

Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400



Subject 218

12 Laboratory Drive
 Research Triangle Park, NC 27709
 January 3, 1997

TO: Electrical Council of Underwriters Laboratories Inc.,
 Fire Council of Underwriters Laboratories Inc.,
 Subscribers to UL's Standards Service for Fire Pump Controllers

SUBJECT: New Services for Foam Concentrate Fire Pump Controllers and Non-Pressure Actuated Diesel Engine Drive Fire Pump Controllers

UL announces a new Listing Service for two types of fire pump controllers: Foam Concentrate Fire Pump Controllers, and Non-Pressure Actuated Diesel Engine Drive Fire Pump Controllers. These fire pump controllers have recently been added to the Standard for the Installation of Centrifugal Fire Pumps, NFPA 20.

A foam concentrate fire pump controller is a device that operates a pump that propels water and an additive. It is used to assist in extinguishing a fire when water is not adequate. A non-pressure actuated diesel engine drive fire pump controller uses a manual starting device rather than a pressure switch for starting the diesel engine.

In order to evaluate these two new types of fire pump controllers, UL will use requirements from UL 218, the Standard for Fire Pump Controllers, and the specific requirements for such controllers in NFPA 20. In concert with this new Listing Service, UL will propose revisions to UL 218 to incorporate the requirements for foam concentrate fire pump controllers and for non-pressure actuated diesel engine drive fire pump controllers. UL anticipates issuing this proposal bulletin in 1997.

Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix A of this bulletin regarding designated responsibility for the subject product categories.

UNDERWRITERS LABORATORIES INC.

REVIEWED BY:

SONYA BIRD (Ext. 11685)
 Engineering Group Leader
 Standards Department
 RESEARCH TRIANGLE PARK OFFICE
 (919) 549-1400

JOE GETNER (Ext. 43519)
 Project Engineer
 Engineering Services 418A
 NORTHBROOK OFFICE
 (847) 272-8800

SR:DES

0218ANN.001

A not-for-profit organization
 dedicated to public safety and
 committed to quality service

AVA Documents
 Document Sharing Hub

A P P E N D I X ADESIGNATED RESPONSIBILITY FOR UL
PRODUCT CATEGORIES

QYZS, FIRE PUMP CONTROLLERS
 QYZS2, PUMPING EQUIPMENT FOR FIRE SERVICE,
 COMPONENT FIRE PUMP CONTROLLERS
 QZGR, FIRE PUMP CONTROLLERS OVER 600V
 QZKE, RESIDENTIAL FIRE PUMP CONTROLLERS

The individuals shown in the following tables are involved with the investigation of products covered under the subject categories. The Primary Designated Engineer (**shown in UPPERCASE letters**) coordinates the establishment and uniform interpretation of UL requirements applicable to the product categories. The Designated Engineers (**shown in lowercase letters**) work with the Primary Designated Engineer to interpret requirements and maintain standards.

Should you have questions regarding any adopted requirements that affect your product, you are encouraged to contact the individual at the office to which you normally submit your products.

The Industry Advisory Conference (IAC) Chairman for the subject categories is Lee Hewitt at UL's Northbrook office. The IAC Chairman oversees the significant interpretations made by the Primary Designated Engineer and arbitrates any differences regarding interpretation of UL requirements.

CCN	Office/Subsidiary	Responsible Engineer	Extension
QZGR	Northbrook	JOE GETNER	43519
	Santa Clara	Ron Breschini	32405

CCN	Office/Subsidiary	Responsible Engineer	Extension
QYZS QYZS2 QZKE	Northbrook	JOE GETNER	43519

UL 218

ISBN 1-55969-945-X

Fire Pump Controllers





Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400
 Camas, Washington • (360) 817-5500

Underwriters Laboratories Inc., founded in 1894, is chartered as a not-for-profit organization without capital stock, under the laws of the State of Delaware, to establish, maintain, and operate laboratories for the examination and testing of devices, systems and materials to determine their relation to hazards to life and property, and to ascertain, define and publish standards, classifications and specifications for materials, devices, products, equipment, constructions, methods, and systems affecting such hazards.

UL Standards for Safety are developed under a procedure which provides for participation and comment from the affected public as well as industry. The procedure takes into consideration a survey of known existing standards and the needs and opinions of a wide variety of interests concerned with the subject matter of the standard. Thus manufacturers, consumers, individuals associated with consumer-oriented organizations, academicians, government officials, industrial and commercial users, inspection authorities, insurance interests and others provide input to UL in the formulating of UL Standards for Safety, to keep them consonant with social and technological advances.

