



International Society of Automation

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STANDARD

American National Standard **ANSI/ISA-18.1-2024**

Annunciator Sequences and Specifications

Approved: 7 March 2024

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ISA
3252 S. Miami Blvd., Suite 102
Durham, NC 27703 USA

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The following served as contributing members of ISA18 Working Group 1 in the development of this standard:

NAME	AFFILIATION
M. Ramey, Co-Chair	Celanese
D. Dunn, Co-Chair	WS Nelson
J. Alford	Consultant
K. Brown	mCloud
A. Bryant	Occidental
L. Dubois	Manage4U BV
B. Fitzpatrick	Wood
B. Hollifield	PAS / Hexagon
G. Lehmann	NextEra Energy
M. Marvan	Shell Canada
G. Plowman	Rockwell
D. Reed	Rockwell
S. Reilly	aeSolutions
C. Ruiz	Dow
G. Robertson	Chevron
D. Rothenberg	D Roth Inc.
N. Sands	DuPont
T. Stauffer	Virtual Facility
B. Vail	Amentum
R. Weibel	TiPS Inc.

The following served as voting members of ISA18 during the development of this standard:

NAME	AFFILIATION
K. Brown, Co-Chair	mCloud
D. Dunn, Co-Chair	WS Nelson
G. Nasby Co-Managing Director	CN Rail
N. Sands, Co-Managing Director	DuPont
J. Alford	Consultant
M. Carter	Hargrove Controls + Automation
L. Dubois	Manage4U BV
B. Hollifield	PAS / Hexagon
S. Kandasamy	Chevron
D. Logerot	ProSys Inc.
M. Marvan	Shell Canada
D. Metzger	DPM Consulting
L. Myers	Consultant
M. Ramey	Celanese
D. Reed	Rockwell Automation

D. Rothenberg
T. Stauffer
D. Strobhar
D. Visnich
R. Weibel

D Roth Inc.
Virtual Facility
Beville Engineering Inc.
Burns & McDonnell
TiPS Inc.

This standard was approved for publication by the ISA Standards and Practices Board on 5 January 2024:

NAME	AFFILIATION
D. Lee, Chair	UCDS
D. Brandl, Chair-Elect	BR&L Consulting
D. Bartusiak	Collaborative Systems Integration
P. Brett	Honeywell
E. Cosman	OIT Concepts
D. Dunn	WS Nelson
J. Federlein	Federlein & Associates
S. Fluchs	admeritia GmbH
J.-P. Hauet	KB Intelligence
G. Lehmann	NextEra Energy
T. McAvinew	Consultant
V. Mezzano	Fluor
C. Monchinski	Automated Control Concepts
G. Nasby	CN Rail
D. Reed	Rockwell Automation
N. Sands	DuPont
H. Sasajima	FieldComm Group
I. Verhappen	Willowglen Systems
D. Visnich	Burns & McDonnell
W. Weidman	Consultant
J. Weiss	Applied Control Solutions
M. Wilkins	Yokogawa
D. Zetterberg	Consultant

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Introduction

Purpose

The purpose of this standard is to establish uniform annunciator terminology, sequence designations, and sequence presentation, where a sequence is a chronological series of steps that provide visual and audible indications to call attention to process changes.

This standard is intended to improve communications among those who specify, distribute, design, manufacture, or use annunciators.

History

Based on work started in 1955 by an ISA survey committee titled Instrument Alarms and Interlocks, the 8D-RP18 Committee on Annunciator Systems of the Production Processes was formed. Tentative recommended practice ISA-RP18.1, *Specifications and Guides for the Use of General Purpose Annunciators*, was completed by that committee in 1965.

That committee, reactivated as ISA18, Instrument Signals and Alarms, began revising ISA-RP18.1 in 1976 to reflect then-current industry practice for annunciators. In 1979, ISA released, as a product of the ISA18 and ISA67 committees, ISA-18.1-1979, *Annunciator Sequences and Specifications*.

Organization

This standard is organized in two parts. The first part is introductory in nature (Clauses 1–4). The main body of the standard (Clause 5) presents mandatory (normative) requirements. The annex sections present nonmandatory (informative) recommendations as noted. If a clause contains no mandatory requirements, then it is noted as informative.

