
Regulacijske naprave za sisteme ogrevanja - 1. del: Naprave za regulacijo toplovodnih ogrevalnih sistemov v odvisnosti od zunanje temperature

Controls for heating systems - Part 1: Outside temperature compensated control equipment for hot water heating systems

Meß-, Steuer- und Regeleinrichtungen für Heizungen - Teil 1: Witterungsgeführte Regeleinrichtungen für Warmwasserheizungen

Régulation pour les systèmes de chauffage - Partie 1: Equipements de régulation en fonction de la température extérieure pour les systèmes de chauffage à eau chaude

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Descriptors: buildings, heating, hot water heating, control equipment, electronic equipment, regulators, energy consumption, thermal comfort, characteristics

English version

**Controls for heating systems - Part 1: Outside
temperature compensated control equipment for
hot water heating systems**

iTeh STANDARD PREVIEW

Régulation pour les systèmes de chauffage -
Partie 1: Equipements de régulation en fonction
de la température extérieure pour les systèmes
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This European Standard was approved by CEN on 1996-04-11. 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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by CEN TC 247 "Controls for mechanical building services", the secretariat of which is held by SNV.

This standard considers Definitions, Functionality, Requirements, Test-Methods and Documentation for Outside Temperature/Compensated Boiler-and Supply-Water Temperature Control of Hot Water Heating Systems.

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 1997 and conflicting national standards shall be withdrawn at the latest by January 1997.

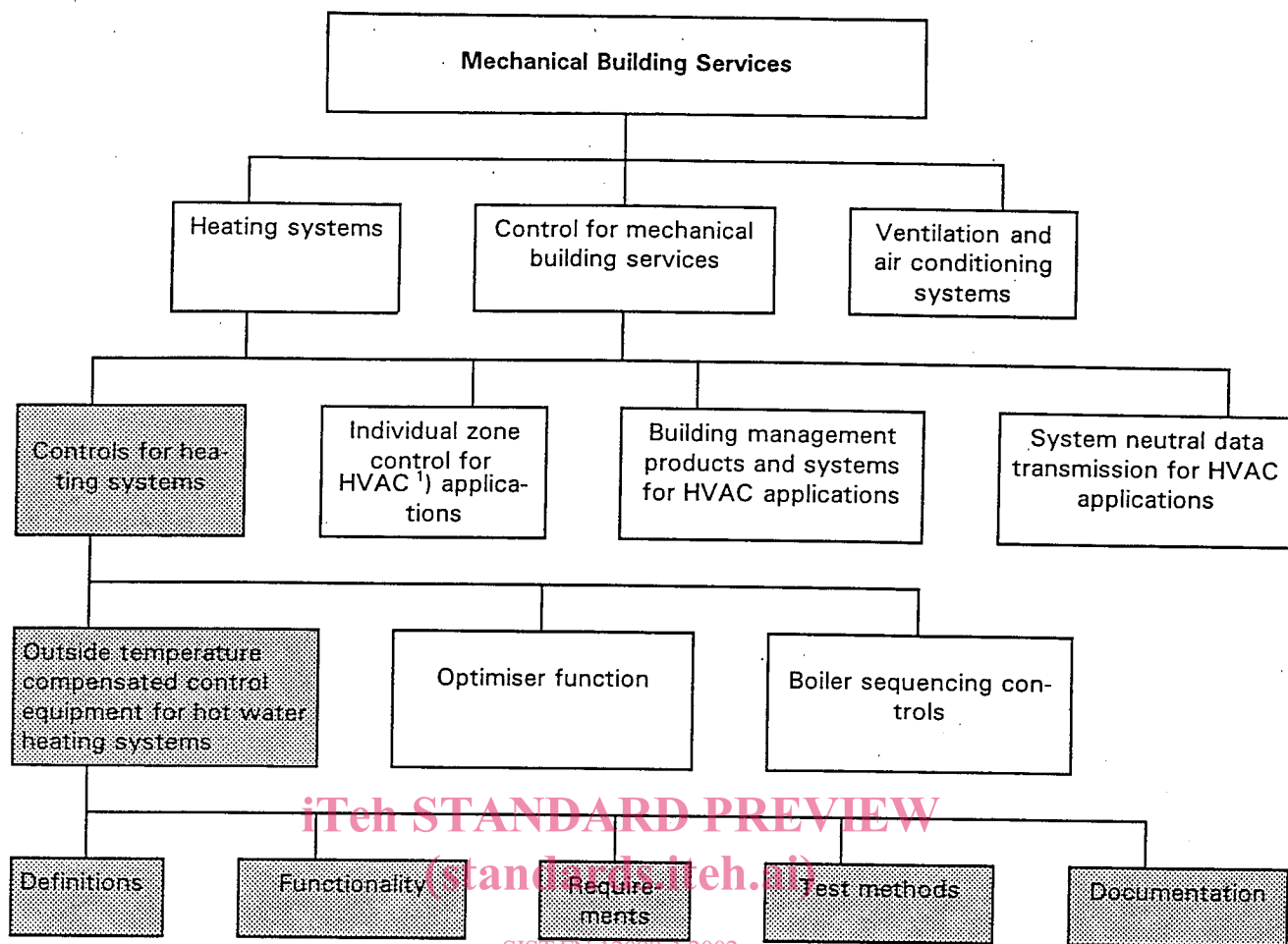
According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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The position of this standard in the whole field of standards for mechanical building services is illustrated in figure below:





