Ex e box diagram

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Instrument Junction Boxes (commonly referred to as JBs) are an integral part of every control and instrumentation installation. They protect electrical connections from the weather, help prevent operators and technicians from suffering accidental electric shocks, and offer a convenient entry into a circuit for maintenance and fault finding.

In this article we will look at the considerations and options available when specifying a junction box, and also at some of the documentation used by instrument designers and technicians relating to Junction Boxes.

An instrument junction box is an enclosure housing terminals that allows interconnection between field devices (i.e. instruments, switches etc) in the process/production areas, and control or monitoring equipment typically located in the control room.

Typically, numerous field cables of a common system are joined, via the terminal blocks within the JB, to a multicore cable. Examples could be analogue signals to the DCS, switch signals to DCS, analogue signals from DCS, analogue signals to ESD etc.

Like every part of an instrument loop, it is essential that the JB selected is suitable for the required application. Consideration needs to be given to:- Materials of construction,- Suitbility for use in hazardous areas,- Degree of ingress protection,- Type and quantity of terminals to be housed within the JB,- Number of cable entries and their direction,- Earthing,- Requirement for breather or drain plug,- Junction box size and mounting,- Labeling,- Doors.

Junction boxes can be manufactured in a variety of materials including stainless steel, mild steel, glass reinforced polyester, aluminum, polycarbonate and ABS (Acrylonitrile butadiene styrene - a thermoplastic polymer). These are all suitable for a wide range of industrial and OEM applications.

For outdoor areas that are exposed to changing environmental conditions like those encountered in many process and petrochemical plants, and Oil & Gas installations, the use of materials with good corrosion resistance, the ability to tolerate high ambient temperatures and high creep strength, is important. That is why stainless steel is most often selected, with GRP being a popular second choice.

Glass Reinforced Polyester (GRP) has a high resistance to contamination from oils, has excellent mechanical properties (e.g. strength), and offers a long life expectancy.

Junction boxes, certified suitable for use in potentially Hazardous Areas are available from many manufacturers. Common certification standards include the ATEX Standard, and the IEC 60079-series of explosion prevention standards. For JBs, the most common types of protection used are Ex d

"flameproof" and Ex e "increased safety". Though it is not uncommon to see Ex"N", or indeed Ex"P". Ex e is often used for junction boxes in intrinsically safe circuits.

For Ex e certified JBs there are two main criteria to consider;- Are the internal components e.g. terminals etc acceptable for use in the JB i.e. only terminals or other components which are specifically allowed for in the JB"s certificate of compliance, and- Will any internal components, or wiring, be hotter than the temperature classification of the JB allows.

In all Ex certified enclosures it is important that an earth facility is provided. For metallic enclosures the earth facility must earth the enclosure body and can be provided by earth terminals connected to the body through the terminal mounting rail and/or by means of an internal/external earth stud.

A major secondary form of protection for the internals of a JB is its IP rating. Moisture or dust, if allowed to come into contact with the JB internals, could lead to either sparking or physical breakdown of the components and interfere with the explosion protection method being used. It is for this reason that IP56 is usually considered the minimum rating that should be used for junction boxes, especially if they are located outside.