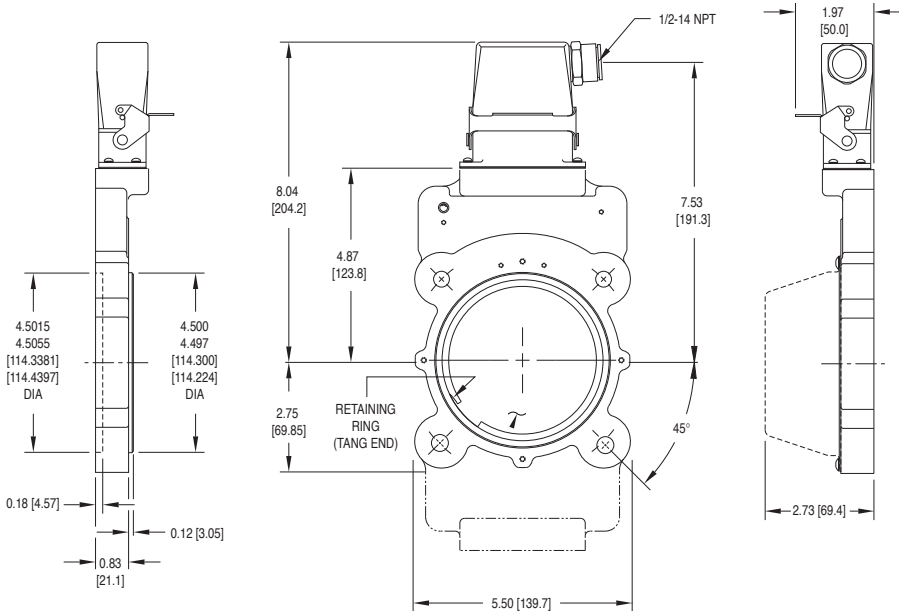
For applications requiring ATEX/IECEx Zone 2 or 22 or UL Class I, Division 2, (gas) Groups A,B,C,D use the XR56A directly in your application with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEx Zone 1 or 21 protection use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion-proof conduit or glands. The XR56A can also be used in UL Class I Div 1 & Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of relying on a tiny optical encoder with weak bearings, install the most rugged encoders available for your drilling or industrial applications. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe encoders! Paint booths, draw works, coil tubing rigs...XR56A can keep them all working 24/7/365.

Eliminate the biggest cause of industrial encoder failure-eliminate the bearings with XR56A hazardous duty encoders.



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
XR56A	1 - Single Output 2 - Dual Output	<b>US</b> CA - 0.500 CB - 0.625 CC - 0.875 CD - 0.938 CE - 1.000 CF - 1.125 C2 - 1.188 CG - 1.250 CH - 1.375 CT - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 TS - 2.625* TW - 2.750* TU - 2.875* TV - 3.000* T4 - 3.125* T7 - 3.188* TZ - 3.250*	<b>Metric</b> D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D4 - 18mm DE - 19mm DF - 24mm D5 - 25mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover X - None	See Table Below	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	X - None F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	See Table Below	000 - None 005 - Super Magnetic Shielding 018 - Add XRB3 Isolator 4xx - Special PPR Code, consult factory 9xx - Special Cable Length, xx=length in feet

\*Set Screw Rotor Only

	Description	ATEX / IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
	Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
	Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:** (add load and cable drive current as req'd)  
Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA  
Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**  
Division 1, Zone 1: Encoder 500' Isolator 1000'  
Division 2, Zone 2 (5 to 15 VDC in): 500'  
Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

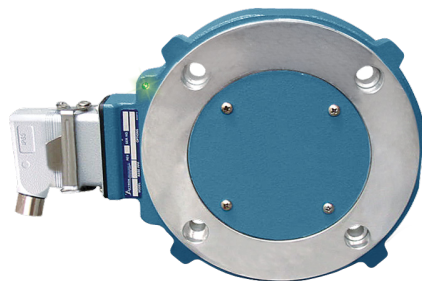
**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

**Vibration:** 5-2000 Hz, 20 G, 100 G Shock

**Weight:** 2-3 lb [.9-1.4 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations  
\*\* See manual for environmental details



**Certifications:**

- ATEX/IECEx Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR85A SMARTSafe 8.5" modular rotary incremental quadrature encoders are a breakthrough in hazardous duty encoders. They are ATEX and UL approved and offer incredibly reliable no-bearing construction! SMARTSafe encoders can be used in gas and ATEX dust hazardous environments. Also available: hollow shaft models (XR45, XR685), shafted models (XR4F, XR485), and no-bearing modular encoders to fit other flange sizes (XR56A, XR115, XR125, XR850).

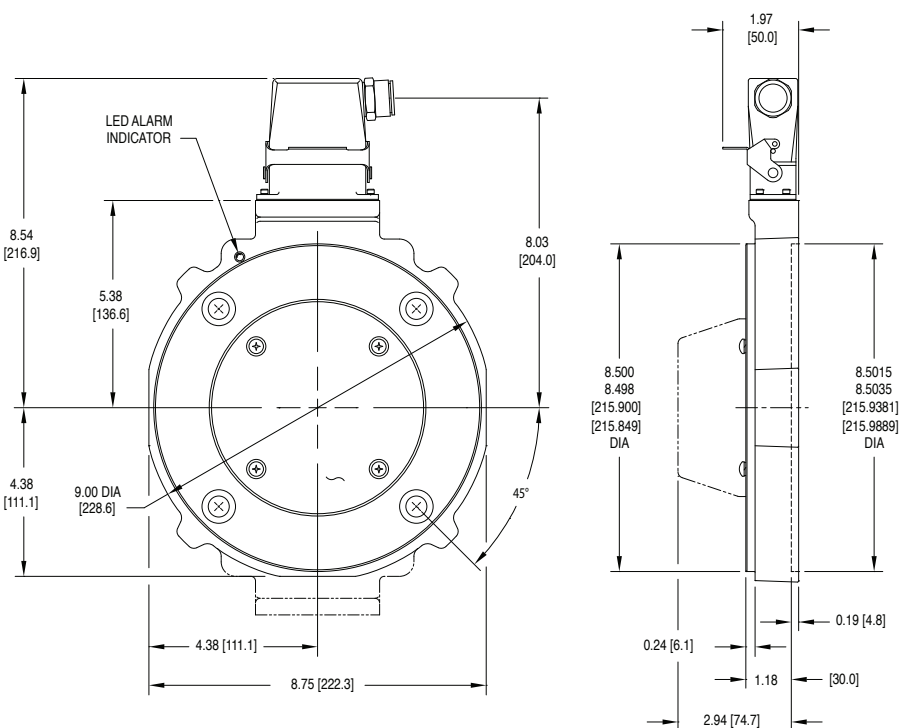
For applications requiring ATEX/IECEx Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D use the XR85A directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEx Zone 1 or 21, protection use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion-proof conduit or glands. The XR85A can also be used in UL Class I Div 1 & Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of relying on a tiny optical encoder with weak bearings, install the most rugged encoders available for your drilling or industrial applications. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe encoders! Paint booths, draw works, coil tubing rigs, XR85A can keep them all working 24/7/365.

Eliminate the biggest cause of industrial encoder failure-eliminate the bearings with XR85A hazardous duty encoders



MODEL	HOUSING TYPE	ROTOR CODE		COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
XR85A	1 - Single Output 2 - Dual Output	<b>US</b> CA - 0.500 CB - 0.625 CC - 0.875 CD - 0.938 CE - 1.000 CF - 1.125 C2 - 1.188 CG - 1.250 CH - 1.375 CT - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 TS - 2.625* TU - 2.875* TV - 3.000* T4 - 3.125* T7 - 3.188* TZ - 3.250*	<b>Metric</b> D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D4 - 16mm DE - 19mm DF - 24mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	X - None E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover	See Table Below	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std. X - None	See Table Below	000 - None 004 - Add Housing Drain 005 - Super Magnetic Shielding 017 - Counter bored mtg. holes 018 - Add XRB3 Isolator 4xx - Special PPR (see chart) 9xx - Special Cable Length, xx=length in feet

\*Set Screw Rotor Only

Description		ATEX / IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
Voltage In / Out		5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
Line Driver Code		H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

SPECIAL PPR OPTION CODES		
OPTION CODE	LEFT PPR	RIGHT PPR
401	1270	None
402	150	None
403	50	None
404	512	16
405	16	None
406	6000	None
407	2800	None
408	1400	None
409	30	None
410	None	6000
411	12000	None
412	200	None
413	30	30
414	1500	None
415	3000	None
416	3600	None
417	1250	None
418	2400	2400
419	160	160
420	450	None

**SPECIFICATIONS**

**Operating Power:** (add load and cable drive current as req'd)

Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA

Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**

Division 1, Zone 1: Encoder 500' Isolator 1000'

Division 2, Zone 2 (5 to 15 VDC in): 500'

Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

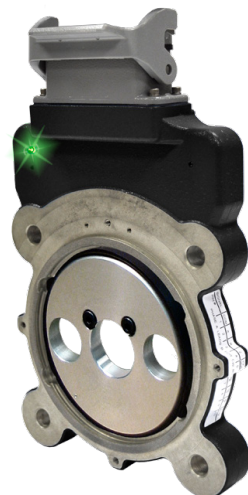
**Vibration:** 5-2000 Hz, 20 G, 100 G Shock

**Weight:** 2-3 lb [9-1.4 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations

\*\* See manual for environmental details



**Certifications:**

- ATEX/IECEx Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR115 SMARTSafe 115mm modular incremental quadrature rotary encoders are a breakthrough in hazardous duty encoders. They are ATEX and UL approved and offer incredibly reliable no-bearing construction! SMARTSafe encoders can be used in gas and ATEX dust hazardous environments. Also available: hollow shaft models (XR45, XR685), shafted models (XR4F, XR485), and no-bearing modular encoders to fit other flange sizes (XR56A, XR85A, XR125, XR850).

