Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors

MTS SENSORS

Closed Error Signal Utility (Option F) for G-Series Digital-Pulse Output Sensors

Document Part Number
550983 Revision A

Technical Tip

Utility Interface Examples

Summary

When shock and vibration events exceed the sensor specification rating, the *Closed Error Signal Utility* will provide a PWM or Start/Stop output that is backward-compatible to interface cards and controllers designed for retired MTS Temposonics Tempo II and L-Series sensor models.

FAQ

Q When do I need the 'F ' option?

A Only when the following two conditions exist in the application: Extreme shock and vibration in excess of 15 g and the use of the specific Allen Bradley or Digitron Electronics interface cards listed under the section "Sensors and Interface card/ controllers affected".

Q Does this change the sensors measurement performance?

A No, the measurement performance does not change. What changes is the way in which an error signal (due to high shock) is reported to the controller.

Q What 'problem' does this solve?

A It replicates the specific failure mode of retireder sensors and minimizes the frequency of "Tempo Fault" reports from the controller in high shock and vibration conditions.

Sensors and Interface Cards/Controllers Affected

The Closed Error Signal Utility is only available for G-Series sensors with digital-pulse outputs, (i.e. PWM or Start/Stop). This utility should only be used if the controls for the machine application include interface cards listed below.

Allen Bradley

1771-QB, Linear Positioning Module 1756-HYD02, ControlLogix motion interface card for LDT feedback

Digitron Electronics

STD-5601, STD Bus Temposonics Interface Card, (when used with Coe controls and software)

Other interface cards/ controllers that are found to operate in a similar manner may also be applicable. Contact MTS Applications Engineering for more information.

Typically, this utility is only beneficial for those machine applications where the sensor is exposed to very high shock and vibration events exceeding 15 g RMS. However, it will not hinder normal operation when shock/vibration levels remain under 15 g's. The Closed Error Signal Utility changes the sensor's output for the following two error conditions:

1. High shock/vibration levels exceeding sensor specifications
2. Magnet not detected

During these error events, the Closed Error Signal Utility will produce an output signal waveform that corresponds to a value of just over the 100% full stroke position. Therefore, the Closed Error Signal Utility should only be used with interface cards/controllers that are designed to process this sensor output appropriately.

Ordering G-Series Sensors with the Closed Error Signal Utility (Option F)

New G-Series sensors with digit-pulse outputs can be ordered with the Closed Error Signal Utility enabled by using the '**F**' designator in the model number as shown below.

G-Series Digital-pulse Output Selections

RF *X* = Start/Stop with Closed Error Signal type. If more than one magnet the *'X'* denotes the number of magnets in hexadecimal, (2 to F).

FI *X* = PWM, internal interrogation with Closed Error Signal type. The X denotes number of circulations in hexadecimal, (1 to F)

FE *X* = PWM, external interrogation with Closed Error Signal type. The *'X'* denotes number of circulations in hexadecimal, (1 to F).

Example:

Model number *'GH T 0120U RB1 2 FE8'* denotes a GH sensor with: raised-face flange, 12.0 inches of stroke, 1 foot integral cable with male in-line RB connector, 9 to 28.8 Vdc input voltage, and PWM output having external interrogation with 8 circulations and the Closed Error Signal type.

Programming the Error Signal Type

The Closed Error Signal Utility is included in all G-Series digital-pulse sensors having firmware revision 1.08, or later. Firmware revision 1.08 was released to production on August 1, 2006, starting with sensor serial number *'90093884'*.

Including the Closed Error Signal Utility in the sensor firmware allows users to change the error signal type in the field. The G-Series PC Setup Software, *(revision 1.04, or later)*, provides an *'Error Signal Type'* pop-up selection box located in the *'Factory Functions'* main menu. You must first enter a password before the pop-up selection box will display. Use the password '***becareful***'.

Choose from one of the two selections:

'**Error Signal Type: Open (standard)**'
or
'**Error Signal Type: Closed (option F)**'

If required, the Error Signal Type can be changed back to the previous setting. New sensors will be shipped from the factory with the Error Signal Type Closed only if the sensor is ordered with the option *'F'* designator in the model number.

Background

During very high shock/vibration events retired Tempo II or L-Series sensors, (PWM or Start/Stop output models), may generate output signals in response to noise spikes rather than the actual magnet return signal. When this happens, these sensors will produce bad data output values.

The interface cards and controllers, typically seen in the wood industry, have been programmed to filter out bad data, or to average the sensor data values, to still allow proper operation of the system.

Temposonics G-Series sensors have replaced the now retired Tempo II and L-Series sensor models. The G-Series electronics has greatly improved noise filtering compared to the Tempo II and L-Series. It is more than seven times better than the Tempo II in shock and vibration performance. However, when exposed to very high shock and/or vibration levels that are above the G-Series specifications, the G-Series sensor may fail to capture the magnet return signal. For PWM sensors the usual falling edge of the PWM waveform will not be produced in the output signal, or for Start/Stop sensors, the Stop signal will not be produced.

This failure mode output should be interpreted as a *'not valid data'* type error. However, most interface cards/controllers are currently programmed for the retired Tempo II sensor. They will immediately trigger a *'Tempo Fault'* or *'loss of feedback'* type of error, whenever the PWM falling edge, (or Stop signal), is not found within the controller's cycle time setting.

The Closed Error Signal Utility will make the sensor electronics produce a falling edge of the PWM signal, (or produce a Stop pulse), even if the magnet return signal is not properly detected. Therefore, the usually expected output waveform is completed, or "closed", *(see Figures 1 and 2)* on page 3.

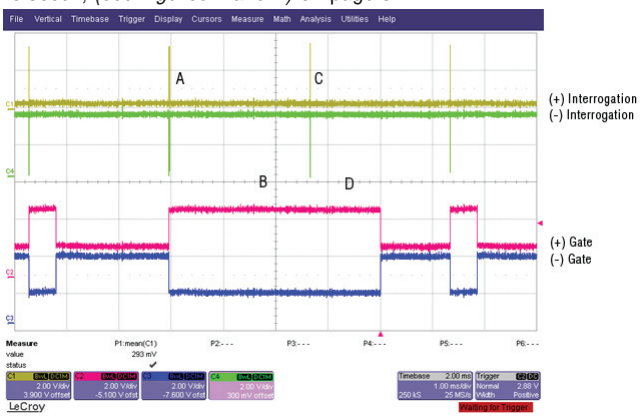

Figure 1. Open Error Signal Type (Standard)

A single high shock event, (not shown), that happened directly after the interrogation signal labeled '**A**', was over 15 g. As seen in the bottom set of oscilloscope traces, the corresponding output PWM waveform labeled '**B**', was not completed, (no falling edge), until after the next interrogation signal, labeled '**C**', and the subsequent sensor output cycle labeled '**D**'.

Figure 2. Closed Error Signal Type (Option F)

In *Figure 2*, the same high shock event is repeated directly after the interrogation signal, labeled '**E**'. This time the bottom scope traces show that the output PWM waveform, labeled '**F**', is completed before the next interrogation signal, labeled '**G**'. The Closed Error Signal Utility produced a falling edge for the PWM waveform at the last instant of the sensor's measurement cycle, corresponding to a value of just over the 100% full stroke position.

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