Encoders and Tachometers

Maximum Reliability

Nidec | AVTRON ENCODERS

Industrial Encoders and Tachometers for Drive System Feedback, Instrumentation, and Control

General Information

INTRODUCTION

Nidec Avtron Automation manufactures Avtron Encoders, recognized as the market leading brand of industrial encoders (also known as rotary pulse generators or digital tachometers).

We have been proudly manufacturing rugged designs in the U.S.A. for over 40 years and provide full support and service for all our models, even older units. As part of a large global corporation, Nidec-Avtron can support your application worldwide!

ENCODER SELECTION

Nidec-Avtron offers ultra-reliable encoders for all applications. Select a mounting style (modular, hollow shaft, etc.),then pick the level of durability (light, heavy, severe duty).

Avtron Encoders are far more durable than competitive 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 to eliminate head crashes.

Our magnetic sensors also increase reliability – they withstand dirt, dust, oil and liquids that disable optical sensors.

Many of our encoders come with onboard 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.

Some models have experienced over 4,500,000 hours Mean-Time-Between-Failure! Keep your machines running with Avtron Encoders!

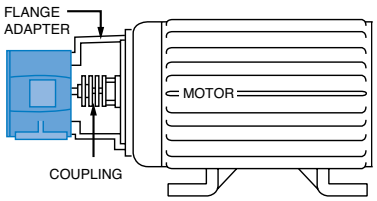
PRICING

Pricing and ordering information can be obtained directly from our web site, or by calling, faxing, or e-mailing us.

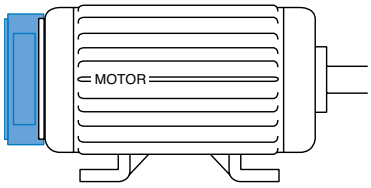
www.avtronencoders.com

MECHANICAL MOUNTING

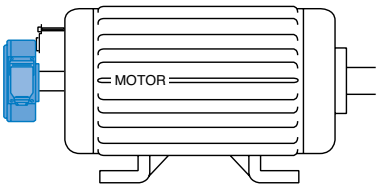
Avtron Encoders can be mounted several different ways. The standard mounting methods include:



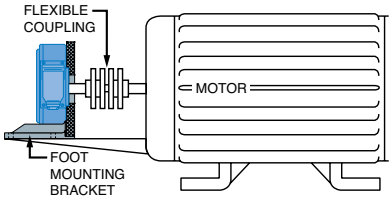
Flange Mounting: (Solid Shaft Coupled) Requires flange adapter with coupling.



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.



Hollow Shaft/Tether Mounting: Stub shaft required. Shaft requirements depend on the encoder selected.



Foot Mounting: This method is usually used when encoders are coupled directly to rolls, gear boxes, or motors without C-Faces.

ENVIRONMENTAL RATINGS

Nidec-Avtron 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, Nidec-Avtron rates encoders for overall durability:

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.

Hazardous Duty: Avtron Encoders are available for use in explosive atmospheres; these models are also extremely rugged. Nidec-Avtron offers two levels of hazard protection: Level 2 for areas with moderate risk, and Level 1 for higher risk environments.

Encoder Selection Guide

TYPE	TYPICAL APPLICATIONS *								
	Conveying	Converting	Films	Food	Paper	Steel	Mining	Marine	Oil Drilling
LIGHT MILL	👍	👍		👎	👎	👎	👎	👎	👎
STD. MILL	👍	👍	👍		👎	👎	👎	👎	👎
HEAVY MILL	👍	👍	👍	👍	👍	👍	👍	👍	👍
SEVERE	👍	👍	👍	👍	👍	👍	👍	👍	👍

See Specification Chart on pages 30-31 for more details on the encoders below.

TYPE of ENCODER	MOUNTING	MODEL	PAGE
Optical Light Mill Duty	Face or Foot Solid Shaft (Coupled)	AV20, AV25 AV6A (abs)	11-12
	Hollow Shaft	HS6A (abs), HS25A, HS35A	17-18
Magnetic Light Mill Duty	Face or Foot Solid Shaft (Coupled)	AV6M (abs)	11
	Hollow Shaft	HS6M (abs)	17
Optical Mill Duty	Large Bore Hollow Shaft	M3	21
Magnetic Mill Duty	Hollow Shaft	HS35M	19
Magnetic Heavy Mill Duty	Modular C-Face	AV5, AV12, AV56, AV56S, AV67, AV85, AV115, AV125, AV850	7-9
	Hollow Shaft Large Bore Hollow Shaft	HS45, M4, M7	20 21 22
	Face or Foot Solid Shaft (Coupled)	AV45	13
Magnetic Severe Duty	Face or Foot Solid Shaft (Coupled)	AV30 (abs), AV485	14-15
	Hollow Shaft	HS40 (abs), AV685	23-25
Level 1 & 2 Hazardous Duty	Hollow Shaft	M6C, XR45, XR685	22 20 24 25
	Modular C-Face	XR5, XR12, XR56, XR67, XR85, XR115, XR125, XR850	7-9
	Face or Foot Solid Shaft (Coupled)	XR4F, XR485	13 15

Features and specifications subject to change without notice.
SMARTSafe™, SMARTach™, SMARTach II™, THIN-LINE II™ are trademarks of Nidec-Avtron.
Viton™ is a trademark of DuPont for Fluoroelastomers.

**Nidec Avtron Automation Corporation makes no warranty as to suitability of purpose; recommendations are based on industry standard applications and are subject to warranty terms and conditions of sale.*

TABLE OF CONTENTS **PAGE**

Nidec-Avtron Technology

ULTRA-DURABLE SENSORS

Nidec-Avtron uses optical and magnetic sensor technologies to generate the signals in our encoders.

Both technologies are field proven with thousands of successful installations with all brands of variable speed drives and controls. The choice is based on durability needs.

Optical sensors are offered in Light Mill and Mill Duty encoders. Optical sensing technology performs best when used in environments without frequent temperature changes and/or chronically wet conditions.

The optical sensing circuit uses an LED light source that shines through a rotating disk. Unlike the competition, which sometimes uses fragile glass disks, Nidec-Avtron uses only shatterproof disks. As the disk rotates, the sensor sees an interruption in the light beam, and generates pulses as a result. Avtron brand encoders feature Wide-Gap technology, with up to 8X the distance between disk and sensor. This eliminates sensor damage from vibration or shock.

Magnetic sensors are offered in Light Mill Duty, Mill Duty, Heavy Mill Duty, and Severe Duty encoders. Because they are not affected by dust or moisture, they are suited to rough service in modular style encoders like the SMARTach II™ and the THIN-LINE II™ series.

A magnetic sensor detects a rotating wheel (rotor) that is encoded with a series of magnetic poles on its surface. As the poles pass the sensor, a small change in resistance of the sensor is detected and pulses are generated as a result. Nidec-Avtron Wide-Gap Technology allows the wheel to be 2-4X farther from the sensor, eliminating sensor damage from misalignment, shaft runout, and bearing movement.

INCREMENTAL AND ABSOLUTE ENCODERS

Nidec-Avtron offers both incremental and absolute encoders (in both magnetic and optical sensor versions).

Incremental encoders create a series of pulses to represent the measured motion. Each incremental pulse is the same. The only significant differences are voltage levels and the type of circuit (open collector vs. line driver).

Most Nidec-Avtron incremental encoders include a once-per-turn marker pulse. Only by measuring from a starting position, and keeping track of the number of pulses observed can incremental encoders be used to measure position. 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 Nidec-Avtron to completely imbed 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-Avtron has industry-leading coverage.

The absolute position information is retained by the encoder, regardless of power. 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-Avtron 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.

Hazardous Duty

SMARTSafe™ Encoders | XRB1 Isolator | XRB2 Isolator

DURABILITY

What use is a hazardous duty encoder if it fails to work? Many "hazardous duty" encoders from the competition are merely repackaged weak optical encoders.

Avtron hazardous duty SMARTSafe XR encoders are heavy and severe duty units, with potted electronics, magnetic sensors and huge bearings or no bearings at all!

Nidec-Avtron offers a full range of SMARTSafe XR encoders including shafted, hollow shaft, and modular no-bearing styles.

Select Application Protection

LEVEL 1 PROTECTION

Where hazardous/ignitable concentrations of materials can or are likely to exist under normal operating conditions:

INTRINSIC SAFETY ENCODER ISOLATORS

XRB1 Certifications

- Level 1 certifications
  - ATEX Zone 1

XRB2 Certifications

- Level 1 certifications
  - ATEX Zone 0, 1
  - UL/cUL Class I/II*, Div 1
  - UL/cUL Class I/II*, Zone 1

XRB1 & XRB2 Isolator Features

- Ideal for oil and gas operations
- Works with a broad range of Avtron brand SMARTSafe XR incremental encoders
- Permits cable runs of 1000 ft [300m]
- Compatible with all major drive brands and controls
- Protected against wiring errors

LEVEL 2 PROTECTION

Where hazards are not likely to exist under normal operating conditions. No isolator required.

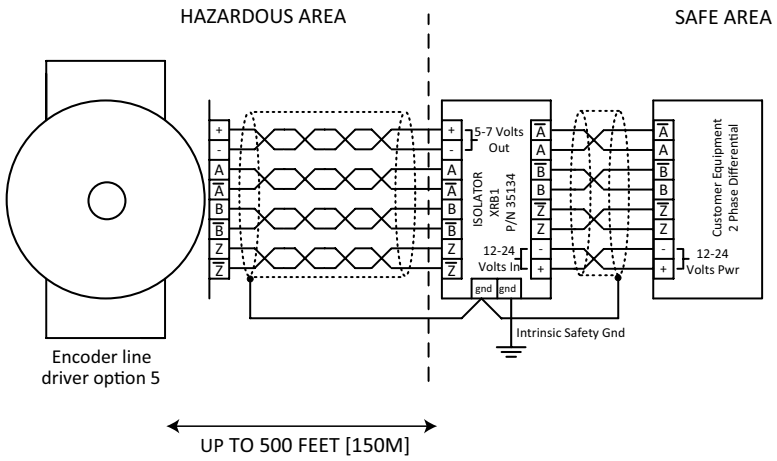
Certifications

- ATEX Zone 2
- UL/cUL Classes I & II*, Div II
- UL/cUL Class I, Zone 2

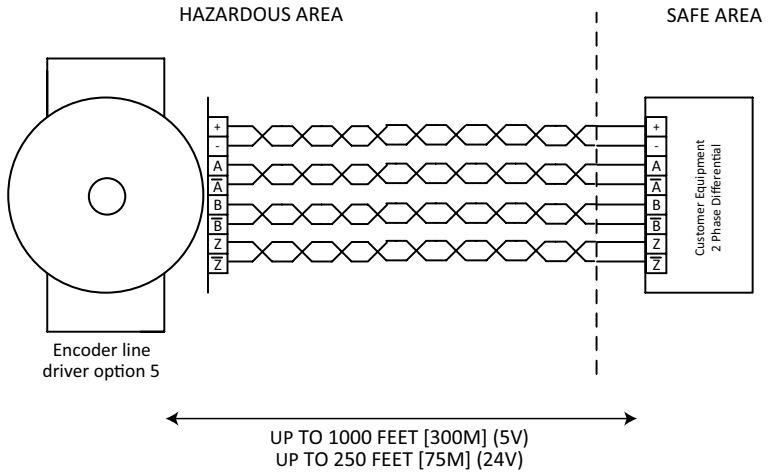
*(Certifications pending)

XRB1 isolator for remote installation; XR4F, XR45 incremental encoders with Level 2 Local Protection

LEVEL 1 PROTECTION



LEVEL 2 PROTECTION



SMARTSafe XR Advantages

- Replace failure prone optical encoders
- Eliminate costly motor oversizing caused by flange designs
- Fits huge shafts up to 7 7/8" [200mm]
- Directly feed cooling water or air junctions through the encoder!
- Eliminate bearings with modular units
- Fully potted electronics
- Built-in diagnostics

Modular Encoders

Modular no-bearing encoders, such as AV850 and AV125 SMARTach II™ and THIN-LINE II™ series offer extremely high durability. A machined face is required on the motor or machine. The rotor mounts on the motor shaft, and the stator with electronics bolts directly to the flange or face. This design has no couplings, bearings, or wearing parts.

FAST, RELIABLE INSTALLATION

The SMARTach II, THIN-LINE II and SMARTSafe modular style designs permit installation in under 5 minutes. These designs also eliminate common encoder failures such as:

Installation Damage
The sensor gap is 2-4X larger than older models, so sensor scraping, gapping, and shimming are eliminated.

Mechanical Misalignment
On power up, the green LED shows that the encoder and rotor are installed properly and are providing optimal output signals. Digital self-tuning ensures the optimal signal is maintained, even as physical conditions change.

