



International Society of Automation
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**TECHNICAL
REPORT**

ISA-TR5.1.02-2024

Instrumentation and Control Identification System Guidelines

Approved: 5 APRIL 2024

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ISA-TR5.1.02-2024, Instrumentation and Control Identification System Guidelines

ISBN: 978-1-64331-251-4

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Introduction

ANSI/ISA-5.1, referred to as ISA-5.1 in the technical report, provides guidance that addresses identification for instrumentation and control equipment and functions across various drawings and systems utilized in the field of instrumentation, control, and automation. This technical report is intended to provide additional guidance on the use and implementation of identification of instrumentation and control equipment and functions.

The guidance as presented in this technical report 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.

Background of 2024 revision

ISA-TR5.1.02-2024, *Instrumentation and Control Identification System Guidelines* supersedes Annex A found in ANSI/ISA-5.1-2022. As part of the 2024 revision to that standard, this information was moved to this technical report because it contains nonmandatory guidance on the use of the standard, specifically regarding identification systems. In addition to some editorial changes, the order of the content was changed to place table notes following the respective tables to improve the readability. Refer to Annex A of this technical report for a list of changes made to the content since it appeared in ANSI/ISA-5.1-2022.

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1 Scope

This technical report was written in support of the widely used ISA international standard, ANSI/ISA-5.1, *Instrumentation and Control Symbols and Identification*.

This technical report is designed to provide guidance, rationale, and examples of identification of instrumentation and control equipment and functions.

2 Terms, definitions, and abbreviated terms

2.1 Definitions

Definitions, including applicable abbreviations, from ANSI/ISA-5.1-2024 are listed in this subclause for terms used in this document.

2.1.1 alarm

indicating *device* or *function* that provides a visible and/or audible indication if and when the value of a measured or initiating variable is outside of set limits, has changed from a safe to an unsafe condition, or has changed from a normal to an abnormal operating state or condition

Note 1 to entry: Actuation can be by a *discrete* or *analog signal* or *function*.

Note 2 to entry: Indication can be by any or all of the following: annunciator *panels*, flashing lights, printers, buzzers, bells, horns, sirens, or shared graphic display systems.

2.1.2 analog signal

signal representing a variable that can be continuously observed and continuously represented

2.1.3 application software

software specific to a user application that is *configurable* and in general contains logic sequences, interlocks and limit expressions, control algorithms, and other code required to control the appropriate input, output, calculations, and decisions

2.1.4 bubble balloon

circle-based symbols used to denote and identify the purpose of an *instrument* or function that can contain a tag number

2.1.5 computing *device* computing *relay*

device that performs one or more calculations or logic operations, or both, and transmits one or more resultant output signals

2.1.6 configurable

devices or systems whose functional and/or communication characteristics can be selected or rearranged through setting of program switches, *application software*, fill-in-the-blank forms, pull-down menus, entered values or text, and/or other methods, other than rewiring/reprogramming as a means of altering the configuration

2.1.7**control valve**

device, other than a common, hand-actuated *process* block valve or self-actuated check valve, that directly manipulates the flow of one or more fluid *process* streams

Note 1 to entry: The designation “hand control valve” is limited to hand-actuated valves that when used for process throttling require identification as an instrument or control device.

2.1.8**controlled variable**

quantity, property, or condition that is measured and controlled

Note 1 to entry: Controlled variables are a subset of measured variables.

2.1.9**controller**

device that operates automatically to regulate a controlled variable

2.1.10**detector**

device that is used to detect the presence of something, such as flammable or toxic gases or individual parts; see also *primary element* and *sensor*

2.1.11**device**

piece of *instrument* hardware that is designed to perform a specific action or function, such as a *controller*, indicator, *transmitter*, annunciator, or *control valve*

2.1.12**discrete signal**

signal that has any number of noncontinuous distinct or defined states or positions, but most typically having two distinct states

2.1.13**final control element**

device, such as a *control valve*, that directly controls the value of the manipulated variable of a control *loop*

2.1.14**function**

purpose of, or the action performed by, a *device* or *application software*

2.1.15**hardware**

physical equipment directly involved in performing measuring, *monitoring*, and controlling *functions*

2.1.16**identification**

sequence of letters or numerals, or both, used to designate an individual *instrument*, *function*, or *loop*

2.1.17**initiating variable**

quantity, property, or condition that is not measured or calculated but serves as the measured variable of a loop, a change of which initiates loop action

Note 1 to entry: For example, “hand,” as in push button or switch, is an initiating variable.

2.1.18

instrument

device used for direct or indirect *measurement*, *monitoring*, and/or control of a *process variable*, including *primary elements*, indicators, *controllers*, *final control elements*, *computing* devices, and electrical *devices* such as annunciators, *switches*, and push buttons

Note 1 to entry: The term does not apply to a device's internal components or parts, such as receiver bellows or resistors.

2.1.19

instrument, field

instrument, local

instrument that is not mounted on a *panel* or console or in a control room but commonly in the vicinity of its *primary element* or *final control element*

2.1.20

instrument, standalone

device or *hardware* that is a separate entity, such as a single-case *controller* or recorder

2.1.21

instrumentation

collection of instruments, *devices*, *hardware*, or *functions* or their application for the purpose of measuring, *monitoring*, or controlling an industrial *process*, or any combination of these

2.1.22

interlock

device or group of *devices* (*hardware*) or function or group of functions (*application software*) arranged to sense a limit or off-limit condition, or improper sequence of events and take a desired action

2.1.23

local panel

panel that is not a central or main *panel* and is commonly located in the vicinity of plant subsystems or subareas

Note 1 to entry: The term “local panel instrument” should not be confused with “local instrument.”