A not-for-profit organization
 dedicated to public safety and
 committed to quality service



Underwriters Laboratories Inc.®

A not-for-profit organization dedicated to public safety
and committed to quality service

February 1, 1996

Standard for

Fire Pump Controllers

UL 218, First Edition

Accompanying this transmittal notice is a copy of the First edition of UL 218.

THIS EDITION OF THE STANDARD IS NOW IN EFFECT.

The requirements in this standard are substantially in accordance with UL's bulletin on this subject dated April 1, 1995. This bulletin is now obsolete and may be discarded.

Revised and/or additional pages may be issued from time to time.

FEBRUARY 1, 1996

1

UL 218

Standard for

Fire Pump Controllers

First Edition

February 1, 1996

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. 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 published set of revision pages.

ISBN 1-55989-945-X

COPYRIGHT © 1996 UNDERWRITERS LABORATORIES INC.

CONTENTS**FOREWORD****INTRODUCTION**

1 Scope	5
2 Glossary	5
3 Units of Measurement	6
4 Components	6

CONSTRUCTION

5 Enclosures	7
6 Spacings	7
7 Insulating Barriers	8
8 Wiring Terminals	8
9 Grounding	10
10 Service Equipment	11
11 Wire Bending Space	11
12 Internal Wiring, Busbars, and Connections	12
13 Provisions for Use of Test Instruments	13
14 Power Circuits	13
15 Control Circuit	14
16 External Controls	14
17 Surge Arresters	15
18 Isolation Switches	15
19 Circuit Breakers	15
20 Motor Overcurrent Protection	16
21 Motor Contactor	17
22 Use of Sensing Devices	17
23 Provision for Alarm and Signal Devices	17
24 Automatic Controllers	18
25 Non-Automatic Controllers	18
26 Stopping Methods	19

PERFORMANCE

27 General	19
28 Short Circuit Test	20
29 Short Circuit Test — High Fault Currents	21
30 Dielectric Voltage-Withstand Test	22
31 Wire Flexing Test	23

RATINGS

32 Details	23
------------------	----

MARKINGS

33 Markings	23
-------------------	----

LIMITED SERVICE CONTROLLERS FOR ELECTRIC MOTOR DRIVEN FIRE PUMPS

34 General	24
35 Markings	25

RESIDENTIAL FIRE PUMP CONTROLLERS

36 General	25
37 Visible Indicators	26
38 Marking	26

HIGH VOLTAGE FIRE PUMP CONTROLLERS (RATED OVER 600 V)

39 General	26
40 Meters	26
41 Isolation Switch	26
42 Pressure-Actuated Device	26
43 Control Circuits	26
44 Visible Indicators	27
45 Performance	27
46 Ratings	27
47 Marking	27

CONTROLLERS WITH AUTOMATIC TRANSFER SWITCHES FOR ELECTRIC DRIVEN FIRE PUMPS

48 General	27
49 Isolating Switch	27
50 Sensing and Signal Devices	28
51 Transfer Between Sources	28
52 Test Switch	29
53 Ratings	29
54 Markings	29

DIESEL ENGINE DRIVE CONTROLLERS

55 General	29
56 Locked Cabinet	29
57 Field Wiring Terminals	29
58 Starting and Control	29
59 Alarm and Signal Devices	30
60 Auxiliary Contacts for Remote Sensors	30
61 Pressure Recorder	30
62 Automatic Controllers	31
63 Nonautomatic Controller	31
64 Methods of Stopping	32
65 Emergency Control	32
66 Marking	32

APPENDIX A

Standards for Components	34
--------------------------------	----

FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements cover controllers intended for starting and stopping centrifugal fire pumps, including automatic and non-automatic types for electric motor or engine driven pumps in accordance with the Standard for the Installation of Centrifugal Fire Pumps, NFPA 20. Types of controllers covered include full service, limited service, high voltage and residential. Controllers may be provided with transfer switches. Controllers may be suitable for use as service equipment. This equipment is for use in ordinary locations in accordance with the National Electrical Code, ANSI/NFPA 70.

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 voltage starting. Limited service controllers are intended for across-the-line starting of squirrel cage motors rated 30 Hp or less, 600 V or less. High voltage controllers are intended for use with squirrel cage motors rated 2.2 – 7.2 kV AC. Residential fire pump controllers are intended for use with squirrel cage motors rated 250 V or less.

