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Building automation and control systems (BACS) —

Part 2:
Hardware

Systèmes d'automatisation et de contrôle des bâtiments (BACS) —

Partie 2: Matériel

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Contents

Foreword

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This document was prepared by Technical Committee ISO/TC 205, *Building environment design*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 247, *Building Automation, Controls and Building Management,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16484-2:2004), which has been technically revised.

A list of all parts in the ISO 16484 series can be found on the ISO website.

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Building automation and control systems (BACS) —

Part 2:
Hardware

1 Scope

This document specifies the hardware requirements needed to carry out building automation tasks.

This document is applicable to physical devices, i.e.:

— devices that require human interaction, such as management stations or operator panels;

— devices for data storage and analysis, such as edge or cloud servers;

— devices for control applications, such as automation stations;

— devices for physical quantities acquisition, such as sensors and actuators.

This document provides a generic system topology based on a building network infrastructure, which includes both the devices inside the building envelope and those outside the building envelope.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

IEC/TR 62443-3-1, *Industrial communication networks — Network and system security — Part 3-1: Security technologies for industrial automation and control systems*

IEC 62443-3-3, *Industrial communication networks — Network and system security — Part 3-3: System security requirements and security levels*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
access control system
dedicated security system, that includes the automatic checking of access rights under organizational measures, barrier and door control for buildings and rooms, and registration of events

3.2
alarm
warning given by the system either:

a) indicating the presence of a hazard to property, the environment, or to life

b) a condition detected by a device or controller regarded as abnormal, that implements a rule or logic specifically designed to look for that condition, e.g. "frost alarm"

Note 1 to entry: An alarm can be an annunciation that is either audible, visual or both that alerts an operator to an abnormal condition, which can require corrective action.

3.3
analogue input
part of the hardware pertaining to a control device for measuring

3.4
analogue output
part of the hardware pertaining to a control device for positioning

3.5
application
set of user information processing requirements or functions that together form a logical unit supporting a process

Note 1 to entry: A building automation and control system can support many different applications.

3.6
binary input
hardware pertaining to control devices for state processing

Note 1 to entry: The function is also referred to as binary input state.

3.7
binary output
hardware pertaining to control devices for switching

Note 1 to entry: The function is also referred to as output switching.

3.8
building
large volume separate fixed structures, i.e. commercial or residential premises, however excluding industrial structures

Note 1 to entry: Building automation and control system can also be employed for other structures, such as houses, tunnels, railways, and ships.

3.9
building automation and control system
system, comprising all products, software and engineering services for automatic controls (including interlocks), monitoring, optimization, operation, human intervention, and management to achieve energy-efficient, economical, and safe operation of building services

Note 1 to entry: The trade designation and the industry branch are also referred to as either building automation or building control, or both.

[SOURCE: ISO 52120-1:2021, 3.2, modified — Note 1 has been added.]

Note 2 to entry: Building automation and control system (BACS) is also referred to as building management system (BMS), of which building energy management is part.

Note 3 to entry: The use of the word "control" does not imply that either the system or the device or both are restricted to control functions. Processing of data and information is also possible.

Note 4 to entry: If a building automation and control system, or building energy management system, conforms to the requirements of the ISO 16484 series, it may be designated as a BACS.

Note 5 to entry: Building services are divided into technical, infrastructural and financial building services and energy management is part of technical building management.

3.10
building management
totality of services involved in the management, operation and monitoring of buildings (including plants and installations)

Note 1 to entry: Building management is divided into technical building management, infrastructural building management and commercial building management and has interfaces to area and facility management.

[SOURCE: ISO 52120-1:2021, 3.4, modified — Note 1 has been added.]

3.11
building network infrastructure
communication infrastructure next to the traditional electrical and sanitary installations in modern buildings

Note 1 to entry: The network is optimally set up for the needs of the building and its use and ensures that cyber security needs are met, taking IEC 62443 series into consideration.

3.12
building services
utilities and installations supplied and distributed within a building, such as electricity, gas, heating, water, waste, and communications

3.13
cabling
system of cables and connecting hardware that supports the wired connection of the building automation and control system and other equipment

3.14
cloud
servers located in data centres all over the world that are accessed over the internet, as well as the software and databases that run on those servers

Note 1 to entry: By using cloud computing, users and companies do not need to manage physical servers themselves or run software applications on their own machines.

3.15
communication
act of conveying meaning from one entity or group to another through the use of mutually understood signs, symbols, and semiotic rules

3.16
communication interface
physical and electrical requirements for the connection of components of communicating products

3.17
configuration
site-specific information related to physical and functional units, entered during system engineering resulting in the system configuration

Note 1 to entry: Generally, the configuration does not change once the system is functioning.