2.1.24

loop

instrumentation arranged as a combination of two or more instruments or *functions* arranged so that signals pass from one to another for the purpose of *measurement* and indication or control of a *process variable*

Note 1 to entry: Term includes a self-contained device that measures and controls a process variable.

2.1.25

loop identification number

unique combination of letters and numbers that are assigned to each monitoring and control loop in a facility to identify the process variable that is being monitored or controlled

2.1.26

manipulated variable

quantity or condition that is varied by a controller's output to change the value of the controlled variable

2.1.27**measured variable**

quantity, property, or condition that is measured or calculated

Note 1 to entry: Measured variables are a subset of process variables.

2.1.28**measurement**

determination of the existence and/or magnitude of a *process variable*

2.1.29**monitor (noun)**

instrument or *device* used for indicating or recording a *process variable* or quantity

2.1.30**monitor (verb)**

to measure or sense the status or magnitude of one or more variables for the purpose of deriving useful information, and that sometimes means analyzer, indicator, or *alarm*

2.1.31**owner**

company that operates or owns the production facilities where the instrumentation system is or will be installed

2.1.32**panel**

freestanding or built-in structure consisting of one or more sections, cubicles, consoles, or desks that has groups of instrument *hardware* mounted on it, houses the operator-*process* interface, and is given a unique designation

2.1.33**primary element**

external or internal *instrument* or system element that quantitatively converts the *measured variable* into a form suitable for *measurement*; see also *detector* and *sensor*

Note 1 to entry: An orifice plate is an external primary element.

Note 2 to entry: The sensor of a pressure transmitter is an internal primary element.

2.1.34**process**

any operation or sequence of operations involving a change of energy, state, composition, dimension, or other properties, e.g. change in pressure, temperature, speed, electrical potential

Note 1 to entry: A process can be small or large in scale, e.g. a water heater or a refinery.

2.1.35**process variable**

any property of a *process*; used in this technical report to apply to all variable properties of the process and includes *measured variables* and *controlled variables*

2.1.36**program**

repeatable sequence of actions that defines the state of outputs as a relationship to the state of inputs

2.1.37

relay

device, whose *function* is to pass on information in an unchanged form or in some modified form

Note 1 to entry: Relay is a term applied specifically to an electric, pneumatic, or hydraulic switching device that is actuated by a signal, and to functions performed by a relay.

2.1.38

safety instrumented system

SIS

system composed of *sensors*, logic solvers, and *final control elements* for the purpose of taking the process to a safe state when predetermined conditions are violated

2.1.39

scan

to sample, in a predetermined manner, each of several variables periodically or intermittently

Note 1 to entry: A scanning device is often used to ascertain the state or value of a group of variables and can be associated with other functions such as recording and alarming.

2.1.40

sensor

separate or integral part or *function* of a *loop* or an *instrument* that first senses the value of a *process variable*, that assumes a corresponding predetermined and intelligible state, and/or generates an output signal indicative of or proportional to the *process variable*; see also *detector* and *primary element*

2.1.41

setpoint

input variable that sets the desired value of the *controlled variable* manually, automatically, or by means of a *program* in the same units as the *controlled variable*

2.1.42

shared control

feature of a control *device* or *function* that contains several preprogrammed algorithms, which are user retrievable, *configurable*, and connectable, and allows user-defined control strategies or *functions* to be implemented

Note 1 to entry: Term often used to describe the control features of a distributed control system, programmable logic controller, or other processor-based system.

Note 2 to entry: Control of multiple process variables can be implemented by sharing the capabilities of a single device of this kind.

2.1.43

shared display

operator interface device, a video, light-emitting diode, liquid crystal, or other display unit, used to display process control information from several sources at the command of the operator

Note 1 to entry: Term is often used to describe the visual features of a *distributed control system*, *programmable logic controller*, or other processor-based system.

2.1.44

station, auto-manual

station, control

device or function that provides switching between manual and automatic control modes of a control loop

2.1.45**station, manual loading**

device or *function* that has a manually adjustable output, and can also have indicators, lights, and/or other functions, that is used to actuate and/or modulate one or more devices but does not provide switching between auto-manual modes of a control *loop*

2.1.46**switch**

device that connects, disconnects, selects, or transfers one or more circuits and is not designated as a *controller*, a *relay*, or a *control valve*; the term is also applied to the *functions* performed by switches

2.1.47**tag number**

unique combination of letters and numbers that are formed by adding letters to the *loop identification number* to define the purpose of each loop *device* and/or *function* that comprises a monitoring or control *loop*

Note 1 to entry: Synonymous terms include: instrument identification, instrument identification number, instrument tag number, instrument number, and tag name.

2.1.48**test point**

process connection to which no *instrument* is permanently connected, but which is intended for the temporary or intermittent connection of an *instrument*

2.1.49**transducer**

device, which can be a *primary element*, *transmitter*, *relay*, *converter* or other *device*, that receives information in the form of one or more physical quantities, modifies the information or its form, or both if required, and produces a resultant output signal

2.1.50**transmitter**

device that senses a *process variable* through the medium of a *sensor* or measuring element and has an output whose steady-state value varies only as a predetermined *function* of the *process variable*

Note 1 to entry: The sensor can be an integral part, as in a direct-connected pressure transmitter, or a separate part, as in a thermocouple.

2.1.51**user**

entity that applies this standard for their company, or on behalf of their customer/client

Note 1 to entry: Examples include engineering/consulting firms, operating process companies, manufacturing companies, etc.

2.2 Abbreviations – for terms not otherwise defined

P&ID piping (or process) and instrument diagram