



Yiku Electrics



How to find the right junction enclosure?

How to Know What Junction Box to Use?

Electrical junction boxes are designed to be waterproof, dustproof, and sunproof, primarily serving to protect internal components (such as wires, instruments, and meters) from environmental damage that could impair their functionality. Additionally, they prevent accidental contact by humans and animals, reducing the risk of electrical shock or fire hazards. Therefore, these enclosures play a crucial role in safeguarding electrical components both inside the box and in the surrounding environment.

With a wide range of options available, how do you choose the right and most reliable junction box? In this article, Yiku Electrics will guide you through the process of selecting the most suitable one.

Breaking Down the Various Junction Box Options

Types of Materials Used in Junction Boxes

Junction boxes can be classified into different types based on the materials used, such as ABS engineering plastic, polycarbonate (PC), PC/ABS, fiberglass reinforced plastic (FRP), cast aluminum, and stainless steel. These materials are all sealed from dust, moisture, and water.

Appearance Options: Transparent vs. Opaque Covers

In terms of appearance, plastic junction enclosures can be further divided into transparent or opaque types. Transparent covers allow a direct view of the components inside, while opaque covers are typically made in industrial gray to match the overall color of the box.

Functional Options and Customization of Junction Boxes

In terms of functionality, we have waterproof junction boxes with mounting ears and without mounting ears, which are quite common. At the same time, we can design the enclosure to meet specific requirements, such as a single entry and exit for electrical wires, or a single entry with two exits, or other custom configurations. We can also design holes based on needs, change the connectors according to wire diameter, and pair the terminals with the appropriate current rating. These boxes are custom-designed junction boxes based on functionality.

What Junction Box to Use?

Match the Protection Level You Need

First, we need to consider the protection level of the waterproof enclosure. According to the IEC standards, specifically IEC 60529 set by the International Electrotechnical Commission, the IP (Ingress Protection) rating consists of two digits. The first digit represents the level of protection against the intrusion of solid particles, while the second digit indicates the protection against water ingress. The higher the IP rating, the better the enclosure is suited to withstand harsh environmental conditions.

IP Rating Code Explanation

Notes: The IP rating format is IPXX, where XX represents two Arabic numerals. The first digit is solid protection, indicating the level of protection against contact and solid foreign objects, while the second digit is water protection, which means the level of waterproof protection, from drops to submersion or high-pressure jets.

Protection Against Foreign Objects (First Digit X)			Protection Against Water (Second Digit X)		
X	Definition (Solid)	Description (Solid)	X	Definition (Water)	Description (Water)
0	No protection		0	No protection	

1	Protection against solid objects 50mm in diameter and larger	A probe, spherical with a diameter of 50mm, should not fully penetrate	1	Protection against water drops	Vertically falling water drops
2	Protection against solid objects 12.5mm in diameter and larger	A probe, spherical with a diameter of 12.5mm, should not fully penetrate	2	Protection against water drops when tilted at 15 degrees	Vertically falling water drops should not cause damage when the device is tilted up to 15 degrees on either side
3	Protection against solid objects 2.5mm in diameter and larger	A probe, spherical with a diameter of 2.5mm, should not fully penetrate	3	Protection against splashing water	Water splashed at an angle of 60 degrees from the vertical on either side should not cause damage
4	Protection against solid objects 1.0mm in diameter and larger	A probe, spherical with a diameter of 1.0mm, should not fully penetrate	4	Protection against water spray	Water sprayed from any direction against the device, when tilted up to 15 degrees from its normal position, should not cause damage
5	Dust-protected	Cannot completely prevent dust ingress, but the amount of dust that enters will not affect the normal operation of the equipment	5	Protection against water jets	Water projected from any direction against the device should not cause damage
6	Dust-tight	Completely prevents dust ingress	6	Protection against powerful water jets	Large waves or powerful jets of water entering the device should not cause damage
			7	Protection against immersion	When immersed in water under defined pressure and time, no amount of water that could cause damage should enter

			8	Protection against submersion	The device can be submerged in water for an extended period under conditions specified by the manufacturer
			9	Protection against high-temperature, high-pressure water jets	(New) High-temperature/high-pressure water sprayed in all directions against the enclosure should have no harmful effects

Cost vs. Durability

When considering cost and application, let's compare plastic waterproof enclosures with cast aluminum waterproof enclosures. [plastic waterproof enclosures](#) are more cost-effective.

However, [cast aluminum waterproof enclosures](#) generally offer a longer lifespan and provide higher protection levels, such as explosion-proof capabilities. While cast aluminum enclosures have a higher production cost, it's important to take a long-term view. Different application environments can lead to higher replacement costs.

Selection of Sealing Gasket Materials

For waterproof junction box products, commonly used sealing gasket materials include PUR, EPDM, Neoprene, and Silicone. When selecting a sealing gasket, factors to consider include temperature range, tensile strength, elongation rate, hardness, density, compression rate, and chemical resistance.



Black sealing gaskets are made by machine injection molding, resulting in no gaps, a tight fit, and integration with the lid, making them impossible to remove. To ensure the gasket is more secure, the waterproof box should be assembled only after the injected material has cooled.

White sealing gaskets, on the other hand, are manually applied by extrusion. These gaskets are made from sponge strips, cut to lengths suitable for each waterproof box specification. Since they are applied manually, there may be some inconsistencies. The waterproof performance of sponge gaskets is slightly inferior to that of injection-molded boxes, as they cannot achieve a complete seal. They are separate from the waterproof box lid and can be detached.

Choosing the Right Size

Selecting the correct size for the waterproof enclosure is primarily based on the dimensions of the existing components and the installation location. However, it's also important to consider whether new components might be added in the future, and if so, whether there will be sufficient space. Additionally, make sure to verify whether the dimensions provided by the supplier refer to the external or internal measurements. The available mounting space is typically smaller than the internal dimensions, so this should be taken into account.

Overall, when choosing a sealed enclosure, we must consider various factors, including the protection level, application scenario, material, and functionality of the product. This ensures that the selected junction box provides optimal protection and meets long-term usage requirements. Choosing the right junction box not only enhances the safety and reliability of the equipment but also reduces maintenance and replacement costs, ensuring stable operation in various environments.