Contamination
Oil, water, dirt, and debris are ignored by the fully potted Avtron Encoder magnetic sensor system.

Damaged Outputs
The electronics in the SMARTach II and THIN-LINE II are protected against wiring errors, short circuits, reverse voltage, overvoltage, and surges.

See our web site for an AV850 installation video. See it to believe it!

www.avtronencoders.com

MODULAR ENCODER MOUNTING OPTIONS

Modular encoders can be easily installed on most AC and DC motors equipped with accessory mounting faces as shown below.

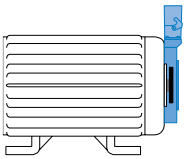


Figure A
Totally enclosed, non-ventilated with face mounted modular encoder.

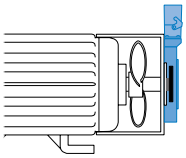


Figure B
Totally enclosed, fan cooled with C-Face and modular encoder (outboard).

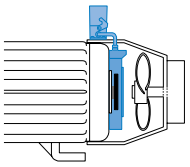


Figure C
Totally enclosed, blower cooled with face mounted modular encoder (inboard). ("Z" connector option shown.)

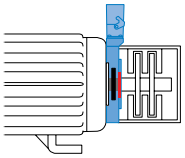


Figure D
Modular encoder mounted between brake and motor (shown with optional thru-shaft cover and seal.)

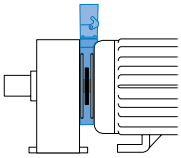


Figure E
Gearbox motor with modular encoder mounted on drive end with optional thru-shaft cover and seal.

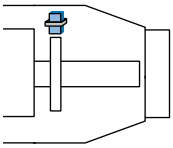


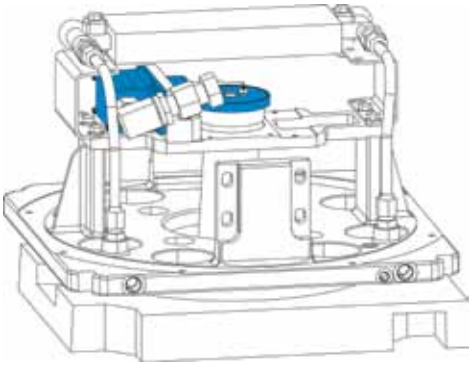
Figure F
Modular encoder components imbedded in OEM machinery.

NO FLANGE?

Wish you could use no-bearing encoders but don't have a C-face or flange? Nidec-Avtron offers you two options:

Adapters and mounting kits
Center the modular encoder on the application shaft

Modular Components
Enable OEMs to imbed modular sensors and rotors within their designs.
No Bearings + Potted Electronics = Ultra-Reliable Operation



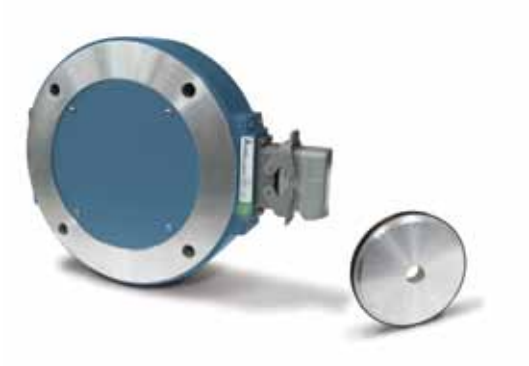
Modular C-Face Mount

AV125 (SMARTach II™) | AV12 Sensors
XR125 (SMARTSafe™) | XR12 Sensors

MAGNETIC, HEAVY MILL DUTY INCREMENTAL

AV125 Features

- -40° to 100°C Operation, (Rotors -40°C to 150°C)
- High power outputs
- Full short circuit and wiring protection
- Wide rotor to sensor gap
- Replaceable sensors
- Diagnostic LED
- No bearings or couplings
- Large axial tolerance: ±0.100" [±2.5mm]
- Installs in minutes, lasts for decades
- Fits shafts up to 7 7/8" [200mm], metric or US
- Fits 12 1/2" C-Face
- 8 – 8192 PPR



Avtron Model AV125 and AV125 rotor

HAZARDOUS DUTY INCREMENTAL

XR125 Features

- Mechanically identical to AV125
- 8 – 8192 PPR
- -40° to 80°C Operation
- Level 1 & Level 2 Hazard Protection

AV125 direct replacement for Avtron M1250, Lakeshore/Northstar RIM 1250™, and SL1250™.

Avtron Model XR125 with Level 1 Remote Protection, XRB1 Isolator

Model	Rotor Bore Size/ Mounting (AV & XR Models)		Inboard & Outboard Cover Plates	Left Module		Right Module		Connector Options	Modifications
	Thru Shaft (US)	Thru Shaft (Metric)		Line Driver	PPR	Line Driver	PPR		
AV125	**XX-** none **C3-** 3.500 **CH-** 1.375 **C4-** 3.875 **CJ-** 1.625 **C1-** 4.000 **CK-** 1.750 **CB-** 4.125 **CL-** 1.875 **C5-** 4.250 **CM-** 2.000 **CC-** 4.375 **CN-** 2.125 **C6-** 4.500 **CQ-** 2.250 **CD-** 4.625 **CP-** 2.375 **CE-** 4.690 **CR-** 2.500 **CA-** 4.875 **CT-** 2.625 **CG-** 5.000 **C2-** 2.875 **CK-** 5.250 **CV-** 3.125 **C7-** 5.375 **CW-** 3.250 **CF-** 6.250 **CY-** 3.375 **C8-** 6.750 **CZ-** 3.421 **T9-** 7.875	**XX-** none **MG-** 25mm **MF-** 30mm **MJ-** 42mm **MZ-** 80mm **MY-** 85mm **M4-** 95mm **MC-** 110mm **ME-** 120mm **MF-** 160mm **M8-** 170mm	**X-** none **F-** flat outboard, no inboard **T-** thru outboard, no inboard	**X-** none **8-** STD: 5-24V in/ 5-15V out hi power **6 -** Single Ended: 5-24V in/ 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **J-** 960 **F-** 60 **Y-** 1024 **G-** 100 **W-** 1000 **H-** 120 **Z-** 1200 **A-** 128 **3-** 2000 **L-** 240 **4-** 2048 **N-** 256 **5-** 2500 **P-** 300 **D-** 4096 **E-** 360 **8-** 4800 **B-** 480 **9-** 5000 **Q-** 500 **R-** 512 **S-** 600 **V-** 900	**X-** none **8-** STD: 5-24V in/ 5-15V out hi power **6-** Single-Ended: 5-24V in/ 5-24V out hi power **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **J-** 960 **F-** 60 **W-** 1000 **G-** 100 **Y-** 1024 **H-** 120 **Z-** 1200 **A-** 128 **3-** 2000 **L-** 240 **4-** 2048 **N-** 256 **5-** 2500 **P-** 300 **D-** 4096 **E-** 360 **8-** 4800 **B-** 480 **9-** 5000 **Q-** 500 **R-** 512 **S-** 600 **V-** 900	**P-** Ind. w/ Plug **G-** Ind. w/ Plug (Northstar Pinout) **B-** 10 Pin MS w/ Plug **W-** 3' Leads only	**000-** none **003-** BC42/46 converter **004-** Super magnetic shielding **4xx-** Special PPR **9xx-** Spcl cable length (xx-feet [0.3m])
XR125	as above See manual for all options including rotor sizes, grounding kits, special PPRs and additional connector options.	as above	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	Contact Factory	as above See manual for all options

Modular C-Face Mount

AV850 (SMARTach II™) | AV5 Sensors
XR850 (SMARTSafe™) | XR5 Sensors

MAGNETIC, HEAVY MILL DUTY INCREMENTAL

AV850 Features

- -40° to 100°C operation, (Rotors -40°C to 150°C)
- High power outputs
- Full short circuit and wiring protection
- Wide rotor to sensor gap
- Replaceable sensors
- Diagnostic LED
- No bearings or couplings
- Large axial tolerance: ±0.100" [±2.5mm]
- Installs in minutes, lasts for decades
- Fits shafts up to 4 1/2" [115mm], metric or US
- Fits 8 1/2" C-Face
- 8 – 5000 PPR

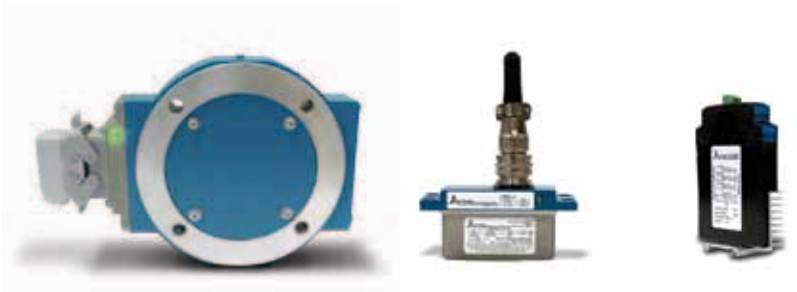
AV850 SMARTach II encoders (left) with diagnostic LED and connector option "P". AV850 motor side view (right) with universal cam screw rotor (patented).

HAZARDOUS DUTY INCREMENTAL

XR850 Features

- Mechanically identical to AV850
- 8 – 5000 PPR
- -40° to 80°C operation
- Level 1 & Level 2 hazard protection

AV850 direct replacement for Avtron M193B and M285, Lakeshore/Northstar RIM 8500™, and GE ANDG series.



XR850 (left) with Level 2 protection; XR5 (center) with Level 1 remote protection; XRB1 (right) Level 1 isolator.

Model	Rotor Bore Size/ Mounting (AV & XR Models)		Inboard & Outboard Cover Plates	Left Module		Right Module		Connector Options	Modifi-cations
	Thru Shaft (US)	End of Shaft* (GE Motors)		Line Driver	PPR	Line Driver	PPR		
AV850	**XX-** none **CR-** 2.500 **CB-** 0.625 **CT-** 2.625 **CA-** 0.750 **C2-** 2.875 **CC-** 0.875 **CW-** 3.250 **CE-** 1.000 **CY-** 3.375 **CF-** 1.125 **CZ-** 3.421 **CH-** 1.375 **C3-** 3.500 **CJ-** 1.625 **T4-** 3.875 **CK-** 1.750 **T5-** 4.250 **CL-** 1.875 **T6-** 4.500 **CM-** 2.000 **CN-** 2.125 or choose **CQ-** 2.250 metric size **CP-** 2.375 below	**XX-** no rotor **UY-** CD46xx, 47xx, 85xx, 86xx, 9xxx **UF-** CD180-32x **UN-** CD36x **UZ-** CD68x **UP-** CD4xx **U9-** CD6xx-62xx, v67xx-69xx **UQ-** CD444/ 505E **UU-** Universal: CD180-CD9xxx **U2-** CD5xx **U4-** ABB 95mm **UR-** CD507/509 **UV-** CD43xx, 44xx, 54xx, 64xx, 65xx **UW-** CD45xx, 75xx, 76xx	**X-** none **B-** inboard, thru outboard **F-** flat outboard, no inboard **N-** inboard, flat outboard **T-** thru outboard, no inboard	**X-** none **8-** STD: 5-24V in/ 5-15V out hi power **6-** Single Ended: 5-24V in/ 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **V-** 900 **F-** 60 **J-** 960 **G-** 100 **W-** 1000 **H-** 120 **Y-** 1024 **A-** 128 **Z-** 1200 **L-** 240 **3-** 2000 **N-** 256 **4-** 2048 **P-** 300 **5-** 2500 **E-** 360 **D-** 4096 **B-** 480 **8-** 4800 **Q-** 500 **9-** 5000 **R-** 512 **0-** spcl **S-** 600	**X-** none **8-** STD: 5-24V in/ 5-15V out hi power **6-** Single Ended: 5-24V in/ 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **J-** 960 **F-** 60 **W-** 1000 **G-** 100 **Y-** 1024 **H-** 120 **Z-** 1200 **A-** 128 **3-** 2000 **L-** 240 **4-** 2048 **N-** 256 **5-** 2500 **P-** 300 **D-** 4096 **E-** 360 **8-** 4800 **B-** 480 **9-** 5000 **Q-** 500 **0-** spcl **R-** 512 **S-** 600 **V-** 900	**P-** Ind. w/ Plug **G-** Ind. w/ Plug (Northstar Pinout) **B-** 10 Pin MS w/ Plug **W-** 3' Leads only	**000-** none **003-** BC42/46 converter **004-** super magnetic shielding **4xx-** special PPR **700-** large motor stator adapter* **9xx-** spcl cable length (xx-feet [0.3m])
	Thru Shaft (Metric) for both AV850/XR850								
XR850	**XX-** none **MG-** 25mm **MF-** 30mm **MJ-** 42mm **MP-** 60mm **MS-** 70mm **MZ-** 80mm **MY-** 85mm **M3-** 90mm **M4-** 95mm **MC-** 110mm	*See manual for all options including rotor sizes, grounding kits, special PPRs and additional connector options.*	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	Contact Factory	as above

Modular C-Face Mount

AV56 | AV67 | AV85 | AV115 (THIN-LINE II™)
XR56 | XR67 | XR85 | XR115 (SMARTSafe™)

MAGNETIC, HEAVY MILL DUTY INCREMENTAL

AV56, AV67, AV85, and AV115 Features

- Fits shafts 1/2" to 3 3/16" metric bores [10mm to 85mm]
- Fits 4 1/2", 6 3/4", 8 1/2", or 115mm C-Face
- 8 – 5000 PPR
- -40° to 100°C Operation (rotors -40°C to 150°C)
- High power outputs with full short circuit and wiring protection
- Diagnostic LED + alarm
- Wide sensor-to-rotor gap

HAZARDOUS DUTY INCREMENTAL

XR56, XR67, XR85 and XR115 Features

- Mechanically identical to AV models
- 8 – 5000 PPR
- -40° to 80°C operation
- Level 1 & Level 2 hazard protection

AV models direct replacement for Avtron M56, M67, M85, M115 and LakeShore/Northstar SL56, RL67, SL85, and MSL115

Avtron model AV85, AV56, and AV67 with "P" connector option and diagnostic LED.

