WOODWARD

Application Note 51652
(Revision -, 8/2024)
Original Instructions

High Output Digital Valve Positioner 10K Peak Input Current Issue

Contents

Problem Information

Introduction

A series of Woodward valves and actuators are supported by the High Output Digital Valve Positioner (HODVP) 10K driver. A condition has been identified in the HODVP 10K driver operation that may create a fault condition due to high peak input current.

Read the following sections for additional detail on the issue, symptoms, likelihood of occurrence, workarounds, software revisions, and impacted units.

Background

The HODVP 10K driver has a boost converter to enhance the performance of the driver (refer to Woodward manual 26773 for additional information). Under typical use, the HODVP 10K driver internal bus is running directly from the input voltage (i.e. the boost converter is disabled). When dynamic conditions require additional drive voltage, the boost converter is enabled to boost the internal bus to approximately 400V, and additional input current is drawn during the time the internal bus is charged.

Description of Problem

An input current limiter algorithm is present that works to limit the peak input current value under various load conditions. However, there is an observed condition where the peak value is not adequately limited and may reach the level of a fault condition.

During certain changing demand conditions, the boost converter may be enabled such that the input current encounters a transient event that reaches the maximum input range of the input current sensor circuit. This results in a fault reported as Input Current High or Input Current Low, and one or both faults may occur during this peak event. The response from the HODVP is to annunciate the fault condition and to apply the configured fault response:

- Keep the position controller operational if the active fault is configured as an Alarm.
- Take the position controller operation offline if the active fault is configured as a Shutdown.

Symptoms

The outward symptom observable by a user is the presence of Input Current High and/or Input Current Low alarm during operation. These alarms are due to a transient event and should be clearable with a Reset command. If they do not clear with a Reset, then an unrelated, non-transient failure mode is present.

The typical alarm reported will be Input Current High, but the Input Current Low alarm may occur due to saturation of the input current sensing circuit. NOTE: There is no functional implication to the control behavior if this saturation condition occurs.

Likelihood of Encountering

A number of factors influence whether the situation will occur, such as the variance in the HODVP 10K input current sensing circuit, input voltage level to the HODVP 10K, input current capability of the supply voltage to the HODVP 10K, actuator load conditions, dynamic performance of the actuator, stroke length of the actuator, and the magnitude of a position demand change.

Investigation has shown the alarm condition is most likely to occur with a step-change in position demand where the change is > 5% Position and < 15% Position. This range of position demand change may cause the boost to become enabled after the motor is already moving at speed, and this condition requires additional input current to charge the boost converter.

A secondary factor that increases the likelihood of occurrence is the use of a lower nominal input voltage (such as 125V) on an actuator with high dynamic performance. This combination increases the peak input current which may be observed during actuator movement and enabling of the boost converter.

Fix

An enhancement to the input current limit operation has been implemented for several actuators in the 5418-8088A (version 6.13) DVP software. Note that this software is the first revision to support the two actuators mentioned below.

The enhanced input current limit accounts for the additional load during the transient event and maintains the input current at levels below the Input Current High threshold. The enhanced algorithm is in place for the following actuator part numbers based on their intended nominal input voltage range of 125V and the dynamic performance of the actuator:

- 9904-3721 (ELA80.03) – ELA80, 80KN 191MM STROKE, ZERO EXTEND, FREE, 818MM RETRACTED PIN TO PIN, CLEVIS
  - This actuator is only supported in DVP software 5418-8088A (version 6.13) or later.
- 9904-3722 (ELA150.03) – ELA150, 150KN 94MM STROKE, ZERO EXTEND, FREE, 942MM RETRACTED PIN TO PIN, CLEVIS
  - This actuator is only supported in DVP software 5418-8088A (version 6.13) or later.

The mentioned fix has not been implemented for additional actuators due to:

- An effective workaround is identified to avoid impact to position controller operation.
- The expected operational profile does not include step changes in the mentioned range.
- The absence of any reported issues from units currently in operation.
- Internal testing showed a low likelihood of occurrence.
- The potential for unknown/negative impact to performance for actuators already in use.

Workaround

A workaround to ride through the fault event is to ensure the Input Current High and Input Current Low faults are configured to the Alarm mode. This allows the unit to continue position controller operation in the presence of these faults.

Another mitigation to minimize the likelihood of occurrence is to avoid step-changes in position demand that are within the defined range.

Units Impacted

It is possible that these faults could occur with any actuator which can be run with the HODVP 10K driver. Review sections **Likelihood of Encountering** and **Workaround** for additional details.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at **https://www.woodward.com/support**, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Released

We appreciate your comments about the content of our publications.

Send comments to: industrial.support@woodward.com

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