

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Automatic electrical controls for household and similar use –
Part 2-5: Particular requirements for automatic electrical burner control systems**

**Dispositifs de commande électrique automatiques à usage domestique et
analogue –
Partie 2-5: Règles particulières pour les systèmes de commande électrique
automatiques des brûleurs**

IEC 60730-2-5:2000

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD
AND SIMILAR USE –****Part 2-5: Particular requirements for automatic electrical
burner control systems**

FOREWORD

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International Standard IEC 60730-2-5 has been prepared by IEC technical committee 72: Automatic controls for household use.

This consolidated version of IEC 60730-2-5 consists of the third edition (2000) [documents 72/430/FDIS and 72/447/RVD], its amendment 1 (2004) [documents 72/632A/FDIS and 72/642/RVD] and its amendment 2 (2008) [documents 72/770/FDIS and 72/773/RVD].

The amendment 2 is based on 60730-2-5, Edition 3 (2000) and its Amendment 1 (2004).

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 3.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

This Part 2-5 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the third edition (1999) and Amendment 1 (2003) and Amendment 2 (2007) of that publication. Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This part 2-5 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Safety requirements for automatic electrical burner control systems.

Where this part 2-5 states "addition", "modification", or "replacement", the relevant requirement, test specification or explanatory matter in part 1 should be adapted accordingly.

Where no change is necessary, this part 2-5 indicates that the relevant clause or subclause applies.

In the development of a fully international standard, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The "in some countries" notes regarding differing national practices are contained in the following subclauses:

- 2.3.127
- 6.11
- 15.7
- 17.16.102.1
- H.26.10
- H.26.11.103
- Table H.27.1, Note 7
- H.27.1.3

In this publication:

1) The following print types are used:

- Requirements proper: in roman type;
- *Test specifications: in italic type,*
- Explanatory matter; in small roman type.

2) Subclauses, notes, tables and figures which are additional to those in part 1 are numbered starting from 101, additional annexes are lettered AA, BB, etc.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE –

Part 2-5: Particular requirements for automatic electrical burner control systems

1 Scope and normative references

This clause of part 1 is applicable except as follows:

1.1 Replacement:

This part of IEC 60730 applies to automatic electrical burner control systems for the automatic control of burners for oil, gas, coal or other combustibles for household and similar use including heating, air conditioning and similar use.

This part 2-5 is applicable to a complete burner control system and to a separate programming unit. This part 2-5 is also applicable to a separate electronic high-voltage ignition source and to a separate flame detector.

Separate ignition devices (electrodes, pilot burners, etc.) are not covered by this part 2-5 unless they are submitted as part of a burner control system.

Requirements for separate ignition transformers are contained in IEC 60989.

Throughout this part 2-5, where it can be used unambiguously, the word "system" means "burner control system" and "systems" means "burner control systems".

Systems utilizing thermoelectric flame supervision are not covered by this part 2-5.

1.1.1 This part 2-5 applies to the inherent safety, to the manufacturer's declared operating values, operating times and operating sequences where such are associated with burner safety and to the testing of automatic electrical burner control systems used in, on, or in association with, burners.

Requirements for specific operating values, operating times and operating sequences are given in the standards for appliances and equipment.

Systems for equipment not intended for normal household use, but which nevertheless may be used by the public, such as equipment intended to be used by laymen in shops, in light industry and on farms, are within the scope of this part 2-5.

This part 2-5 applies to systems using NTC or PTC thermistors, additional requirements for which are contained in annex J.

This part 2-5 does not apply to systems designed exclusively for industrial applications.

1.1.2 This part 2-5 applies to manual controls when such are electrically and/or mechanically integral with automatic controls.

Requirements for manual switches not forming part of an automatic control are contained in IEC 61058-1.

Throughout this part 2-5, the word "equipment" means "appliance and equipment".

1.2 Replacement:

This part 2-5 applies to systems with a rated voltage not exceeding 660 V and with a rated current not exceeding 63 A.

