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Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control

National Electrical Manufacturers Association

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Foreword

This Standards Publication has been written to assist the user of solid state components in industrial control applications to a better understanding of the unique characteristics of solid state devices or packaged assemblies incorporating solid state components. The thrust of this document is personnel safety.

In the preparation of this Standards Publication, input of users and other interested parties has been sought and evaluated.

Comments are welcome and should be addressed to:

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This Standards publication was developed by the Industrial Automation Control Products and Systems Section. Section approval of the Standard does not necessarily imply that all section Member s voted for its approval or participated in its development. At the time it was approved, the Industrial Automation Control Products and Systems Section consisted of the following Member s:

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1 Scope and Definitions

1.1 Scope

This Standards Publication is intended to provide general guidelines for the application, installation, and maintenance of solid state control in the form of individual devices or packaged assemblies incorporating solid state components. The emphasis of the guidelines is personnel safety. Applicable NEMA Standards and product related instructions should be carefully followed.

1.2 Definitions

electrical noise-unwanted: electrical energy that has the possibility of producing undesirable effects in the control, its circuits, and system.

electrical noise immunity: the extent to which the control is protected from a stated electrical noise.

off-state current: the current that flows in a solid state device in the off-state condition.

off-state condition: The conditions of a solid state device where no control signal is applied.

on-state condition: the condition of a solid state device when conducting.

surge current: current exceeding the steady state current for a short time duration, normally described by its peak amplitude and time duration.

transient overvoltage: the peak voltage in excess of steady state voltage for a short time during the transient conditions (e.g., resulting from the operations of a switching device).

2 General

2.1 General Principles

Solid State and electro-mechanical controls can perform similar control functions, but there are certain unique characteristics of solid state controls which must be understood.

In the application, installation, and maintenance of solid state control, special consideration should be given to the characteristics described in 2.1 through 2.7.

2.2 Electrical Noise

Performance of solid state controls can be affected by electrical noise. In general. complete systems are designed with a degree of noise immunity. Noise immunity can be determined through tests such as described in 3.4.2. Manufacturer recommended installation practices for reducing the effect of noise should be followed.

2.3 Off-State Current

Solid state controls generally exhibit a small amount of current flow when in the off-state condition. Precautions must be exercised to ensure proper circuit performance and personnel safety. The value of this current is available from the manufacturer.

2.4 Polarity

Incorrect polarity of applied voltages may damage solid state controls. The correct polarity of solid state controls should be observed.