



NRAG7.E197594

Programmable Controllers for Use in Hazardous Locations Certified for Canada

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Guide Information

SCHNEIDER AUTOMATION INC
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E197594

Class I, Division 2, Groups A, B, C and D.

Programmable controllers, Additional option modules: Series TWDNAC232D, -485D, -485T, TWDXCPMFK32, -64, TWDXCPODC, TWDXCPODM, TWDXCPRTC; Base modules: Series TWDLCAA10DRF, -16DRF, -24DRF, TWDLMDA20DRT, -20DRT1, -20DUK, TWDLMDA20DTK, -40DUK, -40DTK; Communication module: Series TWDNOZ232D, -485D, -485T; Expansion modules: Series TWDALM3LT, TWDAM12HT, TWDAMM3HT, TWDAMO1HT, TWDDDI8DT, -16DK, -16DT, -32DK, TWDDDO8TT, -8UT, -16TK, -16UK, -32TK, -32UK, TWDDMM8DRT, -24DRF, TWDDRA8RT, -16RT.

Programmable logic controllers, Open type, Cat. Nos. 499NEH14100, 499NES17100, -18100, 499NOS17100, 499NTR10100.

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[Industrial Control Equipment for Use in Hazardous Locations Certified for Canada] Programmable Controllers for Use in Hazardous Locations Certified for Canada

Guide Information

This category covers programmable industrial control systems for use in Division 2 hazardous locations utilizing a programmable memory for internal storage of user oriented instructions for specific functions such as logic, sequencing, counting, and controlling various industrial equipment through digital or analog inputs or outputs. This category also includes power supplies, central processing units, input and output accessories, computer interfaces and programming or program diagnostic units associated with programmable control systems.

These products are marked with their electrical ratings. Output devices may have more than one rating. At least one rating is marked on the output device and additional ratings may be marked on an instruction sheet referenced on the output device.

This category does not cover primary safety controls intended for programming and monitoring the operation of the burner on gas, gas-oil, or oil fired appliances.

The basic standards used to investigate products in this category are CSA Standard C22.2 No. 142-M1987, Process Control Equipment and CSA Standard C22.2 No. 213-M1987, Non-Incentive Electrical Equipment For Use In Class I, Division 2 Hazardous Location.

The Listing Mark of Underwriters Laboratories Inc. on the product is the only method provided by UL to identify products manufactured under its Listing and Follow-Up Service. The Listing Mark for these products includes the UL Mark for Canada symbol (as illustrated in the Introduction of this Directory) together with the word "LISTED", a control number and the following product name: "Industrial Control Equipment for Use in Hazardous Locations" (or Ind. Cont. Eq. for Use in Haz. Loc.) of Industrial Control Equipment for Hazardous Locations (or Ind. Cont. Eq. for Haz. Loc.).



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Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations Certified for Canada

Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations Certified for Canada

I. GENERAL

Part I of this section includes electrical equipment intended for use in and relating to Class I, II and III, Division 1 and 2 hazardous locations. See **Part II** for electrical equipment intended for use in Class I, Zone 0, 1 and 2 hazardous locations.

Unless equipment is identified in 1) the product category title as relating to hazardous (classified) locations or 2) the individual Listing as apparatus for use in unclassified (ordinary) locations, all product categories contain electrical equipment for use in Class I, II and III hazardous locations.

The Listings and Classifications pertain to equipment that has been evaluated with reference to risks to life and property and for potential conformity to the installation and use provisions of the Canadian Electrical Code, Part I (CEC). Those products evaluated for conformity to the installation and use provisions of the Canadian Coast Guard Regulations are identified in the general Guide Information for each product category or the individual Listings for the product. Attention is called to the limitations of the Listings and Classifications specified in the general Guide Information for each product category, such as current, voltage, horsepower limits, markings, special descriptions and installation provisions.

II. RELATED PRODUCTS

Electrical equipment for unclassified (ordinary) locations is covered in the Electrical Appliance and Utilization Equipment section or the Electrical Construction Equipment section.

Equipment for unclassified (ordinary) locations is covered in the other product sections.

III. HAZARDOUS LOCATIONS - GENERAL INFORMATION

Hazardous locations, as defined in the CEC, are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors, or flammable liquids (Class I), combustible dusts (Class II), or ignitable fibers or flyings (Class III).

