



Kollmorgen's New High Resolution Sine Encoder Systems



Performance & Flexibility

KOLLMORGEN

The Sine Encoder Advantage From Kollmorgen

Sine encoders are the perfect match for high performance Kollmorgen motors, providing the following benefits:

- **Increased resolution**
 - Improved velocity control
 - Improved repeatability
 - Increased system stiffness
 - Reduced position dither
- **Increased accuracy**
- **Absolute position information**

And now you can get it on all Kollmorgen motor types!

The Basics

Sine encoders provide position information to the SERVOSTAR® drive in the form of analog sine/cosine signals. By sending these signals as sine waves (as opposed to pulse incremental encoders) the receiving electronics can decode the sine waves to a very fine resolution - a process called interpolation. The SERVOSTAR® product line interpolates internally each sine wave to 1024 counts. With the Kollmorgen GOLDLINE® DDR at 2048 sines per rev you can achieve an amazing 2,097,152 counts per revolution... or 0.62 arc.sec of resolution!



PLATINUM DDL with sine encoders used on precision inspection equipment and pick and place machines.

Improved Velocity Control: The increased resolution improves the system's velocity performance by giving more information to the velocity loop controller which, in turn, reduces truncation and quantization errors and allows higher loop gains - very important characteristics for high inertia and mass loads typical of DDR and DDL motor applications.

Improved Repeatability: Repeatability is a direct function of system resolution - as the resolution increases so does repeatability.

Increased System Stiffness: Increased position resolution of the sine encoder system provides a higher gain for position and velocity loops resulting in superior system stiffness. The higher resolution also allows for higher proportional gain to correct for torque disturbances.

Reduced Position Dither: High velocity and position loop gains typical of DDR and DDL applications can cause a motor to dither back-and-forth by a least-significant-bit (LSB) of the feedback resolution. Increased resolution reduces dither by reducing the significance of an LSB.

Increased Accuracy: The increase in feedback accuracy (down to ± 20 arc.sec compared to ± 600 arc.sec for resolvers)

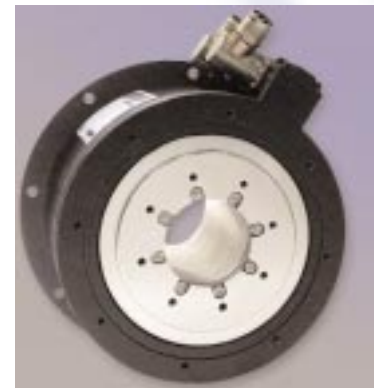
has obvious benefits when attempting to position a load but also provides the benefit of reduced velocity ripple. When the application demands perfect film coating or mirror-like surface finish, Kollmorgen high resolution sine encoder systems are the best choice.

Absolute position information: Kollmorgen sine encoder systems are available in single-turn or multi-turn absolute devices. The Kollmorgen multi-turn sine encoder offers the advantage of being able to know where the load is on a cold power-up without homing - simply by querying the SERVOSTAR®'s serial port. This can be a great advantage during intermittent power failures by reducing scrapped parts or simplifying the removal of a robot arm that had articulated its way into a work piece cavity.

Putting it all together: Kollmorgen's sine encoders provide your servo system with the increased performance demanded by many applications today...and you won't have to wait on them since they are standard offerings at standard lead times, just like our resolver based systems. We also save you the hassle of mounting those bulky interpolation boxes by packaging the Kollmorgen interpolation electronics in our SERVOSTAR® drives!



Kollmorgen GOLDLINE XT with sine encoder used for high speed registration on packaging machines.



Kollmorgen GOLDLINE DDR with sine encoders used on precision coating and web tensioning systems.

So, what's your sine today? Rotary, DDR, DDL?

Kollmorgen provides the tools for . . .

... Freedom Of Design

Kollmorgen sine encoder systems are available on all motor technologies, Rotary, DDR (Direct Drive Rotary, and DDL (Direct Drive Linear)...and all of these are compatible with Kollmorgen SERVOSTAR® CD/S/600 drives. That's less training, less stocking, and less cost, but with the freedom to use the best motor for each axis...only from Kollmorgen.