1) HVAC = Heating, Ventilation, Airconditioning
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Introduction

Equipment which controls the heating supply in a building according to outside temperature and time is necessary to reduce the energy consumption of heating plants. This equipment can bring about improved comfort and energy savings, especially when effective heat retention measures are taken.

For this purpose, a central controller, like an outside temperature compensated controller is necessary, although in some cases this may not be sufficient.

Included in this standard are the main equipment characteristics which assist in reaching these energy saving and comfort objectives:

Characteristics which are tested directly include :

- accuracy of sensors,
- part load characteristics.

Characteristics which are required to be indicated by the manufacturer include :

- time constants.

Other characteristics of the equipment are tested indirectly by measuring dependent responses, for example:

- proportional band,
- differential,
- dead band.

NOTE: This standard, therefore, conforms to the requirements and objectives of the interpretative document no. 6 "Energy Economy and Heat Retention" relating to the Construction Products Directive (89/106/EEC).

1 Scope

This European Standard applies to electronic control equipment for heating systems with water as the heating medium and a flow temperature up to 120°C.

The signals can be processed by using either analogue or digital techniques, or both.

This control equipment controls and regulates the distribution and/or the generation of heat in relation to the outside temperature and other reference variables and time.

Safety requirements on heating systems remain unaffected by this standard. Safety requirements for these controls are covered in EN 60730-1 together with EN 60730-2-7 and EN 60730-2-9. The dynamic behaviour of the valves and actuators are not covered in this standard.

This control equipment may or may not be connected to a data network.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 60730-1 : 1991

Automatic electrical controls for household and similar use – Part 1: General requirements

EN 60730-2-7 : 1991

Automatic electrical controls for household and similar use - Part 2: Particular requirements for timers and time switches (IEC 730-2-7:1990, modified)

EN 60730-2-9 : 1992

Automatic electrical control for household and similar use – Part 2: Particular requirements for temperature sensing controls

EN 50081-1 : 1992

Electromagnetic compatibility – Generic emission standard – Part 1: Residential, commercial and light industry

EN 50082-1 : 1992

Electromagnetic compatibility – Generic immunity standard – Part 1: Residential, commercial and light industry

EN 60529 : 1991

Degrees of Protection provided by enclosures (IP code) (IEC 529 : 1989)

IEC 38

IEC standard voltages

IEC 417

Graphical symbols for use on equipment - Index, survey and compilation of the single sheets

ISO 7000

Graphical symbols for use on equipment - Index and synopsis

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 Outside temperature compensated controller (OTC)

The control device consists of the electronic controller, sensors and output signals but does not include the actuating equipment (see Fig. 1).

