UL 218

STANDARD FOR SAFETY

Fire Pump Controllers

UL Standard for Safety for Fire Pump Controllers, UL 218

Third Edition, Dated September 16, 2015

Summary of Topics

This revision of ANSI/UL 218 dated September 10, 2020 is issued to correct the recent ANSI reaffirmation date on the title page. No other changes have been made.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL, CSA, and ANCE are committed to updating this harmonized standard jointly. However, the revision pages dated September 10, 2020 will not be jointly issued by UL, CSA, and ANCE as these revision pages only address UL ANSI approval dates.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

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Second Edition

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CSA C22.2 No. 263-15
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Underwriters Laboratories Inc.
UL 218
Third Edition

Fire Pump Controllers

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Approved American National Standard

ANSI/UL 218-2015 (R2020)

Commitment for Amendments

This standard is issued jointly by the Association of Standardization and Certification (ANCE), the Canadian Standards Association (operating as “CSA Group”), and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to ANCE, CSA Group, or UL at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of ANCE, CSA Group, and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue. ANCE will incorporate the same revisions into a new edition of the standard bearing the same date of issue as the CSA Group and UL pages.

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup. org and include "Proposal for change" in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the Third Edition including revisions through September 10, 2020. The most recent designation of ANSI/UL 218 as a Reaffirmed American National Standard (ANS) occurred on July 22, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Preface

This is the harmonized ANCE, CSA Group, and UL standard for fire pump controllers. It is the second edition of NMX-J-626-ANCE, the second edition of CSA C22.2 No. 263, and the third edition of UL 218. This edition of NMX-J-626-ANCE supersedes the previous edition published on September 28, 2009. This edition of CSA C22.2 No. 263 supersedes the previous edition published in 2009. This edition of UL 218 supersedes the previous edition published in 1999.

This harmonized standard was prepared by the Association of Standardization and Certification, (ANCE), CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee for Fire Pump Controllers, CANENA THSC 17B WG4, of the Council on the Harmonization of Electrotechnical Standards of the Nations of the Americas (CANENA), are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

The present Mexican Standard was developed by the CT 64 Instalaciones eléctricas y protección contra choque eléctrico from the Comite de Normalizacion de la Asociacion de Normalizacion y Certificacion, A.C., CONANCE, with the collaboration of the fire pump controllers manufactures and users.

This standard was reviewed by the CSA Subcommittee for Fire Pump Controllers, under the jurisdiction of the CSA Technical Committee on Industrial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This standard was reviewed and approved by the Committee de Normalizacion of ANCE (CONANCE). This standard was reviewed by UL's Standards Technical Panel (STP) for Fire Pump Controllers, STP 218.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

Application of standard

A UL standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of harmonization

This standard uses the IEC format but is not based on, nor shall it be considered equivalent to, an IEC standard. This standard is published as an equivalent standard for ANCE, CSA, and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Reasons for differences from IEC

This standard provides requirements for fire pump controllers for use in accordance with the electrical installation codes of Canada, Mexico, and the United States. At present there is no IEC standard for fire pump controllers for use in accordance with these codes. Therefore, this standard does not employ any IEC standard for base requirements.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

INTRODUCTION

1 Scope

1.1 Products covered

1.1.1 These requirements cover controllers intended for starting and stopping centrifugal and positive displacement fire pumps, including automatic and non-automatic types for electric motor with or without transfer switch or engine driven pumps in accordance with Annex A, item 1. Types of controllers covered include diesel engine, electric motor, limited service, medium voltage and residential. Controllers may be suitable for use as service equipment. This equipment is for installation in non-hazardous locations in accordance with Annex A, item 2.

1.1.2 Controllers for electric motor driven, centrifugal fire pumps are intended for use with squirrel cage or wound rotor motors rated 600 V or less. Controllers for squirrel cage motors may be for across-the-line or reduced inrush current starting. Controllers may be provided with integral automatic transfer switches.

