

ROSEMOUNT INC.  
12001 Technology Drive  
Eden Prairie, MN 55344 U.S.A.  
(612) 941-5560  
TWX: 4310012 or 4310024  
FAX: (612) 828-3088

# Rosemount

October 10, 1989

Mr. Thomas Murley  
Office of Nuclear Reactor Regulation  
United States Nuclear Regulating Commission  
Washington, D.C. 20555

Re: Notification Under 10CFR21 on Rosemount Model 710  
Trip/Calibration units.

Dear Mr. Murley,

The purpose of this letter is to inform you that results of additional testing and analysis of components (precision resistors) similar to those reported in our August 17, 1989 letter indicates that they also may exhibit premature long term degradation. Rosemount has manufactured and shipped 38 Model 710DU0TT (known as 710 masters) to seven customers with these components. The product model number, serial number and purchase order number for the affected hardware shipped to these seven utilities has been provided in an attachment to those customers. The identified degradation of these components may result in shifts of varying magnitude in the reset differential adjustment. The accuracy and operability of the unit is not impaired, however the reset differential specification may no longer be met.

Rosemount does not have complete information relating to possible effects of such a shift in the application of the product. As a result we cannot evaluate the impact of this condition from an application viewpoint.

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We are providing the required information as follows:

1. Name and address of the individual providing information:

Mr. Stephen J. Wanek  
Vice President Operations  
Rosemount Inc.  
12001 Technology Drive  
Eden Prairie, MN 55344

2. Identification of the items supplied:

A total quantity of 38 Model 710DUOTT Rosemount master trip cards shipped to seven locations. A master trip card consists of one circuit card with a front panel. See attached Product Data Sheet 2471, page three for a description.

3. Identification of the firm supplying the item:

Rosemount Inc.  
12001 Technology Drive  
Eden Prairie, MN 55344  
ATTN: Mr. Stephen J. Wanek

4. Nature of the failure and potential safety hazard:

Under certain combinations of humidity, temperature, power, and duration, the suspect component will increase resistance value and can fail in an electrically 'open' state. These conditions may cause shifts of varying magnitudes in the reset differential adjustment.

The concern is that these conditions in a trip/calibration system, if undetected, could cause a trip unit to lose the stability feature provided by the reset differential circuitry.

The loss of stability on the reset differential circuitry could cause erratic off/on trip indicators when operating at or very near to the trip set point. It should be noted that although the trip indications may be erratic as the input signal varies about the setpoint, the unit will remain operable and within the accuracy specification. The unit will not generate false trips or fail to provide true trip indications. The purpose of the reset differential feature, when functioning properly, is to provide an adjustable margin (from .6% to 7.5% of input span) before the unit will change its trip indication from on to off or vice versa.

5. The corrective action which is taken, the name of the individual or organization responsible for that action and the length of time that will be taken to complete that action:

Rosemount has identified the cause of the problem as an unrequested, vendor initiated process change in the manufacture of the precision resistors. The effect of this process change was not detected by quality tests at the vendor nor by testing done by Rosemount at component and assembly levels.

This problem with precision resistors was discovered during extended review initiated after Rosemount discovered a problem with similar parts (reference August 17th, 1989 letter to Nuclear Regulatory Commission).

The vendor has returned to the original process and Rosemount has verified that newly built resistors no longer exhibit the problem. We have implemented piece part testing and criteria that will provide quality parts.

Mr Stephen Wanek is responsible for further action on this matter.

6. Any advice related to the potential failure of the item:

Attached hereto are copies of information concerning the potential failures. These include further technical information found in Appendix A and warranty/replacement information in Appendix B.

We have expanded exhaustive efforts to determine the extent of this problem and eliminate the problem from new manufacture. All current information is provided in the attachment (Appendix A). We have urged customers to thoroughly review the identified product(s) delivered to their plant sites as they relate to the technical attachment. The customers must then make a determination of the safety considerations for their specific applications.