OPTIONS

- Stainless steel model, (AV56S only)
- Remote wiring base "Q" for mounting under fan/blower covers
- Super magnetic shielding
- Mating cables

Model	Housing Type	Rotor Bore Size: Thru Shaft (US)	Rotor Bore Size: End of Shaft	Cover Style	Line Driver	Single/Left Output PPR	Right Output PPR	Connector Options	Special Features
AV56A **AV56S** **AV67A** **AV85A** **AV115**	**1-** Single Output: 4 1/2", 6 3/4", 8 1/2", 115mm Pilot **2-** Dual Output: 4 1/2" Pilot*, 8 1/2" Pilot * Dual Output NA on AV56S, AV67A, XR67A	**CA-** 1/2" **CB-** 5/8" **CC-** 7/8" **CD-** 15/16" **CE-** 1" **CF-** 1 1/8" **CG-** 1 1/4" **CH-** 1 3/8" **CT-** 1 1/2" **CJ-** 1 5/8" **CK-** 1 3/4" **CL-** 1 7/8" **CM-** 2" **CN-** 2 1/8" **CQ-** 2 1/4" **CP-** 2 3/8" **CR-** 2 1/2" **TS-** 2 5/8" **TU-** 2 7/8" **TV-** 3" **T4-** 3 1/8" **T7-** 3 3/16" or choose metric size below	**EF-** CD180-32x **EN-** CD36x **EP-** CD4xx **E2-** CD5xx For AV85 only	**X-** none **E-** Extended Shaft Cover **F-** Flat Cover **T-** Flat Thru-Hole Cover w/ Shaft Seal	**X-** none **8-** STD: 5-24V in 5-15V out hi power **6-** Single Ended: 5-24V in/ 5-24V out hi power **9-** Remote TTL: 5-24V in, 5V fixed out	**F-** 60 **G-** 100 **H-** 120 **A-** 128 **L-** 240 **N-** 256 **P-** 300 **E-** 360 **B-** 480 **R-** 512 **S-** 600 **V-** 900 **J-** 960 **W-** 1000 **Y-** 1024 **Z-** 1200 **4-** 2048 **5-** 2500 **D-** 4096 **8-** 4800 **9-** 5000 **0-** spcl	**X-** none **F-** 60 **G-** 100 **H-** 120 **A-** 128 **L-** 240 **N-** 256 **P-** 300 **E-** 360 **B-** 480 **R-** 512 **S-** 600 **V-** 900 **J-** 960 **W-** 1000 **Y-** 1024 **Z-** 1200 **4-** 2048 **5-** 2500 **D-** 4096 **8-** 4800 **9-** 5000 **0-** spcl	**G-** Plug-in Ind. w/ Northstar pinout **P-** Plug-in Ind. **Q-** Plug-in Ind., 18" cable, remote mounting base **W-** 3' Flex. Cable **Z-** Plug-in Ind., 3' Flex. Cable	**000-** none **005-** Super Magnetic Shielding **4xx-** Special PPR **9xx-** Special Cable Length, xx-feet (xx-feet [0.3m])
		Thru Shaft (metric)							
XR56A **XR67A** **XR85A** **XR115**	as above	**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 **MS-** 60mm **MU-** 65mm **MV-** 70mm **MW-**75mm **MY-** 80mm **MZ-** 85mm	as above	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	as above	Contact Factory	as above See manual for all options

Solid Shaft Encoders

NEMA 56C FACE
Historically, this is the most common encoder mounting system for US DC motors. NEMA 56C Face provides a 4 1/2" flange (with 5.88" bolt circle) for flange adapter mounting. Solid shaft encoders are bolted to a flange adapter and coupled to the motor.

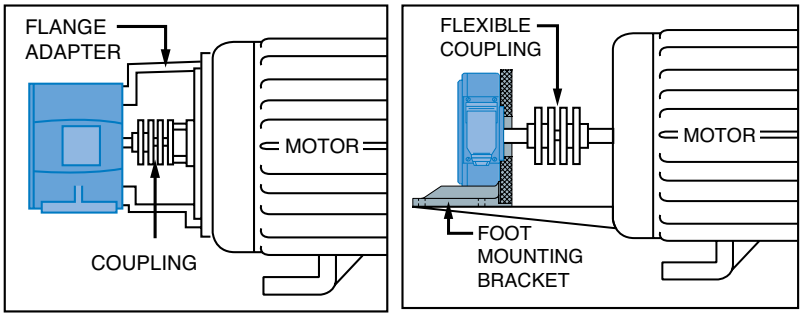
IEC B10 FLANGE
This is a common encoder mounting system for European motors. IEC B10 Flange provides a 85mm flange (with 100mm bolt circle) for encoder mounting. Solid shaft encoders are bolted to a flange adapter and coupled to the motor.

SERVO FLANGES
There are a variety of servo flanges common to the US and Europe, including the 2.65" square flange, 2.5" and 2" round flanges, and 58mm clamp and synchro flanges.

FOOT MOUNTING BRACKET OPTION
The AV485, XR485, AV45 and XR4F offer optional foot mount brackets. The encoder only needs to be aligned once, rather than each time the encoder is serviced.

COUPLINGS
If they cannot be eliminated from the system, Nidec-Avtron can provide couplings for many foot and flange mounting applications on motors. Consult the factory for specifications and details.

ELIMINATE COUPLINGS & BEARINGS
Nidec-Avtron offers modular encoders such as AV850 and AV115 that can directly mount on the back of the motor, eliminating the flange adapter, coupling, and the encoder bearings. This offers yet another huge increase in reliability.



Direct coupled encoder. Bracket Part Numbers: BC46 Style: A25448, Standard:A36261

AV45 (right) with optional foot mount bracket (option 2, Hubner POG Style)

Flexible disk couplings.

Solid Shaft Coupled Face

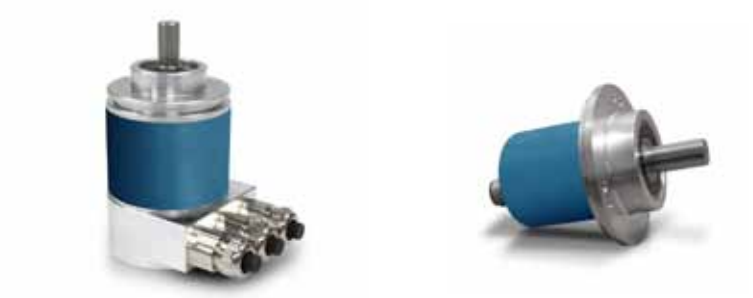
AV6A | AV6M

LIGHT MILL DUTY, OPTICAL AND MAGNETIC ABSOLUTE

AV6A and AV6M Features

- Industry standard form factors
- 58mm or 36.5mm flange/face mounting
- 4096 - 65536 bits per turn resolution
- 0 - 32768 turns counting
- Analog or digital output options
- -40° to 85°C operation
- Shatterproof optical or magnetic disk
- No batteries or super-capacitors
- True permanent position storage
- AV6M offers no-gear multiturn system
- 40lb shaft loads permitted (2-4X the competition)

Direct replacement for all 58mm absolute encoders, including Siemens, P+F, BEI, Acuro/ Dynapar, and many others.



Avtron model AV6A with 58mm clamp flange "1" with 3x cable entry, wiring style "K"; radial/side wire exit "A" (left); Avtron model AV6M with 58mm clamp flange "1" with M12 connector "E"; axial/end exit "E" (right).

OPTIONS

- All-stainless-steel construction
- IP69K seals
- Oversize bearings (AV6M)
- Parallel output (AV6A)
- Factory-programmed cam limits (digital outputs)
- Field-programmable cam limits (analog outputs)

AV6A PART NUMBERS AND AVAILABLE OPTIONS

Model	Bus	Flange	Shaft Size	Turns/ bits	PPR/bits per turn	Connector	Conn Exit	Output	IP Rating	Special Option
AV6A	**C-** CANOpen **D-** DeviceNet **F-** CANSafe **K-** POWERLINK **L-** Parallel **M-** ModbusTCP Ethernet **N-** Profinet IO **P-** Profibus DP **R-** Ethernet/IP **S-** SSI	**1-** 58mm "servo/ clamp" flange, 36mm male pilot, 3X M3, 3X M4 at 42mm **2-** 58mm "synchro" flange, 50mm male pilot, 3X M3, 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** **D-** 128/7** **E-** 256/8** **2-** 4096/12 **4-** 16384/14	**E-** 256/8** **F-** 512/9** **0-** 1024/10** **2-** 4096/12 **3-** 8192/13 **4-** 16384/14 **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-** M27/26pin **J-** 2x cable entry **K-** 3x cable entry **M-** M23/8pin Hengstler **N-** M23/8pin Stegmann **Q-** M23/8pin Kubler **W-** Cable, 1m	**A-** side/radial **E-** end/axial	**1-** Binary **2-** Gray	**X-** None, IP54+ **A-** IP66 shaft seals **S-** IP66 seals, stainless housing	**000-** none **9xx-** special cable length xx=length *0.3m

**Parallel Bus Only

FLANGE COMPATIBILITY

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

*X - no seal option not recommended

STANDARD CONNECTORS & OUTPUT FORMATS

Bus	Code	Connectors	Output
CANOpen	C	A, B, C, J, K, W	1
DeviceNet	D	A, W	1
CANSafe	F	K	1
POWERLINK	K	C	1
Parallel	L	G, W	1, 2
ModbusTCP	M	D	1
Profinet	N	C	1
Profibus DP	P	C, J, K	1
EtherNet/IP	R	C	1
SSI	S	E, F, W	1, 2

AV6M PART NUMBERS AND AVAILABLE OPTIONS

Model	Bus	Flange	Shaft Size	Turns/ bits	PPR/bits per turn	Connector	Connector Exit	Output	IP Rating	Special Option
AV6M	**A-** Analog **C-** CANOpen **D-** DeviceNet **J-** J1939 **S-** SSI	**1-** 58mm "servo/ clamp" flange, 36mm male pilot, 3X M3, 3X M4 at 42mm **2-** 58mm "synchro" flange, 50mm male pilot, 3X M3, 3X M4 at 42mm **3-** 36.5mm mini- flange w/33mm male pilot, 4X M3 at 26mm BC **4-** 2.5" square flange w/1.25" male pilot **6-** 36.5mm HD flange w/30mm male pilot, 4X M4 at 24mm **7-** 42mm HD flange pilot, 4X M4 at 35mm	**B-** 3/8" dia. x 5/8" w/flat **C-** 10mm dia. x 20mm w/flat **R-** 10mm dia. x 20mm w/o flat **T-** 6mm dia., x 10mm, no flat	**X-** 0/0- single turn **A-** 16/4 (analog) **2-** 4096/12 **3-** 8192/13 **4-** 32768/15	**2-** 4096/12* **3-** 8192/13 *use '2' also for analog output	**A-** 1xM12/5 pin **C-** M12 x3 pin **E-** 1xM12/8 pin **F-** M23/12 pin **K-** 3x cable entry **W-** Cable, 1m	**A-** side/radial **E-** end/axial	**Digital** **1-** Binary **2-** Gray **Analog** **3-** V output 0-5V **4-** V output 0-10V **5-** I Output 4-20mA **6-** I Output 0-20mA	**X-** no shaft seal, IP54, aluminum + steel housing **A-** IP66 seals, aluminum+steel housing **K-** IP69K stainless housing	**000-** none **9xx-** special cable length xx=length *0.3m **001-** pushbutton setpoints

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	A
7	C	K

STANDARD CONNECTORS

Bus	Code	Connectors	Exits	Outputs
Analog	A	A, W	A, E	3, 4, 5, 6
CANOpen	C	A, W	A, E	1
DeviceNet	D	A, W	A, E	1
J1939	J	A, W	A, E	1
SSI	S	E, F, W	A, E	1, 2

Solid Shaft Coupled Face

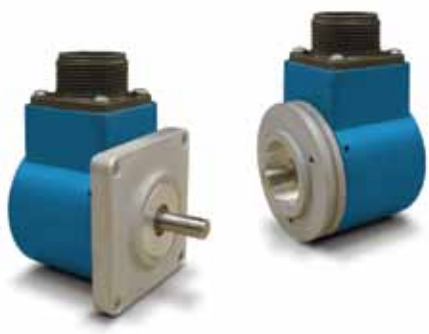
AV20 | AV25

OPTICAL, LIGHT MILL DUTY INCREMENTAL

AV20 and AV25 Features

- Industry standard form factors
- 2" or 2.5" face/flange mounting
- 1/4", 3/8", and 10mm shaft options
- 1 – 3600 PPR AV20
- 1 – 5000 PPR AV25
- -40° to 100°C operation
- Optical sensor-rotor gap up to 8X larger than the competition
- Shatterproof optical disk
- 100lb shaft loads permitted (2-4X the competition)

Direct replacement for BEI H20 and H25, Dynapar Hx25, Hx525, Hx625 and many other common 2" and 2.5" encoders



Avtron model AV20 shown with square flange mounting style "1" (left) and servo mounting style "4" (right).

