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# Ingress Protection

IP ratings according to

DIN 60529

### What are IP ratings?

*IP stands for Ingress Protection and means „protection against contamination“*

Electrical equipment such as luminaries or power supplies is used in various environments. Correspondingly different are the requirements for the housing of such equipment: on the one hand it has to protect the user against contact with dangerous parts within the device; on the other hand the equipment should be protected against external contamination or moisture. Depending on their operational environment and strain, devices should always belong to a particular protection class which is significantly defined by the design. So-called IP ratings classify the level of protection in terms of contact as well as penetration of foreign substances and moisture. These protection ratings are defined by the standard DIN 60529.

### Other external influences and the difference between IP ratings and protection classes

In addition to the potential penetration of foreign substances, dust or moisture, enclosures are usually exposed to many other external influences. These include, for example, mechanical shocks, mold or even harmful insects. Such effects, however, are not part of IP protection but are ruled by the relevant product standard. They must therefore be considered separately during engineering. Moreover, the protection ratings are not to be confused with the electrical protection classes (I, II, III). These classes are of overriding importance superior for all electrical equipment and define measures for protection against hazardous live parts.

### Glossary of protection classes

According to DIN 60529 the protection rating is displayed by a two-digit combination:

*First IP digit = Protection against penetration of foreign substances*

*Second IP digit = Protection against moisture*

The first IP digit indicates both the protection against penetration of solid substances as well as the degree of protection against human contact. Solid substances are differentiated according to particle sizes. The differentiation spans from unprotected to dustproof. The second IP digit defines the protection against penetration of moisture. It spans from unprotected via jet water to permanent submersion. The lowest possible degree of IP rating is IP00. It states that the electrical equipment is neither protected against penetration of foreign substances, nor against harmful ingress of moisture.

*Practical tip: In case of different mounting configurations, which are required to meet the corresponding protection rating, they must be highlighted by the manufacturer in the corresponding mounting instructions!*

### Overview of IP digits

IP digit	First IP digit		Second IP digit	
	Protection against penetration of solid substances	Explanation which foreign substances must not penetrate the housing	Protection against ingress of moisture	Explanation of protective measure
<b>0</b>	<b>Unprotected</b>	No particular protection	<b>Unprotected</b>	No particular protection
<b>1</b>	<b>≥ 50.0 mm diameter</b>	Large body surfaces (for example hand). Solid substances of more than 50 mm Ø	<b>Vertical dripping</b>	Protected against dripping water (vertical drops)
<b>2</b>	<b>≥ 12.5 mm diameter</b>	Finger or test equipment of up to 80 mm length, solid foreign substances of more than 12.5 mm Ø	<b>Dripping (15° gradient)</b>	Protected against vertically dripping at a housing inclination of up to 15° in position of use
<b>3</b>	<b>≥ 2.5 mm diameter</b>	Tools or similar, solid substances of more than 2.5 mm Ø	<b>Water spray</b>	Water spray at an inclination of 60° must not jeopardize the running device
<b>4</b>	<b>≥ 1.0 mm diameter</b>	Wires or solid substances of more than 1.0 mm Ø	<b>Splash water</b>	Protected against splash water from all directions
<b>5</b>	<b>Dust-proof</b>	Ingress of dust is not allowed to such an extent that a proper operation is no longer possible	<b>Strong water jets</b>	Protected against water, supplied by a nozzle
<b>6</b>	<b>Dust-tight</b>	No ingress of dust	<b>Temporary submersion</b>	Protected against temporary submersion
<b>7</b>	-	-	<b>Permanent submersion</b>	Protected against ingress of water during permanent submersion



#### **FRIWO presents new product family with optionally interchangeable IP42 adapters**

Based on more than 40 years of experience in R&D and production of power supplies, FRIWO have created a new product line. The new FOX series features an interchangeable adapter system and a wide range input of 90 to 264 VAC for worldwide use. Optional accessories include a special primary adapter which offers IP 42 protection when applied to the device. To ensure this protection, the device must be operated in the defined position.

Do you need support? Please contact us: Tel. +49 (0)2532 / 810 • [sales@friwo.com](mailto:sales@friwo.com)

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