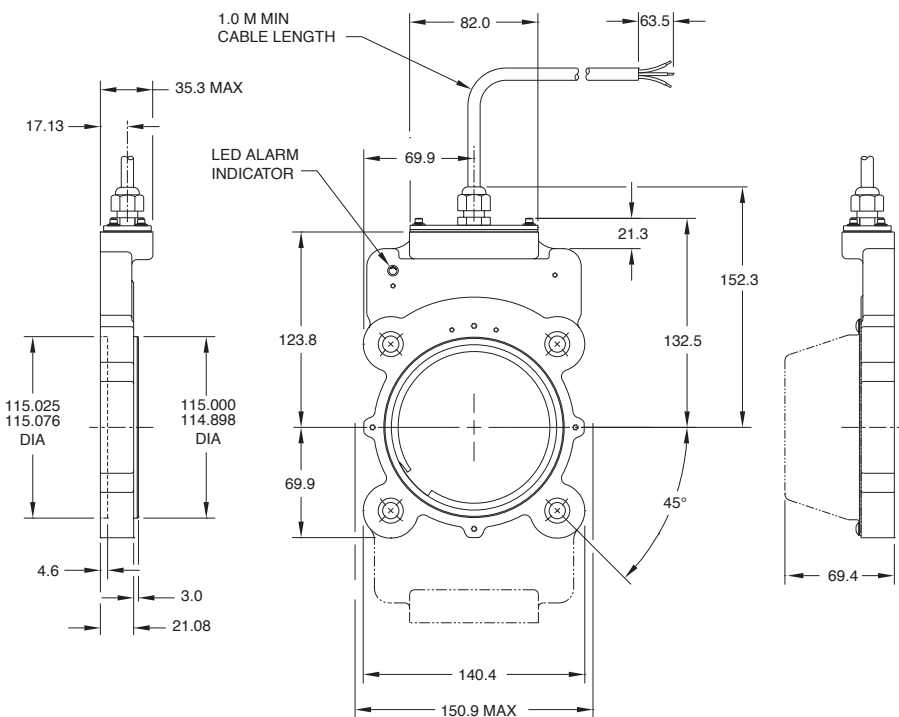
For applications requiring ATEX/IECEx Zone 2 or 22 or UL Class I, Division 2 (Gas) Groups A,B,C,D use the XR115 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEx Zone 1 or 21 protection use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion-proof conduit or glands. The XR115 can also be used in UL Class I Div 1 & Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of relying on a tiny optical encoder with weak bearings, install the most rugged encoders available for your drilling or industrial applications. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe encoders! Paint booths, draw works, coil tubing rigs...XR115 can keep them all working 24/7/365.

Eliminate the biggest cause of Industrial Encoder failures. Eliminate the bearings with XR115 Hazardous Duty Encoders



MODEL	HOUSING TYPE	SHAFT SIZE (METRIC)	COVER STYLE	LINE DRIVER	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTOR	SPECIAL OPTIONS
XR115	1 - Single Output 2 - Dual Output	XX - None  Thru Shaft Rotor: D2 - 10mm DA - 11mm D3 - 12mm DB - 14mm DC - 15mm DD - 16mm D4 - 18mm DE - 19mm DF - 24mm DG - 28mm DH - 30mm DT - 32mm DJ - 36mm DK - 38mm DL - 42mm DM - 45mm DN - 48mm DP - 52mm DR - 55mm DS - 60mm MU - 65mm* MV - 70mm* MW - 75mm* MY - 80mm* MZ - 85mm*	E - Extended Shaft Cover F - Flat Cover T - Flat Thru-Hole Cover X - None	See Table Below	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std.	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 W - 1000 Y - 1024 Z - 1200 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std. X - None	See Table Below	000 - None 004 - Add Housing Drain (single output only) 005 - Super Magnetic Shielding 018 - Add XRB3 Isolator 4xx - Special PPR - Enter Ø in the PPR code(s), (Consult Factory) 9xx - Special Cable Length, xx=length in feet

\* Set Screw Rotor only

	Description	ATEX/ IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
	Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
	Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:** (add load and cable drive current as req'd)

Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150 mA

Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-5000

**Speed:** 5000 RPM

**Maximum Cable Length:**

Division 1, Zone 1: Encoder 500' Isolator 1000'

Division 2, Zone 2 (5 to 15 VDC in): 500'

Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (storage -40°C to 100°C)

**Encoder Enclosure:** IP65

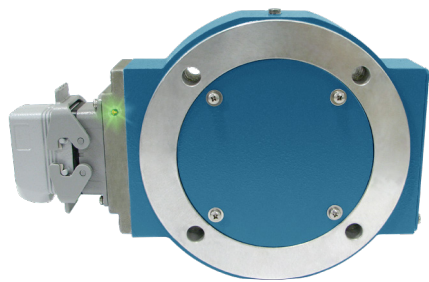
**Encoder Electronics:** Fully Encapsulated - IP67 \*\*

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations

\*\* See manual for environmental details

**Uses XR5 Sensor - See Page 95**



**Certifications:**

- ATEX/IECEX Zone 1 & 21 Group IIC
- cULus Class I Div 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEX Zone 2 & 22 Group IIC
- cULus Class I Div. 2 Groups A,B,C,D

XR850 SMARTSafe 8.5" modular incremental quadrature rotary encoders are a breakthrough in hazardous duty encoders. They are ATEX/IECEX, cULus approved and offer reliable no-bearing construction! SMARTSafe encoders can be used in UL gas and ATEX/IECEX gas and dust hazardous environments. Also available: hollow shaft models (XR45, XR685), shafted models (XR4F, XR485), no-bearing modular encoders to fit other flange sizes (XR56A, XR85A, XR115, XR125, XR850), and modular sensors (XR5, XR12).

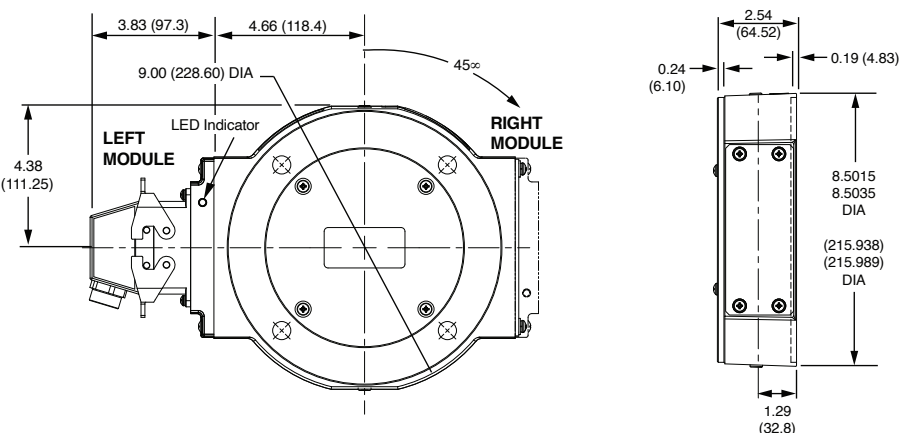
For applications requiring ATEX/IECEX Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D, use the XR850 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEX Zone 1 or 21 use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion proof conduit or glands. The XR850 can also be used in UL Class I, DIV 1 and Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of mounting a tiny optical encoder with weak bearings on a wobbling stub shaft, mount XR850 directly on your main application shaft. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XR850 encoders! Paint booths, draw works, coil tubing rigs...XR850 can keep them all working 24/7/365.

Eliminate the biggest cause of industrial encoder failure eliminate the bearings with XR850 hazardous duty encoders.