There are two independent classification systems as described in the CEC. One system divides all hazardous locations into Classes, Divisions and Groups. Division 1 is a location where a flammable or combustible atmosphere is present under normal operating conditions. Division 2 is a location where a combustible atmosphere is present only under abnormal conditions.

The other classification system divides only Class I hazardous locations into Zones and Gas Groups (see Part II of this Directory). Zone 0 is a location where an explosive or flammable atmosphere is present continuously or for long period of time. Zone 1 is a location where the explosive or flammable atmosphere is likely to occur during normal operation. Zone 2 is a location where the explosive or flammable atmosphere is not likely to occur in normal

operation and, if it occurs, will exist for only a short time.

Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself. In addition, intrinsically safe circuit wiring terminals and intrinsically safe equipment is marked "Intrinsically Safe."

Suitability of Listed or Classified Equipment

Equipment intended for use in a hazardous location Class and Group and marked "Division 1" or "Div. 1" or without any Division indication is suitable for use in both Division 1 and 2 locations as defined in the CEC, and in unclassified (ordinary) locations. Equipment marked "Division 2" or "Div. 2" is suitable only for Division 2 and unclassified (ordinary) locations. In addition, the CEC permits equipment Listed for Class I, Division 1 to be used in a Class I, Zone 1 or 2 location of the same gas group and with a suitable temperature rating. Equipment Listed for Class I, Division 2 is permitted to be used in a Class I, Zone 2 location of the same gas group and with a suitable temperature rating. Equipment marked for use in or relating to Class I, Zone 0 area is also suitable for use in or relating to Zones 1 and 2 areas of the same gas group and with suitable temperature rating. Equipment marked for use in or relating to Class I, Zone 1 areas is also suitable for use in or relating to Class I, Zone 2 areas of the same gas group with suitable temperature rating. Equipment marked for use in or relating to Class I, Zone 2 areas is suitable only for use in or relating to those areas classified as Class I, Zone 2, and in unclassified (ordinary) locations.

Environmental Considerations

Unless the equipment is marked otherwise, it is to be used indoors where severe corrosive conditions are not likely to be present. Equipment investigated for severe environmental conditions will be marked with an enclosure type designation or other designation indicating the suitability of the equipment in different environments. See "Enclosure Considerations for All Equipment" below for more information.

Ambient Temperatures

Unless the equipment is marked otherwise, it has been investigated only for use under normal atmospheric conditions in an ambient temperature within the range of -25°C (-13°F) to +40°C (+104°F). Use of equipment under conditions of higher than normal atmospheric pressure or oxygen partial pressure, use in artificial atmospheres, and use under conditions of excessively high ambient temperatures can increase the likelihood of ignition of flammable atmospheres. In addition, low ambient temperatures may increase explosion pressures developed within explosion-proof equipment.

Overload Protection

Equipment should be installed in circuits with overload and short-circuit protection for established ratings. The ampere or wattage marking on power consuming equipment is valid only when the equipment is supplied at its marked rated voltage. In general, the current input to heating appliances or resistance heating equipment will increase in direct proportion to an increase in the supply voltage, while the current input to an induction motor supplying a constant load will increase approximately in direct proportion to a decrease in the supply voltage. These increases in current can cause overcurrent protection devices to open even when these devices are properly selected on the basis of nameplate ratings.

Enclosure Modification and Maintenance

The integrity of an enclosure for explosion-proof or dust-ignition-proof equipment must be maintained. Making holes (other than conduit openings specified in the instructions) or alterations in the enclosure during installation may compromise the ability of the enclosure to contain the explosion or to exclude dust. Holding bolts and threaded parts must be screwed tight. The continued acceptability of the equipment will depend upon proper maintenance.

Gas Groups

The following paragraphs group flammable and explosive mixtures of specific gases, vapors and dusts in accordance with the CEC.

Class I Equipment

Equipment for use in Class I hazardous (classified) locations, as defined in the CEC, is tested with respect to acceptability of operation in the presence of flammable and explosive mixtures of specific vapors and gases with air. For purposes of area classification for Divisions 1 and 2, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group A — Atmospheres containing acetylene.

Class I, Group B — Atmospheres containing acrolein, butadiene, ethylene oxide, propylene oxide, hydrogen, or fuel and combustible process gases containing more than 30 percent hydrogen by volume.