1.1.3 Variable speed fire pump controllers for electric motor driven, centrifugal fire pumps are intended for use with squirrel cage induction, inverter duty rated motors rated 600 V or less, and rated for 50 Hz or 60 Hz.

1.1.4 Limited service controllers are intended for across-the-line starting of squirrel cage motors rated 22 kW (30 hp) or less, 600 V or less. Controllers may be provided with integral automatic transfer switches.

1.1.5 Medium voltage fire pump controllers are intended for use with squirrel cage motors rated 601 V – 7.2 kV AC.

1.1.6 Residential fire pump controllers are intended for use with single-phase squirrel cage motors rated 240 V or less. Residential fire pump controllers are intended to be used in one or two family dwelling units in accordance with the requirements of item 35 in Annex A.

1.1.7 Diesel engine fire pump controllers rated nominal 24 V DC or less are intended for use with fire pump engines. Where required, AC voltage is limited to 600 V AC or less.

1.2 Products not covered

1.2.1 An automatic transfer switch intended to be used in fire pump circuits, that is provided separate from a controller.

Note: Stand-alone automatic transfer switches for fire pump circuits are covered by the requirements of item 11, Annex A.

2 Normative References

2.1 Products covered by this standard shall comply with the referenced installation codes and standards noted in Annex A as appropriate for the country where the product is to be used. When the product is intended for use in more than one country, the product shall comply with the installation codes and standards for all countries where it is intended to be used.

2.2 Where reference is made to any Standards, such reference shall be considered to refer to the latest editions and revisions thereto available at the time of printing, unless otherwise specified.

3 Units of Measurement

3.1 The values given in SI (metric) units shall be normative. Any other values are for information only.

4 General Requirements

4.1 General

4.1.1 In Canada, requirements applicable to this Standard are given in item 17 of Annex A.

4.2 Components

4.2.1 A component of a product covered by this standard shall comply with the requirements for that component. See Annex B for a list of standards covering components generally used in the products covered by this standard. A component shall comply with the ANCE, CSA, or UL standards as appropriate for the country where the product is to be used.

5 Definitions

5.1 For the purpose of this standard, the following definitions apply. In Canada, in addition to the definitions listed in this standard, the definitions of item 2 in Annex A also apply.

5.2 AUXILIARY CIRCUIT – Circuits not essential for the performance of the fire pump controller.

5.3 CENTRIFUGAL PUMP – A pump in which the pressure is developed principally by the action of centrifugal force.

5.4 CIRCUIT BREAKERS

Circuit breaker (as applied to fire pump controllers) – For the purposes of this standard, the term circuit breaker (disconnecting means) refers to either thermal-magnetic or inverse time circuit breakers (for residential fire pump controllers only) or to instantaneous-only circuit breakers.

Circuit breaker – A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.[1)]

Thermal-Magnetic Circuit breaker – A device designed to open and close a circuit by non-automatic means, and to open the circuit automatically on a predetermined overcurrent (overload and short circuit), without damage to itself when properly applied within its rating.

Inverse Time (as applied to circuit breakers) – A qualifying term indicating that there is purposely introduced a delay in the tripping action of the circuit breaker, which delay decreases as the magnitude of the current increases.[1)]

Instantaneous-Only Circuit breaker – One intended to provide short circuit protection only.

Instantaneous Trip (as applied to circuit breakers) – A qualifying term indicating that no delay is purposely introduced in the tripping action of the circuit breaker.[1)]

[1)] 5.4, 5.6 and 5.15 originated, in part, from Article 100 of the 2011 edition of NFPA 70. Reprinted with permission from NFPA 70-2011, National Electrical Code, Copyright © 2010, National Fire Protection Association, Quincy, MA. This reprinted material is not the complete and official position of the NFPA on the referenced subject, which is represented only by the standard in its entirety.