Rosemount will extend the warranty for failures of precision resistors on the identified units for five years. As an alternative we will replace these specific trip cards at no charge.

Rosemount has a strong commitment to the nuclear industry and wants to assure you that we are dedicated to supplying quality products and services to our customers. Please contact Mark Van Sloun, Business Unit Manager, (613) 828-3484 should you have questions on this issue.

Sincerely,

ROSEMOUNT INC.

*Stephen J. Wanek /mjlw*

Stephen J. Wanek  
Vice President Operations

SJW:JES

Enc: Appendix A  
Appendix B

## APPENDIX A

### TECHNICAL ATTACHMENT

#### INTRODUCTION

This problem with precision resistors was discovered during extended parts testing and review initiated after Rosemount discovered a problem with similar parts. We have clearly identified the cause and solution to the problem. Corrective action has been implemented on all products presently being shipped. Under certain combinations of humidity, temperature, power and duration, the suspect components will increase resistance value, and can fail in an electrically "open" state. These conditions may cause shifts of varying magnitude in the reset differential adjustment. The accuracy and operability of the unit is not impaired, however the reset differential specification may no longer be met.

#### SENSITIVITY TO THE ENVIRONMENT

We are unable to comment on the degree of sensitivity to be expected from field operation.

We have established a test for screening the piece parts that is a function of specific environments. That test is the exposure of the precision resistors to 60% relative humidity at 90 degrees C, two-hour soak, followed by a 10-minute period of 100 percent rated power. This exposure results in 40-50 percent failure of the resistors manufactured with the faulty process.

Standard design practice calls for using these resistors at no more than 50 percent de-rated power. Typically, we use these resistors at 10 to 15 percent of the rated power limit in our applications.

Humidity and temperature levels to be expected in the field are best estimated by you for each specific application. It should also be noted that these resistors are typically conformal coated once installed in the product. It is generally accepted that conformal coating should provide some additional protection against degradation from humidity.

Perhaps with this background, the application specifics can be related to the above information.

### ROOT CAUSE OF THE PROBLEM

The cause of the problem has been identified as an unrequested, vendor initiated process change in the manufacture of these precision resistors. The process change occurred in September 1988. The effect of the process change was not detected by quality tests at the Vendor nor by testing by Rosemount at component and assembly levels.

Rosemount has verified that a return to the original process by our vendor has eliminated the problem.

In addition Rosemount has implemented piece part testing that will identify this failure mode if present.

### DISPOSITION OF UNITS IN THE FIELD

While we have been able to test individual resistors for acceptability, it is not considered feasible to test a field product to cause a suspect product to shift value.

In considering the proper disposition of units in the field, we believe the following items are of importance:

- The effect of a resistor changing value will be influenced by the field humidity, temperature, power conditions and duration.
- Erratic off/on trip indications when operating at or very near to the trip setpoint are a symptom of possible failure of the suspect resistors. It should be noted that although the trip indications may be erratic as the input signal varies about the setpoint, the unit will remain operable and within the accuracy specification. The unit will not generate false trips or fail to provide true trip indications. The consequence of this type of failure could be that it may cause operator confusion or be a nuisance factor in operation. A decision as to whether or not to continue further product use, or modify the procedure in using the instrument in question, should be based on the expected frequency and consequence of this failure mode.

### SUMMATION

The information provided above will enable you to assess the safety implications at your plant.

## APPENDIX B

### EXTENDED WARRANTY OR REPLACEMENT

Rosemount is dedicated to providing quality products and services to our customers.

Rosemount will continue to honor all warranty obligations for our products. In addition, we are extending our warranty to insure you are covered for the specific problem involved. If you should experience a failure of any of the products listed in Appendix C due to failing precision resistors Rosemount will extend the warranty to cover the repair for the next five years. As an alternative we offer to replace those products listed in Appendix C.

Rosemount will continue to provide the technical support necessary to answer your questions concerning this matter in a timely fashion.