1.3 An automatic transfer switch intended to be used in fire pump circuits, that is provided separate from a controller is to be investigated in accordance with the appropriate Standard for Automatic Transfer Switches, UL 1008, and NFPA 20.

1.4 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this Standard, and that involve a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as required to maintain the level of safety as originally anticipated by the intent of this Standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this Standard cannot be judged to comply with this Standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard.

2 Glossary

2.1 For the purpose of this standard, the following definitions apply.

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

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

2.4 **CONTROLLER** – The cabinet, motor starter, circuit breaker and disconnect switch, and other control devices for the control of electric motor or engine driven pumps.

2.5 **CURRENT LIMITERS** – Current limiters are 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.

2.6 **DISCONNECTING MEANS** – A device, group of devices, or other arrangement (such as a circuit breaker or disconnecting switches) that removes the conductors of a circuit from their source of supply.

2.7 **DROP-OUT RELAY** – A relay that is removed from the circuit at a specified maximum input by the opening or closing of the associated contacts.

2.8 ENCLOSURE – A surrounding case 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.

2.9 ISOLATING SWITCH – A switch that removes the supply of power from the controller and an electric circuit from its source of power.

2.10 SERVICE EQUIPMENT – The necessary equipment, usually consisting of a circuit breaker or switch and fuses and their accessories, located near the point of entrance of supply conductors to a building or other structure, or an otherwise defined area, and intended to constitute the main control and means to cutoff the supply.

2.11 TRANSFER SWITCHES:

- a) **AUTOMATIC TRANSFER SWITCH** – A switch that is self-acting for transferring one or more load conductor connections from one power source to another.
- b) **MANUAL TRANSFER SWITCH** – A switch, operated by direct manpower, for transferring one or more load conductor connections from one power source to another.

3 Units of Measurement

3.1 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

4 Components

4.1 Except as indicated in 4.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

4.2 A component need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed in the application of the component in the product covered by this standard; or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its recognized rating established for the intended conditions of use.

4.4 Specific components are recognized as being incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits and shall be used only under those specific conditions for which they have been recognized.

CONSTRUCTION

5 Enclosures

5.1 A fire pump controller assembly or panel shall be securely mounted in an enclosure that protects the equipment against limited amounts of falling water and dirt. 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 displacement of parts, or other serious defects.

5.2 Unless otherwise specified in this standard, an enclosure shall comply with the requirements for a Type 2 environmental rating, as specified in the Standard for Enclosures for Electrical Equipment, UL 50.

Exception: An enclosure of another environmental rating, other than Type 2, that has been evaluated for the specific rating is capable of being used.

6 Spacings

6.1 Electrical spacings through air, over surface and between uninsulated live parts and the enclosure walls shall be at least those specified in Table 6.1. See 6.2.

Table 6.1
Minimum acceptable spacings

Potential involved volts rms ac or dc		Minimum spacings, inch (mm)				
		General equipment			Devices having limited rating	
		51 – 150	151 – 300	301 – 600	51 – 300	301 – 600
Between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part other than the enclosure, or exposed metal part	Through air or oil	1/8 ^a (3.2)	1/4 (6.4)	3/8 (9.5)	1/16 ^a (1.6)	3/16 ^a (4.8)
	Over surface	1/4 (6.4)	3/8 (9.5)	1/2 (12.7)	1/8 ^a (9.5)	3/8 (9.5)
Between any uninsulated live part and the walls of a metal enclosure including fittings for conduit or armored cable ^b	Shortest distance	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/4 (6.4)	1/4 (6.4)

NOTES

1 A slot, groove, or the like, 0.013 inch (0.33 mm) wide or less in the contour of insulating material is to be disregarded.

2 An air space of 0.013 inch (0.33 mm) or less between a live part and an insulating surface is to be disregarded for the purpose of measuring over surface spacings.

^a The spacing between field wiring terminals of opposite polarity and the spacing between a field wiring terminal and a grounded dead metal part shall be at least 1/4 inch (6.4 mm) if short-circuiting or grounding of such terminals may result from projecting strands of wire. For circuits involving no potential greater than 50 volts rms ac or dc, spacings at field wiring terminals may be 1/8 inch (3.2 mm) through air and 1/4 inch over surface.

^b For the purpose of this requirement, a metal piece attached to the enclosure is considered to be a part of the enclosure if deformation of the enclosure is likely to reduce the spacings between the metal piece and uninsulated live parts.