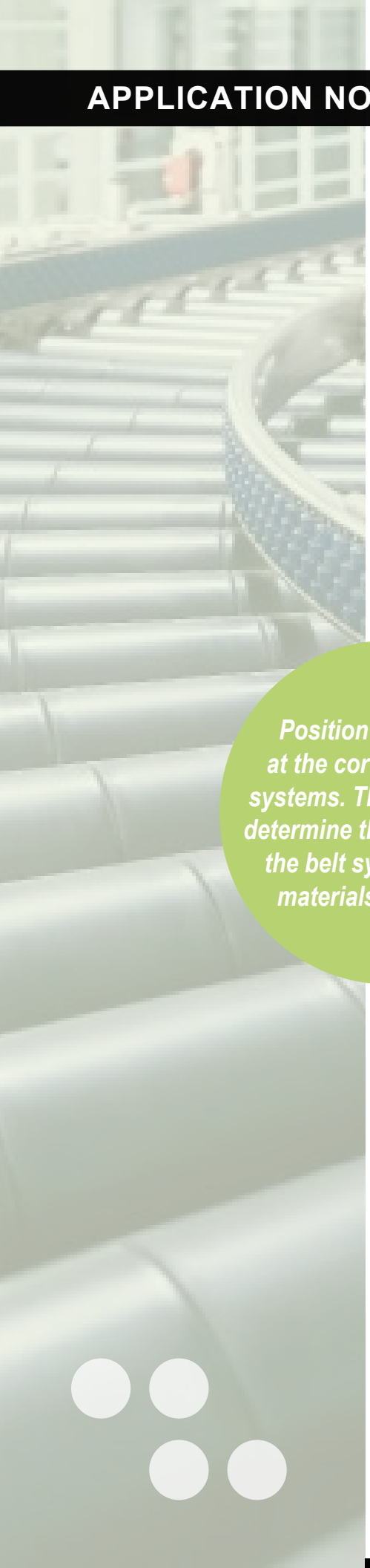


APPLICATION NOTE

Sensata Technologies

SENSATA SOLUTIONS FOR CONVEYOR BELT SYSTEMS

Background

Factory automation is growing in demand globally. Suppliers and distributors have seen a dramatic increase in the volume of goods, adding to the need for more automated warehouses. To meet this demand, manufacturers are building new automated plants while retrofitting old factories to increase productivity. Central to factory automation is the conveyor belt. This application moves product from point A to point B in an efficient manner, while also allowing the items that travel on it to be sorted, augmented or modified in some way. Factory outfitters and manufacturers are looking for ways to decrease wear and tear, increase capabilities and improve communication of conveyor belt systems.

Position sensors are at the core of conveyor systems. They are used to determine the movement of the belt system and the materials on the belt.

Solution

Maintenance reduction, downtime reduction and control are three core areas in which conveyor systems can be improved. End users want to reduce the cost of wear and tear on the components that drive the conveyor system. The less maintenance required, the fewer headaches, both operationally and financially. Users also want to reduce downtime of their system because downtime is lost production and therefore a loss in revenue. Finally, coordination between different applications across the conveyor system is increasing in importance as the entire factory becomes one ecosystem.

Switches and controllers are used to power the motors that move the conveyor belt. Our solid state relays and hybrid motor starters include functions that provide added control over the motor that drives the conveyor. Those added functions include soft start, soft stop, and motor reversing. Additionally, solid state relays have no moving parts, reducing wear and tear and increasing the longevity of the application.

Position sensors are at the core of conveyor systems. They are used to determine the movement of the belt system and the materials on the belt system. Encoders are used to determine the speed of the belt and specialty encoders are used to provide extra control of the system. For example, encoders are able to limit the maximum speed to ensure human safety near the conveyor system. Encoder modules supplement the signals encoders produce to help overcome application barriers. They can remove interference from high vibration environments or take an encoder and broadcast the signal to various downstream operations.