5.5 CONTROL CIRCUIT – A circuit that carries the electric signals directing the performance of a fire pump controller, but which does not carry the main power circuit. A control circuit is generally limited to 15 A.

5.6 CONTROLLER (Electric motor) – A device or group of devices that serves to govern, in some predetermined manner, the electric power delivered to the apparatus to which it is connected.[1)]

CONTROLLER (Diesel engine) – A device or group of devices that serves to govern, in some predetermined manner, the engine power delivered to the apparatus to which it is connected.

5.7 CONTROLLER – LIMITED SERVICE – A controller that is limited in application when approved by the authority having jurisdiction, as defined in 1.1.3.

5.8 CURRENT LIMITERS – Melting link-type devices that, when used as an integral part of a circuit breaker, limit the current during a short circuit to less than the interrupting capacity of the circuit breaker.

5.9 DISCONNECTING MEANS – A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

5.10 DROP-OUT RELAY – A relay that, when de-energized, initiates the control function.

5.11 ENCLOSURE – The case or housing of apparatus constructed to provide a degree of protection against incidental contact with the enclosed equipment, and to provide a degree of protection against specified environmental conditions.

5.12 ISOLATING SWITCH – A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

5.13 READILY ACCESSIBLE – Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, and so forth.

5.14 SERVICE BOX (For Canada) – An approved assembly consisting of a metal box or enclosure constructed so that it may be effectually locked or sealed, containing either service fuses and a service switch or a circuit breaker, and of such design that either the switch or circuit breaker may be manually operated when the box is closed.

In Mexico and the United States, this definition does not apply.

5.15 SERVICE EQUIPMENT (For Mexico and the United States) – The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply.[1)]

In Canada, this definition does not apply.

5.16 SERVICE EQUIPMENT (For Canada) – In addition to 5.14, the service circuit breaker or fused switch is located in a service box.

In Mexico and the United States, this definition does not apply.

5.17 TRANSFER SWITCH (AUTOMATIC) – Self-acting equipment for transferring the connected load from one power source to another power source.[2)]

[2)] 5.17 originated from the 2013 edition of NFPA 110. Reprinted with permission from NFPA 110-2013, Standard for Emergency and Standby Power Systems, Copyright © 2013, National Fire Protection Association, Quincy, MA. This reprinted material is not the complete and official position of the NFPA on the referenced subject, which is represented only by the standard in its entirety.

5.18 MEDIUM VOLTAGE – (For Mexico and the United States) An AC voltage in the range of 1501 to 7200 V.

For Canada – An AC voltage in the range of 751 to 7200 V.

Note: The applicable installation codes will in some cases refer to this voltage range as “high-voltage”.

CONSTRUCTION

6 Construction

6.1 Enclosures

6.1.1 A fire pump controller assembly shall be securely mounted in an enclosure that protects the equipment. The enclosure shall be constructed to provide strength and rigidity required to resist the abuses to which it is subjected without total or partial collapse resulting in a risk of fire, electric shock, or injury to persons due to reduction of spacings, loosening or displacing of parts, or other serious defects.

6.1.2 Enclosures for fire pump controllers shall comply with the requirements in Annex A, item 9.

6.1.3 An enclosure shall comply with the requirements for an environmental rating, excluding Type 1, as specified in Annex A, item 3.

6.2 Spacings

6.2.1 Electrical spacings through air, over surface, and between uninsulated live parts and the enclosure walls shall be at least those specified in Table 1.

6.2.2 For printed circuit wiring boards, the minimum spacings shall be as specified in Table 11.

6.2.3 The spacings at a field-wiring terminal shall be measured with wire connected to the terminal as in service. The connected wire shall be the next larger size than normally required if the terminal will accommodate it, or if the equipment is not marked to restrict its use.