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1 Scope

1.1 General applicability

This standard is primarily for use with annunciators, devices or groups of devices that call attention to changes in process conditions. Annunciators can range from a single annunciator cabinet, to complex annunciator systems with many visual display cabinets and remote logic cabinets, to computer-based displays. Both hardware and software annunciators are included. The annunciator may also include interfaces to the process historian.

The sequence designations are provided to describe basic annunciator sequences and also many sequence variations. This standard specifies the sequence logic for several standard sequences used for annunciators; however, detailed design requirements and documentation formats are beyond the scope of this standard.

1.2 Technical relationship to ISA-18.2

ISA-18.2 (see Clause 2) addresses alarm systems that notify operators of abnormal process conditions or equipment malfunctions that require an operator response to prevent or mitigate related consequences. Many of the principles contained in ISA-18.2 apply also to the annunciators described in ISA-18.1, but annunciators are not restricted only to process conditions that qualify as alarms.

1.3 Exclusions

This standard is not intended to be used directly as an annunciator system purchase specification. This standard may be useful in developing an annunciator specification. It will not eliminate the need for sound engineering judgment. No particular technology is mandated.

This standard is not intended to be used for mobile devices that can also call attention to process conditions.

2 References

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ANSI/ISA-61511-1-2018, *Functional Safety – Safety Instrumented Systems for the Process Industry Sector – Part 1: Framework, Definitions, System, Hardware and Application Programming Requirements*

ANSI/ISA-84.91.01-2021, *Identification and Mechanical Integrity of Process Safety Controls, Alarms, and Interlocks in the Process Industry*

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

3 Definition of terms and acronyms

Defined terms are used in this standard. Synonymous terms, which are not used in this standard, are also listed.

3.1 Definitions

For the purposes of this standard, the following definitions apply. The following are terms and their definitions that have special meaning in relation to annunciators.

3.1.1

acknowledge

operator action that confirms recognition of an alarm or annunciator state

3.1.2

active annunciator point

annunciator point that is completely configured and functional

Note 1 to entry: The visual display identifies a specific monitored variable.

3.1.3

alarm

audible and/or visible means of indicating to the operator an equipment malfunction, process deviation, or abnormal condition requiring a timely response

[SOURCE: ANSI/ISA-18.2 – 2016]

3.1.4

analog input point

point used for an analog monitored variable signal

Note 1 to entry: An analog input point is usually current or voltage.

3.1.5

annunciated condition

process or system condition defined to raise operator awareness through the use of an annunciator

Note 1 to entry: The annunciated condition may be either normal or abnormal, alarm or operator alert, and/or state or mode of operation change.

Note 2 to entry: Annunciated conditions may be momentary or maintained.

3.1.6

annunciated state

audible and/or visible means of indicating to the operator a process or system condition that matches an annunciated condition

3.1.7

annunciator

device or group of devices that call attention to changes in process conditions

3.1.8

annunciator module

point or sequence module

hardware assembly containing the sequence logic

Note 1 to entry: Some modules also contain visual displays.

3.1.9

annunciator point

hardware and/or software configuration related to one visual display

Note 1 to entry: Types of annunciator points include active annunciator point, spare annunciator point, and future annunciator point.

3.1.10

annunciator point state

conditions that an annunciator point will transition through between the initiation and removal of the annunciated condition

Note 1 to entry: The state includes the related audible and/or visual indications of that condition.

3.1.11

audible device

device that calls attention by sound to an annunciated state

Note 1 to entry: An audible device may also be activated when the annunciated state returns to normal.

3.1.12

audible device follower

horn relay contact

auxiliary output that operates while the audible device operates

3.1.13

automatic reset

sequence action that returns the sequence to the normal state when the annunciated state returns to normal

Note 1 to entry: The automatic reset will not occur if the annunciated state has not been acknowledged.

3.1.14

auxiliary output

auxiliary contact

output signal operated by a single annunciator point or group of points for use with a remote device

Note 1 to entry: Types of auxiliary outputs include digital input follower, visual display follower, audible device follower, and reflash.

3.1.15

control system

system that responds to input signals from the equipment under control and/or from an operator and generates output signals that cause the equipment under control to operate in the desired manner

Note 1 to entry: The control system can include one or more basic process control systems (BPCS), safety instrumented systems (SIS), or packaged systems.

