SLOVENSKI STANDARD

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Polnilni krmilni sistemi za kontrolo napajanja pri električnem termoakumulacijskem ogrevanju gospodinjstev – Metode za merjenje (delovnih) lastnosti

Charging control systems for household electric room heating of the storage type - Methods for measuring performance

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English version

Charging control systems for household electric room heating of the storage type – Methods for measuring performance

Systèmes de commande de charge des appareils de chauffage à accumulation à usage domestique - Méthodes de mesure de l'aptitude à la fonction

Aufladesteuerungen für elektrische Speicherheizungen für den Hausgebrauch - Verfahren zur Messung der Gebrauchseigenschaften

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This European Standard was prepared by the CENELEC BTWG 70-1, Charging controls for storage heating appliances.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50350 on 2004-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2005-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-04-01

Contents

1 Scope

This standard applies to charging control systems for household electric room heating (systems) of the storage type with internal energy source (resistors).

The object of this standard is to list and define, for the information of the users, the main performance characteristics of the charging control systems and to describe standard methods for verifying these characteristics and to improve quality. This standard does not deal with safety requirements.

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 60531 Household electric thermal storage room heaters – Methods for measuring performance (IEC 60531, modified)

3 Definitions

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

3.1
charging control system
system which consists of control and adjustment elements for the charging of storage heating units (e.g. storage heaters)

A charging control system regulates the heat content of a storage heating unit within an allowed charging period as a function of the climatic conditions. The assembly of all the components required to carry out this task is called charging control system.

The individual components can have one or several functions and can consist of several elements

3.2
outside sensor
component which measures the outside climatic conditions (e.g. temperature) and transmits the measured value as an information to other components of the charging control

3.3
central control unit
component which transmits command settings to other components as a function of information received from sensors and as a function of the daily charge program

3.4
timer
component which determines the start time and end time of a charge within an allowed charge period

3.5
group control unit
component which amplifies the command setting of the central controller and facilitates the matching of individual heat requirements

3.6
charge controller
the charge controller of a storage heating unit (e.g. storage heater) is a component which controls the charge as a function of the heat content and the command setting of the central controller or the group controller. This enables each storage heating unit to be matched to the heat requirements of the individual rooms

3.7
characteristic curve adjuster
adjustable element of a component of a charging control system which enables to modify the characteristic curve of an output signal

3.7.1
accessible to the service engineer only
a characteristic curve adjuster is considered to be accessible only to the service engineer if the characteristic curve adjuster requires tools for setting

3.7.2
accessible to the user
a characteristic curve adjuster is considered to be accessible to the user if the characteristic curve adjuster can be freely set and the setting read on a scale in case of normal installation conditions of the charging control system

3.8
charge period
period during which the storage heater is enabled to convert electrical power into heat in order to store it in the accumulating core

3.8.1
supply charge period
longest period (in hours) of uninterrupted electrical supply to the heater

NOTE The length of this period is set and shall be published by the utility.

3.8.2
additional supply charge period
any period of uninterrupted electrical supply to the heater, additional to the supply charge period

NOTE The length and sequence of these periods are set and shall be published by the utility.

3.8.3
supplementary charge period (T_{zf} – in hours)
sum of additional supply charge periods in a daily charge program

3.8.4
daily charge program
sequence of charge periods (supply and additional supply periods) over a 24 h cycle, beginning with the supply charge period

3.9
load characteristic
property of a charging control system which determines the switching-on behaviour of storage heating units within the daily charge program. The changeover from the main load characteristic to the supplementary load characteristic occurs at time T_4

3.9.1
forward charging
takes place when the charge switches on at the start of the supply charge period and instant of switching-off is set by the climatic conditions and the heat content of the storage heating units

3.9.2
backward charging
takes place when instant of switching the charge on is set by the climatic conditions and by the heat content of the storage heating units and instant of switching-off is given by the end of the supply charge period

3.9.3
spread charging
modified form of backward charging. The instant of switching-on and switching-off are set by the climatic conditions, the heat content of the storage heating units and a time function

4 Classification

4.1 According to the time function

Central control unit with timer.

