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TECHNICAL REPORT

**ISA-TR18.2.7-2017**

# **Alarm Management When Utilizing Packaged Systems**

**Approved 17 February 2017**

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## Abstract

In 2016, the ANSI/ISA-18.2-2016 (ISA-18.2) alarm management standard was released. This technical report, Alarm Management When Utilizing Packaged Systems, provides guidance on the application of the ISA-18.2 standard to facilities that use packaged systems. This includes guidance for designing, configuring, interfacing and implementing alarms with respect to packaged systems and integrating them into a facility's BPCS (basic process control system). Other topics addressed include how to apply the various ISA-18.2 life cycle stages to packaged systems, common interfacing issues, and the many benefits of using a standardized alarm management approach for integrating packaged systems with a BPCS. This report also contains some content on stand-alone packaged systems.

## Foreword

In June of 2009, ISA-18.2-2009, Management of Alarm Systems for the Process Industries, commonly referred to as ISA-18.2, was issued. Subsequently, the standard was adopted by ANSI and became ANSI/ISA-18.2-2009. In 2009 the ISA18 committee also established six working groups to develop a series of technical reports with guidance on how to implement the principles contained in ISA-18.2. The six technical reports are listed below with a brief overview. In 2016 the standard underwent revisions and became ANSI/ISA-18.2-2016.

- TR1 – Alarm Philosophy – provides guidance on the alarm philosophy. TR1 is limited to the scope of Clause 6 in ISA-18.2. The alarm philosophy provides guidance for successful management of the alarm system. It covers the definitions, principles, and activities by providing overall guidance on methods for alarm identification, rationalization, classification, prioritization, monitoring, management of change, and audit.
- TR2 – Alarm Identification and Rationalization – provides guidance on alarm identification and rationalization. TR2 is limited to the scope of ISA-18.2 Clauses 8 and 9. Identification and rationalization covers the processes to determine the possible need for an alarm or a change to an alarm, systematically compare alarms to the alarm philosophy and determine the alarm setpoint, consequence, operator action, priority, and class. Activities include, but are not limited to: identification, justification, prioritization, classification, and documentation.
- TR3 – Basic Alarm Design – provides guidance on basic alarm design. TR3 focuses on the scope of ISA-18.2 Clause 10 and may include other clauses as needed (e.g., operations and maintenance). Basic alarm design covers the selection of alarm attributes (e.g., types, deadbands, and delay times) and may be specific to each control system.
- TR4 – Enhanced and Advanced Alarm Methods – provides guidance on advanced and enhanced alarm methods. TR4 focuses on the scope of ISA-18.2 Clause 12. Enhanced alarm design covers guidance on additional logic, programming, or modeling used to modify alarm behavior. These methods may include: dynamic alarming, state-based alarming, adaptive alarms, logic-based alarming, predictive alarming, as well as most of the designed suppression methods.
- TR5 – Alarm Monitoring, Assessment, and Audit – provides guidance on monitoring, assessment and audit of alarms. TR5 focuses on the scope of ISA-18.2 Clauses 16 and 18. Monitoring, assessment, and audit cover the continuous monitoring, periodic performance assessment, and recurring audit of the alarm system.
- TR6 – Alarm Systems for Batch and Discrete Processes – provides guidance on the application of ISA-18.2 alarm life cycle activities to batch and discrete processes, expanding on multiple clauses of ISA-18.2.

In 2013, the ISA18 committee established a seventh committee to develop this technical report on alarm management for facilities utilizing packaged systems which can be summarized as follows:

- TR7 – Alarm Management when Utilizing Packaged Systems – provides guidance on the application of ISA-18.2 to facilities that use packaged systems. This includes guidance for designing, configuring, interfacing and implementing alarms with respect to packaged systems and integrating them into a facility's BPCS (basic process control system).

Each technical report is written to be a standalone document. In an effort to minimize repetition, the technical reports have cross references.

The guidance as presented in this document is general in nature, and should be applied to each system as appropriate by personnel knowledgeable in the manufacturing process and control systems to which it is being applied.

### **Preamble**

ANSI/ISA-18.2-2016 describes requirements that address alarm systems for facilities in the process industries to improve safety, quality, and productivity. The general principles and processes in ANSI/ISA-18.2-2016 are intended for use in the lifecycle management of an alarm system based on programmable electronic controller and computer-based human-machine interface (HMI) technology.

The ISA-18.2 standard, however, does not provide specific guidance on how to effectively apply alarm management to scenarios where packaged systems are used in process facilities. This technical report provides guidance for this type of application of alarm management.

Note that, as a technical report, the contents of this document are informative. ANSI/ISA-18.2-2016 contains the mandatory (normative) requirements.

## 1. Scope

### 1.1 General considerations

This technical report provides guidance on how to integrate packaged systems (PSs) into a BPCS-based centralized alarm system. The scope includes discussing various issues that can arise when ISA-18.2 work processes are applied to facilities where PSs are used, and providing guidance on how to successfully apply ISA-18.2 in these situations.

Within the context of this report, a packaged system (PS) can be visualized as existing outside of the BPCS. It is a separate entity, usually containing an embedded microprocessor, controller or hardwired logic, which performs specific tasks for a piece of equipment or a process operating within a facility. Most PSs can be configured to send alarm or status information to a BPCS, directly to an alarm annunciation system, or both.

While not the primary emphasis of this report, some discussion is included of PSs that are stand-alone and also those that are only partially integrated with a BPCS.

PSs can take many forms but have several common characteristics. Typically, PSs combine multiple elements such as process equipment, embedded control systems (typically PLC), and instruments.

### 1.2 Alarm system interfaces

This report includes a focus on alarming-specific issues that can arise when PS interfaces are specified, designed, and implemented. Pros and cons of several design techniques are discussed from an alarm system point of view; the system designer should select the best PS interface option to use for the particular application.

### 1.3 Packaged system design

Within the context of this report, PSs are only considered as sources of possible alarms or of process data for the BPCS to create the alarm. This report does not contain guidance on how to design PSs or how PSs should operate.

### 1.4 Safety instrumented systems

Safety Instrumented Systems (SIS) are considered to be a special case of PSs. While governance of SIS is described by ISA-84, some SISs have the same common attributes as a PS and, in such cases, the guidance in this technical report may apply. SIS design is out of the scope of this document.

## 2. Normative references

NOTE In some cases, reference to ISA standards may have historically used "S" instead of "ISA," e.g., S88.

ISA-18.2: ANSI/ISA-18.2-2016, *Management of Alarm Systems for the Process Industries*, also known as ISA-18.2

ISA-84:ISA-84.00.01-2004 (Parts 1-3), *Safety Instrumented Systems for the Process Industry Sector*

ISA-88: ANSI/ISA-88.00.01-2010, *Batch Control Part 1: Models and Terminology*

ISA-101: ANSI/ISA-101.01-2015, *Human Machine Interfaces for Process Automation Systems*