Class I, Group C — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group D — Atmospheres containing acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Zone 0, 1 and 2 Gas Groups

For purposes of area classifications for Zones, such mixtures have been grouped on the basis of their characteristics, as follows:

Class I, Group IIA — Atmospheres containing acetone, ammonia, benzene, butane, ethanol, gasoline, hexane, methane, methanol, naphtha, propane, or gases or vapors of equivalent hazard.

Class I, Group IIB — Atmospheres containing ethyl ether, ethylene, or gases or vapors of equivalent hazard.

Class I, Group IIC — Atmospheres containing hydrogen, acetylene, ethyl nitrate, or gases or vapors of equivalent hazard.

The following table compares Class I, Division 1 and 2 Gas Groups with Class I, Zone 0, 1 and 2 Gas Groups. The gases shown are representative of others in the Group.

Division 1 & 2	Zone 0, 1 & 2
A (acetylene)	IIC (acetylene and hydrogen)
B (hydrogen)	IIC (acetylene and hydrogen)
C (ethylene)	IIB (ethylene)
D (propane)	IIA (propane)

Class I Temperature Considerations

The marked operating temperature of the equipment is based on either the maximum external temperature or internal temperature of the equipment, depending on the protection method used.

For Class I, Division 1 and Zone 1 equipment, in general, the operating temperature is the maximum temperature of external surfaces of the equipment. For Class I, Division 2 and Zone 0 or 2 equipment, in general, the operating temperature is the maximum temperature of all parts of the equipment, including internal parts, that may be exposed to the flammable material.

Equipment is required to be marked with the operating temperature or operating temperature code if the maximum operating temperature is more than 100°C (212°F).

This temperature marking shall not exceed the ignition temperature of the specific gas or vapor to be encountered.

Class I Equipment in Class II Locations

Equipment Listed or Classified for use in Class I locations is not necessarily acceptable for Class II locations as it may not be dusttight or operate at a safe temperature when blanketed with dust.

Class II Equipment

Dust-ignition-proof equipment for use in Class II hazardous (classified) locations, as defined in the CEC, is tested with respect to acceptability of operation in the presence of combustible dusts in air. For purposes of area classification, the CEC groups combustible dust-air mixtures as follows:

Class II, Group E — Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present an equivalent hazard.

Class II, Group F — Atmospheres containing carbon black, charcoal, coal or coke dusts which have more than 8 percent total volatile material, or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard.

Class II, Group G — Atmospheres containing combustible dusts not included in Group E or F, including flour, grain, wood, plastic and chemicals.

Class II Equipment in Class III Locations

Equipment Listed or Classified for Class II, Group G hazardous locations is also suitable for use in Class III locations, except for 1) those products marked for Division 2 only, and 2) fan-cooled type motors where there is a very large amount of lint or combustible flyings which are likely to choke or clog the air passages of the motor.

Class III Equipment

Equipment for use in Class III hazardous (classified) locations, as defined in the CEC, is tested with respect to acceptability of operation in the presence of easily ignitable fibers or flyings. These fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Intrinsically Safe Circuits and Apparatus, and Associated Apparatus

Intrinsically safe circuits and apparatus may be evaluated for any or all of the Classes and Groups as defined in the CEC. In an intrinsically safe circuit, the energy level available in the hazardous location under normal and abnormal conditions is sufficiently low as not to cause ignition of the specified explosive atmospheres. To maintain the low energy levels, it is necessary that the intrinsically safe and associated apparatus be installed and interconnected in accordance with the CEC and the instructions provided with the equipment.

Associated apparatus is apparatus in which the circuits are not necessarily intrinsically safe, but which affect the energy in the intrinsically safe circuits and which are relied upon to maintain intrinsic safety. Associated apparatus is not intended for use in hazardous locations unless use in hazardous locations is specifically indicated.

When interconnecting associated apparatus with equipment for use in the hazardous location, special attention should be paid to installation instructions, control drawings, or product markings which may limit the types of connections that are acceptable.

Equipment Relating to Hazardous Locations

Equipment relating to hazardous locations includes 1) devices, products, and materials for use in locations where it is necessary for safety to avoid the accumulation of static electricity on personnel or equipment, 2) anesthesia equipment, 3) devices not intended for operation in hazardous locations, but which are designed to indicate certain potentially dangerous conditions with respect to such locations, 4) electrical equipment not intended for installation in hazardous locations except for provision of certain intrinsically safe (low energy) circuit extensions as indicated in the Listings and Classifications, and 5) paint spray booths.

