



# SLOVENSKI STANDARD

## SIST EN 15500:2008

01-december-2008

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### Elektronske naprave za regulacijo posameznih con

Electronic individual zone control equipment

Elektronische Regel- und Steuereinrichtungen für einzelne Räume oder Zonen

Régulateur électronique de zone pour le chauffage

Ta slovenski standard je istoveten z: EN 15500:2008

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#### **ICS:**

97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use
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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 15500**

July 2008

ICS 97.120

English Version

**Control for heating, ventilating and air-conditioning applications -  
Electronic individual zone control equipment**

Régulation pour les applications CVC - Régulateurs  
électroniques de zone pour le chauffage

Automation von HLK-Anwendungen - Elektronische Regel-  
und Steuereinrichtungen für einzelne Räume oder Zonen

This European Standard was approved by CEN on 3 November 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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# Contents

Page

Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	7
3 Terms and definitions .....	7
4 Abbreviations .....	10
5 Functionality.....	11
5.1 General.....	11
5.1.1 Functional objective .....	11
5.1.2 Minimum operating mode .....	11
5.1.3 Controller functions.....	12
5.1.4 Function blocks .....	14
5.2 Heating application.....	17
5.2.1 Central generation .....	17
5.2.2 Direct heating.....	17
5.2.3 Storage system (for direct or central heating).....	18
5.3 Fan coil and induction application.....	19
5.3.1 Four pipe fan coil units .....	19
5.3.2 Functional objective .....	20
5.3.3 Two pipe Fan Coil Units .....	21
5.3.4 2 Pipes 2 Wires Fan Coil Units .....	23
5.3.5 Induction units .....	25
5.4 VAV, CAV and Chilled Ceiling Applications.....	27
5.4.1 Functionality requirements.....	27
5.4.2 Factory settings for fixed-function controllers.....	28
5.4.3 Pressure dependent VAV systems .....	29
5.4.4 Pressure independent VAV systems .....	30
5.4.5 Fan assisted VAV systems .....	32
5.4.6 CAV Systems.....	34
5.4.7 Chilled ceilings.....	36
5.4.8 Dewpoint control function .....	38
5.5 Functionality and hardware .....	38
5.5.1 General.....	38
5.5.2 Power supply and data protection .....	38
5.5.3 Inputs .....	38
5.5.4 Outputs .....	39
5.5.5 Sensor requirements .....	39
5.6 Temperature control accuracy .....	40
5.7 Human System Interface (HSI) .....	41
5.8 Electrical requirements .....	42
5.8.1 General.....	42
5.8.2 Supply voltage .....	42
5.8.3 Protection against electric shock .....	42
5.8.4 Electromagnetic compatibility.....	42
5.8.5 Degrees of protection.....	42
5.8.6 Environmentally induced stress due to temperature.....	42
5.8.7 Materials .....	42
6 Test method.....	43
6.1 Power supply and data protection .....	43
6.2 Operating modes .....	43

6.2.1	Economy mode .....	43
6.2.2	Frost protection .....	43
6.3	Human System Interface (HSI) .....	43
6.4	Temperature control accuracy compliance .....	43
6.5	Electrical tests .....	43
6.6	Supply voltage .....	43
6.7	Protection against electric shock .....	43
6.8	Electromagnetic compatibility .....	43
6.9	Degrees of protection.....	44
6.10	Environmental individual stress due to temperature .....	44
7	Classification and designation.....	44
8	Marking and documentation.....	44
8.1	Marking .....	44
8.2	Documentation.....	45
8.2.1	Installation instructions .....	45
8.2.2	Factory settings and adjustment possibilities .....	45
8.2.3	User operating instructions.....	45
Annex A	(normative) Functional and acceptance test .....	46
A.1	Objective.....	46
A.2	Testing procedures .....	46
A.2.1	Test principle .....	46
A.2.2	Test parameters .....	47
A.2.3	Product configuration .....	48
A.2.4	Definition of the Control Accuracy (CA).....	49
A.3	Test facility description.....	54
A.3.1	General layout.....	54
A.3.2	Sensor side interface .....	56
A.3.3	Actuator side interface.....	59
A.3.4	Interface between real and simulated environment.....	61
A.3.5	Simulated environment.....	62
A.3.6	Data acquisition system.....	62
Annex B	(informative) Data .....	63
B.1	Objective.....	63
B.2	Applications .....	63
B.3	Building and zone types .....	63
B.3.1	Building types .....	63
B.3.2	Zone types .....	64
B.4	Default time test parameters .....	64
Bibliography	.....	66

## Foreword

This document (EN 15500:2008) has been prepared by Technical Committee CEN/TC 247 "Building Automation, Controls and Building Management", the secretariat of which is held by SNV.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2009, and conflicting national standards shall be withdrawn at the latest by January 2009.

This standard is for products for electronic individual zone control equipment applications for mechanical building services and covers electronic individual zone control equipment for heating, ventilation and air conditioning applications in residential and non residential buildings.

This standard is part of a series of European Standards for Control for HVAC Applications.