RECOMMENDED PRODUCTS

Reference on Diagram	Product	Function	Features	Brand
Switches & Relays				
1	SOLICON DRC Series 	The DRC series is a solid state contactor, built for frequent switching on 3-phase loads. It offers an interlock control that allows only off, forward and reverse operation in a safe mode, which can be utilized in conveyor systems that need to control the belt in the presence of humans.	• Interlock control allows safe forward and reversing operation • Fits 35mm DIN Rail • Rated for 3-phase loads up to 5 HP, 600 VAC, 7.6 Amps	Crydom
2	DRMS Series 	The DRMS series is a hybrid motor starter. It offers soft start, soft stop and motor reversing functions in a compact 22.5mm package. The soft start, stop and motor reversing functions extend the lifetime of conveyor systems; while the motor functions offer additional control on the movement of the belt.	• Soft Start, Soft Stop, and Motor Reversing Functions • Built-In Overload Protection • Optional Mains Isolating Relay	Crydom
3	DRA3R/DRA3P Series 	The DRA3 series is a solid state relay, capable of switching loads and motor reversing for small 3-phase AC motors up to 2 HP. Its 61mm wide DIN rail package doesn't require heat sinking up to 60°C, makes it an ideal, low-cost option for conveyor systems.	• No Heat-sinking required up through 60°C • UL and IEC Motor Ratings • 5 Variations of input control voltage available	Crydom
4	DP Series 	The DP4R is a DC reversing solid state contactor, which can be used for demanding DC applications that require frequent switching. It comes with reversing control and optional soft start, soft stop functions. It has an LED input status indicator that shows which direction control (forward, reverse) is being activated.	• Convenient FET switches in H-Bridge configuration • Optional Soft Start w/Brake, Soft Start/Soft Stop no Brake • cULus Recognized, IEC Rated, CE & RoHS Compliant	Crydom
Position Sensors				
5	H25 GEN2 + H20 GEN2 Series 	Encoders sense rotary position and are essential to the performance of conveyor belts. Optical encoders have high resolution and are very precise. They can sense and coordinate conveyor speed with other parts of the system in the loop. The H25 Series (2.5" shaft) and the H20 Series (2.0" shaft) are a bread and butter industrial encoder, built robustly for tough environments.	• Heavy duty precision bearings • Meets NEMA 4 and 13 requirements • EMI Shielding	BEI Sensors
6	DSM Series 	Cleaning or clearing conveyor jams means downtime and reduced productivity. Functional safety encoders can work with functional safety controllers and implement "Safety-Limited-Speed" to allow the conveyor to move in a safe manner while being cleaned or cleared. This speeds up the process and reduces downtime.	• SIL3 / Cat. 4 PLe rated • IP65 (IP69k functional safety encoders available) • Shafted and Hollow versions available	BEI Sensors
7	Anti-Dither Module 	Conveyor systems often can have a high level of wind-up or hysteresis. This can be a byproduct of an application or self-induced for special applications. This variability can cause controller miscounts with the signals produced by encoders. Anti-Dither Modules buffer the encoder signal to "clean up" the output, eliminating controller miscounts.	• See datasheet for case examples: - Case 1 - Starts & Stops - Case 2 - High Vibration	BEI Sensors
8	Broadcaster Module 	Some conveyor systems need to have multiple point-to-point communications. They may change operation based on the position or speed of one aspect of the application. This may require, for example: upstream position information to be communicated downstream. A Broadcaster Module helps accomplish this communication by isolating and precisely replicating the encoder signals. One Broadcaster Module can reliably transmit four copies of the original signal to various parts of the overall system. It can broadcast upstream encoder signals to downstream encoders or other operations to adjust their performance based on the "master encoder" signal.	• Broadcasts encoder signals to up to four independent receivers • Signal processing modules can be added to each output for additional capabilities • Accepts single ended, differential and open collector input voltages	BEI Sensors