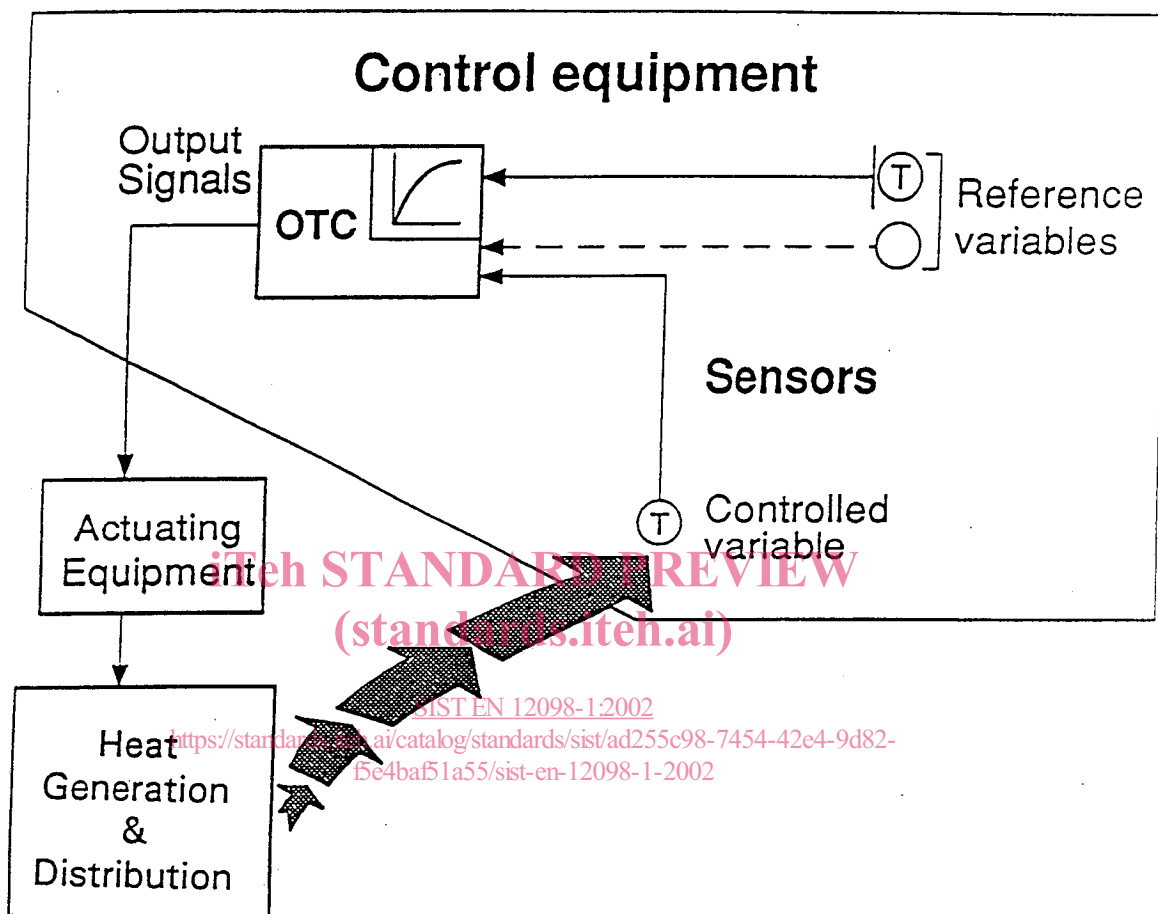


Figure 1: Control equipment for heating systems

3.2 Actuating equipment

The equipment providing the means by which the controller affects the controlled variable.

3.3 Controlled variable

The boiler and/or supply-water temperature.

3.4 Output signals

The signals generated by the controller for operating the actuating equipment.

3.5 Reference variables

The outside temperature with or without other influences or variables (e. g. room temperature) used to determine the set point of the controlled variable.

3.6 Outside temperature

Reference variable that is measured with a sensor fitted outside the building, mainly intended to measure the air temperature.

3.7 Outside temperature compensated control

Change of the controlled variable guided by the outside temperature.

