

Industrial connectors ready for use in North American control cabinets

HARTING now offers focused product solutions that are fully compliant with the UL 508 (508A, 508C) certification standard for “Industrial Control Equipment”. This represents a significant advance for North American OEMs and anywhere else where UL 508 certification is a practical necessity. It will expand the use of connector-based cable assemblies or components in industrial electrical control cabinets. HARTING has created two possibilities for using its industrial connectors to make electrical connections in UL 508 control panels, switchgear and other control systems. The first is the creation of an extensive range of “UL-Listed”, pre-assembled, connector-based cable assemblies that meet the requirements of UL 2237 (“PVVA” section), a complementary standard to UL 508 that governs multi-point connections of power cables in industrial machinery. The second is made possible through the newly launched “PVVA2” section of UL 2237, which was established by UL at the request of HARTING. It allows for field assembly using individual “UL-Recognized” components. The PVVA2 classification facilitates the use of connectors in a UL 508-certified cabinet, which in turn will deliver benefits throughout all stages of product design, fabrication, testing and commissioning, with enormous time and cost savings over hard-wired connections. HARTING connectors are the only rectangle connectors that have undergone rigorous testing by UL to gain “UL-Recognized” (PVVA2) status, which also makes them suitable for incorporation in PVVA cable assemblies. A wide range of HARTING connectors now have “UL-Recognized” status, and many more HARTING products will be added to both the PVVA and PVVA2 lists in the months and years to come.

How does it relate?

Many people in the industry are familiar with the UL 508 standard and both where and how it applies. This has raised the question of how does the UL 2237 specification that our HARTING components are tested to relate to the UL508 specification? In simple terms, the PVVA and PVVA2 category of UL 2237 are the categories and testing methods that are given to industrial connectors for the use in a UL 508 compliant panel. As there are a multitude of different components that can end up being used within, or even on a UL 508 panel, each category of these components has its own testing standards. The UL 2237 standard is the applicable standard for testing of industrial connectors in multi-point interconnection assemblies. The PVVA category is for cable assemblies and the testing of those, where the newly created PVVA2 category is where they test individual components.



Connectors now have own recognition

UL 508 is the must-have certification standard for electrical control cabinets for OEMs servicing the North American market. Industrial equipment complying with the UL 508 (508A and 508C) standard may only contain components and sub-assemblies whose product groups are listed in Appendix A, “Standards for Components”. That list does not include industrial connectors under ECBT2, which has created a significant hurdle for the use of connector-based assemblies and individual connectors in UL 508-certified electrical panels. Industrial connectors, even those certified under other international certification standards for use in electrical control cabinets, have been relegated in the UL world to historical electrical interface categories such as ECBT2 (using UL 1977 as its base standard). Manufacturers using ECBT2-class connectors to create a UL 508-certified control panel often are subjected to a higher degree of end product testing to prove the safety and reliability of their equipment. The customer’s UL field representative will conduct a thorough investigation of the connector application, including the overall electrical transmission path, for possible safety issues. This usually entails extensive testing that adds time, cost and frustration to the customer’s effort to bring a new product to market. Even OEMs that make liberal use of connector-based wiring elsewhere in their machine or plant system often take the path of least resistance – hard-wiring connections – in building their control panels.

Facilitates customer’s compliance pathway

HARTING sought to remove this hurdle by shifting the primary UL testing burden from the user to the connector manufacturer. UL agreed to allow HARTING to submit connectors for testing and certification under the UL 2237 standard. UL 2237 describes the North American requirements for cable assemblies used to distribute power in machines. It specifies guidelines for testing the electrical path of industrial connectors, cables, cable glands and fuse elements. Now, once a particular connector or connector-based assembly is tested by UL, it is classified under the PVVA or PVVA2 category of the UL 2237 standard and eligible for use in UL 508 applications in the prescribed manner. Hence, the importance of PVVA and PVVA2. PVVA is reserved for “UL-Listed”, multi-point power transmission cable assemblies. These “UL-Listed” assemblies may be employed without restrictions (for example, without the need for further instructions or testing) within electrical control cabinet applications where UL 508 certification is of concern. The creation of PVVA2 by UL, at HARTING’s request, places those ECBT2 connectors that have passed testing by UL on this new list, which designates them as “UL-Recognized” under the PVVA2 category. “UL-Recognized” components under PVVA2 are approved for use in UL 508A (Standard for Industrial Control Panels) applications, with minimal conditions of acceptability. That makes field wiring using “UL-Recognized” HARTING connectors a more practical choice for deployment in industrial control equipment. Users get all the benefits of Plug & Play connectorization, including massive time savings during commissioning and maintenance, which translates into major labor cost savings. The time-consuming process of hard-wiring is eliminated, including the risk of costly wiring errors, which can add further cost and delay to a project. Using only connectors and connector-based assemblies on the UL 2237 lists also helps OEMs and end users eliminate the guess work in managing procurement costs and parts inventories.