CONVEYOR BELT SYSTEMS


SOLICON DRC Series


DRMS SERIES


DRA3R/DRA3P Series

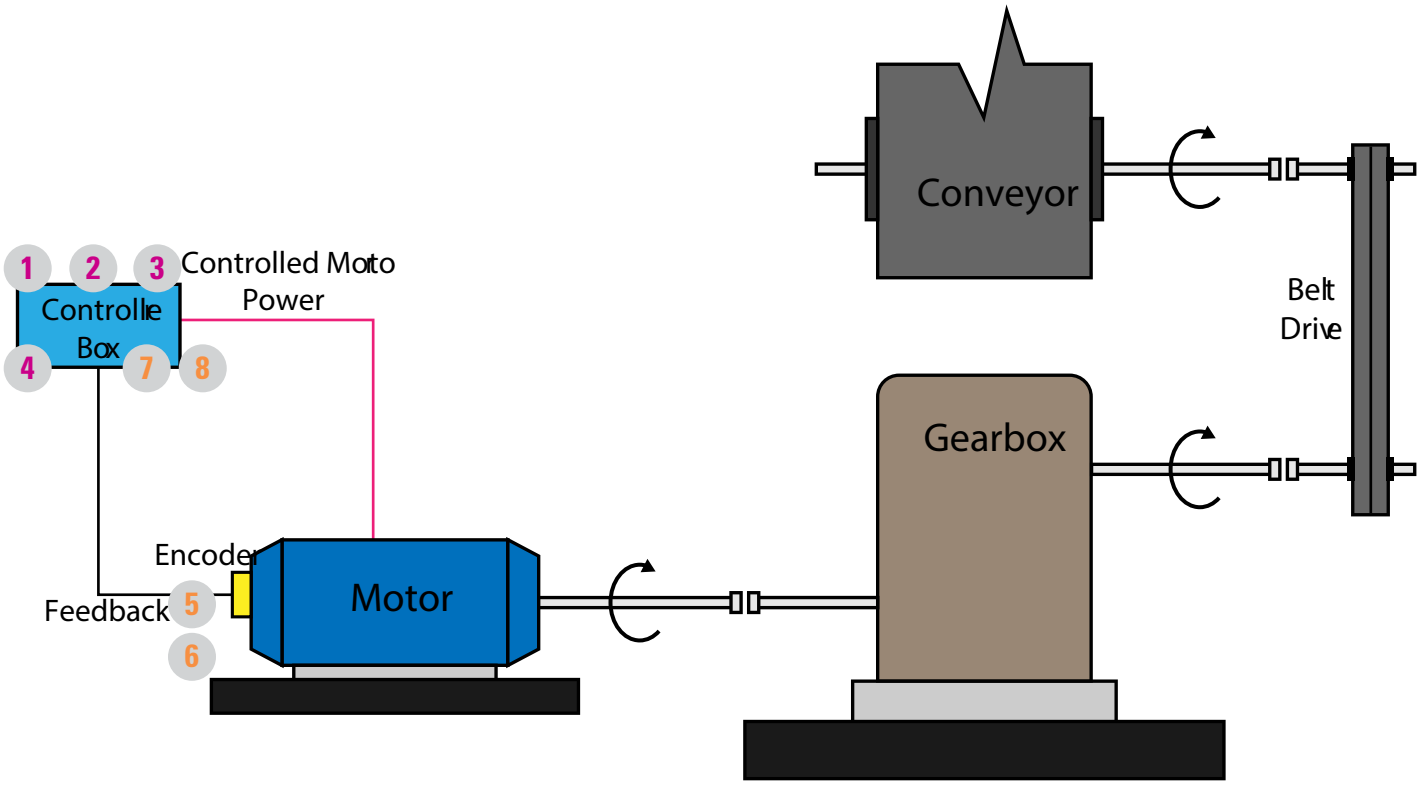

DP Series


H25 GEN2 + H20 GEN2 Series


DSM Series


Anti-Dither Module


Broadcaster Module



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