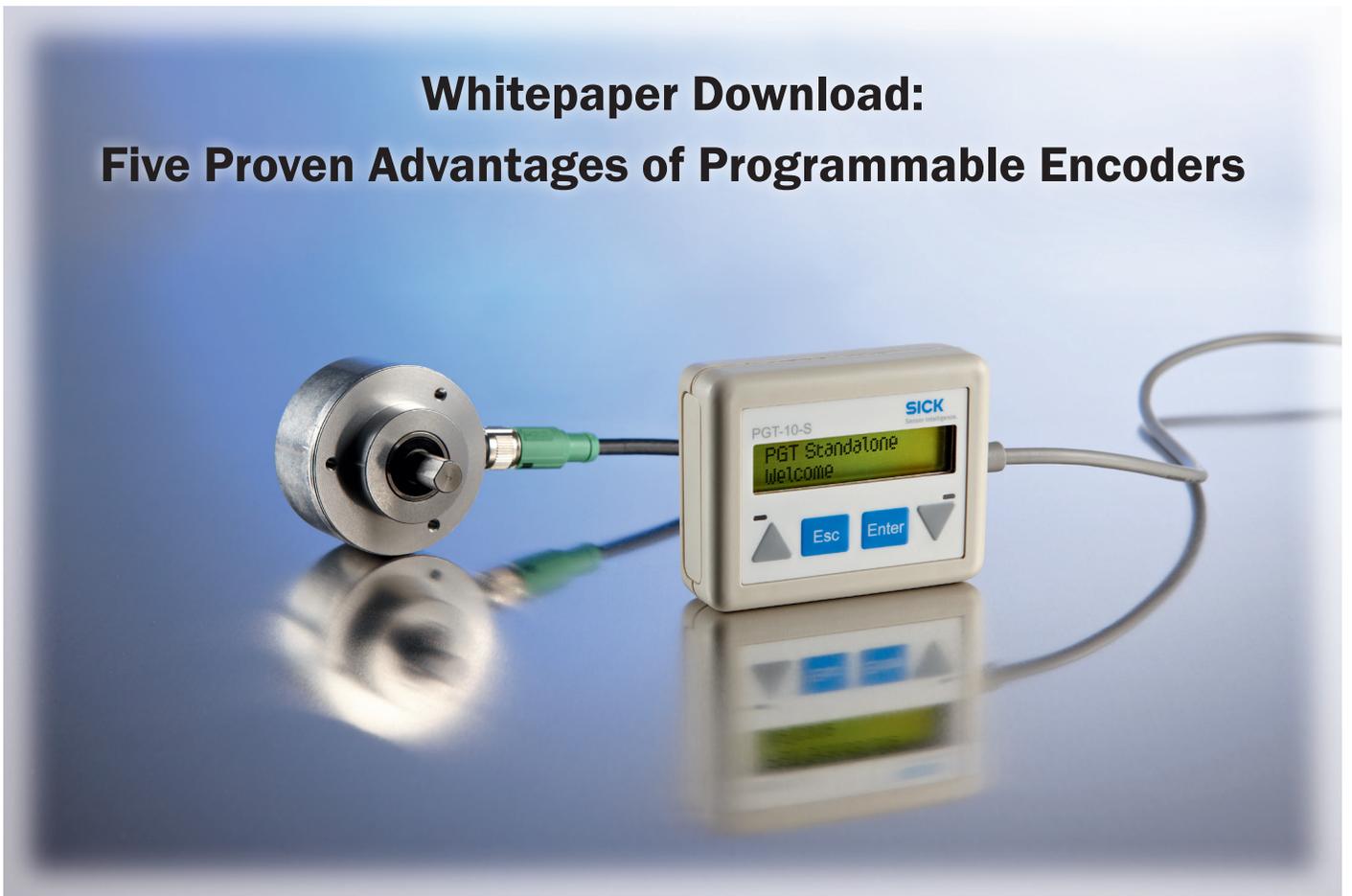


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Whitepaper Download: Five Proven Advantages of Programmable Encoders



A programmable encoder can be programmed to any line count in either the field or during production. It provides benefits to both the end user and the manufacturer. Read the whitepaper to learn the 5 proven advantages of using programmable encoders in your manufacturing processes.

Five Proven Advantages of Programmable Encoders

Encoders are used in a variety of manufacturing plants, primarily to determine a motion control axis position or to obtain speed feedback. A traditional optical encoder is a very simple sensor that uses a fixed code disc (a circular slotted ring to cyclically manipulate a light source) to produce an electrical signal, usually a square wave output. When the disc is rotated between a light source and a photodiode, the output signal corresponds to the light being passed through or blocked from the photodiode. The number of times the signal is high corresponds to the number of slots on the code disc, which is typically referred to as the line count, resolution, or pulses per revolution.