6.2.4 In Mexico and the United States, the spacings specified in Table 1 for devices having limited rating shall apply to:

a) Devices rated 0.75 kW (1 hp) or less; 720 VA or less (break pilot duty); or not more than 15 A at 51 – 150 V, 10 A at 151 – 300 V, or 5 A at 301 – 600 V; or any combination thereof;

b) These same devices, when multipole and controlling more than one load, provided that the total load connected to the line at one time does not exceed 1.5 kW (2 hp), 1440 VA, or have a current rating greater than 30 A at 51 – 150 V, 20 A at 151 – 300 V, or 10 A at 301 – 600 V, and provided also that the loading on any one pole does not exceed its marked rating.

In Canada, reduced spacings for limited ratings are only allowed in control circuits.

6.2.5 In a circuit involving voltages of 50 V or less, spacings at field-wiring terminals may be 3.2 mm (0.125 inch) through air and 6.3 mm (0.25 inch) over surface.

6.2.6 In a circuit involving voltages of 50 V or less, other than field wiring terminals, the spacings shall be 1.6 mm (0.06 inch) through air or over surface, provided that the insulation and clearances between such circuits and any circuits of more than 50 V are in accordance with the requirements for the higher voltage circuit.

6.3 Insulating barriers

6.3.1 An insulating barrier or liner used as the sole separation between uninsulated live parts and grounded dead metal parts, including the enclosure, or between uninsulated live parts of opposite polarity shall be of a material specified in Table 14.

6.3.2 An insulating barrier or liner that is used in addition to not less than one-half the required spacing through air shall be of a material specified in Table 14 and shall:

a) Be of a material that is intended for the support of uninsulated live parts;

b) Have the mechanical strength required to withstand mechanical damage;

c) Be held in place; and

d) Be located so that it is not adversely affected by operation of the equipment in service.

6.3.3 Insulating barriers or liners having a thickness less than that specified in Table 14 may be used when subjected to the Barrier Dielectric Strength Test in 7.9.

6.4 Field wiring terminals

6.4.1 A controller shall be provided with wiring terminals for connection of conductors having an ampacity or wire size not less than the following:

a) For power circuits, 125 percent of the full-load motor current specified in Table 2 and Table 3 for the horsepower rating or, in the case of power conversion equipment in which the input current is different from motor full-load current, 125 percent of maximum rated input current;

b) For service use not less than 5.3 mm^2 (10 AWG); and

c) For control circuits not less than 2.1 mm^2 (14 AWG).

See Table 5 for field conductor ampacities.

6.4.2 All wiring terminals intended for field connection shall:

a) Be evaluated in accordance with Annex A, items 7 and 12, and marked for the wire size or range;

b) Be part of a device evaluated and marked for the wire size or range; or

c) Comply with the secureness and pullout requirements of 6.4.5 for the next larger size conductor than that specified in 6.4.1, unless the equipment is marked to restrict its use to only the smaller size conductor.

6.4.3 A terminal to which field wiring is to be connected shall be a pressure wire connector.

6.4.4 A terminal to which 5.3 mm^2 (10 AWG) or smaller wiring connections are to be made may consist of a clamp or wire-binding screw with a terminal plate having upturned lugs or the equivalent to hold the wire in position. See 6.4.6 – 6.4.10.

6.4.5 A field-wiring pressure wire connector provided with or specified for use with industrial control equipment shall comply with one or more of the following, as applicable:

a) The performance requirements in Annex A, item 6 (see 16.12);

b) The performance requirements in Annex A, item 7; or

c) The performance requirements in Annex A, item 12.

6.4.6 A wire-binding screw to which field-wiring connections are made shall be No. 8 or larger.

6.4.7 A No. 6 screw may be used at a terminal intended only for connection of a 2.1 mm^2 (14 AWG) conductor or smaller.

6.4.8 A terminal plate tapped for wire-binding screw shall be of metal not less than 0.76 mm (0.030 inch) thick for a 2.1 mm^2 (14 AWG) or smaller wire, and not less than 1.27 mm (0.050 inch) thick for a wire larger than 2.1 mm^2 (14 AWG). There shall be at least two full threads in the plate.