Avtron model AV25 shown with servo mounting style "2" (left) and square flange mounting style "1" (right).

Model	PPR	Line Driver	Shaft Size	Connector Options	Wiring	Mounting Style	Face/Bolt Pattern	Seals	Channels	Special Features
AV20 **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* **0-** Special	**1-** 5-28V (7272) **2-** 5-28V, open collector (7273) **3-** 5-15V* (4469) **4-** 5-28V in, 5V out (7272)	**0-** Non-std With Flat **A-** 0.25" **B-** 0.375" **C-** 10mm Without Flat **N-** 0.25" **P-** 0.375" **R-** 10mm	**W-** 18" cable (pigtail) See manual for all options.	**A-** Side **E-** End*	**AV20** **1-** Sq. Flange 2.06", 1.25" mp **2-** Rnd. Flange 2.0", 1.25" mp **3-** Sq. Flange 2.06", 1.181" fp **4-** Rnd. Flange 2.0", 1.181" fp **AV25** **1-** Sq. Flange 2.650", 1.250" mp **2-** Rnd. Servo Mount 2.500", 1.250" mp **3-** Rnd. Servo Mount 2.625", 2.500" mp **mp-** male pilot **fp-** female pilot	**X-** none **AV25** **1-** 3x 10-32 @ 1.875" **2-** 4x 4-40 @ 1.272"^ **3-** 4x 4-40 @ 2" **4-** 3x 6-32 @ 2" **AV20** **5-** 4x 6-32 @ 2" **6-** 4x 10-32 @ 1.625" **7-** 3x 4-40 @ 1.5"	**X-** none **A-** Shaft Sealed** **B-** Bearing Sealed	**With Comp.** **A-** A,A–,B,B–Z,Z–*** **B-** A,A–,B,B– **D-** A,A– **Without Comp.** **E-** A,B,Z **F-** A,B	**000-** none **9xx-** Specify cable length xx-feet [0.3m] (use w/ Option "W")

Connector Options

Mounted on Encoder

10 Pin MS	6 Pin MS	7 Pin MS	8 Pin M12
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)

* AV25 Only.
** N/A with AV20 Mounting Styles "3" & "4"
** N/A with AV25 Mounting Style "3"
*** N/A with MS 6 or 7 Pin Connector
^ Only available with AV25 Mounting Style "3"

Solid Shaft

AV45 (EU-SMART) | XR4F (SMARTSafe™)

MAGNETIC, HEAVY DUTY INCREMENTAL

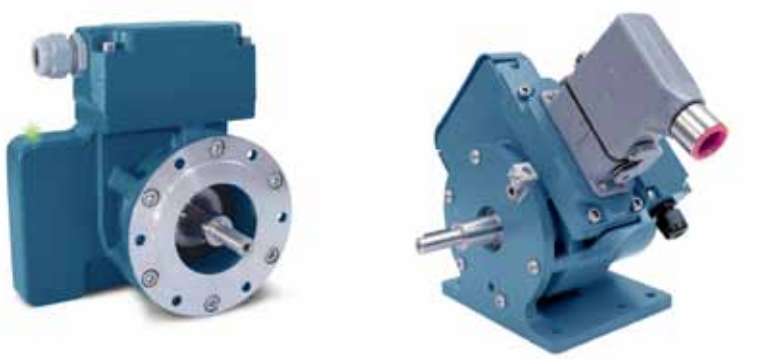
AV45 Features

- Fits IEC B10 85mm flange
- 8 – 5000 PPR
- -40° to 100°C operation
- Diagnostic LED, remote alarm
- High power outputs with full short circuit and wiring protection
- Universal TTL & HTL power design
- Direct replacement for Hubner POG 8, POG 9, other models
- The most rugged B10 flange encoder ever made!

HAZARDOUS DUTY INCREMENTAL

XR4F Features

- Physically identical to AV45
- Fits IEC B10 flange
- 8 – 5000 PPR
- -40° to 80°C operation
- Level 1 & Level 2 hazard protection



AV45 (XR4F with Level 2 protection) connector option "L"; AV45 with optional over-speed switch connector option "P"

OPTIONS

- Second isolated output
- Overspeed switch (AV45 only)
- Foot mounting bracket
- Mating cables

Model	Shaft Size	Left PPR	Right PPR	Line Driver	Connector Options	Foot Mount	Output Channels	Modifications
AV45	**H-** 11mm **N-** 10mm **T-** 18mm	**XX-** none **AF-** 60 **AG-** 100 **AH-** 120 **AL-** 240 **AN-** 256 **AP-** 300 **AE-** 360 **AB-** 480 **AQ-** 500 **AR-** 512 **AS-** 600 **AV-** 900 **AJ-** 960 **AW-** 1000 **AY-** 1024 **AZ-** 1200 **A3-** 2000 **A4-** 2048 **A5-** 2500 **AD-** 4096 **A8-** 4800 **A9-** 5000 **A0-** Special	**XX-** none **AG-** 100 **AH-** 120 **AL-** 240 **AN-** 256 **AP-** 300 **AE-** 360 **AB-** 480 **AQ-** 500 **AR-** 512 **AS-** 600 **AV-** 900 **AJ-** 960 **AW-** 1000 **AY-** 1024 **AZ-** 1200 **A3-** 2000 **A4-** 2048 **A5-** 2500 **AD-** 4096 **A8-** 4800 **A9-** 5000 **A0-** Special	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**T-** M12 Global pinout w/o plug **U-** M12 USA pinout w/o plug **2-** M23 Leine & Linde pinout w/o plug **3-** M23 Hubner pinout w/o plug **L-** Terminal Box (Europe) **H-** Terminal Box USA **P-** Ind. w/ Plug **W-** 0.45m Cable	**X-** none **1-** Toshiba TS2113N **2-** Hubner POG/OG **3-** J. Hubner - FG4 Foot mount not available with dual outputs	**A-** A,A–, B,B–, Z,Z–	**000-** none **6xx-** mechanical overspeed switch **9xx-** Special cable length xx-feet [0.3m] (use w/ Connector Option "W")
XR4F	as above	as above	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	Contact Factory	as above	as above	**000-** none **9xx-** Special cable length xx-length x 0.3m (use w/ Connector Option "W") See manual for all options

Solid Shaft

AV30

MAGNETIC, SEVERE DUTY ABSOLUTE

AV30 Features

- Perfect drop-in upgrade for many light duty absolute encoder models
- Huge variety of flanges: IEC B10, 58mm clamp and servo, US NEMA, 2.5" square
- 4096 or 8192 counts per turn
- 0 - 32768 turns counting
- Analog or digital output
- No gears, no optical disks, no batteries
- Bearings over 20X larger than light duty models
- Direct replacement for US 2.5" models, 58mm & 85mm IEC models and many more!
- The most rugged shafted absolute encoder available!

AV30 absolute encoder with IEC 58mm servo flange "1", clamp flange "2", and with US 2.5" servo flange "4"

OPTIONS

- Factory-programmed cam limits (digital outputs)
- Field-programmable cam limits (analog outputs)
- Mating cables

Model	Bus	Flange	Shaft	MT Turns	ST Resol	Conn	Conn exit	Coding	Add'l drill pattern	Mods
AV30	**A-** Analog **C-** CANOpen **D-** DeviceNet **P-** Profibus DP **S-** SSI	**1-** 58mm flange, 36mm male pilot, 3X M3, 3X M4 @ 42mm BC **2-** 58mm flange, 50mm male pilot, 3X M3, 3X M4 @ 42mm BC **4-** 2.65" Square flange, 1.25 male pilot" **5-** 85mm (B10) flange 6X M6 @ 100mm	**B-** 3/8" solid shaft w/flat **C-** 10mm solid shaft w/flat **H-** 11mm dia. Shaft **T-** 6mm solid shaft, no flat	**X-** 0/0-single turn **A-** 16/4 (analog) **2-** 4096/12 **3-** 8192/13 **4-** 16384/14 **5-** 32768/15	**2-** 4096/12 **3-** 8192/13	**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	**1-** Binary **2-** Gray **3-** 0-5V **4-** 0-10V **5-** 4-20mA **6-** 0-20mA **7-** 0.5-4.5V **8-** 0.5-9.5V	**X-** No Additional Face Drill Holes	**000-** none **9xx-** special cable length (xx-feet [0.3m])

Solid Shaft NEMA

AV485 (SMARTach II™) | XR485 (SMARTSafe™)

MAGNETIC, SEVERE DUTY INCREMENTAL

AV485 Features

- 5/8" Stainless steel shaft
- 8 – 5000 PPR
- -40° to 120°C operation
- Replaceable sensors to maximize uptime
- Diagnostic LED, remote alarm
- High power outputs with full short circuit and wiring protection
- Direct replacement for Avtron M485, Lakeshore/Northstar RIM 6200™, Dynapar H56 Rotopulser™
- Replaces analog tachometers GE BC42, BC46
- The most rugged solid shaft encoder available!

High resolution performance in a tough package. Model AV485 SMARTach II encoder shown upper left with foot mount; upper right with face mount; all views show connector option "P" with diagnostic LED and remote alarm.

HAZARDOUS DUTY INCREMENTAL

XR485 Features

- Physically identical to AV485
- 8 – 5000 PPR
- Replaces GE explosion-proof tach BC66
- -40° to 80°C Operation
- Level 1 & Level 2 hazard protection

OPTIONS

- Dual shaft
- Second isolated output
- Overspeed switch (AV485 only)
- Shaft grounding brush (AV485 only)
- Foot mounting bracket
- Mating cables

Model	Temperature Rating	Foot Bracket	Style	Left Module		Right Module		Connector Options	Modifications
				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	**X-** none **1-** Standard **2-** BC42/46 Style	**S-** Single Shaft **D-** Dual Shaft **G-** Grounding	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**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 **3-** 2000 **4-** 2048 **5-** 2500 **D-** 4096 **8-** 4800 **9-** 5000 **0-** special	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**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 **3-** 2000 **4-** 2048 **5-** 2500 **D-** 4096 **8-** 4800 **9-** 5000 **0-** special	**P-** Ind. w/ Plug **G-** Ind. w/ Plug (Northstar Pinout) **B-** 10 Pin MS w/ Plug **W-** 3' Leads only	**000-** none **003-** BC42/46 converter **004-** super magnetic shielding **4xx-** special PPR **9xx-** special cable length (xx-feet [0.3m])
XR485	**N-** -20°C to 80°C **C-** -40°C to 80°C	as above	**S-** Single Shaft **D-** Dual Shaft	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	Contact Factory	as above

Hollow Shaft Encoders

HOLLOW SHAFT/TETHER MOUNTED

Hollow shaft encoders fit over the shaft and clamp onto it. As the shaft rotates, so does the disk or rotor of the encoder. An anti-rotation or torque arm prevents the housing from also rotating. Avtron hollow-shaft encoders feature our Wide-Gap technology for shock and vibration resistance, enhanced with shatter-proof optical disks or chip-resistant magnetic rotors.

