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**Building automation and control systems  
(BACS) —**

**Part 3:  
Functions**

*Systèmes de gestion technique du bâtiment (SGTB) —  
Partie 3: Fonctions*



Reference number  
ISO 16484-3:2005(E)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16484-3 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 247, *Building automation, controls and building management*, in collaboration with Technical Committee ISO/TC 205, *Building environment design*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This corrected version of ISO 16484-3:2005 contains numerous changes to be consistent with EN/ISO 16484-3:2005.

ISO 16484 consists of the following parts under the general title *Building automation and control systems (BACS)*:

- *Part 2: Hardware*
- *Part 3: Functions*
- *Part 5: Data communication protocol*
- *Part 6: Data communication conformance testing*

Two parts are under development:

- *Part 4 dealing with applications*
- *Part 7 dealing with project implementation*

Annex A (normative): *BACS function list (BACS FL)*, forms a normative part of this standard.

The Annex B (informative): *Examples for control schematic and BACS function list*, and Annex C (informative): *Bibliography*, are for information only.

NOTE National annexes may contain information provided for easier implementation of the standard, e.g. an alphabetical index or national footnotes.

## Introduction

This series of standards is intended for design of new buildings and retrofit of existing buildings for an acceptable indoor environment, practical energy conservation, and efficiency.

The application of this series of standards for BACS is envisaged as follows:

- the environmental design for all building types requires complex methods for automation and control. The functional integration of services other than HVAC is a general task for all parties employed to develop an integrated multi-application system. The Integration comprises, e.g. lighting and electric power distribution control, security control, transportation, maintenance management, or facilities management. This system integration allows the user to take advantage of synergies between the different applications. This standard will give guidance to architects, consultants, and contractors as well as to users on how to share such resources;
- the innovation cycles between devices, systems, and networks vary. To make it possible to add and to change existing devices, and extend the building automation and control network, several interfaces both proprietary and standardized are defined between the BACS network and the other systems. A manufacturer can design a product, both to meet his specific marketing objectives and to give the option to integrate that special device into a multi-application BACS. Interfaces are also defined in appropriate parts of this standard along with the necessary communications protocol and conformance test required to support the inter-working of devices;
- a manufacturer, a systems house, or an electrical or mechanical contractor can assemble an implementation of a building automation and control system;
- the application of this standard is not to standardize the hardware and software design or the architecture of a System, but to define the process for the creation of project specifications, where functionality and the quality of the solution are clearly defined.

The purpose of this series of standards is intended for use by those involved in the design, manufacture, engineering, installation, commissioning, operational maintenance and training of BACS when contracted, i.e.:

- as a guide to the terminology of the building automation and control trade. Unambiguous terminology is required for a complete and accurate conveyance of the intent and details of this standard;
- in product development, to avoid unnecessary duplication of function or terminology, but should not place a restraint on the evolution of new products, systems or applications;
- as a basis for interfacing products and systems. In order to interoperate, the elements of a BACS require a unified data communication protocol and information model;
- as a basis for drawing up a project specification for the procurement of building automation and control products for systems suppliers and customers;
- as a code of practice for expertly commissioning prior to handover of a system;
- by educational establishments wishing to train people in the field of building automation and control systems.

This entire series of BACS standards consists of the following contents:

### Part 1: Overview and definitions (withdrawn)

## Part 2: Hardware

Part 2 of this standard specifies the requirements for the hardware to perform the tasks within a BACS. It provides the terms, definitions, and abbreviations for the understanding of Part 2 and Part 3.

Part 2 relates only to physical items/devices, i.e.:

- operator stations and other human system interface devices;
- devices for management functions;
- control devices, automation stations and application specific controllers;
- field devices and their interfaces;
- cabling and interconnection of devices;
- engineering and commissioning tools.

This part of this standard shows a generic system model to which all-different types of BACS and their interconnections (BACS network) can fit. A graphical concept of the BACS network in terms of LAN and inter-network topology will be provided in Part 3 of this standard.

National annexes:

National annexes may specify the local requirements of physical and electrical characteristics, the verifications for BACS devices and equipment, and the code of practice for the physical installation of systems. The annexes shall refer to the regional implementations of the relevant IEC standards.

## Part 3: Functions (refer to the scope of this part)

## Part 4: Applications

Part 4 of this standard specifies the requirements for specific communicating applications/devices, e.g. for general room automation and for sophisticated optimization of controls for heating, fan coil and induction units, CAV, VAV and radiant cooling.

This work will be coordinated at expert level with standards work from ISO/TC 205 WG 3 and CEN/TC 247.

## Part 5: Data Communication – Protocol

Part 5 of this standard specifies data communication services and objects for computer equipment and controllers used for monitoring and control of HVAC&R and other systems of building services.

This protocol provides a comprehensive set of object types for conveying encoded binary, analog, and alphanumeric data between devices including, but not limited to:

- input measuring: analog input object;
- output positioning/setpoint: analog output object;
- binary input counting;
- input state: binary input object, multi-state input;
- output switching: binary output object, multi-state output;
- values: analog value, binary value, multi-state value, accumulated value, averaging object, trend log object;
- text string;

- schedule information;
- alarm and event information;
- files; and
- control programs and parameters respectively.