MODEL	ROTOR CODE		COVER STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
XR850	US CB - 0.625 CA - 0.750 CC - 0.875 CE - 1.000 CF - 1.125 CH - 1.375 C8 - 1.500 CJ - 1.625 CK - 1.750 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 CT - 2.625 CS - 2.771 C2 - 2.875 CU - 3.000 CW - 3.250 CY - 3.375 CZ - 3.421 CV - 3.438 C3 - 3.500 TD - 3.625* TG - 3.750* T4 - 3.875* T1 - 4.000* T7 - 4.250* T6 - 4.500*	Metric DF - 30mm DJ - 42mm DP - 60mm DS - 70mm (m6) DY - 80mm (f6) DZ - 80mm (h7) D3 - 90mm (m6) MD - 93mm(g6)* M4 - 95mm (m6)*	X - None B - Thru Shaft Cover w/ inboard seal plate F - Flat Cover N - Flat Cover w/ inboard seal plate T - Thru Shaft Cover	See Table Below	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 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std. X - None	See Table Below	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 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-std. X - None	See Table Below	000 - None 004 - Super sensor shielding 018 - Add XRB3 Isolator 4xx - Special PPR (Consult Factory) 9xx - Special Cable Length, xx=length in feet

\* Set Screw Rotor only

		ATEX/IECEX Zone 1 & 21	ATEX/IECEX Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
Description						
Voltage In / Out		5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
Line Driver Code		H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	



**SPECIFICATIONS**

**Operating Power:** (add cable drive current as req'd)  
 Division 1, Zone 1 (XRB3): 12-24VDC In/Out, 150mA  
 Division 2, Zone 2: 5-24VDC In/Out, 100mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**PPR:** 8-5000

**Speed:** 5400 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:**  
 Division 1, Zone 1: Encoder 500' Isolator 1000'  
 Division 2, Zone 2 (5 to 15 VDC in): 500'  
 Division 2, Zone 2 (15 to 24 VDC in): 250'

**Temperature:** -40°C to 80°C (Storage -40°C to 100°C)

**Environmental:** Electronics-IP67 (see manual for details)

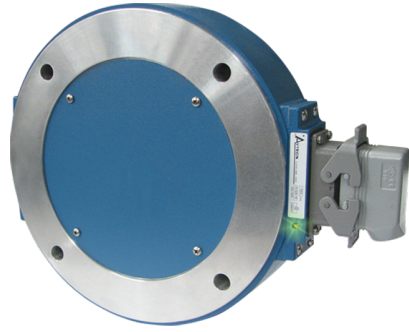
**Vibration:** 5-2000 Hz, 20 G; 100 G Shock

**Weight:** 15-18 lb [7-8 kg]

**Warranty:** 3 Year No-Hassle

\* See installation drawings for warnings and limitations

**Uses XR12 Sensor - See Page 95**



- Certifications:**
- ATEX/IECEX Zone 1 & Zone 21 Group IIC
  - cULus Class I, Division 1 and Zone 0 Group A,B,C,D\*
  - ATEX/IECEX Zone 2 & 22 Group IIC
  - cULus Class I, Division 2 Group A,B,C,D

XR125 SMARTSafe 12.5" modular incremental quadrature rotary encoders are a breakthrough in hazardous duty encoders to fit large shaft applications. They are ATEX/IECEX and cULus approved and offer incredibly reliable no-bearing construction! SMARTSafe encoders can be used in ATEX/IECEX gas and dust and UL gas environments. Also available: hollow shaft models (XR45, XR685), shafted models (XR4F, XR485), no-bearing modular encoders to fit other flange sizes (XR56A, XR85A, XR115, XR850), and modular sensors (XR5, XR12).

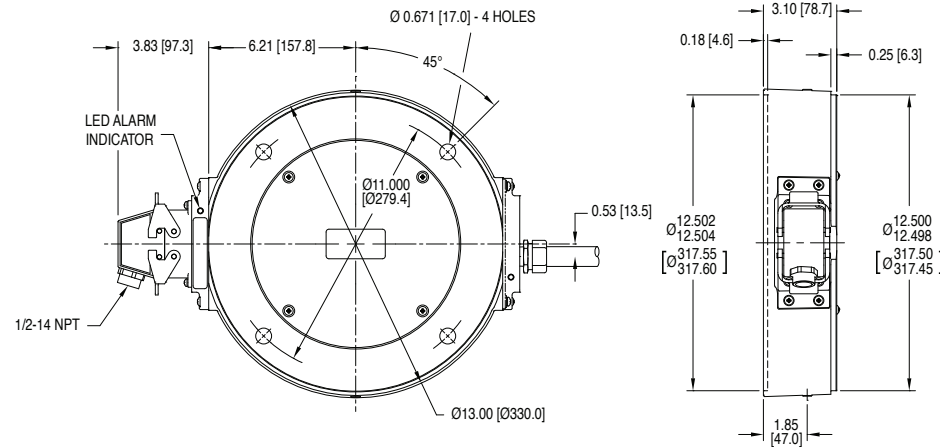
For applications requiring ATEX/IECEX Zone 2 or 22 or UL Class I, Division 2, Groups A,B,C,D use the XR125 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEX Zone 1 or 21 use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion proof conduit or glands. The XR125 can also be used in UL Class I Division 1 and Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of mounting a tiny optical encoder with weak bearings on a wobbling stub shaft, mount XR125 directly on your main application shaft. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XR125 encoders! Paint booths, draw works, coil tubing rigs...XR125 can keep them all working 24/7/365.

Eliminate the biggest cause of industrial encoder failure-eliminate the bearings with XR125 hazardous duty encoders.



MODEL	ROTOR CODE		COVER STYLE	LEFT MODULE		RIGHT MODULE		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LINE DRIVER	PPR	LINE DRIVER	PPR		
XR125	<b>US</b> CH - 1.375 CJ - 1.625 CL - 1.875 CM - 2.000 CN - 2.125 CQ - 2.250 CP - 2.375 CR - 2.500 CT - 2.625 C2 - 2.875 CV - 3.125 CW - 3.250 CY - 3.375 C4 - 3.875 Z - 4.000 CB - 4.125 C5 - 4.250 CC - 4.375 C6 - 4.500 CD - 4.625 CE - 4.690 CA - 4.875 CG - 5.000 CK - 5.250 C7 - 5.375 C3 - 6.000 CF - 6.250 C8 - 6.750 TZ - 5.001* TU - 6.375* T9 - 7.875*	<b>Metric</b> DG - 25mm DY - 85mm M1 - 100mm* DC - 110mm DE - 120mm MK - 120mm (m6)* D7 - 130mm* DF - 160mm D8 - 170mm	X - None F - Flat Cover T - Flat Thru-Hole Cove	See Table Below	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1600 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-Std X - None	See Table Below	F - 60 G - 100 H - 120 A - 128 L - 240 N - 256 P - 300 E - 360 B - 480 Q - 500 R - 512 S - 600 V - 900 J - 960 Y - 1024 Z - 1200 6 - 1600 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-Std X - None	See Table Below	000 - None 004 - Super magnetic shielding 018 - Add XRB3 Isolator 4xx - Special PPR (Consult Factory) 9xx - Special Cable length

\* Set Screw Rotor only

		ATEX/ IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
Description		5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
Voltage In / Out		H	7	F	G	R
Line Driver Code		XRB3	None	XRB3	None	None
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:** (add cable drive current as req'd)

Division 1, Zone 1 (XRB3): 12-24VDC in/out, 150 mA

Division 2, Zone 2: 5-24VDC in/out, 150 mA

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 165 kHz

**Maximum Cable Length:**

Division 1, Zone 1: Encoder 500' Isolator 1000'

Division 2, Zone 2 (5 to 15 VDC in): 500'

Division 2, Zone 2 (15 to 24 VDC in): 250'

**Rotor Positioning:** Up to +/-0.100" [+/-2.54 mm] movement/misalignment

**Temperature:** -40°C to 80°C (Storage -40°C to 100°C)

**Vibration:** 5-2000 Hz, 18 G; 100 G Shock

**Weight:** 2.2 lb [1 kg]

**Warranty:** 3 Year No-Hassle

\*See installation drawings for Warnings and Limitations.

**XR5 sensors are used on the XR485, XR685 and XR850**

**XR12 sensors are used on the XR125**



**Certifications:**

- ATEX/IECEX Zone 1 & Zone 21 Group IIC
- cULus Class I, Division 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEX Zone 2 & 22 Group IIC
- cULus Class I, Division 2 Group A,B,C,D

XR5 and XR12 SMARTSafe™ modular incremental quadrature encoder sensors enable the world's first hazardous duty rotary encoders with removable electronics. They are cULus, ATEX and IECEx certified and offer incredibly reliable no-bearing construction! SMARTSafe sensors can be used in ATEX/IECEX gas and dust and UL gas hazardous environments. Also available: hollow shaft models (XR685), shafted models (XR485), no-bearing modular encoders (XR125, XR850), and explosion proof sensor (XP5).

