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Elektrotechnik + Automation

Selected Flexibility for Ex Protection

ABB's FlowMaster Product Family



ABB

Increased Flexibility for Ex Protection

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A large quantity of explosion-proof products is available on the market today. This is caused, on the one hand, by various regional and industry sector-oriented certificates and, on the other hand, by the different technologies, such as gas and dust protection, two-wire and four-wire technology, or devices with integrated and remote transmitters. Device manufacturers with a platform concept are able to meet a maximum of requirements based on a minimum number of different types.

ABB [1] has for many years been using such a concept, with different explosion protection classes and protection types combined in a single measuring device. This is demonstrated in the following by examples such as the VA Master FAM540 variable area flowmeter, representing the two-wire devices, and the CoriolisMaster mass flowmeter, representing the four-wire devices (Figure 1.).

No matter whether certificates are international, country-specific or specific to the industry sector – the requirements on field instrumentation products in terms of certification are multifaceted, differing with respect to the measurement task and device usage. To this day, no unified standards or technical solutions have been implemented for explosion protection. In addition to typical European certifications like ATEX, additional certifications such as Gost, Nepsi, Kosha, FM and CSA are required in other countries. Now the certifying organizations of several countries have started to cooperate in the IECEx Scheme Working Group in order to agree on commonly accepted standards. This will most likely have a positive impact on the transparency of products used in hazardous areas.



Figure 1. The versatile Ex protection concept of the FlowMaster flowmeter family provides users with sustainable selection options regarding the usage of their devices. CoriolisMaster (left) and VA Master (right)

Platform concept to limit the number of devices available

A large number of device versions are available due to the different requirements (explosion protection for purely mechanical instruments or for two-wire and four-wire electronic devices, integrated or remote transmitters inside or outside the hazardous area, gas Ex or dust Ex protection). As a consequence, manufacturers of field instrumentation devices are required to provide appropriate qualification for their product portfolio. The market requires products with explosion protection certificates that meet a maximum number of requirements using a minimum number of device types. A platform concept based on standardized modules, where for example FM-certified devices only slightly differ from IECEx devices, ensures transparency of the variety of devices.

Graded Ex protection

The variable area flowmeter is available in different versions: from a mechanical indicator over switching contacts to the (4 ... 20 mA) HART output. It can be used in all explosion protection zones, from dust Ex Zone 22 to Zone 0. A graded explosion protection concept where the higher type of protection always includes the next lower one is required in order to meet these requirements while at the same time ensuring transparency of the entire product portfolio.

The Zone 2/22 device is the entry level device for which IECEx and ATEX are not differentiated – provided that the required type of protection is available according to both standards. Devices classified as “intrinsically safe” (Figure 2.) for Zone 1/21 include the assessed explosion protection for Zone 2/22. Users can therefore operate the device both in intrinsically

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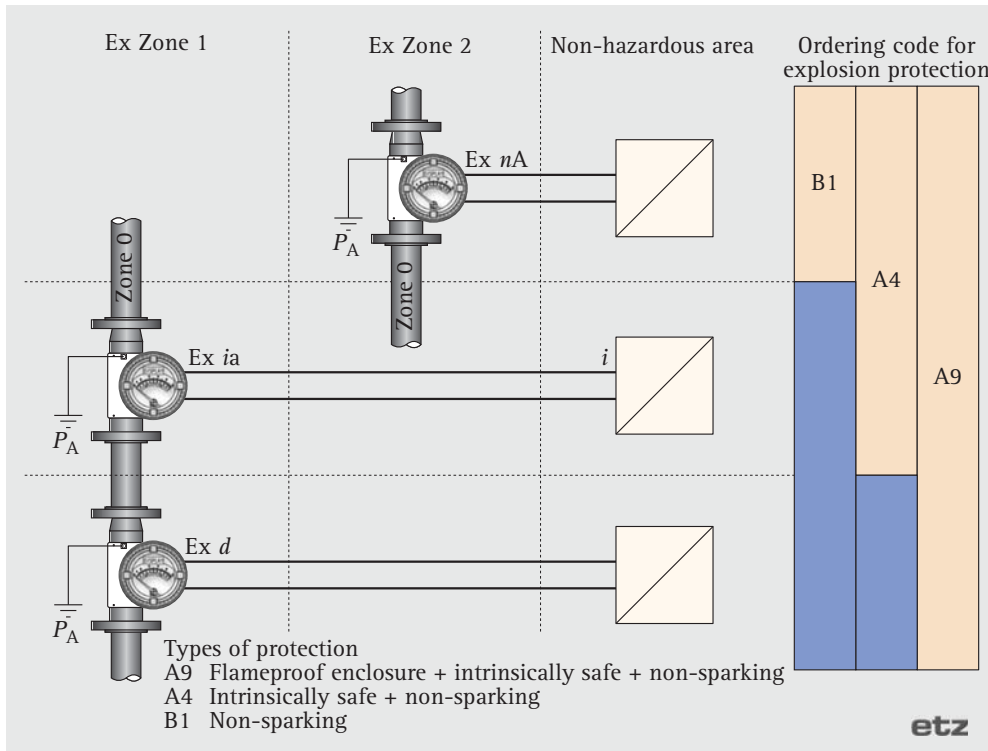