3.1.16
digital input follower
field contact follower

auxiliary output that operates while the digital input point indicates an annunciated condition

3.1.17
digital input point
field, trouble, or signal contact

point for use with an on/off signal sensing the process condition

Note 1 to entry: Types of digital input points include normally open (NO) input and normally closed (NC) input.

Note 2 to entry: Annunciator digital input points are identified in relation to annunciator operation—not the disconnected position of the devices.

3.1.18
digital input voltage
field, trouble, or signal contact voltage

voltage applied to digital input points to provide the digital signal

3.1.19
first out

sequence feature that indicates which annunciator point determined by logic to have operated first in a scenario with multiple annunciated conditions

3.1.20
first out reset

sequence action that removes the first out indication

Note 1 to entry: The first out reset will remove the first out indication whether the annunciated state is active or not.

3.1.21
flasher

hardware or software configuration that causes visual displays to turn on and off repeatedly

Note 1 to entry: Types of flashing include fast flashing, flashing, slow flashing, and intermittent flashing.

3.1.22
integral logic annunciator

annunciator that includes visual displays and sequence logic circuits in one assembly

3.1.23
latch
lock-in

sequence feature that retains the annunciated state when the annunciated condition is momentary

Note 1 to entry: The state requires an acknowledge or reset to clear.

3.1.24
logic cabinet

cabinet containing sequence logic hardware and no visual displays

3.1.25
maintained state

annunciated state that is active until the process condition returns to normal

Note 1 to entry: The flashing and annunciation is cleared when acknowledged.

3.1.26
manual reset

sequence action that returns the sequence to the normal state when the reset is activated after the annunciated state has been acknowledged and the annunciated state returns to normal

3.1.27
momentary state

annunciated state that may return to normal before it has been acknowledged

3.1.28
nameplate

component of a visual display that is illuminated and labeled to identify the monitored variable

3.1.29
normally closed input
NC input

digital input point that is closed when energized

3.1.30
normally open input
NO input

digital input point that is open when energized

3.1.31
operational test
functional test

annunciator sequence to test the sequence, visual display, audible devices, software, and hardware

3.1.32
operator alert

audible and/or visible means of indicating to the operator an equipment or process condition for evaluation when time allows which may result in a response

Note 1 to entry: operator alert as defined in this document aligns to term alert in ANSI/ISA-18.2.

3.1.33
pushbutton

momentary manual switch that causes a change from one sequence state to another

Note 1 to entry: Pushbutton actions include silence, acknowledge, reset, first out reset, and test.

Note 2 to entry: A pushbutton may be a physical device or a target on a visual display.

3.1.34 reflash

auxiliary logic that allows two or more annunciated conditions to initiate or reinitiate the annunciated state of one annunciator point

Note 1 to entry: The point returns to the normal state when all annunciated states return to normal.

3.1.35 remote logic annunciator

annunciator that locates the visual displays and the sequence logic in separate assemblies

3.1.36 reset

sequence action that returns the sequence to the normal state

Note 1 to entry: Types of reset include automatic reset, manual reset, and first out reset.

3.1.37 response time

time period between the annunciated condition occurring and initiation of the annunciated state

Note 1 to entry: The response time inherent in the annunciator design will act as an on-delay for the input signal.

3.1.38 ringback return indication

sequence feature that provides a distinct visual or audible indication or both when the condition no longer matches an annunciated condition

3.1.39 sequence

chronological series of actions and states of an annunciator point after an annunciated condition or manual test initiation occurs

3.1.40 sequence action

signal that causes the sequence to change from one sequence state to another

Note 1 to entry: Sequence actions include annunciated state changes and manual operation of pushbuttons.

3.1.41 sequence diagram

graphic presentation that describes sequence actions and sequence states

3.1.42
sequence state

condition of the visual display and audible device provided by an annunciator to indicate the annunciated state

Note 1 to entry: Sequence state can also indicate pushbutton actions.

Note 2 to entry: Sequence states include normal, annunciated, silenced, acknowledged, and ringback.

3.1.43
sequence table

presentation that describes sequence actions and sequence states by lines of statements arranged in columns

3.1.44
silence

sequence action that stops the sound of the audible device

3.1.45
spare annunciator point

point that is allocated on the annunciator visual display but is not configured

Note 1 to entry: A spare annunciator point is completely equipped with an annunciator module but is not linked to an analog input point or digital input point. The visual display is blank.