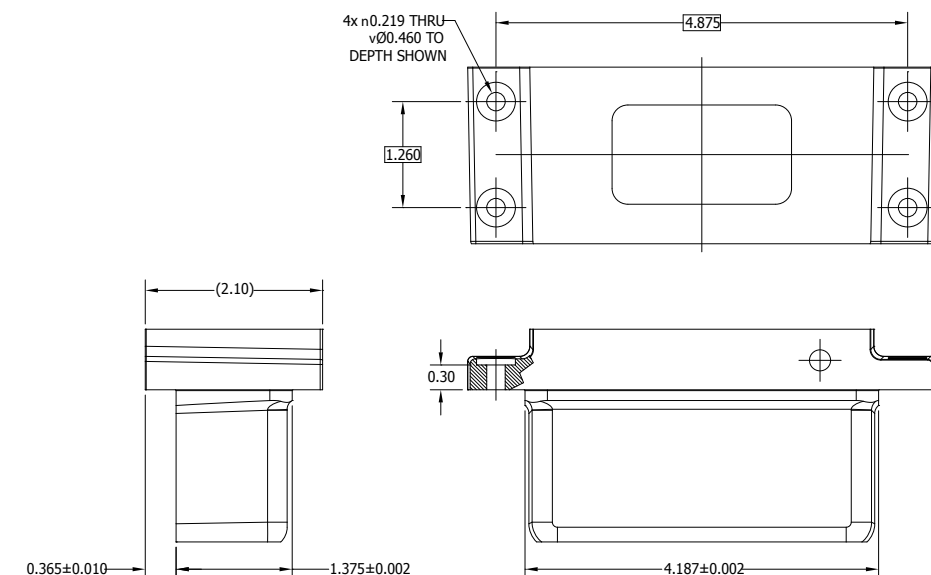
For applications requiring ATEX/IECEX Zone 2 or 22 or cULus Class I, Division 2, Groups A,B,C,D use the XR5 and XR12 directly in your application, with no barrier, isolator or cable gland required.

For applications requiring UL Division 1, ATEX/IECEX Zone 1 or 21 protection use the XRB3 isolator in your control cabinet which permits the use of intrinsically safe wiring instead of explosion-proof conduit or glands. The XR5 and XR12 can also be used in UL Class I Div 1 & Zone 0 applications using the XRB3 Isolator.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults.

Instead of mounting a tiny optical encoder with weak bearings on a wobbling stub shaft, mount XR5 and XR12 directly on your machine and install the rotor on your main application or motor shaft. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe™ XR5 and XR12 sensors! Paint booths, draw works, coil tubing rigs...XR5 and XR12 can keep them all working 24/7/365.

Eliminate the biggest cause of industrial encoder failure-eliminate the bearings with XR5 and XR12 hazardous duty encoder sensors.



MODEL	LINE DRIVER	PPR	CONNECTOR OPTIONS	SPECIAL OPTIONS
XR5* XR12	See Table Below	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 Y - 1024 Z - 1200 6 - 1800 3 - 2000 4 - 2048 5 - 2500 D - 4096 8 - 4800 9 - 5000 0 - Non-Std	See Table Below	000 - None 004 - Super Magnetic Shielding 4xx - Special PPR (Consult Factory) 9xx - Special Cable Length (xx=ff/0.3m)

\* If XR5 is chosen use 3 option code spots instead of 4

	Description	ATEX/ IECEx Zone 1 & 21	ATEX / IECEx Zone 2 & 22	Class I & II Div. 1 & Zone 0	Class I & II Div. 2 Listed	Class I & II Div. 2 Recognized
	Voltage In / Out	5-7 / 5	5-24 / 5-24	5-7 / 5	5-24 / 5-24	5-24 / 5-24
	Line Driver Code	H	7	F	G	R
Code	Required Isolator	XRB3	None	XRB3	None	None
A	10 Pin MS W/O Plug - Std Phasing	✓	✓	✓		✓
B	10 Pin MS W/O Plug - Dynapar Phasing	✓	✓	✓		✓
C	10 Pin MS W/Plug - Std Phasing	✓	✓	✓		✓
D	10 Pin MS W/Plug - Dynapar Phasing	✓	✓	✓		✓
4	10 Pin MS W/Plug - Large Encoder Pinout	✓	✓	✓		✓
E	6 Pin MS W/Plug - Std. Pinout	✓	✓	✓		
F	6 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		
J	7 Pin MS W/Plug - Std. Pinout	✓	✓	✓		✓
K	7 Pin MS W/Plug - Dynapar Pinout	✓	✓	✓		✓
T	8 Pin M12 Global Pinout	✓	✓	✓		
U	8 Pin M12 US Pinout	✓	✓	✓		
2	12 Pin M23 Leine & Linde Pinout	✓	✓	✓		
3	12 Pin M23 Hubner Pinout	✓	✓	✓		
P	Small Industrial W/Plug - Std. Pinout	✓	✓	✓		
G	Small Industrial W/Plug - Northstar Pinout	✓	✓	✓		
R	10 Pin Mini MS Twist Lock W/Plug	✓	✓	✓		
W	18" Flexible Cable with Sealing Gland	✓	✓	✓		
H	Conduit Box, Terminal Block & 1/2" NPT	✓	✓	✓	✓	
L	Conduit Box, Terminal Block & 1/2" NPT+Cord	✓	✓	✓		
M	Conduit Box, Terminal Block, 3/4" NPT	✓	✓	✓	✓	
N	Conduit Box, Terminal Block & 1" NPT	✓	✓	✓	✓	
8	Conduit Box, Terminal Block & 25mm	✓	✓	✓	✓	

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24 VDC

**Current:** 400mA max @ 5V; 200mA max @ 12V; 100mA max @ 24V (plus cable load)

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz

**PPR:** 8-50000

**Speed:** 6000 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:** 1000 ft (305m) (contact factory for longer distances)

**Rotor Positioning:** Up to +/-0.100" [ +/-2.54mm] movement/misalignment

**Sensor-Rotor Gap:** 0.040", +0.015/-0.030" [1.02mm+0.38/-0.76]

**Temperature:** -50°C to 85°C (rotor -50°C to 100°C continuous, +135°C intermittent)

**Environmental:** IP65 fully potted sensors

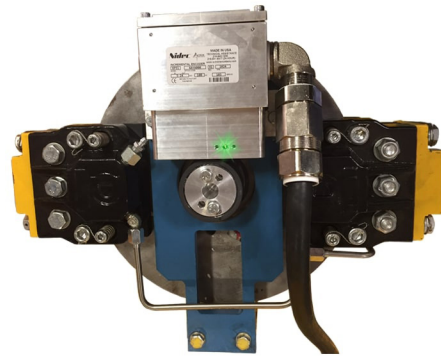
**Vibration:** 5-2000Hz, 18G; 100G Shock

**Weight:** 15 lb [6.8 kg]

**Warranty:** 2 Year No-Hassle

\* See installation drawings for warnings and limitations

**Uses XP5 Sensor - See Page 101**



**Certifications:**

- ATEX/IECEx Zone 1 & Zone 21 Group IIC
- cULus Class I, Division 1 and Zone 0 Group A,B,C,D\*
- ATEX/IECEx Zone 2 & 22 Group IIC
- cULus Class I, Division 2 Group A,B,C,D

Dramatically slash encoder-related downtime on top drive applications!

XPH1 SMARTSafe™ encoders are the world's first explosion-proof encoders with removable electronics and no external barrier! They are cULus, ATEX, IECEx certified and offer incredibly reliable no-bearing construction! SMARTSafe XPH1 encoders can be used in ATEX/IECEx, cUL AEX, and UL gas hazardous environments including NEC500 and NEC 505.

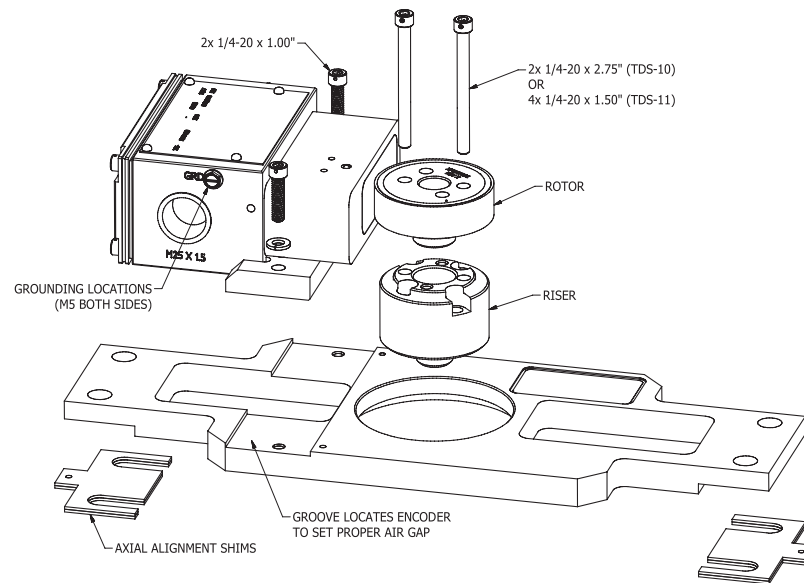
XPH1 comes complete with auto-centering jig, base plate, riser shaft, sensor and rotor to fit NOV TDS9, TDS10, and TDS11. Also available: no-bearing modular sensors (XP5), 8.5" C-face XPH8 as well as intrinsically safe models (XR5, XR12, XR56A, XR125, XR485, XR685, XR850) and hollow shaft model M6C.

Use the XPH1 directly in your application with no barrier or isolator required with 1000 feet of cable or more!

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults. They feature full diagnostics: it's easy to determine that signal quality is good—just look for the green LED. Worried about wiring short circuits and errors? XPH1 will indicate any short circuit conditions with an orange LED and will survive this condition!

No encoder bearing failures, no more sealing problems. Mount XPH1 directly on your motor, build it right into your machine. So many applications benefit from a more reliable no-bearing encoder. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XPH1 encoders!