This protocol models each building automation and control system as a collection of data structures called object types, the properties of which represent various aspects of the hardware, software, and operation of the device. These objects provide a means of identifying and accessing information without requiring knowledge of the details of the device's internal design or configuration.

**NOTE** An overview of possible integration with other systems in buildings, e.g. fire, security, access control, maintenance and facilities management, is shown in Figure 1 of Part 2 of this standard.

### **Part 6: Data communication conformance testing**

Part 6 of this standard specifies the technical requirements of the conformance test suite and the methods for testing the products for the conformance with the protocol. It provides a comprehensive set of procedures for verifying the correct implementation of each capability claimed on a BACS network protocol implementation conformance statement (PICS) including:

- support of each claimed BACS network service, either as a client (initiator), server (executor), or both;
- support of each claimed BACS network object-type, including both required properties and each claimed optional property;
- support of the BACS network layer protocol;
- support of each claimed data link option, and
- support of all claimed special functionality.

### **Part 7: Project implementation**

Part 7 of this standard specifies methods for project specification and implementation of BACS and for integration of other systems into the BACS. This standard defines terms to be used for project specifications and gives guidelines for integration of other systems.

#### **a) Project specification and implementation:**

This clause of the standard describes the procedures (codes of practice) required for the following:

- project specification:  
These procedures also contain an example for a plant/system/customer premises wide unique structured addressing system for data point identification;
- engineering;
- installation;
- project handover.

#### **b) System integration:**

This clause of the standard describes the special requirements/procedures for the integration and implementation of intersystem communication with foreign systems and the interconnection of other units/devices with integrated communications interfaces, e.g. chillers, elevators.

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# Building automation and control systems (BACS) —

## Part 3: Functions

### 1 Scope

This International Standard specifies the characteristics of software and functions used in Building automation and control systems as well as a method for documentation of the design. It gives guidelines for the engineering. It specifies a template for documentation of plant/application specific datapoints and functions, called BACS function list in annex A.

The informative function block examples explain a method to display the referenced functions in system documentation; they do not standardize the method for programming functions and applications.

This International Standard covers the following:

Requirements and definitions regarding BACS and application software, generic function types for plant/project specific applications and engineering functions for building controls and operations. It provides communication functions for the integration of other dedicated special system processes. The functional requirements in this part of the standard are subdivided as follows:

— System management and application software:

This clause describes the requirements for plant independent system and human system interface programs related to a project, including the operating system. This standard does not dedicate the following system functionality to any particular hardware, e.g.:

- system diagnostics, watchdog, redundancy, time keeping, access control, log lists;
- point identification, event message handling, print control;
- database, statistics, data archiving, remote access;
- system communications.

— Human system interface (HSI), point information presentation, graphics, alarms, time scheduling

— Engineering process and tool software:

This clause describes the requirements for configuring of the hardware and control strategies, the system management, and the commissioning process.

— BACS application processing programs and plant/application specific function types:

This clause describes the requirements for plant, application, and / or project specific functions and a method for the documentation of a project. The functions are subdivided into the following types:

- input and output functions;
- processing functions;

- management functions and required communications;
- operator functions.

This International Standard defines a method for creating the procurement specifications containing all essential elements required for the operational functioning of a BACS. The successful installation and operation of a BACS requires that its procurement be based on a complete specification with accurate functions.

The standard provides a template called the 'BACS function list' that can be found in annex A (normative). Its purpose is to determine and document the options for plant / application specific functionality. Further explanations can be given in form of plant/control descriptions, control flow chart diagrams, and plant/control schematics. Examples are given in annex B (informative). The exact specifications will be project-specific. Information about the standardized functions is given in the form of informative examples as function-blocks, textual, and graphical descriptions in 5.5.

It is recognized, that functions can be described and implemented in many different ways, depending on:

- climatic differences;
- cultural and regional differences;
- national regulations.

## 2 Normative references

The following referenced documents are indispensable for the application of this International Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10628:1997, *Flow diagrams for process plants — General rules*

ISO 16484-2:2004, *Building automation and control systems (BACS) — Part 2: Hardware*

ISO 16484-5, *Building automation and control systems (BACS) — Part 5: Data communication protocol*

IEC 60617-12:1997<sup>1)</sup>, *Graphical symbols for diagrams — Part 12: Binary logic elements*

IEC 60617-13:1993<sup>1)</sup>, *Graphical symbols for diagrams — Part 13: Analogue elements*

## 3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 16484-2:2004 apply.

## 4 Symbols, abbreviations and acronyms

For the purposes of this standard, the symbols, abbreviations and acronyms given in ISO 16484-2:2004 apply.

NOTE The abbreviations used and explained within the tables for the function block examples are for information only.

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1) Withdrawn. Replaced by IEC 60617:2001.