HOLLOW SHAFT ADVANTAGES

- No C-Face required
- No couplings to maintain
- High tolerance of axial shaft movement
- No misalignment issues
- Reduced installation costs

STUB SHAFTS

For hollow shaft mounted encoders, Nidec-Avtron has a complete selection of stub shafts to fit over 50 different motor configurations.

PROTECTIVE GUARDS

Nidec-Avtron offers optional guards to protect the encoder from damage, or to provide finger safety when the encoder is not directly adjacent to the motor.

TORQUE ARMS AND TETHERS

Nidec-Avtron offers threaded rod torque arms for heavier duty models to better handle the larger inertia; simple flat tethers are provided for smaller, lighter models.

SELECTING HOLLOW SHAFT ENCODERS

How do you select the best encoder for your application? Encoders on these pages range from Light, Mill Duty weighing less than 1 pound, to Explosion Protected, weighing over 17 pounds!

To choose, consider the environment and application: the rougher the service environment, the more you need a durable, larger encoder to survive in these conditions.

HELP ME CHOOSE

Our web site has an expert system to select encoders based on motor type and brand, application needs and much more.

www.avtronencoders.com

HOLLOW SHAFT APPLICATION FIGURES

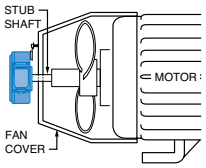


Figure 1
Shaft mounted on totally enclosed fan cooled motor.

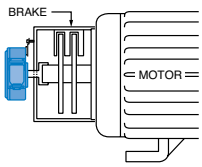


Figure 2
Shaft mounted outboard of disk brake.

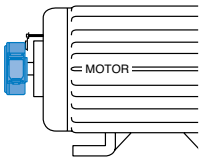


Figure 3
Shaft mounted on totally enclosed non-ventilated motor.

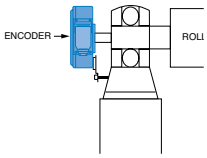
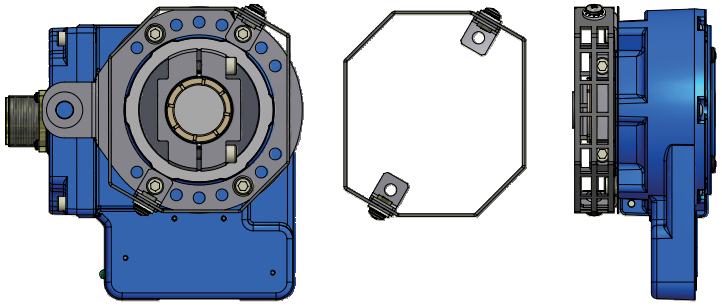


Figure 4
Shaft mounted encoder on process roll.

Stub shaft kits

Basket guard

Threaded rod torque arm



Finger guard

Hollow Shaft Mount

HS6A | HS6M

LIGHT MILL DUTY OPTICAL OR MAGNETIC ABSOLUTE

HS6A, HS6M Features

- HS6A: Fits shafts from 0.3" - 0.6" [8mm to 15mm]
- HS6M: Fits 6mm shafts
- Field resizeable by swapping inserts
- 4096 - 65536 bits per turn resolution
- 0 - 32768 turns counting
- IP66 rating
- -40° to 85°C operation
- Shatterproof optical or magnetic disk
- No batteries or super-capacitors
- True permanent position storage
- AV6M offers no-gear multiturn system

Direct replacement for all 58mm hollow shaft absolute encoders, including Siemens, P+F, BEI, Acuro/Dynapar, and many others.

Avtron absolute models: (left) HS6A w/15mm bore and 3X cable entry "K" option; (right) model HS6M w/6mm bore, tether, and axial M12 connector option "A"

OPTIONS

- All-stainless-steel construction
- IP69K seals
- Parallel output (AV6A)
- Factory-programmed cam limits (digital outputs)
- Field-programmable cam limits (analog outputs)

HS6A PART NUMBERS AND AVAILABLE OPTIONS

Model	Sensor	Bus	Style	Shaft Size	Turns/ bits	PPR/bits per turn	Connector	Mounting	Output	IP Rating	Special Option
HS6A	**A-** Optical	**C-** CANOpen **D-** DeviceNet **F-** CANSafe **K-** POWERLINK **L-** Parallel **M-** ModbusTCP Ethernet **N-** Profinet IO **P-** Profibus DP **R-** Ethernet/IP **S-** SSI	**1-** 58mm housing	**L-** 6mm **M-** 8mm **N-** 10mm **P-** 12mm **R-** 15mm (EOS only) **Z-** All metric sizes	**X-** 0/0- single turn **2-** 4096/12 **4-** 16384/14	**2-** 4096/12 **3-** 8192/13 **4-** 16384/14 **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-** M27/26pin **J-** 2x cable entry **K-** 3x cable entry **M-** M23/8pin Hengstler **N-** M23/8pin Stegmann **Q-** M23/8pin Kubler **W-** Cable, 1m	**E-** EOS only **U-** EOS or Thru (12mm SSI only)	**1-** Binary **2-** Gray	**X-** None, IP54 **A-** IP66 shaft seals **S-** IP66 seals, stainless housing	**000-** none **9xx-** special cable length xx=length 0.3m/ft

MOUNTING COMPATIBILITY

Housing	Bore Size	Mounting	IP/Sealing
1	M, N, P, R, Z	E	A, S
1	P	U	X

STANDARD CONNECTORS & OUTPUT FORMATS

Bus	Code	Connectors	Output
CANOpen	C	A, B, C, J, K, W	1
DeviceNet	D	A, W	1
CANSafe	F	K	1
POWERLINK	K	C	1
Parallel	L	G, W	1, 2
ModbusTCP	M	D	1
Profinet	N	C	1
Profibus DP	P	C, J, K	1
EtherNet/IP	R	C	1
SSI	S	E, F, W	1, 2

HS6M PART NUMBERS AND AVAILABLE OPTIONS

Model	Bus	Housing	Bore Size	Turns/ bits	PPR/bits per turn	Connector	Mounting Style	Output	IP Rating	Special Option
HS6M	**A-** Analog **C-** CANOpen **D-** DeviceNet **J-** J1939 **S-** SSI	**1-** 58mm **3-** 36.5mm **7-** 42mm	**L-** 6mm **M-** 8mm **N-** 10mm **P-** 12mm **R-** 15mm **Z-** All metric sizes	**X-** 0/0- single turn **A-** 16/4 (analog) **2-** 4096/12 **3-** 8192/13 **5-** 32768/15	**2-** 4096/12* **3-** 8192/13 *use '2' also for analog output	**A-** 1xM12/5 pin **C-** M12 x3 pin **E-** 1xM12/8 pin **F-** M23/12 pin **K-** 3x cable entry **W-** Cable, 1m	**E-** EOS only	**Digital** **1-** Binary **2-** Gray **Analog** **3-** V output 0-5V **4-** V output 0-10V **5-** I Output 4-20mA **6-** I Output 0-20mA	**X-** no shaft seal, IP54, aluminum + steel housing **A-** IP65 seals, aluminum + steel housing **K-** IP69K stainless housing	**000-** none **9xx-** special cable length xx=length *0.3m **001-** pushbutton setpoints

HOUSING COMPATIBILITY

Housing	Bore Size	IP/Sealing
1	M, N, P, R, Z	A, K
3	L	X, A
7	M, N, P	A

STANDARD CONNECTORS & OUTPUT FORMATS

Bus	Code	Connectors	Output
Analog	A	A, W	3, 4, 5, 6
CANOpen	C	A, W	1
DeviceNet	D	A, W	1
J1939	J	A, W	1
SSI	S	E, F, W	1, 2

Hollow Shaft Mount

HS25A | HS35A

OPTICAL, LIGHT MILL DUTY INCREMENTAL

HS25A, HS35A Features

- HS25A: fits shafts from 3/8" to 3/4" [6mm to 16mm]
- HS35A: Fits shafts from 1/2" to 1" [12mm to 20mm]
- 1 – 5000 PPR
- -20° to 100°C operation
- Field resizeable by swapping inserts
- Wide-Gap sensor
- Shatterproof optical disk
- Fully isolated from motor shaft currents

Direct replacement for BEI HS35 and Dynapar HS35, Northstar HS35R, HSD38

Avtron model HS35A (left) with connector option A (B); HS35A with connector option "T" (U) and model HS25A (right) shown with connector option "A" (B).

OPTIONS

- Full range of tether arms
- Mating cables

HOW TO BUILD AN ENCODER PART NUMBER

Begin with a model, then select an Encoder Part Number (Example HS35A)

Model	1024 PPR	5-24V	5/8" Bore	10 Pin MS w/mate	thru shaft	with basket	4.5" tether	all signals	no specials
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
HS35A	Y	1	C	C	U	1	E	A	000

Final part number: HS35AY1CCU1EA000

Model	PPR	Line Driver	Bore Size	Connector Options	Mounting Style	Protection	Anti-Rotation Tether Options	Channels	Special Features
HS25A **HS35A**	**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* **8-** 4000^ **D-** 4096^ **9-** 5000^ **0-** Special	**1-** 5-28V (7272) **2-** 5-28V, Open Collector (7273) **4-** 5-28V in, 5V out (7272) See manual for all options.	**0-** Non-Std. Shaft **A-** 3/8"** **B-** 1/2" **C-** 5/8" **D-** 3/4"** **E-** 7/8" **F-** 1" **L-** 6mm* **M-** 8mm* **N-** 10mm* **P-** 12mm **Q-** 14mm* **R-** 15mm^ **S-** 16mm **W-** 20mm^ **X-** No inserts **U-** all U.S. inserts **Z-** all metric inserts	**W-** 18" flex cable See Below	**E-** End-of-Shaft (HS25A) **U-** Universal End-of-Shaft & Thru Shaft (HS35A)	**0-** None **1-** Basket	**X-** None **A-** Fan cover, 1/4-20 **B-** Fan cover, 5/16-18 **C-** Fan cover, 3/8-16 **D-** Fan cover, all **E-** 4.5" C-Face **F-** 8.5" C-Face **M-** 4.5" C-Face or Fan Cover **U-** Universal (all tether options)	**A-** A,A–,B,B–, Z,Z–< **B-** A,A–,B,B–« **D-** A,A–« **E-** A,B,Z« **F-** A,B«	**000-** None **00W-** Connector on 18" cable: Use w/ Option "E"-"N", "T"-"U") **9xx-** Specify cable length xx-feet [0.3m] (use w/ Option "W")

Connector Options

10 Pin MS	10 Pin Mini MS/ TwistLock	6 Pin MS	7 Pin MS	8 Pin M12
A- *w/o plug (std. phasing)* **B-** *w/o plug (Dynapar HS35 phasing)* **C-** *"A" w/ plug* **D-** *"B" w/ plug*	**S-** *w/o plug on 18" cable (req's option "00W")*	**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)*

* HS25A only.
^ HS35A only.
** No insert for HS25A.
« Only available with 6 & 7 pin MS connectors.
< Only available with cable, 10 pin MS, 8 pin M12 connectors.

Hollow Shaft Mount

HS35M

MAGNETIC, MILL DUTY INCREMENTAL

HS35M Features

- Fits shafts from 1/2" to 1 1/8" [12mm to 30mm]
- 1 – 3072 PPR
- -20° to 85°C operation
- Field resizeable by swapping inserts
- Fully isolated from motor shaft currents
- Magnetic technology shrugs off dirt, dust, and moisture
- Optional high power outputs with full short circuit and wiring protection

Direct replacement upgrade for BEI HS35, Dynapar HS35, Northstar HS35R, HSD35, HSD37, HSD38

Avtron model HS35M shown with industrial connector option "P" (left); MS connector option "A" (middle); dual output HS35M with connector option "P" (lower right).