Eliminate the biggest cause of hazardous duty encoder failure—eliminate the bearings with XPH1 hazardous duty encoders!



MODEL	ROTOR	COVER STYLE	OUTPUT	PPR		CONNECTOR OPTIONS	SPECIAL OPTIONS
				LEFT PPR	RIGHT PPR		
XP1	XX - No Rotor A1- TDS 9/10/11 w/shaft adapter	X - None	8 - 5-24V in/out Hi-Power (HX)	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AD - 4096 A8 - 4800 A9 - 5000 A0 - Non-std.	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AD - 4096 A8 - 4800 A9 - 5000 A0 - Non-std.	A - Terminal Box with screw-type terminal block, M25 thread on left exit, blanking plug installed on right side, A leads B with CW rotation  B - Terminal Box with screw-type terminal block, M25 thread on right exit, blanking plug installed on left side, A leads B with CW rotation  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Left-Right orientation are viewed with terminal box facing up</div>	000 - None 004 - Super magnetic shielding 4xx - Special PPR (Consult Factory) 9xx - Special Cable length

**SPECIFICATIONS**

**Operating Power:**

**Volts:** 5-24VDC In/Out

**Current:** 400mA max @ 5V; 200mA max @ 12V; 100mA max @ 24V (plus cable load)

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz

**PPR:** 8-500000

**Speed:** 6000 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:** 1000 ft (305 m) (contact factory for longer distances)

**Rotor Positioning:** Up to +/-0.100" [ +/-2.54 mm] movement/misalignment

**Sensor-Rotor Gap:** 0.040", +0.015/-0.030" [1.02mm+0.38/-0.76]

**Temperature:** -50°C to 85°C (rotor -50°C to 100°C continuous, +150°C intermittent)

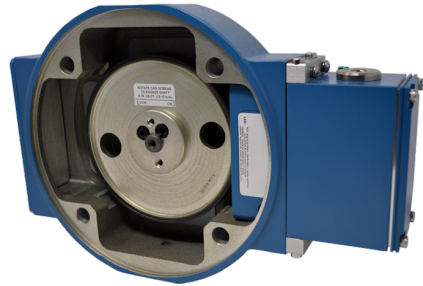
**Environmental:** IP65 fully potted sensors

**Vibration:** 5-2000 Hz, 18 G; 100 G Shock

**Weight:** 10-14 lb [4.5-6.4 kg]

**Warranty:** 2 Year No-Hassle

**Uses XP5 Sensor - See Page 101**



**Certifications:**

- Class I Div 1, Groups C and D
- Class I Zone 1, Ex db ia IIB T4 Gb
- Class I Zone 1, AEx db ia IIB T4 Gb
- Ex db ia IIB T4 Gb (ATEX/IECEX)

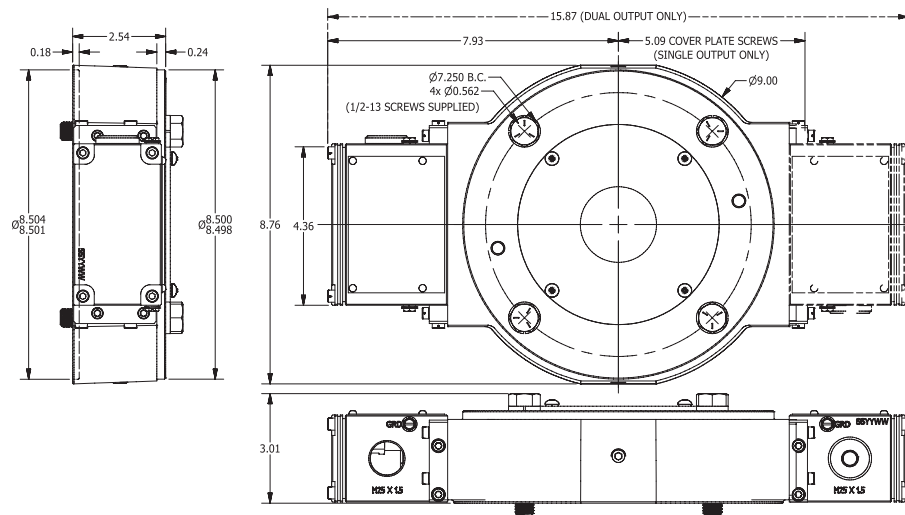
XP8 SMARTSafe™ encoders are the world's first explosion-proof encoders with removable electronics and no external barrier! They are cULus, ATEX, AEx & IECEx certified and offer incredibly reliable no-bearing construction! SMARTSafe XP8 encoders can be used in ATEX/IECEX, cUL AEX, and UL gas hazardous environments. Also available: no-bearing modular sensors (XP5), as well as intrinsically safe models (XR5, XR12, XR56A, XR125, XR485, XR685, XR850) and hollow shaft model M6C.

For applications requiring ATEX/IECEX Zone 1 or 2 or cULus Class I, Division 1 or 2, Groups C & D use the XP8 directly in your application with no barrier or isolator required.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults. They feature full diagnostics: it's easy to determine that signal quality is good-just look for the green LED. Worried about wiring short circuits and errors? XP8 will indicate any short circuit conditions with an orange LED and will survive this condition!

No encoder bearing failures, no more sealing problems. Mount XP8 directly on your motor. Top drives, draw works, coil tubing, paint lines...so many applications benefit from a more reliable no-bearing encoder. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XP8 encoders!

Eliminate the biggest cause of hazardous duty encoder failure-eliminate the bearings with XP8 hazardous duty encoders.



MODEL	ROTOR/BORE SIZE	COVER	OUTPUT	LEFT OUTPUT PPR	RIGHT OUTPUT PPR	CONNECTION OPTIONS	SPECIAL OPTIONS
XP8	See Table Below	X - No Cover F - Flat Cover T - Thru Shaft Cover (No Seals)	8 - 5-24V in/out Hi-Power (HX)	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 A0 - Non-std.	XX - None BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 A0 - Non-std.	A - Terminal Box with screw-type terminal block, M25 thread on left exit, blanking plug installed on right side, A leads B with CW rotation  B - Terminal Box with screw-type terminal block, M25 thread on right exit, blanking plug installed on left side, A leads B with CW rotation	000 - None 004 - Super Magnetic Shielding

Left-Right orientation are viewed with terminal box facing up

ROTOR/BORE SIZE		
US		Metric/Tolerance
CB - 0.625	CP - 2.375	DB - 14mm (h7)
CA - 0.750	CR - 2.500	DE - 19mm (h7)
CC - 0.875	CT - 2.625	DF - 30mm (h7)
CE - 1.000	C2 - 2.875	DH - 40mm (h7)
CF - 1.125	CU - 3.000	DJ - 42mm (h7)
CH - 1.375	CW - 3.250	DP - 60mm (h7)
C8 - 1.500	C3 - 3.500	DS - 70mm (m6)
CJ - 1.625	TD - 3.625*	DY - 80mm (f6)
CK - 1.750	TG - 3.750*	DZ - 80mm (h7)
CL - 1.875	T4 - 3.875*	D2 - 90mm (g6)
CM - 2.000	T5 - 4.125*	
CN - 2.125	T7 - 4.250*	
CQ - 2.250	T6 - 4.500*	

\* Set Screw Rotor only



**SPECIFICATIONS**

**Operating Power:**

Volts: 5-24 VDC

Current: 400mA max @ 5V; 200mA max @ 12V; 100mA max @ 24V (plus cable load)

**Output Format:** A Quad B with marker (A, /A, B, /B, Z, /Z)

**Frequency Range:** 0 to 250 kHz

**PPR:** 8-100000

**Speed:** 6000 RPM Max. (contact factory for higher speeds)

**Maximum Cable Length:** 1000 ft (305 m) (contact factory for longer distances)

**Rotor Positioning:** Up to +/-0.100" [±2.54 mm] movement/misalignment

**Sensor-Rotor Gap:** 0.040", +0.015/-0.030" [1.02mm+0.38/-0.76]

**Temperature:** -50°C to 85°C (rotor -50°C to 100°C continuous, +135°C intermittent)

**Environmental:** IP65

**Vibration:** 5-2000 Hz, 18 G; 100 G Shock

**Weight:** 4.6 lb [2.1 kg] (no rotor)

**Warranty:** 2 Year No-Hassle

XP5 sensors are used on the XPH1 and XPH8



**Certifications:**

- Class I Div 1, Groups C and D
- Class I Zone 1, Ex db ia IIB T4 Gb
- Class I Zone 1, AEx db ia IIB T4 Gb
- Ex db ia IIB T4 Gb (ATEX/IECEX)

XP5 SMARTSafe™ sensors power the world's first explosion-proof encoder with removable electronics and no external barrier!

They are cULus, ATEX, AEx & IECEx certified and offer incredibly reliable no-bearing construction!

