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ANSI/ASHRAE Standard 231-2026
A Control Description Language for Building Environmental Control Sequences

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Preview

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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FOREWORD

ANSI/ASHRAE Standard 231 defines and documents Control Description Language (CDL), a standard interchange format for the control logic to be used in control systems. This standard is complementary and tightly connected to other work being developed in ASHRAE controls standards and guidelines. For example, ASHRAE Guideline 36 defines best practices for high performance sequences, while Guideline 13 defines how to develop a control specification. ANSI/ASHRAE Standard 135 (BACnet®) defines a protocol for controls communication, while the forthcoming ANSI/ASHRAE Standard 223 defines a methodology for semantic modeling. The intent is for this standard to be coordinated to work with the other ASHRAE controls standards and guidelines. Note that the U.S. Department of Energy's National Laboratories is conducting associated project work to develop tools and control sequence libraries based on this standard. See Informative Appendix A, Section A2, for more details of these efforts.

CDL can be applied to the following applications:

- *ASHRAE Guideline 36. Sequences of operation (SOOs) in Guideline 36 are currently written only in English. This format is mandatory for human understanding of the SOOs, but the language is inherently imprecise and ambiguous, which has led to inconsistent implementation of the SOOs. Writing the SOOs in CDL will eliminate these issues.*
- *Simulation. CDL can be used to simulate control sequences using Spawn of EnergyPlus (SOEP) or any other tool that supports the open Modelica® standard, allowing designers to determine energy efficiency effectiveness and to fine tune the logic. This simulation could also be used to demonstrate the effectiveness of Guideline 36 SOOs for a given application.*
- *Control System Manufacturer Programming. Manufacturers of digital control systems can develop translators that convert CDL to their proprietary programming language, allowing fast and reliable ways to convert CDL for use in their commercial products. Manufacturers may also decide to change from their proprietary programming language to CDL, just as they did with BACnet. Both of these paths provide for a digital approach to deploying control sequence logic developed as part of ASHRAE Guideline 36 or from other sources.*

Preview

1. PURPOSE

The purpose of this standard is to define a declarative graphical programming language for building environmental control sequences that are both human- and machine-readable designed for specification, implementation through machine-to-machine translation, documentation, and simulation.

2. SCOPE

This standard applies to building automation systems controlling environmental systems such as mechanical systems, active facades, and lighting.

3. DEFINITIONS

3.1 Definitions

Boolean: a data type with two possible values, true/false, which can be interpreted as open/close or on/off.

composite block: a collection of any number of elementary blocks and other composite blocks, inputs, outputs, and connectors. *(**Informative note:** Composite blocks are a valuable tool to allow for consistent reuse of logic.)*

Control Description Language (CDL): an interchange format for control sequence logic using a subset of the Modelica modeling language intended to be used for control sequence definition and allows for use in modeling and simulation as well as for use in commercially available control systems or to be translated to CXF. *(**Informative Note:** Refer to Section 5 for more details.)*

constant: value that does not change.

control logic: functional description that determines how outputs are assigned based on given inputs, parameters, and state variables. Control logic is the digital implementation of what is specified in the control sequence.

control sequence: English language description that is used to specify the control logic. Control sequences are typically developed by HVAC/control system designers.