3.18
controller
automation station
device for either regulation or logic control, or both, as well as the monitoring and processing of information such as temperature, humidity and pressure

Note 1 to entry: The use of the words "automation" and "control" does not imply that the device or system is restricted to control functions only. Monitoring and processing of other information is possible.

Note 2 to entry: In IT, a device that controls the transfer of data between a computer and a peripheral device is also referred to as a controller.

3.19
counter input
hardware pertaining to a control device for pulse counting

3.20
data
representation of information in a formalized manner suitable for human or automatic processing

Note 1 to entry: Processing includes communication and interpretation.

3.21
data interface unit
functional or physical unit for communication between the devices of a BACS, as well as devices and systems in other networks

Note 1 to entry: Different types of DIUs can exist, such as routers or gateways.

Note 2 to entry: A DIU may be used to conform to the relevant national standards if connected via public data networks.

3.22
data-point
input and output function consisting of all assigned information describing the point's meaning entirely

Note 1 to entry: There are physical and virtual data-points. A physical data-point is related to a direct or remotely connected input/output device. A virtual data-point can be derived from the result of a processing function, or is related to another device as a shared data-point.

Note 2 to entry: Historically, the term "data-point" described only a physical value or state.

Note 3 to entry: A collection of virtual data-points is usually identified as the digital twin of the controller owning the physical data-point counterparts.

3.23
data security
framework conditions to protect data from direct or indirect manipulation or unauthorized use

Note 1 to entry: Data manipulation includes loss of data, destruction or falsification of data.

Note 2 to entry: Data security means are the measures and equipment to secure and maintain the safety of data.

3.24
device
physical product designed and implemented to perform specified or programmable functions, in operational, electrotechnology equipment

Note 1 to entry: For the purposes of this document, a device forms a self-contained physical unit.

3.25
digital twin
virtual representation of real-world entities and processes, synchronized at a specified frequency and fidelity

3.26
electromagnetic compatibility
ability of equipment or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment

[SOURCE: IEC 60050-161:2018]

3.27
edge device
piece of hardware that controls data flow at the boundary between two networks, fulfilling a variety of roles depending on what type of device they are, but essentially serving as network entries or exit points

Note 1 to entry: Some common functions of edge devices include the transmission, routing, processing, monitoring, filtering, translation and storage of the data passing between networks.

Note 2 to entry: There can be multiple edge devices in a building automation network devoted to different purposes, such as for different portions of the network or for different application requirements.

3.28
engineering
project and system-specific services for the system planning process, configuration, and commissioning of the various parts of a building automation and control system

Note 1 to entry: The services that can be performed as part of engineering include configuration of the physical and logical connections and relationships between all items of a system to achieve the required application.

3.29
facility management
services performed before, during, and after the use of real estate and infrastructure that are based on a holistic (integral) strategy

3.30
historical data
data that is recorded on a storage medium for an undefined time

Note 1 to entry: The data logging performed by storing historical data is referred to as a "historical database function".

3.31
input/output
function that includes either the processing of a signal from a sensor or a signal for an actuator of the system to be controlled

Note 1 to entry: The I/O also provides system users with the specific status and value information for a data-point.

3.32
information
knowledge concerning objects, facts, events, things, processes, or ideas (including concepts), which, within a certain context, has a particular meaning

3.33
interface
functional or physical unit as a defined interconnection between a device or system to another device or system, or to a person

3.34
logbook
record book or its electronic equivalent, where all relevant details of an operation, a system, its performance, and its maintenance can be entered in a secure manner for subsequent retrieval

Note 1 to entry: A logbook can consist of one or more record books.

Note 2 to entry: A logbook can be kept in a centralized or distributed manner.

3.35
maintenance
combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in or restore it to a state in which it can perform the required function

3.36
monitoring
activity of the system, intended to observe the actual state of an item, identify a defined deviation from the normal state, and transmit a message about the observed state

3.37
operating system
software to control program operation and to provide services for resource allocation, task scheduling, input/output control, and data management

3.38
room control unit
interface enabling users to interact with the building automation system in order to influence room conditions

Note 1 to entry: Room control units can either be permanently installed on the wall of a room or they can be available as an application on a room user's mobile device.

3.39
cyber security
security
protection of networks, devices, programs and data from attacks, damage and unauthorized access

3.40
sensor
device designed to detect or measure a variable

3.41
topology
way in which the links and nodes of a network are arranged so that they relate to each other

Note 1 to entry: Topologies are categorized as either a physical network topology, which is the physical medium of signalling, or a logical network topology, which refers to the way in which data is transferred between devices regardless of the physical connection of the devices through the network.

4   Abbreviated terms

Abbreviated term	Description
AI	analogue input
AO	analogue output
BACS	building automaton control systems
BI	binary input
BO	binary output
CI	counter input
DIU	data interface unit
EMC	electromagnetic compatibility
GUI	graphical user interface
I/O	input/output
HMI	human-machine interface