6.4.9 For a terminal plate formed from stock having the required thickness specified in 6.4.8, one method of complying with the thread requirement of 6.4.8 is to have the metal extruded at the tapped hole for the binding screw to provide two full threads.

6.4.10 A wire-binding screw shall thread into metal.

6.5 Grounding

6.5.1 In Mexico and the United States, all controllers shall have provisions for grounding all non-current-carrying metal parts that are exposed or that are located in a position to be contacted by persons during normal operation or adjustment of the equipment and that are capable of becoming energized.

In Canada, this requirement does not apply.

6.5.2 In Canada, the requirements for bonding as specified in Annex A, item 19, shall apply.

In Mexico and the United states these requirements do not apply.

6.5.3 The grounding and bonding terminology used in this standard is in accordance with the UL column in Figure 1. The corresponding CEC and ANCE terms are also provided.

6.5.4 Controllers shall be provided with a terminal or an equivalent means for connecting an equipment grounding or bonding conductor except as provided in 6.5.6. A terminal shall be sized for a grounding or bonding conductor as specified in Table 7.

6.5.5 In Canada, the following requirements amend Table 7:

a) The use of aluminum wire shall not be permitted;

b) The values in brackets [xx] for size of equipment grounding or bonding conductor shall apply; and

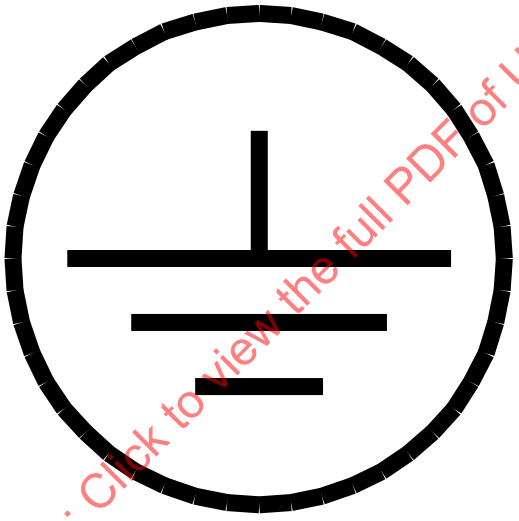
c) Footnote (c) does not apply.

In Mexico and the United States, Table 7 is not amended.

6.5.6 A terminal need not be provided with a controller that is marked to indicate the pressure wire connector or component terminal kits that are intended for use with the controller. A wire connector of the type mentioned shall be installed in the equipment at the factory with instructions, if required, for proper connection to the conductor. A terminal kit shall be described in the instructions by model number and manufacturer's name.

6.5.7 A wire-binding screw intended for the connection of a field-installed equipment grounding conductor shall have a green colored head that is hexagonal, slotted, Robertson, Phillips, Allen, Torx™, or any combination. See 6.4.6 – 6.4.10.

6.5.8 A terminal intended for connection of an equipment grounding or bonding conductor shall be plainly identified with the symbol



(IEC Publication 60417, Symbol 5019)

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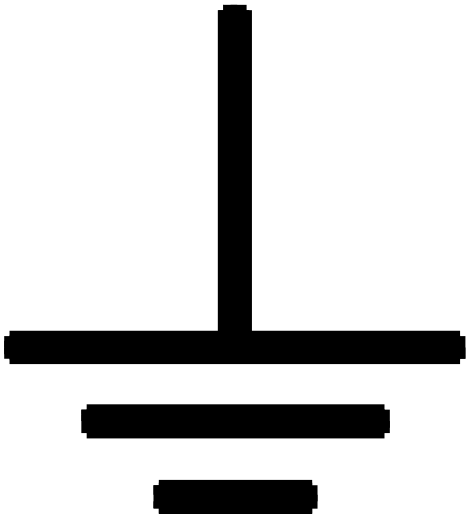

(IEC Publication 60417, Symbol 5017)