Enclosure Considerations for All Equipment

The CEC directs that equipment shall not be used in damp or wet locations; locations where exposed to gases, fumes, vapors, liquids or other agents having a deteriorating effect on the equipment; or locations where exposed to excessive temperatures unless the equipment is identified for use in such environments. To assist inspection authorities, electrical equipment Listed or Classified for use in and relating to hazardous locations may be investigated for use in certain operating environments and marked with an enclosure type number or numbers. The following table summarizes the intended uses of the various enclosure types:

Enclosure Type Number	Provides a Degree of Protection Against the Following Environmental Conditions*
1	Indoor use.
2	Indoor use, limited amounts of falling water.
3R	Outdoor use, undamaged by the formation of ice on the enclosure.**
3	Same as 3R plus windblown dust.
3S	Same as 3R plus windblown dust, external mechanisms remain operable while ice laden.
4	Outdoor use, splashing water, windblown dust, hose-directed water, undamaged by the formation of ice on the enclosure.**
4X	Same as 4 plus resists corrosion.
5	Indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Same as 3R plus entry of water during temporary submersion at a limited depth.
6P	Same as 3R plus entry of water during prolonged submersion at a limited depth.
12, 12K	Indoor use, dust, dripping noncorrosive liquids.
13	Indoor use, dust, spraying water, oil and noncorrosive coolants.

*All types of enclosures provide a degree of protection against ordinary corrosion and against accidental contact with the enclosed equipment when doors or covers are closed and in place. All types of enclosures provide protection against a limited amount of falling dirt.

**All outdoor type enclosures provide a degree of protection against rain, snow and sleet. Outdoor enclosures are also suitable for use indoors if they meet the environmental conditions present.

In some cases, individual appliances and equipment may be marked "Raintight" or "Rainproof" indicating that they have been subjected to a test designed to simulate exposure to beating rain. For equipment designated as "Raintight" such exposure will not result in entrance of water. For equipment designated as "Rainproof" such exposure will not interfere with the operation of the apparatus or result in wetting of live parts and wiring within the enclosure.

Additionally or alternatively, IEC 60529, "Classification of Degrees of Protection Provided by Enclosures," provides a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure (or IP rating) as follows:

First Characteristics Numeral	Protection Against Ingress of Solid Foreign Objects
IP0X	Not evaluated
IP1X	50 mm diameter or larger
IP2X	12.5 mm diameter or larger

IP3X	2.5 mm diameter or larger
IP4X	1.0 mm diameter or larger
IP5X	Dust protected
IP6X	Dusttight

Second Characteristics Numeral	Protection Against Ingress of Water with Harmful Effect
IPX0	Not evaluated
IPX1	Vertically dripping
IPX2	Dripping (15 degree tilted)
IPX3	Spraying
IPX4	Splashing
IPX5	Jetting
IPX6	Powerful jetting
IPX7	Temporary immersion
IPX8	Continuous immersion

Fittings at Supply Entries

Consideration should be given to the Type or IP rating of fittings used at supply entries. When the manufacturer supplies a fitting with the enclosure, enclosures are to be connected to the wiring system using the fitting provided. If no fitting is provided by the manufacturer, the fitting employed must meet or exceed the Type or IP rating of the enclosure, so that the assembly maintains its protection against contaminants.

Wiring Considerations for All Equipment

Appliances and Utilization Equipment Terminations — Except as noted in the general Guide Information for some product categories, most terminals, unless marked otherwise, are for use only with copper wire. If aluminum wire can be used, marking to indicate this fact is provided. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C insulated conductors in circuits rated 100 A or less, and the use of 75°C insulated conductors in higher rated circuits as specified in Table 2 of the CEC. If the termination provisions on equipment are based on the use of other conductors, the equipment is either marked with both the size and temperature rating of the conductors to be used or with only the temperature rating of the conductors to be used. If the equipment is only marked for use with conductors having a higher (75°C or 90°C) temperature rating (wire size not specified), the 60°C ampacities (for circuits rated 100 A or less) and 75°C ampacities (for circuits rated over 100 A) should be used to determine wire size. Conductors having a temperature rating higher than specified may be used, though not required, if the size of the conductors is determined on the basis of the 60°C ampacity (circuits rated 100 A or less) or 75°C ampacity (circuits rated over 100 A).