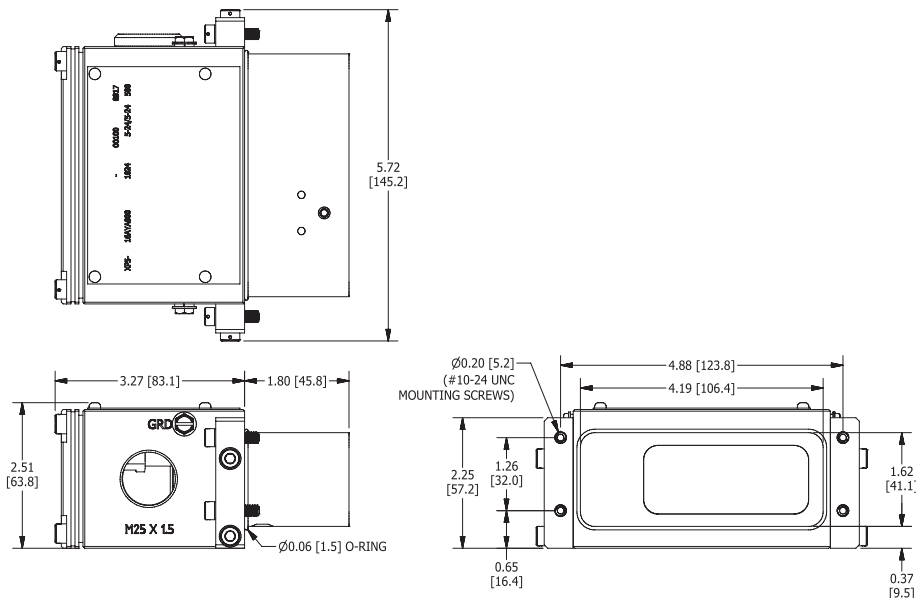
SMARTSafe XP5 sensors can be used in ATEX/IECEX, cUL, AEX, and UL gas hazardous environments. Also available: no-bearing modular encoders (XPH8), as well as intrinsically safe models (XR5, XR12, XR56A, XR125, XR485, XR685, XR850), and hollow shaft models (M6C).

For Level 1 applications requiring ATEX/IECEX Zone 1 or cULus Class I, Division 1, Groups C & D use the XP5 directly in your application with no barrier or isolator required.

Unlike the competition, Avtron SMARTSafe encoder systems are protected against short circuits, power-to-output wiring, and output-to-ground faults. XP5 features full diagnostics: it's easy to determine that signal quality is good, and that there are no wiring short-circuits.

Instead of mounting a tiny optical encoder with weak bearings on a wobbling stub shaft mount XP5 directly on your machine and install the rotor on your main application shaft. Top drives, draw works, coil tubing, paint lines...so many applications benefit from a more reliable no-bearing encoder. Vibration, shock, liquids, dust and dirt won't harm SMARTSafe XP5 encoders!

Eliminate the biggest cause of hazardous duty encoder failure-eliminate the bearings with XP5 hazardous duty encoder sensors.



MODEL	STYLE ROTOR COMPATIBILITY	LINE DRIVER	PPR	CONNECTION OPTIONS	SPECIAL OPTIONS
XP5-	1 - With Bottom Mount Bracket for XPH1 64mm Rotor 2 - With Side Mount Bracket compatible with 222mm Rotor 8 - With Side Mount Bracket compatible with 143mm Rotor, XPH8	8 - 5-24V in/out Hi-Power (HX)	BC - 50 AF - 60 AK - 80 AG - 100 AH - 120 AA - 128 AM - 200 AL - 240 AN - 256 AP - 300 AE - 360 AC - 400 AB - 480 AQ - 500 AR - 512 AS - 600 AU - 720 AV - 900 AJ - 960 AW - 1000 AY - 1024 AZ - 1200 CX - 1500 A3 - 2000 A4 - 2048 A5 - 2500 AT - 3072 A7 - 3600 AD - 4096 A8 - 4800 A9 - 5000 A0 - Non-std.	A - M25 thread on left exit, blanking plug installed on right side, A leads B with CW rotation B - M25 thread on right exit, blanking plug installed on left side, A leads B with CW rotation  Left-Right orientation are viewed with terminal box facing up	000 - None 004 - Super Magnetic Shielding

X	R	B	3
MODEL			
XR3			



**SPECIFICATIONS**

- Operating Power:** 12-24VDC, nom. 200mA (w/SMARTSafe™ encoder); max 440mA
- Output Voltage:** 12-24 V, nom.
- Output Format:** Incremental A Quad B with marker (A, /A, B, /B, Z, /Z quadrature)
- Frequency Range:** 0 to 165 kHz
- Maximum Cable Length:** 1000' [300 m] XR3 to control; 500' [152 m] XR3 to encoder
- Temperature:** -40°C to 80°C (Storage -40°C to 100°C)
- Environmental:** IP54, cabinet mount
- Vibration:** 5-2000 Hz, 18 G
- Weight:** 1.1 lb [0.5 kg]
- Warranty:** 3 Year No-Hassle



**Certifications:**  
**D53007: US and Canada**  
 Class I Division 1 Groups A, B, C or D  
 Class I Zone 0 AEx ia IIC T4  
 Class I Zone 0 Ex ia IIC T4X  
**D53008: ATEX and IECEx**  
 Group II Category 2 Zone 1 Gas Group IIC  
 Group II Category 2 Zone 21 Dust Group IIIC

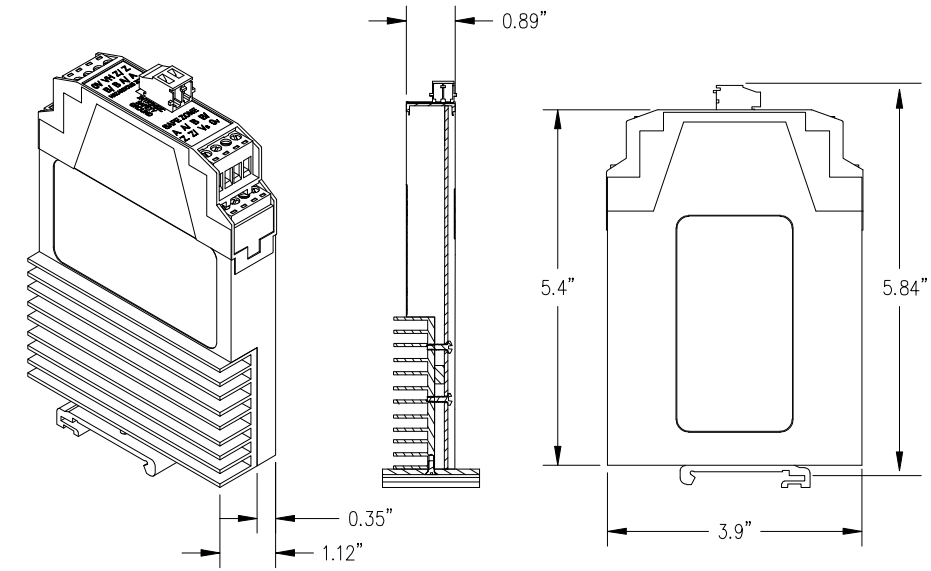
XR3 intrinsic safety isolators are the key to providing complete Level 1 protection including: (cULus Class I, Div 1; Class I, Zone 0, ATEX Zone 1 & 21 "ia"; and IECEx Zone 1 & 21 "ia") for SMARTSafe™ incremental encoders with quadrature output.

The XR3 ensures the SMARTSafe encoder system meets hazardous duty UL and CSA, ATEX & IECEx safety standards. Also available: A full range of SMARTSafe rotary encoders to meet your application needs, including the heavy duty hollow shaft (XR45, XR685), shafted models (XR4F, XR485), and no-bearing modular encoders (XR56A, XR85A, XR115, XR125, XR850), and stand-alone sensors (XR5, XR12).

Unlike the competition, the Avtron SMARTSafe encoder systems including the XR3 are fully protected against short circuits, power-to-output wiring, and output-to-ground faults at every point. Wiring errors won't harm this system!

Competitive intrinsic safety barriers for encoders often limit the available frequency throughput, or have undesirable voltage droop under load that limit cable length severely. The XR3 has full throughput for Avtron quadrature encoders even at high PPRs, and the XR3 allows the use of maximum cable lengths through its innovative stable-voltage design.

Select an Avtron SMARTSafe rotary encoder to eliminate encoder problems, and include the XR3 as part of the system to meet UL and CSA system safety standards in your hazardous duty application!





**SPECIFICATIONS**

**Incremental Cables**

**High Temp. Cable:** Our best for shorter runs and high temperature applications

- Conductor:** 22 AWG, 5 pairs, 7X30 stranding, Tinned Copper
- Insulation:** PVC
- Outer Jacket:** 0.035" pressure extruded PVC jacket
- Overall Cable Diameter:** 0.325"
- Operating Temperature:** -40° C to +105° C
- Nominal Capacitance Conductor to Conductor:** 35 pF/ft
- UL NEC:** CM     **UL CEC:** CMG

**Ultra-Low Capacitance Cable:** Our best for longer cable runs

- Conductor:** 18 AWG, 1 pair, 19X30 TC SR PVC; 22 AWG, 4 pairs, 7X30 stranding TC
- Insulation:** FPE
- Outer Jacket:** 0.035-0.055" pressure extruded PVC jacket
- Overall Cable Diameter:** 0.430"
- Operating Temperature:** -30° C to +80° C
- Nominal Capacitance Conductor to Conductor:** 12 pF/ft
- UL AWM Style 2517**     **UL NEC/CEC:** CM

**Outer Shield:** Overall aluminum mylar shield & tinned copper braid

**Outer Shield Drain:** 24 AWG, 7X32 stranding, TC

**Maximum Operating Voltage:** 300 V

**Absolute Cables**

Contact Factory

Using a low quality cable in your encoder application can mean the difference between clear, reliable signal quality and weak, distorted signal. To ensure your encoder can produce the best signal possible in any application, Avtron offers high quality cables and connectors in a number of different variations and options!