Figure 2. VA Master variable area flowmeters can be installed in different hazardous areas

safe circuits in Zone 1/21 or Zone 2/22, as well as in non-intrinsically safe circuits in Zone 2/22. It is also possible to change from one zone to the other. This only requires some simple checks as defined in the operating instructions.

Possible change of protection type

Users of devices with type of protection “flameproof enclosure” are free to select, if power supply to devices in Zone 1/21 is intrinsically safe (which is not mandatory) (Figure 2.), the compulsory checks of flameproof enclosure installations are not required. Of course the device can also be operated in non-intrinsically safe circuits, provided that the installation requirements of flameproof enclosures are met, and it can be used in Zone 2/22. This flexibility simplifies both the planning and the re-use of devices. Despite such versatility, this product still offers significant transparency due to the clever combination of different options.

Ex concept for four-wire devices

In contrast to two-wire devices which are powered via the passive current or fieldbus output, four-wire devices require power supply.

This means that a power supply circuit independent of the signal circuit must always be provided. For electric circuits, ATEX regulations differentiate between

“i” for intrinsically safe and “e” for increased safety. For intrinsically safe circuits “i”, a power limitation is stipulated so that even short-circuits or breaks will not generate sufficient power to ignite gas mixtures. Circuits with increased safety “e” prevent short circuits due to their special installation. In this case, protection is provided mechanically.

Since the power requirement of Coriolis mass flowmeters and electromagnetic flowmeters is considerably above the power limits for intrinsically safe circuits, these devices must in any case be supplied using an “e”-type circuit with increased safety. Current and fieldbus outputs can be operated with both versions.

Intrinsic safety and increased safety with one device

Only one cable harness is required in cases where nothing but “e”-type circuits are used to connect devices. However if both “e”-type and “i”-type circuits are used, two separate cable harnesses are re-

quired since “e” and “i”-type circuits may not be installed together according to ATEX regulations.

In some cases it turns out only shortly before or even during commissioning that it will be necessary to change from “i” to “e” since not enough “i”-type cables are available. For almost all devices available on the market, changes that are revealed only after ordering and delivery will turn into a time-consuming and expensive replacement or retrofitting.

With the flowmeters of the FlowMaster product family, all outputs can be operated either in “e” or in “i”-mode (Figure 3.). Users can determine the type of protection by selecting the connected circuit. After some simple checks according to the operating instructions, it is possible to change from one type to the other at any time.



Figure 3. The CoriolisMaster mass flowmeter combines both connection types “intrinsically safe” and “increased safety” in one device.

These devices also help to reduce stocking and storage costs. Operators of large systems with explosion-protected plants often have to realize one plant in “e” and in “i”, but the other plant in “e”, only. Up to now, for most manufacturers they usually were forced to stockpile 4-wire replacement devices with “e”-outputs and devices with “i”-outputs – leading to twice as many spares. This is no longer necessary when using ABB equipment for hazardous areas.

Literature

[1] ABB Automation Products GmbH, Instrumentation, Alzenau (Germany) www.abb.com/instrumentation

ABB is a leader in power and automation technologies that enable utility and industry customers as well as wholesalers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 120,000 people.

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