Expanding availability of UL-listed cable assemblies (PVVA)

UL 508

Of the two approaches for UL-sanctioned connector-based wiring in industrial control equipment, now offered by HARTING, pre-assembled, cable assemblies certainly suffice where they can adequately meet standard application challenges. A PVVA assembly has defined parameters such as wire AWG and has to be tested as such. UL has tested and approved many HARTING connector configurations that are now on the PVVA list. That will allow HARTING to build up an extensive portfolio of standard cable assembly products with the “UL-Listed” designation. (By comparison, competitors in the PVVA space only offer a limited number of overmolded circular type cable assemblies.) A “UL-Listed” cable assembly has to have a part number assigned from the manufacturer and built by a defined manufacturing location, which has to be mentioned in the UL file. HARTING only sells “UL-Listed” cable assemblies it manufactures at HARTING production facilities to assure customers of the strictest quality and UL compliance.

Introducing approved individual components (PVVA2)

Sometimes, however, project requirements call for something other than a standard cable assembly. As the global leader in industrial connector innovation, HARTING wanted to give customers a simplified and clearly understood pathway for assembling their own connector-based wiring without having to submit to extensive, supplemental testing and proving at their own expense.

HARTING worked actively to win UL approval for the use of connectors as individual components for use with electrical control cabinets. As a result, UL 2237 has recently been expanded to include the “PVVA2” section. This section defines the connector components which are relevant for power distribution, have been subject to rigorous testing by UL, and are allowed under certain specified conditions to be used as part of user-assembled cable assemblies. Utilizing a PVVA2, “UL-Recognized” component reduces the effort required to attain UL 508 certification of the end-use equipment. That certification exercise can be fast-tracked since the traceability and documentation of the “UL-Recognized” component already has been established. The user of such PVVA2 components can count on their performance, and draw confidence in the safety of the overall project from that. PVVA2-listed components must be installed by trained technical professionals following special approval stipulations – the “Conditions of Acceptability” (CoA). Such application requirements may contain both technical and constructive design information. Example: A PVVA2 connector assembly includes the following conditions of acceptability: The power distribution cables should be selected according to the TC-ER declaration and the approved wire AWG cable cross-section choices. Protective devices (fuse types RK5, CC, J or T) must also be used on the cable path. The short circuit current rating (SCCR) for the connector component must also be compared with the requirements of the electrical cabinet.

HARTING leads the way

HARTING is the first manufacturer to offer this type of component proof, in accordance with the company's existing global designs that have existed for decades. That means the connector components tested and listed by UL have not undergone any changes. The “UL-Recognized” designation is an add-on; customers do not need to change their wiring design because of it. Only HARTING currently offers such “UL-Recognized” components to the marketplace.

This UL testing program has established UL PVVA/PVVA2 approval for the Han® 10 A, 16 A, 32 A, Han® 6 E, 10 E, 16 E, 24 E, 32 E, 48 E, Han® 10 EE, 18 EE, 32 EE, 46 EE, 64 EE, 92 EE, Han 2/0, 3/0, 4/0, 5/0, 7/0, 8/0, 4/2, Han® 6 HsB and Han® Power T's 3xQ 4/2, 3xQ 2/0, 3xQ 5/0 product series. These are all well-proven connectors in HARTING's global catalogue, used by HARTING customers in a wide range of applications, including control cabinets and switchgear certified to other international standards. Availability of these parts is always assured, only now they are eligible for use in electrical control cabinets and other applications where the user is seeking UL 508 certification. The standard Han® E products provide solutions for mid-range power use up to 16 amps and 600 V UL. Han® HsB and Han® Q, however, are intended for the compact transmission of higher currents up to 40 amps and 600 V UL. All of these “UL-Listed” connector product series have passed a rigorous, short circuit current rating (SCCR) test performed by UL on its premises. All passed at a level of 65kA (SCCR). A 65kA rating is more than enough to assure a safe, reliable, long-term service life in most all industrial control panel applications. HARTING opted to test to a 65kA level rather than a lower current level such as 5kA SCCR so as not to limit customers in any way in their use of the company's components. “UL-Recognized” components will be identified by markings consisting of the HARTING identification and catalogue number, model, or other product designation on the product or on its packaging. In addition, they also will bear UL's Recognized Component Mark.



Quicker initial commissioning of facilities

HARTING is currently the only manufacturer in the world that offers its customers two different options for installing connectors in industrial control applications intended for the North American market. The time needed for testing and commissioning at industrial facilities is then reduced, even while the reliability and quality of the facility improves. Besides this work accomplished for UL approvals, HARTING is actively involved in certifications for many markets around the world. Additional quality certificates are available for HARTING products from testing institutes such as GL, DQS or Veritas.



Standards

UL 1977	Standard for Component Connectors for Use in Data, Signal, Control and Power Applications
UL 508	Standard for Industrial Control Equipment
UL 508C	Standard for Power Conversion Equipment
UL 508A	Standard for Industrial Control Panels
UL 2237	Outline of Investigation for Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery
UL 2238	Standard for Cable Assemblies and Fittings for Industrial Control and Signal Distribution
UL50	Enclosures for Electrical Equipment, Non-Environmental Considerations

HARTING UL File Number

E318390	PVVA Listed Assemblies and PVVA2 Recognized Components under UL 2237
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