OPTIONS

- Second isolated output
- No-solder industrial connector
- High power outputs
- Mating cables

Model	Left & Right Output Range	Line Driver	Bore Size	Connector Options	Mounting Style	Protection	Anti-Rotation Tether Options	Channels	Special Features
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 **X-** None	**6-** 5-24V (7272) **8-** 5-15V (4125) hi-power **9-** 5-24V in, 5V out (7272)	**0-** Non-Std. Shaft **B-** 1/2" **C-** 5/8" **D-** 3/4" **E-** 7/8" **F-** 1"^ **G-** 1 1/8"^ **U-** all U.S. inserts, 1/2"-1" **P-** 12mm **Q-** 14mm **R-** 15mm **S-** 16mm **W-** 20mm **Y-** 25mm^ **3-** 30mm^ **Z-** all metric inserts 12mm-20mm	**W-** 18" flex. cable See manual for all options.	**U-** Universal End-of-Shaft & Thru Shaft	**0-** None **1-** Basket*	**X-** None **A-** Fan cover, 1/4-20 **B-** Fan cover, 5/16-18 **C-** Fan cover, 3/8-16 **D-** Fan cover, all **E-** 4.5" or 6.75" C-Face **F-** 8.5" C-Face **G-** Torque Arm **M-** 4.5" C-Face or Fan Cover **U-** Universal (all tether options, excluding "G")	**A-** A,A–,B,B–Z,Z– **B-** A,A–,B,B–« **D-** A,A–« **E-** A,B,Z« **F-** A,B« **4-** special PPR **9-** special cable length xx-feet [0.3m] under special features «Use w/ Connector Option "W".	**00-** None **0W-** Connector on 18" cable: Use w/ Options "E"-"N","S"-"U", Z")

Connector Options

Mounted on Encoder				Mounted on 18" cable ("0W" Option)				
10 Pin MS	10 Pin EPIC	10 Pin Mini MS/ TwistLock	12 Pin M23	6 Pin MS«	7 Pin MS«	8 Pin M12«	10 Pin EPIC	10 Pin Mini MS/ TwistLock
A- *w/o plug (std. phasing)* **B-** *w/o plug (Dynapar HS35 phasing)* **C-** *"A" w/ plug* **D-** *"B" w/ plug*	**P-** *w/ plug* **V-** *w/o plug*	**R-** *w/ plug*	**2-** *w/o 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)*	**Q-** *w/ remote base + plug* **Z-** *w/ plug*	**S-** *w/ plug*

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

Hollow Shaft Mount

HS45 | XR45 (SMARTSafe™)

MAGNETIC, HEAVY MILL DUTY INCREMENTAL

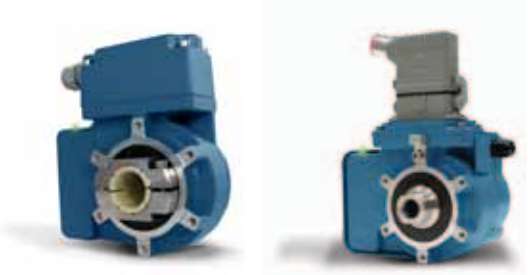
HS45 Features

- Fits shafts from 5/8" to 1 1/8" [16mm to 30mm]
- 8 – 5000 PPR
- -40° to 100°C operation
- Field resizeable by swapping inserts
- Magnetic technology shrugs off dirt, dust, and moisture
- LED & remote alarm diagnostics
- >2500V isolation from shaft currents
- Clamp and center-bolt mounting styles
- Our best model to directly replace: HS35 styles; Avtron M3 & M4; Leine and Linde 861, 862, 865; Hubner HOG 8, HOG 9, HOG 10

HAZARDOUS DUTY INCREMENTAL

XR45 Features

- Physically identical to HS45
- 8 – 5000 PPR
- -40° to 80°C operation
- Level 1 & Level 2 hazard protection



Avtron HS45 clamp style with connector option "L" (left), HS45 center bolt style with overspeed switch option and connector option "P". Removable connector options "P", "H" and "A".

OPTIONS

- Second isolated output
- Overspeed switch (HS45 only)

Sizing inserts

Model	Bore Size	Left PPR	Right PPR	Line Driver	Connector Options	Tether	Channels	Modifications
HS45	Clamp Style (End-of-shaft & thru shaft) **Metric** **S-** 16mm **V-** 19mm **W-** 20mm **Y-** 25mm **3-** 30mm **Z-** All metric sizes **USA** **C-** 5/8" **D-** 3/4" **E-** 7/8" **F-** 1" **G-** 1 1/8" **U-** All US sizes **Center-Bolt Style** **L-** 16mm **M-** 17mm **W-** 20mm **J-** 30mm	**XX-** none **AF-** 60 **AG-**100 **AH-** 120 **AA-** 128 **AL-** 240 **AN-** 256 **AP-** 300 **AE-** 360 **AB-** 480 **AQ-** 500 **AR-** 512 **AS-** 600 **AV-** 900 **AJ-** 960 **AW-** 1000 **AY-** 1024 **AZ-** 1200 **A3-** 2000 **A4-** 2048 **A5-** 2500 **AD-** 4096 **A8-** 4800 **A9-** 5000 **A0-** spcl	**XX-** none **AF-** 60 **AG-**100 **AH-** 120 **AA-** 128 **AL-** 240 **AN-** 256 **AP-** 300 **AE-** 360 **AB-** 480 **AQ-** 500 **AR-** 512 **AS-** 600 **AV-** 900 **AJ-** 960 **AW-** 1000 **AY-** 1024 **AZ-** 1200 **A3-** 2000 **A4-** 2048 **A5-** 2500 **AD-** 4096 **A8-** 4800 **A9-** 5000 **A0-** spcl	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	see below chart	**D-** Fan Cover **E-** 4.5" NEMA C-face **F-** 8.5" NEMA FC-face **P-** 70mm arm **G-** Torque Arm, 70-500mm **Combinations** **H-** Fan Cover & 8.5" C-face **M-** Fan Cover & 4.5" C-Face **U-** Universal (includes all styles) **X-** none	**A-** A,A–,B,B–, Z,Z– **B-** A,A–, B,B–« **D-** A,A–« **E-** A,B,Z« **F-** A,B« « MS6, MS7 only	**000-** none **001-** Omit rear shaft cover **004-** super magnetic shielding **021-** w/ super shield & finger guard **6xx-** mechanical overspeed switch **9xx-** specify cable length xx-feet (use w/ option "W")
XR45	as above	as above	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	Contact Factory	as above	as above	as above See manual for all options

« Only available with 6 & 7 pin MS connectors.

Connector Options

Mounted on Encoder Body								
Global Styles			North American Styles					Cable
M12 8 pin	M23 12 pin	Terminal Box	Industrial Connector	MS 10 pin	MS 6 pin	MS 7 pin	Mini MS TwistLock	
T- Global pin out without plug **U-** USA pinout without plug	**2-** Leine & Linde pinout without plug **3-** Hubner pinout without plug	**L-** box with term'ls & cord grip **H-** box with term'ls & US 1/2" conduit	**P-** with Plug **G-** Northstar™ pinout w/o alarm w/plug	**A-** HS35 pinout without plug **B-** Dynapar™ HS35 pinout without plug **C-** HS35 pinout with plug **D-** Dynapar™ HS35 pinout with plug **4-** Large encoder pinout (M3/4)	**E-** w/plug **F-** Dynapar™ HS35 pinout w/plug	**J-** w/plug **K-** Dynapar™ HS35 pinout w/plug	**R-** w/plug	**W-** 0.45m cable **Q-** 0.45m cable w/ remote base w/ind'l conn w/ plug **S-** 0.45m cable w/ twistlock conn

Hollow Shaft Mount

M3 | M4

LARGE BORE INCREMENTAL
M3 OPTICAL, MILL DUTY
M4 MAGNETIC, HEAVY MILL DUTY

M3 Features

- Fit shafts from 1 1/2" to 2 3/8" [48mm to 60mm]
- 240 – 2500 PPR
- -40°* to 85°C operation
- Our most durable optical encoder

M4 Features

- Fit shafts from 1 1/2" to 2 3/8" [48mm to 60mm]
- 240 – 1200 PPR
- -40°* to 85°C operation
- M4 more resistant to water, oil, and grease than optical encoders

* -40°C rating is optional

Avtron model M3-7 (M4-7) hollow shaft encoder shown with connector option "P", optional dual output, and standard tether.

OPTIONS

- Second isolated output
- -40° C rating*
- Full range of tether arms
- Mating cables

Model	Bore Size	Mounting Style	Line Driver	Output	PPR	Connector Options	Special Features
M3	**8-** 1 1/2" **9-** 1 5/8" **6-** 2" **J-** 2 1/8" **7-** 2 3/8" **G-** 48mm **D-** 52mm **E-** 58mm **H-** 60mm	**S-** End-of-Shaft **G-** End-of-Shaft with Grounding **T-** Thru-Shaft	**1-** 5-24V **2-** 5-18V hi power **3-** 18-24V hi power **4-** 5-24V in, 5V out	**R-** Right **L-** Left **D-** Dual	240 600 256 1024 360 1200 480 2048 512 2500	**N-** Wire Leads only **C-** MS Bulkhead **A-** "C" w/o plug **L-** MS Elbow **T-** Terminal Box **K-** Condulet **P-** Plug-in Industrial **Q-** Plug-in Industrial, w/ remote + base **Z-** Plug-in Industrial, 3' Flexible Cable **W-** 3' Flexible Cable	**000-** none **003-** Torque arm (B27239) **005-** -40° C rated **038-** Fan cover tether (see instruction manual for full list.)

Model	Bore Size	Mounting Style	Line Driver	Left & Right Output Range	Base PPR	Marker	Connector Options	Special Features
M4	**8-** 1 1/2" **9-** 1 5/8" **6-** 2" **J-** 2 1/8" **7-** 2 3/8" **G-** 48mm **D-** 52mm **E-** 58mm **H-** 60mm	**S-** End-of-Shaft **G-** End-of-Shaft with Grounding **T-** Thru-Shaft	**1-** 5-24V **4-** 5-24V in, 5V out **8-** 5-24V in, 5-24V out hi power	**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	**N-** Wire Leads Only **C-** MS Bulkhead **A-** "C" w/o plug **L-** MS Elbow **T-** Terminal Box **K-** Condulet **P-** Plug-in Industrial **Q-** Plug-in Industrial, w/ remote + base **Z-** Plug-in Industrial, 3' Flexible Cable **W-** 3' Flexible Cable	**000-** none **003-** Torque arm (B27239) **005-** -40° C rated **038-** Fan cove tether (see instruction manual for full list.)

Hollow Shaft Mount

M6C | M7

HEAVY DUTY MAGNETIC INCREMENTAL

M7 Features

- Fits shafts from 1″ to 1 1/8″ [25-30mm]
- 240 – 1200 PPR
- -45° to 80°C ultra-low-temperature operation

HAZARDOUS DUTY INCREMENTAL

M6C Features

- Fits shafts from 1″ to 1 1/8″ [25-30mm]
- 240 – 1200 PPR
- -40° to 80°C operation
- ATEX & IECEx certified: EEx de IIC T4/ II 2G
- No isolation barrier required
- Outputs protected against short circuits and wiring errors
- Directly replaces M6 with no modifications
- The industry standard for oil and gas drilling machinery

Avtron model M6C hollow shaft encoder shown with connector option "T"

OPTIONS

- Second isolated output
- -40°C rating (M6C only), M7 std -45°C
- ATEX/IECEx cable gland (M6C only)

Model	Bore Size*	Mounting Style	Line Driver	Left & Right Output Range	Base PPR	Marker	Connector Options	Modifications
M7-	**4-** 1" **5-** 1 1/8"	**S-** End of Shaft	**1-** 5-24 VDC **8-** 5-24 VDC hi power	**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-** Terminal Box	**000-** No tether **003-** include tether arm (B28390)
M6C-	**as above**	as above	as above	as above	as above	as above	**T-** Terminal Box **W-** Terminal Box w/ATEX Gland	**000-** No tether **003-** include tether arm **005-** w/tether arm & -40°C rating

See manual for all options.

*Contact factory for metric sizes.

Hollow Shaft Mount

HS40

MAGNETIC, SEVERE DUTY ABSOLUTE

HS40 Features

- The ideal upgrade from light duty models
- Fits shafts 5/8"-1 1/8" [16-30mm]; field resizeable
- 4096 or 8192 counts per turn
- 0 - 32768 turns counting
- Analog or digital output
- No gears, no optical disks, no batteries
- Bearings over 20X larger than light duty models
- Full electrical isolation from motor shaft currents
- The most rugged hollow shaft absolute encoder available!

Avtron model HS40 with 1" sizing insert "F" and single cable entry "S"

OPTIONS

- Factory-programmed cam limits (digital outputs)
- Field-programmable cam limits (analog outputs)
- Mating Cables

Model	Bus	Future	Shaft Bore	MT Turns	ST Resol	Conn	Mounting	Coding	Tethers	Mods
HS40	**A-** Analog **C-** CANOpen **D-** DeviceNet **P-** Profibus DP **S-** SSI	**X-** Standard	**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-** 1638/14 **5-** 32768/15	**2-** 4096/12 **3-** 8192/13	**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	**1-** Binary **2-** Gray **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]

Hollow Shaft Mount

AV685 (SMARTach II™) | XR685 (SMARTSafe™)

MAGNETIC, SEVERE DUTY INCREMENTAL

AV685 Features

- Fits shafts with diameter of 1 1/8"
- 8 – 5000 PPR
- -40° to 120°C operation
- Replaceable sensors to maximize uptime
- Diagnostic LED, alarm contact
- High power outputs with full short circuit and wiring protection
- The most durable hollow shaft encoder available!
- Auto-centering spline shaft system for perfect fit every time.