Central control unit without timers.

4.2 According to the location of the charge controller

Located in the storage heater.

Located outside the storage heater.

4.3 According to the specification of variables

Type A: AC voltage - power based signal.

Type B: DC voltage.

Type C: AC voltage - digitised signal.

Type D: AC voltage - binary signal.

5 List of measurements

5.1 Symbols, units and abbreviations used

List of symbols, units and abbreviations for the charging control system for storage heaters

Symbol	Unit	Designation
E1	--	Characteristic curve adjuster for full charging
E2	--	Characteristic curve adjuster for start of charge
E3	--	Characteristic curve adjuster for elapsed time at which the optimal charge is theoretically reached
E4	--	Characteristic curve adjuster for the minimum charge base
E5	--	Global characteristic curve adjuster for a group control unit
E6	--	Characteristic curve adjuster for maximum heat content limiter
E7	--	Global characteristic curve adjuster for charging within the main load characteristic (floor storage heating)
E8	--	Global characteristic curve adjuster for charging within the supplementary load characteristic (floor storage heating)
E10	--	Characteristic curve adjuster for the supplementary load characteristic
E11	--	Length of the period during which, if an interruption of the supply charge period appears, the timer of charge controller is stopped up to the end of this interruption
E12	--	End point of the main load characteristic i.e. switching over point to the supplementary charging characteristic
E13	--	Length of the cycle during which the clock of the charge control system is running
E14	--	Characteristic curve adjuster for the total charging period limiter (floor storage heating)
E15	--	Characteristic curve adjuster for the level of charge allowed by E2
E16	--	Additional curve adjuster for restriction of supplementary load characteristic depending on the adjustment of E1
X_{E1}	°C	Setting point for E1
X_{E2}	°C	Setting point for E2
X_{E3}	h	Setting point for E3
X_{E4}	%	Setting point for E4
X_{E5}	%	Setting point for E5
X_{E6}	%	Setting point for E6
X_{E7}	%	Setting point for E7
X_{E8}	%	Setting point for E8
X_{E10}	%	Setting point for E10
X_{E11}	h	Setting point for E11
X_{E12}	h	Setting point for E12
X_{E13}	h	Setting point for E13
X_{E14}	h	Setting point for E14 (floor storage heating)
X_{E15}	%	Setting point for E15
X_{E16}	0/1	Setting point for E16
T_f	h	Length of supply charge period

Symbol	Unit	Designation
T_{zf}	h	Length of supplementary charge period
T	h	Elapsed time since the beginning of the last supply charge (running time)
T_0	h	Starting point of the load-characteristic
T_1	h	Length of the period during which, if an interruption of the supply charge period appears, the timer of charge controller is stopped up to the end of this interruption
T_3	h	Elapsed time at which the optimal charge is theoretically reached
T_4	h	End point of the main load characteristic i.e. switching over point to the supplementary charging characteristic
T_5	h	The end of the cycle during which the clock of the charge control system is running
T_{off}	s	Length of period switched-off
T_{on}	s	Length of period switched-on
n		Number of switched-on supply periods within T (control cycle)
n_{max}		Maximum number of supply periods within T (control cycle)
U	V	Supply voltage
I	A	Value of electric current
P_N	kW	Rated input of storage heating unit
O_a	°C	Outside temperature
O_u	°C	Ambient temperature
X_{eF}	°C	Input value of outside sensor
X_{aF}	*	Output variable of outside sensor
X_{uF}	*	Output variable of ambient temperature sensor
X_{e1}	*	Input variable of central control unit for outside condition
X_{e2}	*	Input variable for running control of the timer in accordance with the tariff-situation
X_{e3}	%	Input variable of group control unit
X_{e4}	%	Input variable of charge controller
X_{e5}	%	Input variable of heat content measurement of an appliance
X_{a1}	%	Output variable of central control unit
X_{a3}	%	Output variable of group control unit
X_{a4}	--	Binary output control signal to switch the charge
X_{aW}	%	Output variable of heat content measurement of an appliance
X_{eW}	%	Instantaneous allowed heat content calculated by the central control unit (set charging rate)
U_{a1}	V	Output voltage of central control unit
N_{a1}	--	Number of connectable charge controllers
N_{a3}	--	Number of connectable group control units
Z_{a1}	kΩ	Output impedance of central control unit
Z_{a3}	kΩ	Output impedance of group control unit
Z_{e3}	kΩ	Input impedance of group control unit
Z_{e4}	kΩ	Input impedance of charge controller
* Shall be defined by the manufacturer.		