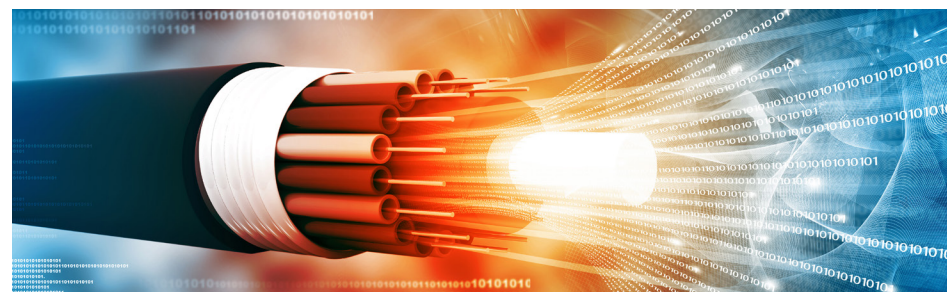
For incremental encoders, all Avtron cables are shielded and have twisted pairs for the best signal possible. For cable runs longer than 100 feet, our special ultra-low capacitance cable is used so that your signal stays strong. Bulk cables can be ordered in lengths up to 2000 ft. and are offered with a variety of different connector options, including: 6 pin, 7 pin, & 10 pin MS, 10 pin TW, 8 pin M12, industrial EPIC, and more.

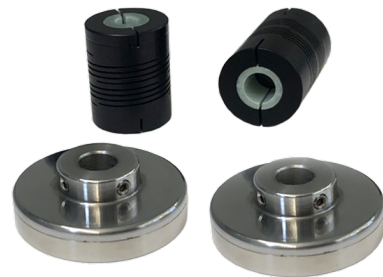
Avtron also offers an expansive catalogue of absolute cables in an assortment of communication protocols such as: Analog, DeviceNet, CANopen, Profibus, Profinet, Ethernet IP, SSI, and plenty more! We also offer cables that support all your functions, from power to daisy chain to encoder communication.

Next time you buy an Avtron Encoder, pair your purchase with one of our high quality cable assemblies!

Mode	Bus	1st Connector	Cable Function	Temp. Rating <sup>1</sup>	Cable Material	2nd Connector	Length <sup>2</sup>
CBL1	A - Analog B - Incremental C - CANopen D - DeviceNet E - Ethernet IP / Modbus TCP / Profinet L - Parallel P - Profibus DP S - SSI	AC - M12 4/5 Pin AE - M12 8 Pin AF - M23 12 Pin AG - M27 26 Pin AR - M23 16 Pin BA - MS 10 Pin (Small Encoder Pinout) BE - MS 6 Pin w/o marker CE - MS 6 Pin w/ marker BJ - MS 7 Pin w/o marker CJ - MS 7 Pin w/ marker BP - 10 Pin Mini EPIC CP - 10 Pin Industrial EPIC BR - 10 Pin Mini Twistlock BW - No Connector, <100 ft CW - No Connector, >100 ft B4 - MS 10 Pin (Large encoder pinout)	1 - Bus In 2 - Bus Out 3 - Power	X - Standard Temp (<100 ft) 8 - 80° C Max., Special Low Capacitance (>100 ft)	P - PVC T - TPE	W - None, Flying Leads only D - Daisy Chain R - RJ45 for Ethernet	000.5 - 1.5 ft (0.5m) 001.0 - 3 ft (1m) 002.0 - 6 ft (2m) 003.0 - 10 ft (3m) 004.3 - 14 ft (4.3m) 005.0 - 16 ft (5m) 010.0 - 33 ft (10m) 015.0 - 49 ft (15m) 020.0 - 64 ft (20m) 025.0 - 82 ft (25m) 030.0 - 98 ft (30m) 040.0 - 130 ft (40m) 050.0 - 160 ft (50m) 060.0 - 196 ft (60m) 070.0 - 230 ft (70m) 080.0 - 260 ft (80m) 090.0 - 295 ft (90m) 100.0 - 324 ft (100m) 125.0 - 410 ft (125m) 130.0 - 426 ft (130m) 150.0 - 492 ft (150m) 152.4 - 500 ft (152.4m) 304.8 - 1000 ft (304.8m) 609.6 - 2000 ft (609.6m)

1. For cable lengths shorter than 100ft, select option "X". Otherwise select option "8".  
2. Custom cable lengths available by request up to a maximum of 2000 meters per spool.





**SPECIFICATIONS**

**Magnetic Couplings**

**Weight:**

**03 Models (Coupling Half):** 0.22 Lbs. (0.10 Kg)

**06 Models (Coupling Half):** 0.32 Lbs. (0.10 Kg)

**Keyway:** Only available on 11 mm and 12 mm

**Flexible Helical Couplings**

**Material:** 2024-T3.51 Aluminum w/ MIL A8625F

Type II Black anodize

**Isolator Insert:** G10 glass filled phenolic

**Clamp Screws:**

**Screw Size:** 6-32 **Torque:** 34 in.lbs.

**Screw Type:** 120° apart; hex socket steel/black oxide finish

**Flexible Disc Couplings**

**Hub and Center Material:** Anodized Aluminum

**Rivet and Washer Material:** Brass

**Disc Material:** Stainless Steel

**Screw Type:** 18-8 Stainless Steel

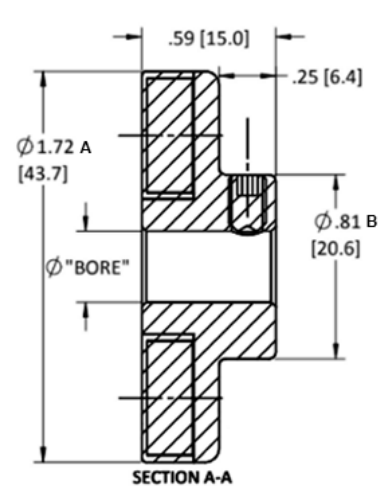
**Max Temp.:** 250° F (120° C)

Avtron Encoders offers a wide range of different couplings to pair with your shafted encoder. Choose from magnetic, flexible helical, and flexible disc couplings depending on your need and application.

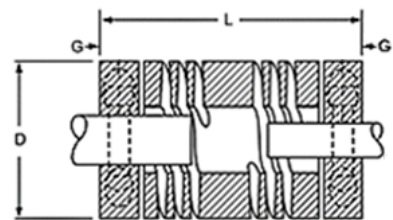
To pick the coupling you need, start by looking at your encoder model and application. Helical flexible couplings work best for light mill duty encoders with small amounts of misalignment. For more misalignment in light duty applications, shift to magnetic couplings. For harsher environments (even with large misalignment), look at our selection of flexible disc couplings to find the right product that you need. Then find the right size you need to mate with your encoder and motor. We offer couplings in both metric and inch sizes to fit any kind of shaft.

Couplings are the perfect way to help protect the life of your encoder. Shaft run-out, or "wobble" can cause excessive wear and tear on the bearings in your encoder, which can destroy the encoder and cause costly downtime for your business. Our couplings help to protect from shaft run-out by absorbing the excessive loads and forces that it causes.

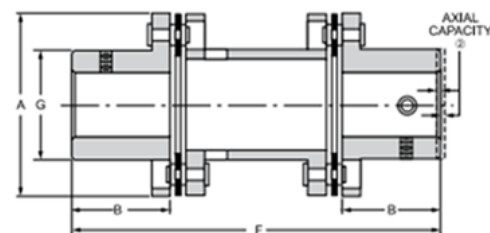
Don't let shaft run-out destroy your encoder investment, order a coupling today!