Historically, code discs contained a fixed line count, which increased manufacturing and production constraints if a different or higher resolution was required. Therefore, any changes to the customer's requirements meant obtaining a new encoder and increasing inventoried parts, resulting in higher costs. In addition, manufacturers are required to stock all parts needed to build any specific encoder configuration, or risk excessive lead times to fulfill customers' basic delivery needs. As a result, a programmable encoder, which can be programmed to any line count in either the field or during production, provides benefits to both the end user and the manufacturer. Following, are five proven advantages of using programmable encoders in your manufacturing processes.



Reduce Costs

The most obvious advantage of programmable encoders is the reduction of replacement and inventory costs. Instead of stocking encoders of different line counts, one programmable encoder will suffice. However, as any frequent user of encoders may realize, programming only the line count does not account for other parameters, such as the output signal voltage or marker pulse alignment. The best option is to obtain an encoder that offers several programmable parameters. Minneapolis-based SICK, Inc. offers a line of DFS incremental encoders that features a programmable line count as well as a programmable electrical interface. The company also offers the AFS/AFM series of programmable absolute encoders, on which different features are programmable depending on the interface selected. This provides significant cost savings in supply chain logistics. Also, in case of a failure, the encoder can be easily programmed and replaced immediately without causing any delays in production, reducing any replacement costs.

Save Time

Setting the marker pulse (marker pulse indicates an absolute position within a revolution of the encoder) at any given point based on the user's preference reduces setup time of an encoder. Usually, when an incremental encoder is installed, the marker/zero pulse is used as a reference signal. In some applications, an oscilloscope is used to monitor the channel so the encoder shaft can be carefully adjusted to trace the starting point. With the DFS series, the marker pulse can be programmed via the easy-to-use programming interface, set remotely by applying a signal on a dedicated pin, using RS-485 commands from a PLC or a HMI display. This saves time and energy during installation. With the AFS/AFM absolute series, the zero position can be remotely set via programming, external signal, or over the network, depending on the electrical interface used. Easier maintenance in the field due to intelligent use of the marker pulse by adjusting to the width of the signal to indicate an additional parameter (e.g., angle) is an added benefit for customers.

Gain Flexibility

Another great benefit of using programmable encoders is the flexibility they offer. Programmable encoders are an indispensable tool for OEMs and machine designers when component procurement is required for a project but the actual design requirements are not fully defined. Programmability offers the flexibility to match any changing needs of the end user. A key differentiation that SICK's encoders offer is the ability to program any integer line count (between 1 to 65,536 on DFS60 incremental encoders and up to 18 bits on AFS/AFM60 absolute encoders) without being restricted to binary line counts only. The encoders can be reprogrammed as many times as needed by the user; the high resolution removes the need for any additional interpolation and gives a high degree of accuracy and precision that is needed for most applications.

Increase Programming Options

With all the advantages programming offers, end users need to be aware of the different programming methods available in the market. The programming options include DIP switches, stand-alone tools, serial/USB interface and control system integration using a PLC or an HMI unit. Selecting the appropriate tool is dictated by the end user's preference, with greater prominence given to the simplicity and accessibility of the programming tool. SICK offers a wide range of user-friendly programming options for both the AFS/AFM60 absolute encoders and the DFS line of incremental encoders. Users can use a USB-based tool or a portable handheld programming tool (see photo), they can automate programming through a set of commands to communicate via a PLC serial port, or they can integrate on-the-fly programming into their control system on a Windows CE-based HMI.



The most common choice of users has been the USB programming interface, which saves the settings of the encoder and makes cloning additional encoders very efficient.

Improve Diagnostics/Condition Monitoring

The programming software interface can be used as a condition monitoring tool as well as for monitoring parameters like position or angle during the initial integration, or when performing maintenance or making adjustments while running operations. Programming tools can be used in the field to remotely read label information of encoders that are not easily accessible, reading the electrical parameters that the programmable encoders are currently set to and also testing operation of the encoder when in use on the line by displaying the position and pulse count data. This helps users quickly identify encoders for replacement, read the electrical settings of the encoder and make any changes as needed on the line, and check for any encoder data errors on the line itself. These additional diagnostic and monitoring capabilities help identify problems during operation, reducing downtime.

In addition to the benefits of programming, the DFS and AFx60 encoders offer a wide range of mechanical features, including a metal code disc that is more resistant to shock and vibration than glass discs and withstands higher temperatures (-20°C to 100°C) than plastic discs; shaft bearings significantly spaced apart so there is no uneven loading even while running at high speeds; and an IP 65 enclosure rating and well-insulated collets to avoid shaft leakage currents. With SIL1 rated versions planned in the future for safety applications and stainless steel housings that offer higher IP ratings, the latest encoders from SICK can be seamlessly adapted to any application.

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