Both SERVOSTAR CD/S and SERVOSTAR 600 digital drive amplifiers are compatible with Heidenhain Endat™ sine encoders. The SERVOSTAR CD/S model number designation is **CB** and **SB** respectively. For complete technical description of sine encoder option card, see Application Note: ASU009H. The SERVOSTAR 600 comes standard with sine encoder capability.

Kollmorgen GOLDLINE® XT

For standard rotary applications, sine encoders offer high precision, resolution, and accuracy for applications such as high speed registration, film coating, web control, and low speed operation where smoothness of rotation is critical.

Motor Model Number	Outline variation from resolver version	Accuracy (arc-sec)		Internal Position Resolution (counts/rev)		Max Encoder Equivalent Output (counts/rev)		Sine Encoder Options Available	
		Feedback Device	System CB/SB/600	CB/SB	600	CB/SB	600	Single Turn Absolute	Multi-turn Absolute
30x	add 1.27" axial length	±60	±85	524,288	1,048,576	262,144	262,144	MT504A1- S	MT504A1- M
50x	No Change								
70x	No Change								

Kollmorgen GOLDLINE® DDR

For Direct Drive Rotary (DDR) applications, the use of sine encoders is particularly important since the added resolution provides the system the ability to achieve high gains, superior stiffness, and positioning accuracy vs conventional devices. Applications such as rotary tables, indexing assembly machines, roll drives, and film coating are ideal for DDR.

Motor Model Number	Outline variation from resolver version	Accuracy (arc-sec)		Internal Position Resolution (counts/rev)		Max Encoder Equivalent Output (counts/rev)		Sine Encoder Options Available
		Feedback Device	System CB/SB/600	CB/SB	600	CB/SB	600	Single Turn Absolute
06x	Inside Diameter = 1.69"	±20	±26	2,097,152	1,048,576	1,048,576	1,048,576	D101 M -13-1 3 10
08x								
10x								

Note: Continuous torque of GOLDLINE DDR motors is reduced slightly with sine encoders. Please contact KCSN (1-800-77 SERVO) for further information.

PLATINUM® DDL

For Direct Drive Linear (DDL) applications, sine encoders provide the same benefits as in DDR applications. Stiffness, accuracy, and high servo gains all enhance the benefits of maintenance-free DDL products in applications such as inspection, pick and place, large X-Y tables, and gantry systems.

Kollmorgen can supply various feedback devices with our DDL motors. However, you can select your own device as long as it is compatible with the SERVOSTAR CB/SB series. The linear sine encoder should be:

- Sine/cosine output: \sim 1Vpp nominal
- With or without single reference mark
- 125kHz max input frequency to SERVOSTAR CB/SB drives (fundamental sine/cosine wave frequency)

Kollmorgen is committed to continuing product development and the application of new technology. We recommend that you contact the KCSN (1-800-77 SERVO) for complete evaluation of system compatibility with our drives.

Cable Sets for Kollmorgen GOLDLINE® XT & Kollmorgen GOLDLINE DDR Standard Products

Amplifier Model	Continuous Current Rating	Brake	Cable Set Number (xx is length in meters)	Maximum Cable Length		Applicable Motor Products
				Feet	Meters	
SERVOSTAR® CB & SB	Up to 10 amps	No	CS-SS-S3HA1HE-xx	128	39	All DDR
		Yes	CS-SS-S3HA1HE-xx	154	46	Small XT
			CS-SS-S3HAAHBE-xx			
SERVOSTAR® SB	Up to 20 amps	No	CS-SS-S3HA2HE-xx	154	46	Large XT
		Yes	CS-SS-S3HABHBE-xx			
SERVOSTAR® 600	Up to 10 amps	No	CS-SS-S3HG1HE-xx	128	39	Small XT, all DDR
		Yes	CS-SS-S3HGAHBE-xx			Small XT
	Up to 20 amps	No	CS-SS-S3HG2HE-xx			Large XT
		Yes	CS-SS-S3HGBHBE-xx			Large XT

Note: Contact KCSN (1-800-77 SERVO) for maximum cable lengths for multi-turn absolute or 24 VDC control power option on SERVOSTAR CB.

Kollmorgen enjoys a reputation of excellence based on constant endeavors to update products. Information in this brochure is subject to change.

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