3.1.46
test

sequence action that reveals annunciator failure

Note 1 to entry: Types of test include operational test and visual display test.

3.1.47
visual display

part of an annunciator or cabinet that indicates the sequence state

Note 1 to entry: The visual display can be off, flashing, or solidly lit.

3.1.48
visual display cabinet
lamp cabinet

cabinet containing only visual displays

3.1.49
visual display follower
lamp follower

auxiliary output that operates while the visual display indicates an annunciated state

3.1.50 visual display test lamp test

annunciator sequence to test the visual display

3.2 Acronyms

AC	Alternating current
ACK	Acknowledge or acknowledged
AnnSt	Annunciated state
BPCS	Basic process control system
DC	Direct current
HMI	Human machine interface
NEMA	National Electrical Manufacturers Association
RTN	Return to normal
SIL	Safety integrity level
UNACK	Unacknowledged

4 Conformance to this standard

4.1 Conformance guidance

To conform to this standard, it shall be shown that each of the mandatory requirements has been satisfied.

4.2 Existing systems

For existing annunciators designed and constructed in accordance with codes, standards, and/or practices prior to the issue of this standard, the facility shall determine that the equipment is designed, maintained, inspected, tested, and operated in a safe manner. The practices and procedures of this standard shall be applied to existing systems in a reasonable time as determined by the facility.

5 Sequences

5.1 Operation

Annunciators usually call attention to abnormal conditions by the use of visual displays and audible devices; however, annunciated states may indicate normal or abnormal states. Changes from one annunciated state to another are caused by changes in conditions and also by manual operation of pushbuttons. For example, for an analog input point, an annunciated state occurs when the analog signal is above or below a setpoint. Annunciator digital input points are identified in relation to annunciator operation—not the disconnected position of the devices. The new annunciated state may be dependent solely on the condition that existed at the time pushbuttons were operated.

Annunciators can be implemented using a variety of technologies. Hardware consisting of cabinets, relays, and lamps are appropriate for some applications. In other applications, annunciators can be implemented entirely in software using signals from the control system and computerized visual

displays with annunciator nameplates rendered as graphics. Other applications use a combination of the wired and computerized implementations. The type of implementation technology that is appropriate for a particular application should be determined by the system designer based on functional requirements. Annunciator points that are associated with a safety alarm that is counted on to provide a safety integrity level (SIL) of SIL 1 or greater shall be designed, operated, and maintained in accordance with ANSI/ISA-61511-1-2018.

For acknowledged points, portions of the visual display should flash to indicate an annunciated state and change to a solid display. Additional types of flashing (e.g., slow, fast, intermittent, or first out) should be available to indicate that the annunciated state has returned to normal or which point within a group of points annunciated first.

Sequences detail the annunciator states after an annunciated condition is detected by logic. Sequences may use one or multiple points, and points may be used in multiple sequences. Figure 1 illustrates a typical annunciator sequence cycling from normal through the alarm state and a return to normal.

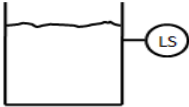
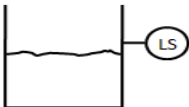
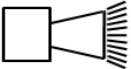
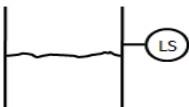
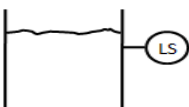
PROCESS CONDITION	PUSHBUTTON OPERATION	SEQUENCE STATE	VISUAL DISPLAY	AUDIBLE DEVICE
 NORMAL	 NONE	NORMAL	 OFF	 SILENT
 ANNUNCIATED	 NONE	ACTIVATED	 FLASHING	 AUDIBLE
 ANNUNCIATED	 ACKNOWLEDGE	ACKNOWLEDGED	 ON	 SILENT
 NORMAL	 NONE	NORMAL	 OFF	 SILENT

Figure 1 – Typical annunciator sequence, sequence A, automatic reset

5.2 Presentation

In order to provide a common understanding of the features and functionality of logic sequences used in annunciators, this standard uses both sequence diagrams and sequence tables. The use of both diagrams and tables allows each sequence to be defined and analyzed.

Sequence diagrams include a step for each annunciated state, and each step indicates the condition, the sequence state, the visual display status, and the audible device status. The steps are arranged to describe the annunciator sequence from the normal transition state, through the other states, and back to the normal state again. Arrows between the steps indicate all possible