3.8 Nominal room temperature

The resulting room temperature in the building arising in nominal operation of the controller. It is dependant on the design of the heating system and can be different for individual rooms.

3.9 Reduced room temperature

Reduced room temperature compared with the nominal room temperature resulting from operation at a reduced set point.

3.10 Stand-by room temperature

The room temperature resulting from switching off the heating.

3.11 Controller characteristic heating curve

The relationship between the setpoint value of the controlled variable and the reference variables, defined by two or more parameters.

3.12 Switch-on time

Point in time at which the controller starts-up the heating or increases the boiler / supply water temperature in order to reach the nominal room temperature.

3.13 Switch-off time

Point in time at which the controller switches off the heating or decreases the boiler/supply water temperature.

3.14 Nominal operation

Operating period between the switch-on time and the switch-off time.

3.15 Reduced operation

Operating period from the switch-off time up to the switch-on time, maintaining a reduced room temperature compared with the nominal room temperature.

3.16 Stand-by operation

A mode in which the heating is switched-off.

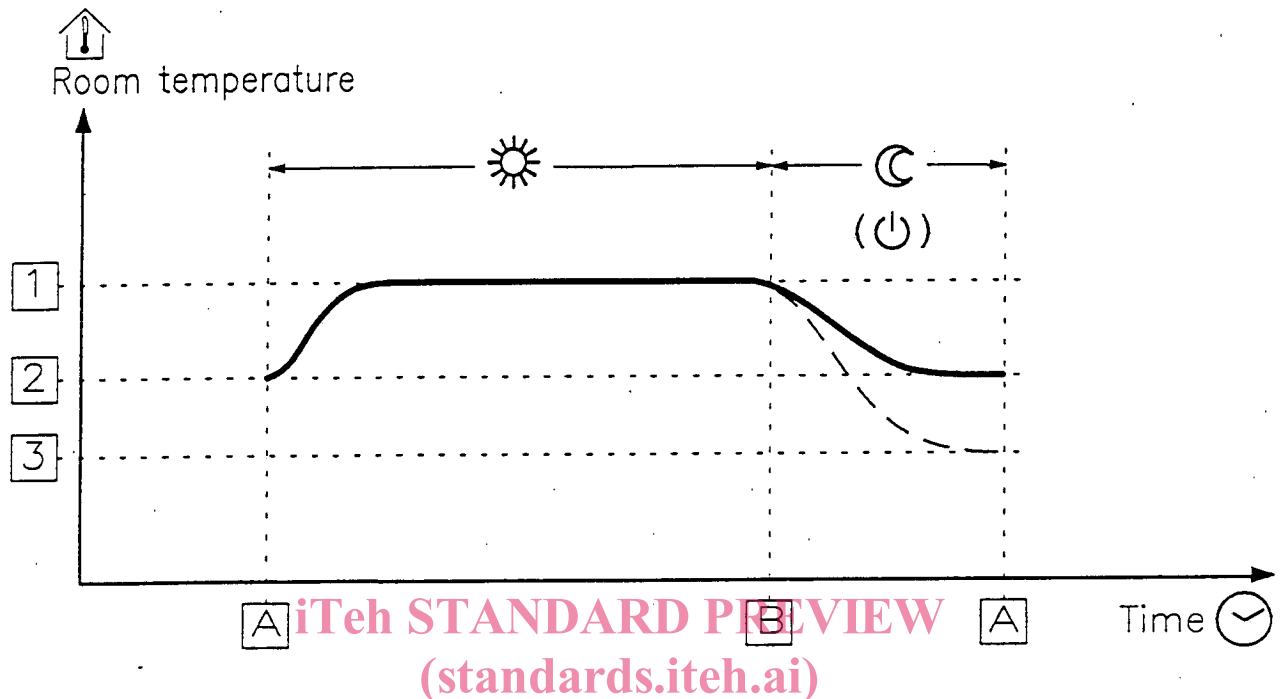
3.17 Manual operation

A mode in which the controller is inactive and the actuating equipment can be manipulated manually.