**Magnetic Coupling**



**Flexible Helical Couplings**



**Flexible Disc Couplings**



Magnetic Couplings											
Model	Bore	Nominal Torque (in.lbs)	Max Torque (in.lbs)	Max Speed (RPM)	STD Air Gap	Set Screw	Dimensions		Max Misalignment		Encoder Style (Works with)
							A	B	Angular	Parallel	
426558-03-0236	6mm	4	5	26,000	.188"	M4-0.7 x 6mm	1.72"	.81"	3°	.25°	Light Mill Duty (AV4, AV6, AV20, AV25)
426558-03-0250	1/4"	4	5	26,000	.188"	#8-32 x 1/4	1.72"	.81"	3°	.25°	
426558-03-0375	3/8"	4	5	26,000	.188"	#8-32 x 1/4	1.72"	.81"	3°	.25°	
426558-03-0394	10mm	4	5	26,000	.188"	M4-0.7 x 6mm	1.72"	.81"	3°	.25°	
426558-06-0433	11mm	6	8	23,000	.188"	M5-0.8 x 8mm	1.98"	1.12"	3°	.25°	
426558-06-0472	12mm	6	8	23,000	.188"	M5-0.8 x 8mm	1.98"	1.12"	3°	.25°	

1 - Magnetic disc couplings are sold as halves

Flexible Helical Couplings									
Model	1st Bore	2nd Bore	Dimensions			Max Misalignment			Encoder Style (Works with)
			D - Dia.	L - Len.	G - Grip	Angular	Parallel	Axial	
426821	1/4"	1/4"	0.995"	.200"	7°	0.03"	±.020	34	Light Mill Duty (AV4, AV6, AV20, AV25)
426820	3/8"	3/8"	0.995"	.200"	7°	0.03"	±.020	34	

Flexible Disc Couplings											
Model	1st Bore	2nd Bore	Dimensions				Max Torque (in.lbs)	Max Misalignment			Encoder Style (Works with)
			A	B	F	G		Angular	Parallel	Axial	
<b>Two Hub Design</b>											
426307	5/8"	5/8"	1.750"	0.938"	3.563"	1.063"	75	1°	.028"	±.031	Severe Mill Duty (AV485)
426342	5/8"	5/8"	2.250"	1.063"	4.000"	1.375"	300	.67°	.028"	±.031	
426278	5/8"	5/8"	2.500"	1.188"	5.000"	1.625"	440	.67°	.028"	±.031	
<b>One Hub Design</b>											
426411	5/8"	5/8"	2.500"	1.188"	3.500"	1.625"	440	.67°	.028"	±.031	

2 - Torque ratings are based on smooth drives with little torque fluctuations. Reduce ratings to 1/3 of the value shown for more severe applications

3 - Refer to our labeled outline drawing for more dimension information




# ENCODER PRODUCT COMPARISON

Enclosure	Non-Hazardous Application Models and Options					Safety Apps.	Hazardous Duty Applications							All Application Options (Hazardous and Non-Hazardous)										
	Mounting Style	Model	Temperature Range	Grounding Brush	Overspeed Switch	Functional Safety Apps.	Intrinsically Safe Model	Temperature Range	Explosion Proof Model	Temperature Range	Certifications			Sensing	Shaft or Bore Size		Pulses Per Revolution (PPR)	Max Turn Count	Max Speed RPM	Max Freq kHz	Max Outputs	Thru Shaft	Replaceable Sensors	Diagnostics
											UL CI /Div	UL CI /Zone	ATEX		US	Metric								
Severe Mill Duty	Modular Sensor	AV5	-40C...+120C	-	✓	SV5	XR5	-40C...+80C	XP5	-50C...+80C	✓	✓	✓	Magnetic	5/8" - 4 1/2"	16mm-115mm	4-100000	1	6000	250kHz	1	✓	✓	✓
	Modular Sensor	AV12	-40C...+120C	-	✓		XR12	-40C...+80C			✓	✓	✓		1 3/8" - 7 7/8"	25-200mm	4-50000	1	6000	250kHz	1	✓	✓	✓
	Face or Foot	▲ AV30	-30C...+85C	-	-										1/4" - 3/8"	6mm-11 mm	8192	1-32768	5000	NA	1	-	-	✓
	56C Face or Foot	» AV485	-40C...+120C	✓	✓		XR485	-40C...+80C			✓	✓	✓		5/8"	15.88mm	4-50000	1	5000	250kHz	2	✓	✓	✓
	Hollow Shaft	▲ HS40	-30C...+85C	-	-										5/8" - 1 1/8"	16-30mm	8192	1-32768	5000	NA	1	-	-	✓
	Hollow Shaft	» AV685	-40C...+120C	✓	✓		XR685	-40C...+80C			✓	✓	✓		1 1/8"	28.58mm	4-50000	1	5400	250kHz	2	✓	✓	✓
Heavy Mill Duty	B10 or PY Face	AV44	-30C...+100C	✓	✓								Magnetic	5/16"	11mm	1-10000	1	6000	250kHz	2	-	-	✓	
	B10 Face or Foot	AV45	-40C...+100C	-	✓		XR4F	-40C...+80C			✓	✓		✓	1/2"	10mm-18mm	8-5000	1	5000	165kHz	2	-	-	✓
	Modular 4.5"	AV56A	-40C...+100C	-	✓		XR56	-40C...+80C			✓	✓		✓	1/2" - 3 3/16"	10-85mm	4-5000	1	5400	250kHz	2	✓	-	✓
	Modular 4.5"	AV56S	-40C...+100C	-	✓										1/2" - 3 3/16"	10-85mm	4-5000	1	5400	250kHz	1	✓	-	✓
	Modular 6.75"	AV67A	-40C...+100C	-	✓										1/2" - 3 3/16"	10-85mm	4-5000	1	5400	250kHz	1	✓	-	✓
	Modular 8.5"	AV85A	-40C...+100C	-	✓		XR85	-40C...+80C			✓	✓		✓	1/2" - 3 3/16"	10-85mm	4-5000	1	5400	250kHz	2	✓	-	✓
	Modular 115mm	AV115	-40C...+100C	-	✓		XR115	-40C...+80C			✓	✓		✓	1/2" - 3 3/16"	10-85mm	4-5000	1	5400	250kHz	2	✓	-	✓
	Modular 12.5"	AV125	-40C...+100C	-	✓		XR125	-40C...+80C			✓	✓		✓	1 3/8" - 7 7/8"	25-200mm	4-5000	1	5000	250kHz	2	✓	✓	✓
	Modular 8.5"	AV850	-40C...+100C	-	✓	SV850	XR850	-40C...+80C	XPH8	-50C...+85C	✓	✓		✓	5/8" - 4 1/2"	16mm-115mm	4-5000	1	6000	250kHz	2	✓	✓	✓
	Hollow Shaft	HS44	-30C...+100C	✓	✓											12-17mm	1-10000	1	6000	250kHz	2	-	-	✓
	Hollow Shaft	HS45	-40C...+100C	-	✓		XR45	-40C...+80C			✓	✓		✓	5/8" - 1 3/8"	16-30mm	8-5000	1	5000	165kHz	2	✓	-	✓
	Hollow Shaft	M7	-45C...+80C	-	-				M6C	-40C...+80C	-	-		✓	1" - 1 1/8"	25-60mm	240-1200	1	*5000	150kHz	2	-	-	✓
Mill Duty	Modular Au-to-Center	AV32	-40C...+100C	-	-								Magnetic	1/4" - 1"	4-25mm	32-5000	1	6000	250kHz	1	-	-	-	
	Hollow Shaft	HS35M	-20C...+85C	-	-	*	-40°C rating is optional							1/2" - 1 1/8"	12-20mm	1-3072	1	4700	165kHz	2	✓	-	-	
	Hollow Shaft	M3	-40C...+85C	✓	✓	**	3600 RPM maximum for bore > 2" [52mm]							1 1/2" - 2 3/8"	48-80mm	6000	1	*5000	150kHz	2	✓	-	-	
	Hollow Shaft	HS35X	-40C...+100C	-	-	»»»	May require additional cooling							1/2" - 1"	12-20mm	1-5000	1	6000	125kHz	1	✓	-	✓	
Light Mill Duty	Face or Foot	AV4	-40C...+85C	-	-	^	Analog position signals of resolver are converted to digital signals by external analog-to-digital board not provided by Nidec						Magnetic	1/4", 3/8"	6-11mm	1-16384	1	6000	1000kHz	1	-	-	✓	
	Hollow Shaft	HS4	-40C...+85C	-	-									1/4" - 5/8"	6 - 15mm	1-16384	1	6000	1000kHz	1	-	-	✓	
	Face or Foot	▲ AV6A	-40C...+85C	-	-									3/8"	6-10mm	256-65536	1-16384	*6k/12k*	NA	1	-	-	✓	
	Face or Foot	▲ AV6M	-40C...+85C	-	-									3/8"	6-10mm	4096-8192	1-32768	12k	NA	1	-	-	✓	
	Face or Foot	AV20	-40C...+100C	-	-									1/4", 3/8"	10mm	1-3600	1	6000	125kHz	1	-	-	-	
	Face or Foot	AV25	-40C...+100C	-	-	+	6000 RPM multi-turn, 12000 RPM single-turn							1/4", 3/8"	10mm	1-5000	1	6000	125kHz	1	-	-	-	
	Hollow Shaft	▲ HS6A	-40C...+85C	-	-	▲	Absolute Encoder							1/4 - 1/2"	8-15mm	256-65536	1-16384	*6k/12k*	NA	1	-	-	✓	
	Hollow Shaft	▲ HS6M	-30C...+85C	-	-									1/4 - 1/2"	6-15mm	4096-8192	1-32768	12k	NA	1	-	-	✓	
	Hollow Shaft	HS25A	-20C...+100C	-	-									3/8" - 3/4	6-16mm	1-3600	1	6000	125kHz	1	-	-	-	
Hollow Shaft	HS35A	-20C...+100C	-	-								1/2" - 1"	12-20mm	1-5000	1	6000	125kHz	1	✓	-	-			

 Magnetic

 Optical

 All Avtron Encoders shown in the specifications table above are CE Rated.



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