This standard, therefore, contributes to the general European policy for energy saving, particularly in the fields of the Construction Products Directive (89/106/EEC) Essential Requirements n°6 «Energy economy and heat retention» (and its interpretative document) and of the Energy Performance of Building Directive (2002/91/CE).

No existing European Standard is superseded.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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## Introduction

Equipment to control the heating, ventilation and air-conditioning (HVAC) in a building according to the actual room or zone energy demand, is necessary in order to reduce the consumption of energy and improve the quality of the air. HVAC installations should, for the purpose of energy conservation and guaranteeing indoor environmental comfort, be equipped with automatic zone control equipment acting as function of measured inside variables in buildings. Under the term “automatic zone control equipment” is understood the functional unit comprising controller, actuator and sensor.

The zone control equipment controls the comfort of the environment by controlling physical variables such as temperature, humidity, air-quality or air-flow in accordance with occupancy and user requirements.

This standard, which is valid for applications in all domestic and non-domestic buildings, conforms to the requirements and objectives of the interpretative documents “Energy Economy and Heat Retention” and “Hygiene, Health and the Environment” relating to the Construction Products Directive (89/106/EEC) and the preparations for a standardisation mandate from the European Commission are on-going.

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**EN 15500:2008 (E)****1 Scope**

The purpose of this standard is to specify the applications, functionality set and application performance for electronic individual zone control equipment. The applications are for cooling and hot water or electrical heating as described in Annex B.

This standard applies specifically to individual zone control equipment for maintaining temperature, humidity and air flow as a function of occupancy and demand operated with auxiliary electrical energy.

Information required for the operation of the equipment may be processed using either analogue or digital techniques or a combination of both. Safety requirements remain unaffected by this standard.

This standard refers to the input and output requirements of the controller and not of the input and output devices as e. g. sensors and actuators.

This standard covers fixed-function, configurable and programmable controllers.

The control equipment may or may not be connected to a data-network however communications aspects are not covered by this standard.

These devices could be applied for any kind of building, intermittent or non-intermittent occupation, residential or non residential (see Annex B).

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## 2 Normative references

The following referenced documents are indispensable for the application 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.

EN 12098-2, *Controls for heating systems — Part 2: Optimum start-stop control equipment for hot water heating systems*

EN 12098-5, *Controls for heating systems — Part 5: Start-stop schedulers for heating systems*

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60730 (all parts), *Automatic electrical controls for household and similar use*

IEC 60038, *IEC standard voltages*

## 3 Terms and definitions

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

### 3.1

#### **electronic individual zone control equipment**

equipment performing closed loop control functions of physical measured variable(s) (e.g. temperature, humidity, pressure) in a single room or in an area of a building

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#### 3.1.1

##### **Fixed-function controller**

application-specific controller where the manufacturer supplies one or more fixed control strategies for specific applications

NOTE see also EN ISO 16484-2

#### 3.1.2

##### **Configurable controller**

Controller where the manufacturer supplies one or more configurable control strategies for specific applications

NOTE see also EN ISO 16484-2

#### 3.1.3

##### **Programmable controller**

Controller where the control strategies can be programmed

NOTE 1 Programmable controllers also are named automation station.

NOTE 2 see also EN ISO 16484-2

### 3.2

#### **operating mode**

mode that applies either to control equipment or to control functions

NOTE Operating modes can be switched over by a scheduler program or manual.

#### 3.2.1

##### **manual**

mode of operation of equipment when significant control functions is overridden by the user

**EN 15500:2008 (E)****3.2.2****automatic**

mode of operation of equipment when significant control functions are not overridden by the user

**3.2.3****operating time override**

mode of operation of equipment that overrides the operating state to a predetermined other operating mode, e.g. comfort or economy for a limited pre-determined period of time

**3.2.4****comfort**

mode of operation for a normally occupied room. The room state is in the comfort range with regard to temperature, humidity, air-quality or air-flow.

NOTE Other terms for comfort mode are e. g. normal, occupied, party mode.

**3.2.5****reduced or economy**

mode of operation for an energy saving operating for a non occupied room that does not need to be in the comfort operating mode for an extended period of time

NOTE 1 In the reduced operating mode, the control setpoint is lowered or raised with respect to the comfort setpoint.

NOTE 2 Other terms for economy mode are e. g. unoccupied, night set-back, sleeping, holiday.

**3.2.6****pre comfort**

reduced operating mode for the room to quickly reach the comfort range upon changing to a comfort operating mode

**3.2.7****frost protection**

mode of operation to reach a minimum acceptable positive temperature preventing freezing

**3.2.8****building protection**

mode of operation to protect the building from overheating or supercooling

**3.2.9****off**

state where control and interlock functions are not operational

**3.2.10****holiday**

function where a time programme is used to control a room temperature for a pre-determined period

**3.2.11****tariff optimization**

function to control the room temperature according to the tariff rate signal from the electrical supplier

**3.3 input and output devices****3.3.1****input device / sensor**

detector

measures physical parameters such as temperature, humidity, air-quality, air-flow or occupancy. The sensor is incorporated into housing suitable for mounting and can be regarded as a functional unit which produces a signal that can be evaluated in correspondence with the quantity measured

**3.3.2****output device / actuator**

changes mass-, volume- and energy-flows. The actuator can be regarded as functional unit which carries out an appropriate change according to an appropriately evaluated signal

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## 4 Abbreviations

For the purposes of this document, the following abbreviations and acronyms apply.