HAZARDOUS DUTY INCREMENTAL

XR685 Features

- Physically identical to AV685
- 8 – 5000 PPR
- -40° to 80°C Operation
- Level 1 & Level 2 hazard protection

Avtron model AV685 SMARTach II encoder with connector option "P" and diagnostic LED.

OPTIONS

- Second isolated output
- Thru shaft
- Overspeed switch (AV685 only)
- Shaft grounding brush (AV685 only)
- Mating cables

Model	Temperature Rating	Tether	Style	Left Module		Right Module		Connector Options	Modifications
				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-** B32809 threaded rod	**E-** Standard (EOS) **T-** Thru Shaft **G-** Grounding **O-** Overspeed Switch	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **J-** 960 **F-** 60 **Y-** 1024 **G-** 100 **W-** 1000 **H-** 120 **Z-** 1200 **A-** 128 **3-** 2000 **L-** 240 **4-** 2048 **N-** 256 **5-** 2500 **P-** 300 **D-** 4096 **E-** 360 **8-** 4800 **B-** 480 **9-** 5000 **Q-** 500 **0-** spcl **R-** 512 **S-** 600 **V-** 900	**X-** none **8-** Standard: 5-24V in, 5-15V out hi power **6-** Single-Ended: 5-24V in, 5-24V out **9-** Remote TTL: 5-24V in, 5V fixed out	**X-** none **J-** 960 **F-** 60 **Y-** 1024 **G-** 100 **W-** 1000 **H-** 120 **Z-** 1200 **A-** 128 **3-** 2000 **L-** 240 **4-** 2048 **N-** 256 **5-** 2500 **P-** 300 **D-** 4096 **E-** 360 **8-** 4800 **B-** 480 **9-** 5000 **Q-** 500 **0-** spcl **R-** 512 **S-** 600 **V-** 900	**P-** Ind. w/ Plug **G-** Ind. w/ Plug (Northstar Pinout) **B-** 10 Pin MS w/ Plug **W-** 3' Leads only See manual for all options	**000-** none **004-** super magnetic shielding **4xx-** special PPR **9xx-** special cable length (xx-feet [0.3m])
XR685	**N-** -20°C to 80°C **C-** -40°C to 80°C	as above	**E-** Standard (EOS) **T-** Thru Shaft	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	**X-** none **H-** ATEX Zone 0/20 12-24V **5-** ATEX Zone 1/21 12-24V **7-** ATEX Zone 2/22 5-24V **F-** UL Class I/II, Div 1 12-24V **G-** UL Class I/II, Div 2 5-24V	as above	Contact Factory	as above

Encoder Cables

Cable Features
Nidec Avtron supplies a full range of cables to save site assembly time and eliminate wiring errors.

Standard lengths (yyy.y): **000.5, 001.0, 002.0, 005.0, 010.0, 020.0, 030.0 (meters)**
For absolute encoders, longer lengths are also available, depending on the bus system.

Encoder Models	Bus	Purpose	Conn Code	Conn #1	Conn #2	Part Number
Absolute Encoders						
AV6A, AV6M, HS6A, HS6M, AV30, HS40	Analog	Sig+Pwr	A	M12/5	none	CBL1AAC1XPWyyy.y
	DeviceNet	Bus In+Pwr	A, B, C	M12/5	none	CBL1DAC1XPWyyy.y
		Daisy Chain	B, C	M12/5	M12/5	CBL1DAC2XPDyyy.y
		Bus Out+Pwr	B, C	M12/5	none	CBL1DAC2XPWyyy.y
	CANOpen	Bus In+Pwr	A, B, C	M12/5	none	CBL1CAC1XPWyyy.y
	CANSafe	Daisy Chain	B, C	M12/5	M12/5	CBL1CAC2XPDyyy.y
		Bus Out+Pwr	B, C	M12/5	none	CBL1CAC2XPWyyy.y
	Profibus	Bus In	C	M12/5	none	CBL1PAC1XPWyyy.y
		Bus Out	C	M12/5	none	CBL1PAC2XPWyyy.y
		Daisy Chain	C	M12/5	M12/5	CBL1PAC2XPDyyy.y
		Pwr	C	M12/4	none	CBL1PAC3XPWyyy.y
	SSI	Sig+Pwr	E	M12/8	none	CBL1SAE1XPWyyy.y
		Sig+Pwr	F	M23/12	none	CBL1SAF1XPWyyy.y
AV6A, HS6A	Parallel	Sig+Pwr	G	M27/26	none	CBL1LAG1XPWyyy.y
	Ethernet	Bus In	C, D	M12/4	none	CBL1EAC1XTWyyy.y
	EtherNet/IP	Bus Out*	C	M12/4	none	CBL1EAC2XPWyyy.y
	PROFINET	Daisy Chain*	C	M12/4	M12/4	CBL1EAC2XPDyyy.y
	Modbus TCP	Pwr	C, D	M12/4	none	CBL1EAC3XTWyyy.y
		*NA for Modbus TCP				
Incremental Encoders						
AV20, AV25, HS25A, HS35A, HS35M, HS45, AV45, AV56, AV67, AV85, AV115	Incremental	Sig+Pwr	A, B, C, D	MS10	none	CBL1BBA1XPWyyy.y
			E, F (ph:B)	MS6	none	CBL1BBE1XPWyyy.y
			E, F (ph:E,F)	MS6	none	CBL1BCE1XPWyyy.y
			J, K, M,N (ph:B)	MS7	none	CBL1BBJ1XPWyyy.y
			J, K, M,N (ph:E,F)	MS7	none	CBL1BCJ1XPWyyy.y
			R, S	TW10	none	CBL1BBR1XPWyyy.y
AV45, AV56, AV67, AV85, AV115, M3, M4, HS45	Incremental	Sig+Pwr	G, P, Q, V, Z	Ind'l (sm)	none	CBL1BBP1XPWyyy.y
AV125, AV485, AV685, AV850	Incremental	Sig+Pwr	G, P, Q, V, Z	Ind'l (lge)	none	CBL1BCP1XPWyyy.y
			A, B, C, D	MS10	none	CBL1BB41XPWyyy.y
Cable <30m	Incremental	Sig+Pwr	Any	none	none	CBL1BBW1XPWyyy.y
Cable >30m	Incremental	Sig+Pwr	Any	none	none	CBL1BCW1XPWyyy.y

Older Models

Industrial factories need equipment to last for decades, not years. Nidec-Avtron proudly manufactures these high-quality, durable models to keep your mill running without costly physical revamps, wiring changes, or drive replacements: M460 Sandwich Encoders, M185 Unipulser™, M925 "PY" Style, and K661 and K662 Frequency to Voltage Converters. (K66x models enable analog tach replacement.)

Nidec-Avtron still services and supports older designs like the units listed in the table below. Please consult our web site to update older models or call us for upgrade/ replacement options.

www.avtronencoders.com

Model	Replacement Model
M3-1,2	*AV485*
M4-1,2	*AV485*
M3-3/5	*HS45*
M4-3/5	*HS45*
M190, M285	*AV850*
M585, M685	*AV685*
M485, M785	*AV485*
M727A	*AV485*
M737A	*AV485*
M738, M938	*AV485*
M940, M945	*AV485*
M1250	*AV125*

Avtron models (from left) M925, K661, M460, and M185 (front).

REPAIRS

Many Avtron Encoders can be repaired or refurbished at our factory. Obtain a Return Material Authorization (RMA) number prior to returning units. Please call us for details or receive your RMA online instantly through our web site.

NIDEC-AVTRON SUPPORT

Unlike most competitors, Nidec-Avtron offers 24x7x365 engineering support for our encoder products at no charge!

Technical support is provided by application engineers familiar not only with our products, but also with industrial applications, motors, etc., to provide complete product support.

Nidec-Avtron's Quality System is Certified to ISO 9001:2000. We are a vertically integrated manufacturing company whose facilities include:

- Machine shop with the latest in high performance machine tools
- Circuit board assembly
- Test department that performs incoming inspections, environmental testing, final testing, and quality control

Upgrades and Retrofits

COMPETITIVE MODELS

Nidec-Avtron 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. Some common models are shown below.

Note that for some models such as HS35, Nidec-Avtron offers "good" (HS35A), "better" (HS35M), and"best"(HS45) drop-in replacements!

Model «	Brand «	Avtron Model	Avtron Connector
62P	*DYN*	*AV485*	*T*
861, 862	*L&L*	*HS45*	*2*
865	*L&L*	*HS45*	*2*
H20 ®	*BEI, DYN*	*AV20*	*A, E, J*
H25 ®	*BEI, DYN*	*AV25*	*A, E, J*
H56	*DYN*	*AV485*	*G*
HOG8,9,10	*HUB*	*HS45*	*3*
HS20	*DYN*	*HS25A*	*A*
HS22	*BEI*	*HS25A*	*A*
HS25	*BEI*	*HS25A*	*A*
HS35	*BEI*	*HS35A*	*A*
HS35	*DYN*	*HS35A*	*B*
HS35M	*NOR*	*HS35M*	*P*
HSD35	*NOR*	*HS35M*	*P*
HS45	*BEI*	*M3*	*A030*
HS56	*NOR*	*M4*	*P*
HS85	*NOR*	*AV685*	*G*
POG8,9	*HUB*	*AV45*	*3, L*
RIM 1250™	*NOR*	*AV125*	*G*
RIM 6200™	*NOR*	*AV485*	*G*
RIM 8500™	*NOR*	*AV850*	*G*
RL67™	*NOR*	*AV67*	*P*
SL56™	*NOR*	*AV56*	*P*
SL85™	*NOR*	*AV85*	*P*
SL1250™	*NOR*	*AV125*	*G*

DYN - Dynapar
NOR - Northstar/Lakeshore
L&L - Leine and Linde
HUB - Baumer/Hubner

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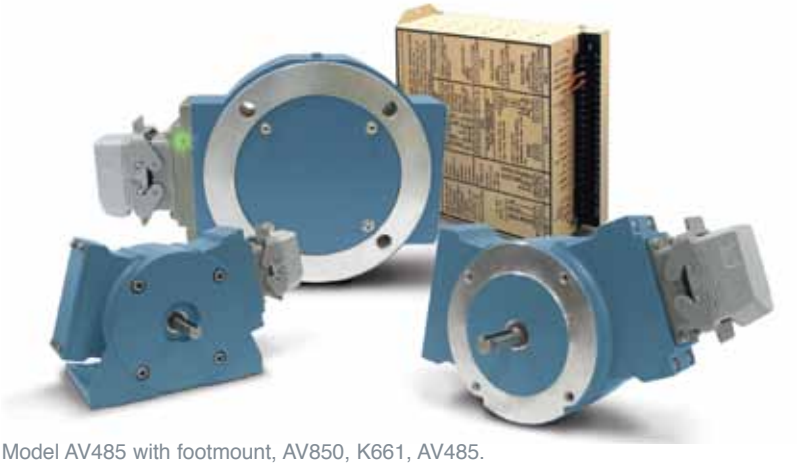
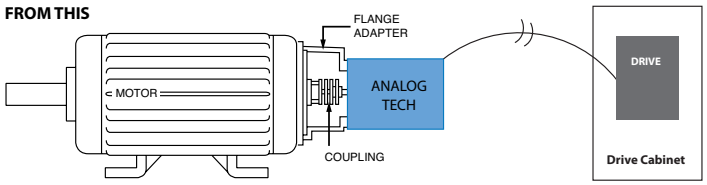
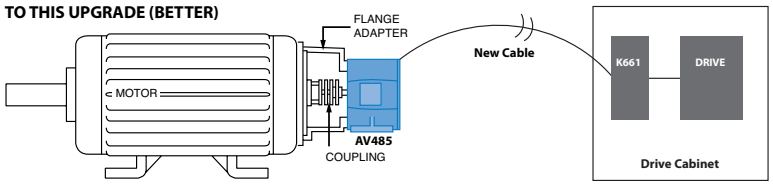
ANALOG RETROFITS

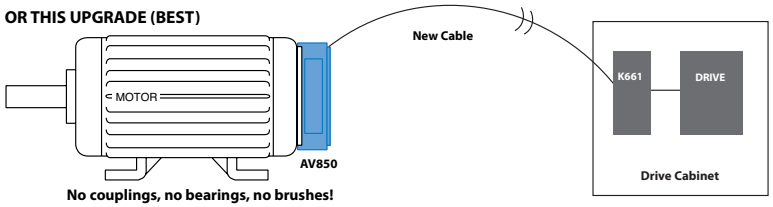
Nidec-Avtron's retrofit solutions directly replace obsolete tachogenerators such as GE 5PY, 5BC42, 5BC46, & 5BC66 with durable magnetic encoders and signal converters, without any drive changes. Enjoy the benefits of more-linear and more-reliable operation, combined with widely interchangable spare parts.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



Model AV485 with footmount, AV850, K661, AV485.