1.3 Replacement:

This part 2-5 does not take into account the response value of an automatic action of a control, if such a response value is dependent upon the method of mounting the control in the equipment. Where a response value is of significant purpose for the protection of the user, or surroundings, the value defined in the appropriate household equipment standard or as determined by the manufacturer applies.

This part 2-5 includes systems responsive to flame properties.

1.4 Replacement:

This part 2-5 applies also to systems incorporating electronic devices, requirements for which are contained in annex H.

1.5 Normative references:

This clause of part 1 is applicable except as follows:

Addition:

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60127-1:2006, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-5-1:2003, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 60989:1991, *Separating transformers, autotransformers, variable transformers and reactors*

2 Definitions

This clause of part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

Additional definitions:

2.2.101

burner control system

system which monitors the operation of fuel burners. It includes a programming unit, a flame detector and may include an ignition source and/or ignition device

The various functions of the system may be in one or more housings.

2.2.102
flame detector

device which provides the programming unit with a signal indicating the presence or absence of flame

It includes the flame sensor and may include an amplifier and a relay for signal transmission. The amplifier and relay may be in its own housing or combined with the programming unit.

2.2.103
flame sensor

device which senses the flame and provides the input signal to the flame detector amplifier

Examples are optical sensors and flame electrodes (flame rods).

2.2.104
ignition source

electrical or electronic system component which provides energy to an ignition device

It may be separated from or incorporated in the programming unit. Examples are ignition transformers and electronic high-voltage generators.

2.2.105
ignition device

device mounted on or adjacent to a burner for igniting fuel at the burner

Examples are pilot burners, spark electrodes and hot surface igniters.

2.2.106
programming unit

device which controls the burner operation in a declared sequence from start-up to shutdown within declared timings and in response to signals from regulating, limiting and monitoring devices

2.2.107
multitry system

system that allows more than one valve open period during its declared operating sequence

2.3 Definitions relating to the function of controls

2.3.30
 T_{\max}

Replace "switch head" by "burner control system."

Additional definitions:

2.3.101
automatic recycle

automatic repetition of the start-up procedure, without manual intervention, following loss of the supervised flame and subsequent fuel supply shutoff

2.3.102
controlled shutdown

de-energization of the fuel flow means as a result of the opening of a control loop by a control device such as a thermostat. The system returns to the start position

Controlled shutdown may include additional actions by the system.

2.3.103

flame detector response time

period of time between the loss of the sensed flame and the signal indicating the absence of flame

2.3.104

flame detector operating characteristics

that function of the flame detector which indicates absence or presence of flame as the output signal of the flame detector relating to the input signal

Normally the input signal is provided by a flame sensor.

2.3.104.1

signal for presence of flame (S_1)

minimum signal which indicates the presence of flame when there was previously no flame

2.3.104.2

signal for absence of flame (S_2)

maximum signal which indicates the loss of flame

S_2 is less than S_1 .

2.3.104.3

maximum flame signal (S_{max})

maximum signal which does not affect the timings or the sequence

2.3.104.4

signal for visible light flame simulation (S_3)

minimum signal which indicates the presence of flame during the visible light flame simulation test

S_3 is less than S_2 .

2.3.105

self-checking flame detector

flame detector which checks for correct operation of the flame detector and its associated electronic circuitry while the burner is in the running position

2.3.106

flame detector self-checking rate

frequency of the self-checking function of the flame detector (in number of operations per unit of time)

2.3.107

flame failure lock-out time

period of time between the signal indicating absence of flame and lock-out

2.3.108

flame failure reignition time (relight time)

period of time between the signal indicating absence of flame and the signal to energize the ignition device. During this time period the fuel supply is not shut off

2.3.109

flame signal

output signal of the flame detector

2.3.110

flame simulation

condition which occurs when the flame detector indicates the presence of flame when in reality no flame is present

2.3.111

ignition time

period of time during which the ignition device is energized

2.3.112

lock-out

process in which the system goes into one of the following lock-out conditions, following safety shutdown

2.3.112.1

non-volatile lock-out

condition such that a restart can only be accomplished by a manual reset of the system and by no other cause