3.18 Frost protection function

A function in all operation modes (except manual operation) to prevent the heating system from freezing by providing specific output signals to actuators.

3.19 Temperature-time curve



1. Nominal room temperature
2. Reduced room temperature
3. Stand-by room temperature

A Switch-on time

B Switch-off time

A-B nominal operation

B-A reduced operation

or stand-by operation

Figure 2: Temperature-time curve

4 Functionality

4.1 Functional objective

The objective of outside temperature compensated control equipment is to save energy by performing these two main functions:

- a) To control the generation and/or distribution of heat so that the inside temperature is maintained at the set or desired level, by calculating the heating demand from measurements of the outside temperature with or without other reference variables.
- b) To alter the heat supply to follow a scheduled change of this set or desired inside temperature level by means of a time-switch, in order to match occupancy patterns.

OTC control equipment also incorporates a frost protection function and a manual operation mode.

4.2 Control equipment functionality

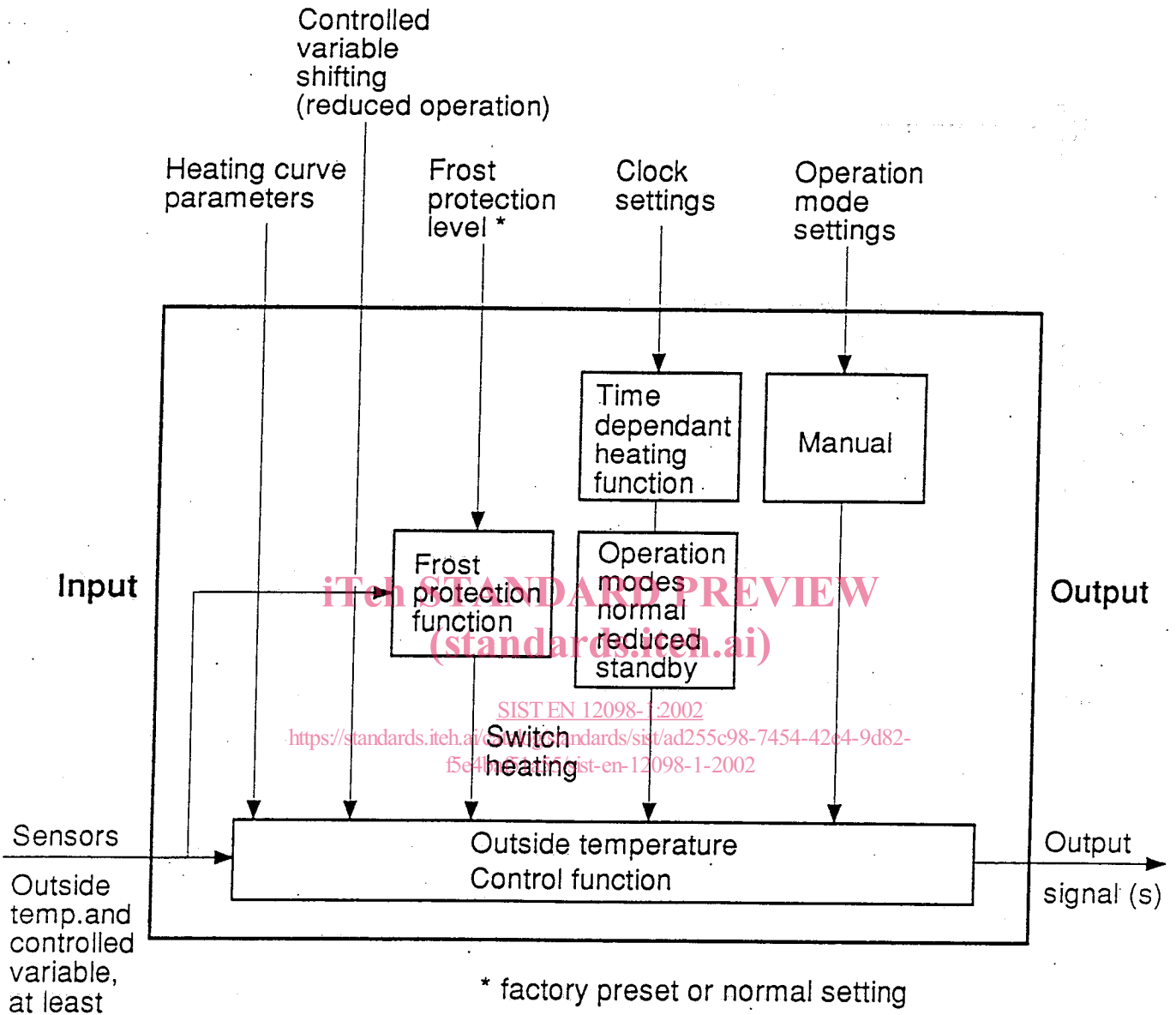
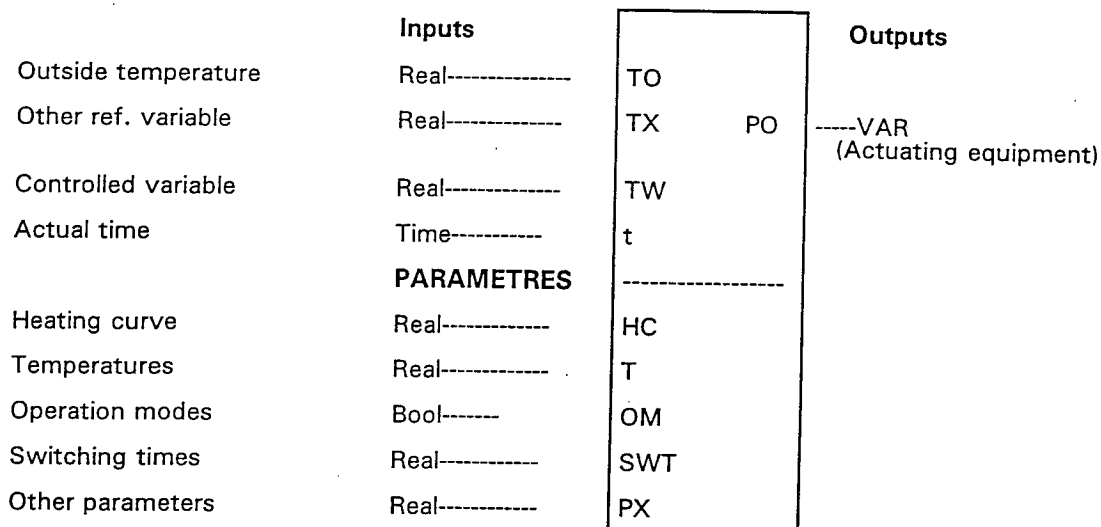