5.2 List of test and measurements

– X_{a1} (test has to be made in accordance to Clause 9).

– Performance of the charging control system (test has to be made in accordance to Clause 12).

– Performance of type D (test has to be made in accordance to Clause 13).

6 General conditions for measurements

6.1 Power supply

If the central control unit requires a main power supply, this shall perform normally for a supply voltage of AC 230 V + 10 % - 15 % at 50 Hz.

During tests the supply voltage has to be 230 V AC ± 1 %.

6.2 Configuration

The configuration of the charging control system shall be in accordance with this given by the manufacturer.

Examples showing the combined action of components of different charging control systems are given in Figure 1a and Figure 1b.

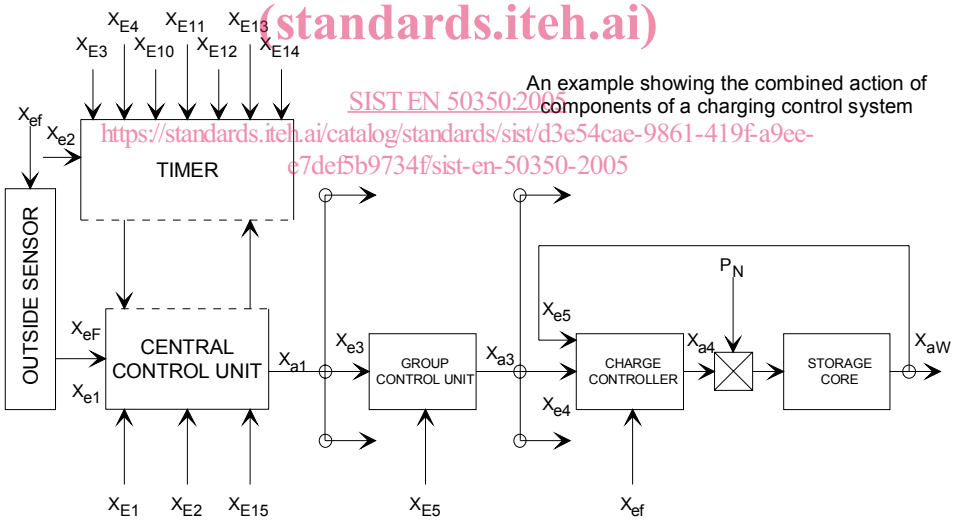

Figure 1a – Combined action of components of a charging control system with an outside sensor

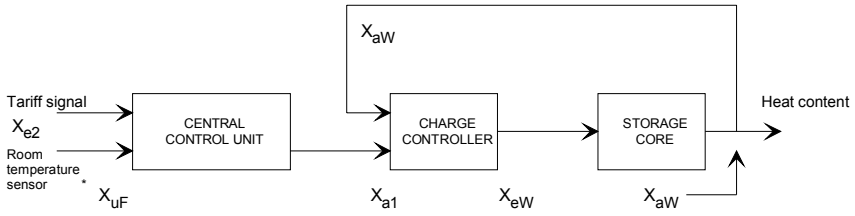

Figure 1b – Combined action of components of a charging control system without an outside sensor