2.3.112.2

volatile lock-out

condition such that a restart can be accomplished by either a manual reset of the system or by an interruption of the power supply and its subsequent restoration

2.3.113

main flame establishing period

period of time between the signal to energize the main fuel flow means and the signal indicating presence of the main burner flame

2.3.114

pilot flame establishing period

period of time between the signal to energize the pilot fuel flow means and the signal indicating presence of the pilot flame

2.3.115

post-ignition time

period of the ignition time between the signal indicating presence of flame and the signal to de-energize the ignition device

2.3.116

pre-ignition time

period of the ignition time between the signal to ignite and the signal to energize the fuel flow means

2.3.117

proved igniter

system in which the fuel flow means is energized only after the availability of sufficient energy to ignite the fuel has been verified

Examples are systems using spark supervision and those using proved hot surface igniters.

2.3.117.1

proved igniter operating value

signal which indicates that the proved igniter has the energy to ignite the fuel

2.3.117.2

igniter proving time

period of time between the signal to energize the proved igniter and the signal to energize the fuel flow means

2.3.117.3

igniter failure response time

period of time between loss of the supervised proved igniter and the signal to de-energize the fuel flow means

2.3.118
purge time

period during which air is introduced to displace any remaining air/fuel mixtures or products of combustion from the combustion zone and flue ways

No fuel is admitted during this period.

2.3.118.1
post-purge time

purge time that takes place immediately following the shutting off of the fuel supply

2.3.118.2
pre-purge time

purge time that takes place between initiation of a burner control sequence and the admission of fuel to the burner

2.3.119
re-ignition (relight)

process by which, following loss of the flame signal, the ignition device will be re-energized without interruption of the fuel flow means

2.3.120
recycle time

period of time between the signal to de-energize the fuel flow means following the loss of flame and the signal to begin a new start-up procedure

2.3.121
running position

this position denotes that the main burner flame is established and supervised

2.3.122
safety shutdown

de-energization of the main fuel flow means as the result of the action of a limiter, a cut-out or the detection of an internal fault of the system

Safety shutdown may include additional actions by the system.

2.3.123
start position

position which denotes that the system is not in the lock-out condition and has not yet received the start signal, but can proceed with the start-up sequence if required

2.3.124
start signal

a signal, for example, from a thermostat, which releases the system from its start position

2.3.125
start-up lock-out time

period of time between the signal to energize the fuel flow means and lock-out

For systems which control two separate fuel flow means, two different start-up lock-out times are possible (first and second start-up lock-out times).

2.3.126
waiting time

period between the start signal and the signal to energize the ignition device. For burners without fans, natural ventilation of the combustion chamber and the flue passages normally takes place during this time

2.3.127**valve open period**

for multity systems, the period of time between the signal to energize the fuel flow means, and the signal to de-energize the fuel flow means, if proof of the supervised burner flame is not established

In the USA, this period is referred to as the "trial-for-ignition period."

2.3.128**valve sequence period**

for multity systems, the sum of all valve opening periods prior to lock-out, if proof of the supervised burner flame is not established

2.3.129**system restart**

process by which, after a safety shutdown, a full start-up procedure is automatically repeated

2.5 Definitions of types of control according to construction

Additional definitions:

2.5.101**system for permanent operation**

system which is intended to remain in the running position for longer than 24 h without interruption

2.5.102**system for non-permanent operation**

system which is intended to remain in the running position for less than 24 h

Additional definitions:

2.101 Definitions relating to the type of burner (see 6.101)**2.101.1****continuous ignition**

a type of ignition which, once placed in operation, is intended to remain energized continuously until it is manually interrupted

2.101.2**continuous pilot**

a pilot which, once placed in operation, is intended to remain ignited continuously until it is manually interrupted

2.101.3**direct ignition**

a type of ignition which is applied directly to the main burner, without the use of a pilot

2.101.4**expanding pilot**

form of continuous pilot where the pilot flame is increased or expanded when required to ignite the main burner and reduced either immediately after main burner ignition, or after the main flame is shut off

2.101.5**full rate start**

condition in which the main burner ignition and subsequent flame supervision occur at full fuel rate