ASP	Actual Setpoint
BACS	Building Automation and Control System
CA	Control Accuracy
CAh	Control Accuracy for heating
CAC	Control Accuracy for cooling
CAV	Constant Air Volume
CCS	Chilled Ceiling System
CP	Control Parameters
CSD	Control Setpoint Deviation
CTRL	Control to setpoint
CV	Control Variation
EC	Electric Convactor
ECH	Electric Ceiling Heating
EFH	Electric Floor Heating
EUBAC	European Building Automation and Controls Association
FCU-2P	Fan Coil Unit system - 2 Pipes
FCU-2P2W	Fan Coil Unit system - 2 Pipes 2 Wires
FCU-4P	Fan Coil Unit system - 4 Pipes
h	Hours
HVAC	Heating Ventilating and Air Conditioning
IEEE	Institute of Electrical and Electronics Engineers
IEP	Index of Energy Price
K	Kelvin
LIM	Limit
NTC	Negative Thermal Coefficient
OM	Operating Mode
OP	Other Parameters
OS	Output Signal
P-Band	Proportional Band
PES	Price energy Signal
PI	Proportional plus Integral
PID	Proportional plus Integral plus Derivative

s	Seconds
SC	Speed control
SP	Setpoint
SPA	Setpoint Adjustment
SPD	Setpoint determination function
T1	Time 1 (End of the overshoot test period)
T2	Time 2 (End of transient test period)
TDP	Dewpoint temperature
TS	Surface temperature
TZ	Zone temperature
V	Air (volume) flow
VAV	Variable Air Volume
Vmax	Maximum air (volume) flow limit
Vmin	Minimum air (volume) flow limit
Vnom	Nominal flow, i.e. the maximum air flow that a VAV box can handle as specified by the manufacturer
Vs	Volume supply air
Vx	Volume exhaust air
WFH	Water Floor Heating

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## 5 Functionality

### 5.1 General

#### 5.1.1 Functional objective

The objective of electronic individual zone control equipment is to save energy and contribute to acceptable levels of hygiene, health and comfort, by performing the following primary functions:

- control the zone variables by influencing the energy supply source (e.g. hot/chilled fluid, electrical energy, air volume);
- minimise the energy supplied to the zone (e.g. operating modes: comfort, economy);
- minimise running cost according to the price of energy.

#### 5.1.2 Minimum operating mode

To minimise energy consumption, heating zone controllers shall at least include the following three operating modes, as defined in 5.1.3:

- comfort;
- reduced or economy;

## EN 15500:2008 (E)

- frost protection;
- building protection.

## 5.1.3 Controller functions

Table 1 describes the functions which the controller can be capable of carrying out, and if they have any significant benefit on energy savings, air quality, comfort and hygiene/health.

Table 1 — Controller functions

## General functions for zone automation controls

Name	Description	Save energy	Air quality	Temp comfort	Hygiene/health	Local function	System function
Control to setpoint of the zone temperature	Algorithm to maintain the room temperature to a pre-determined level	x		x		x	
Setpoint determination	Method by which the pre-determined room temperature is set					x	x
Setpoint limitation	Upper and/or lower control limit for the room temperature setpoint	x		x		x	
Limitation monitoring	Checking that the controlled output complies with pre-selected high or low limit parameters	x		x		x	
Time scheduling	Method by which the temperature level is split into pre-determined periods	x		x		x	x

Table 1 — Controller functions (continued)

Name	Description	Save energy	Air quality	Temp comfort	Hygiene/health	Local function	System function
Optimum start stop, Predictive control	Algorithm to calculate advance level change period to achieve setpoint at a pre-determined time					x	x
Free cooling	Cooling with external air						x
Window open protection	Monitoring the state of windows (open and closed). Signal sent to the zone controller to take action when the windows are open or closed	x					
Boost	A heating operational mode providing maximal power (heating or cooling)			x		x	x
Summer/winter changeover	Changing the action of the controller depending of the heating or cooling demand	x		x			
Summer/winter compensation	Algorithm/selection to adjust temperature control for changes in load condition	x		x			
Operating time override	Means of providing a pre-determined period of comfort level			x			
Energy demand request	Signal from the secondary controller with the greatest heating/cooling demand sent to the primary controller	x				x	
Status monitoring	The monitoring of the status of Zone Controller devices, and any action which is taken to change the operation of the Zone Controller as a result of analysing the monitored values						
Occupancy sensing	Signal sent to the zone controller to take action when the zone is occupied/unoccupied	x		x		x	
Energy price optimizing	Signal supplied by the utility to set the price level of electrical energy						x