Encoder Options & Accessories

SHAFT GROUNDING BRUSHES

Motor shaft currents can cause damage to both the motor and the encoder bearings. Select Avtron encoders have an integral shaft grounding brush option.

Model M3 encoder with shaft grounding brush.

MOTOR SHAFT ISOLATION

The HS25A, HS35A & HS45 hollow shaft encoders are available with a shaft isolating insert to insulate the encoder from the motor shaft. This eliminates induced shaft currents common to AC motor applications. The HS35M features a fully insulated housing for shaft isolation. No bearing, modular encoders, AV5 through AV850 are inherently isolated from shaft currents.

Avtron model HS25A with isolating insert

OVERSPEED SWITCHES

The AV45, AV85, AV485, AV685, AV850 and HS45 encoders can be mounted with a mechanical overspeed switch on the same shaft assembly. This single assembly eliminates the need for couplings or foot mounting pedestals.

Avtron models (from left) AV685 with 3rd party overspeed switch, HS45 with integral overspeed switch.

Output Specifications

OUTPUT CHART 0		Voltage Input (Vin)	Protection	Maximum Cable Drive (feet)
AV20, AV25, HS25A, HS35A Line Driver Options	1	5-28 VDC	Reverse Voltage, Transient, Short Circuit	500 ft. [150m]@5V 250 ft. [75m]@12V 125 ft. [50m]@24V
	2	5-28 VDC		500 ft./150m
	3*	5-15 VDC		1000 ft./300m
	4	5-28 VDC (5V out)		500 ft./150m

* Available only on AV25, no short circuit protection for this option.

OUTPUT CHART 1		Voltage Input (Vin)	Protection	Maximum Cable Drive (feet)
M3, M4, M6, M7 Line Driver Options	1	5-24 VDC	Reverse Voltage, Transient, Short Circuit	1000 ft [300m]@5V 500 ft [150m]@12V 200 ft [60m]@24V
	2	5-18 VDC	Reverse Voltage, Transient	2000 ft. [600m]
	3	12-24 VDC	Reverse Voltage, Transient, Short Circuit (low)	1000 ft. [300m]
	4	5-24 VDC (5V out)*	Reverse Voltage, Transient, Short Circuit	
	8	6.5-24 VDC**	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft. [300m]

* N/A on M6 and M7.
** N/A on M3

OUTPUT CHART 2		Voltage Input (+V)	Protection	Maximum Cable Drive (feet)
AV45, AV56, AV56S, AV67, AV85, AV115 AV125, AV485, AV685, AV850, HS35M, HS45, XT45 Line Driver Options	6	5-24 VDC	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft [300m]@5V 500 ft [150m]@12V 250 ft [75m]@24V
	8	5-24 V (5-15 V*)		2000 ft. [600m]
	9	5-24 VDC (5V out)		1000 ft. [300m]

* HS35M only.

OUTPUT CHART 3		Voltage Input (+V)	Protection	Maximum Cable Drive (feet)
XR4F, XR45, XR47, XR56, XR67, XR85, XR115, XR125, XR485, XR685, XR850 Line Driver Options	F, H, 5	(Level 1) 12-24 VDC (10.6V out)	Reverse Voltage, Transient, Short Circuit	500 ft. [150m]
	G, 7	(Level 2) 5-24 VDC		500 ft. [150m]@5V 500 ft. [150m]@12V 200 ft. [60m]@24V

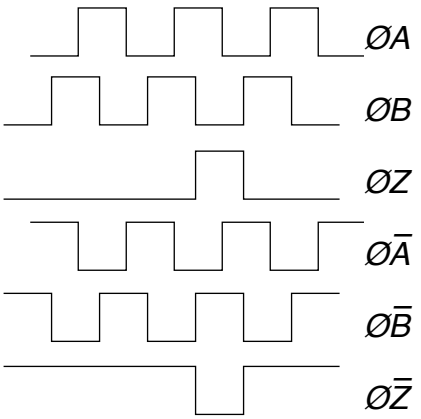
OUTPUT CHART 4		Voltage Input (+V)	Protection	Maximum Cable Drive (feet)
XRB1		12-24 VDC (10.6V out)	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft.
XRB2		12-24VDC	Reverse Voltage, Enhanced Transient, Enhanced Short Circuit	1000 ft.

OUTPUT DESCRIPTION

Most Avtron incremental encoders have a two square wave output: A Quad B (A, B) 90° out of phase, with complements (A–, B–). Marker pulses (Z) are available on most units. Resolver and sine-cosine outputs also available on Admotec components.

OUTPUT WAVEFORMS

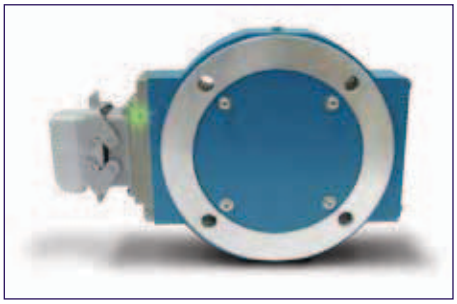
A Quad B: Two Square Waves 90° out of Phase with Complements



–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/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 II Diagnostic LED (AV850 shown)

Encoder Product Comparison

		Non-Hazardous Application Models and Options					All Application Options (Hazardous and Non-Hazardous)				
Enclosure	Mounting Style	Model	Temperature Range	Std Output	Grounding Brush	Overspeed switch	Sensing	Shaft or Bore Size		Pulses per Revolution (PPR)	Max Turn Count
								US	Metric		
Components	Modular	KX	-40C to +115C	3.3-5V	N	N	Magnetic	5/16”- 10”	8-250mm	1-45000	1
Light Mill Duty	Face or Foot	AV6A	-40C to +85C	(per bus)	N	N	Optical		6-10mm	65536	1-16384
	Face or Foot	AV6M	-40C to +85C	(per bus)	N	N	Magnetic		6-10mm	8192	1-32768
	Face or Foot	AV20	-40C to +100C	Chart 0	N	N	Optical	1/4”, 3/8”	10mm	1-3600	1
	Face or Foot	AV25	-40C to +100C	Chart 0	N	N	Optical	1/4”, 3/8”	10mm	1-5000	1
	Face or Foot	HS6A	-40C to +85C	(per bus)	N	N	Optical	5/16”-9/16”	8-15mm	65536	1-16384
	Face or Foot	HS6M	-40C to +85C	(per bus)	N	N	Magnetic		6mm	8192	1-32768
	Hollow Shaft	HS25A	-20C to +100C	Chart 0	N	N	Optical	3/8” - 3/4	6-16mm	1-3600	1
	Hollow Shaft	HS35A	-20C to +100C	Chart 0	N	N	Optical	1/2” - 1”	12-20mm	1-5000	1
Mill Duty	Hollow Shaft	HS35M	-20C to +85C	Chart 2	N	N	Magnetic	1/2” - 1 1/8”	12-20mm	8-3600	1
	Hollow Shaft	M3	-40C to +85C	Chart 1	Y	Y	Optical	1 1/2”- 2 3/8”	48-60mm	240-2500	1
Heavy Mill Duty	B10 Face or Foot	AV45	-40C to +100C	Chart 1	N	Y	Magnetic	5/16” - 11/16”	9-18mm	8-5000	1
	Modular 4.5”	AV56	-40C to +100C	Chart 2	N	Y	Magnetic	1/2” - 3 3/16”	10-85mm	8-5000	1
	Modular 4.5”	AV56S	-40C to +100C	Chart 2	N	Y	Magnetic	1/2” - 3 3/16”	10-85mm	8-5000	1
	Modular 6.75”	AV67	-40C to +100C	Chart 2	N	Y	Magnetic	1/2” - 3 3/16”	10-85mm	8-5000	1
	Modular 8.5”	AV85	-40C to +100C	Chart 2	N	Y	Magnetic	1/2” - 3 3/16”	10-85mm	8-5000	1
	Modular 115mm	AV115	-40C to +100C	Chart 2	N	Y	Magnetic	1/2” - 3 3/16”	10-85mm	8-5000	1
	Modular 12.5”	AV125	-40C to +100C	Chart 2	N	Y	Magnetic	1 3/8” - 7 7/8”	25-200mm	8-8192	1
	Modular 8.5”	AV850	-40C to +100C	Chart 2	N	Y	Magnetic	5/8” - 4 1/2”	16mm-115mm	8-5000	1
	Hollow Shaft	HS45	-40C to +100C	Chart 2	N	Y	Magnetic	5/8” - 1 1/8”	16-30mm	8-5000	1
	Hollow Shaft	M4	-40C to +85C	Chart 1	Y	N	Magnetic	1 1/2”- 2 3/8”	48-60mm	240-1200	1
	Hollow Shaft	M7	-40C to +80C	Chart 1	N	N	Magnetic	1”- 2 3/8”	25-60mm	240-1200	1
Severe Mill Duty	Modular Sensor	AV5	-40C to +100C	Chart 2	N	Y	Magnetic	5/8” - 4 1/2”	16mm-115mm	8-5000	1
	Modular Sensor	AV12	-40C to +100C	Chart 2	N	Y	Magnetic	1 3/8” - 7 7/8”	25-200mm	8-8192	1
	Face or Foot	AV30	-40C to +85C	(per bus)	N	N	Magnetic	3/8”, 5/8”	6-18mm	8192	1-32768
	56C Face or Foot	AV485	-40C to +120C	Chart 2	Y	Y	Magnetic	5/8”	15.88mm	8-5000	1
	Hollow Shaft	HS40	-40C to +85C	(per bus)	N	N	Magnetic	5/8”- 1 1/8”	16-30mm	8192	1-32768
	Hollow Shaft	AV685	-40C to +120C	Chart 2	Y	Y	Magnetic	1 1/8”	28.58mm	8-5000	1

Encoder Product Comparison

							Hazardous Duty Applications					
Model	Max Speed RPM	Max Freq kHz	Max Outputs	Thru Shaft	Replaceable Sensors	Diagnostics	Model	Temperature Range	Output	Certifications		
										UL Cl /Div	UL Cl /Zone	ATEX
KX	100k	500k	1	Y	N	N						
AV6A	*6k/12k+	NA	1	N	N	Y						
AV6M	12k	NA	1	N	N	Y						
AV20	6000	125k	1	N	N	N						
AV25	6000	125k	1	N	N	N						
HS6A	*6k/12k+	NA	1	N	N	Y						
HS6M	12k	NA	1	N	N	Y						
HS25A	6000	125k	1	N	N	N						
HS35A	6000	125k	1	Y	N	N						
HS35M	4700	125k	2	Y	N	N						
M3	5000**	150k	2	Y	N	N						
AV45	5000	165k	2	N	N	Y	XR5F	-40C to +80C	Chart 3	Y	Y	Y
AV56	5000	165k	2	Y	N	Y	XR56	-40C to +80C	Chart 3	Y	Y	Y
AV56S	5000	165k	1	Y	N	Y						
AV67	5000	165k	1	Y	N	Y	XR67	-40C to +80C	Chart 3	Y	Y	Y
AV85	5000	165k	2	Y	N	Y	XR85	-40C to +80C	Chart 3	Y	Y	Y
AV115	5000	165k	2	Y	N	Y	XR115	-40C to +80C	Chart 3	Y	Y	Y
AV125	5000	165k	2	Y	Y	Y	XR125	-40C to +80C	Chart 3	Y	Y	Y
AV850	5000	165k	2	Y	Y	Y	XR850	-40C to +80C	Chart 3	Y	Y	Y
HS45	5000	165k	2	Y	N	Y	XR45	-40C to +80C	Chart 3	Y	Y	Y
M4	5000**	150k	2	Y	N	N						
M7	5000**	150k	2	N	N	N	M6C**	-40C to +80C	Chart 1	N	N	Y
AV5	NA	165k	1	Y	Y	Y	XR5	-40C to +80C	Chart 3	Y	Y	Y
AV12	NA	165k	1	Y	Y	Y	XR12	-40C to +80C	Chart 3	Y	Y	Y
AV30	5000	NA	1	N	N	Y						
AV485	5000	165k	2	Y	Y	Y	XR485	-40C to +80C	Chart 3	Y	Y	Y
HS40	5000	NA	1	N	N	Y						
AV685	4000	165k	2	Y	Y	Y	XR685	-40C to +80C	Chart 3	Y	Y	Y

* *-40°C rating is optional.*

** *3600 RPM max. for bore > 2" [52mm].*

^ *Optional, standard temperature range is -40° to 130°C.*

^^ *Analog position signals of resolver are converted to digital signals by external analog-to-digital board not provided by Avtron.*

\+ *6000 RPM multi-turn, 12000 RPM single-turn*

CE *All Avtron and Admotec brand products shown in the specifications table above are CE Rated.*

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