Figure 3: Block-Scheme of control equipment

4.3 Function block



Name	Type	Description	Unit
INPUTS			
TO	Real	Outside temperature	°C
TX	Real	(optional) e. g. reference room temperature	°C
TW	Real	Controlled variable temperature	°C
t	Time	Actual time	h/min/s
OUTPUTS			
PO	Vari	Actuating equipment e. g. motorised valve, pump, burner	
PARAMETERS			
HC	Real	Characteristic heating curve	°C
T	Real	Temperature setting	K
OM	Bool	Operation mode setting	
SWT	Real	Switching times (Time schedule)	
PX	Real	Other parameters setting	h/min/s

NOTE: Controllers can incorporate additional data processing functions, especially when using digital techniques. These functions can be, for example:

- to adapt or learn automatically characteristic heating curve parameters through the measurement of room temperature, over several days.
- to set maximum heating power after the switch-on time to increase the rate of rise of room temperature.
- to shift automatically the switch-on time in order to reach the nominal room temperature at the desired time (optimum start scheduling).
- to switch off the heating according to outside temperature (automatic summer switch-off).
- to limit (minimum and maximum) boiler and/or distributed flow temperatures.
- to avoid pump blocking (periodic running of pump outside the heating period).

Such functions are not described in this part of the standard.

Equipment incorporating these additional facilities can be taken into consideration only if it is possible to disable these functions or set parameters such that the requirements of this standard can be met during operation.