Distribution and Control Equipment Terminations — Most terminals are suitable for use only with copper wire. Where aluminum wire can or shall be used (some crimp terminals may be Listed only for aluminum wire), there is marking to indicate this. Such marking is required to be independent of any marking on terminal connectors, such as on a wiring diagram or other visible location. The marking may be in an abbreviated form, such as "AL-CU."

Except as noted in the following paragraphs or in the general Guide Information for some product categories, the termination provisions are based on the use of 60°C ampacities for wire size Nos. 14-1 AWG, and 75°C ampacities

for wire size Nos. 1/0 AWG and larger, as specified in Table 2 of the CEC.

Some distribution and control equipment is marked to indicate the required temperature rating of each field-installed conductor. If the equipment, normally intended for connection by wire sizes within the range 14-1 AWG, is marked "75C" or "60/75C," it is intended that 75°C insulated wire may be used at full 75°C ampacity. Where the connection is made to a circuit breaker or switch within the equipment, such a circuit breaker or switch must also be marked for the temperature rating of the conductor.

A 75°C conductor temperature marking on a circuit breaker or switch normally intended for wire sizes 14-1 AWG does not in itself indicate that 75°C insulated wire can be used unless 1) the circuit breaker or switch is used by itself, such as in a separate enclosure, or 2) the equipment in which the circuit breaker or switch is installed is also so marked.

A 75°C or 90°C temperature marking on a terminal (e.g., AL7, CU7AL, AL7CU or AL9, CU9AL, AL9CU) does not in itself indicate that 75°C or 90°C insulated wire can be used unless the equipment in which the terminals are installed is marked for 75°C or 90°C.

Higher temperature rated conductors than specified may be used if the size is based on the above statements.

Copper Pigtail Leads — Copper pigtail leads may be used with aluminum supply wires in dry locations if 1) the splicing devices are Listed for use in joining copper to aluminum 2) there is sufficient wiring space, and 3) the means provided for connecting the wiring system are acceptable for the wire size used.

Wiring Devices — Supply terminals of 15 A and 20 A switches and receptacles not marked "CO/ALR" are for use with copper conductors only. Terminals marked "CO/ALR" are for use with aluminum or copper conductors.

Screwless pressure terminal connectors of the conductor push-in type are for use only with copper conductors, both solid and stranded unless otherwise limited by marking.

Terminals of switches and receptacles rated 30 A and above not marked "AL/CU" are for use with copper conductors only. Terminals of switches rated 30 A and above marked "AL/CU" are for use with aluminum or copper conductors.

Wire Connectors — Combinations of dissimilar conductors in terminals or splicing connectors are acceptable only in dry locations and when the connectors are identified as suitable for such intermixing. See also the information under Wiring Connectors and Soldering Lugs Certified for Canada (ZMVV7) in the Electrical Construction Equipment section.

Terminals — Product terminals, including wire connectors and terminal screws, are acceptable for connection of only one conductor, unless there is marking or a wiring diagram indicating the number of conductors which may be connected.

Tightening Torque — Some equipment may be marked to show a tightening torque for wire connectors intended for use with field wiring.

Supply Cords — When flexible supply cords or cord sets are replaced on utilization equipment, the replacement should be of the same type, AWG size, voltage rating and temperature rating as originally used.

IV. INSTRUCTIONS AND PRODUCT MARKINGS

The products covered in this directory are intended to be installed in accordance with the installation instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

V. FIELD MODIFICATIONS

The UL Mark for Canada applies to the product as it is originally manufactured when shipped from the factory. Authorized use of the UL Mark for Canada is the manufacturer's declaration that the product was originally manufactured in accordance with the applicable requirements. UL does not know what the effect of a modification may have on the safety of the product or the continued validity of the UL certification mark unless the field

modifications have been specifically investigated by UL. Unless UL investigates a modified product, UL cannot indicate that the product continues to meet UL's safety requirements.

The only exception for a field modification authorized by UL is when the product has specific replacement markings. For example, a switchboard may have specific grounding kits added in the field. The switchboard is marked with a list of specific kit numbers that have been evaluated for use in that particular switchboard. Only grounding kits that are included on the product have been evaluated for use in that product.

VI. MARINE EQUIPMENT

Certain equipment has been specifically investigated and certified for use aboard Canadian marine vessels. Such equipment has been evaluated in accordance with the applicable requirements of UL and the Canadian Coast Guard. For additional information, see the general Guide Information for the specific product category. Equipment bearing UL's Marine Mark for Canada is suitable for use only with stranded copper wire.

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