

**Technical data**  
**Degrees of protection provided by enclosures (IP Code)**

**Degrees of protection according to IEC 60 529**

**Degree of protection of electrical equipment**

Electrical equipment must be protected for safety reasons from external influences and conditions. Enclosures provide the protection of electrical equipment against access to hazardous parts and against solid foreign objects, as well as dust, humidity and water.

The international standard IEC 60 529, the german standard *DIN EN 60 529 / VDE 0470 Part 1 September 2000* with the title

“Degrees of protection provided by enclosures (IP Code)”, form the basis for the determination and designation of the degree of protection.

The degree of protection provided by an enclosure is proven by means of standardized testing methods.

The becoming “aged“ of test samples before carrying out the actual type tests are part of the standardized testing methods.

Ageing is made by an more-active increased thermal treatment.

The marking system consists of the code letters **IP** and two following characteristic numerals.

**Example:**

**IP 6 7**



IP	1st characteristic numeral: Protection against foreign solid objects and direct contact		Additional letter		2nd characteristic numeral: Protection against ingress of water with harmful effects									
	Meaning for the protection of equipment against ingress of solid foreign objects and of persons against access to hazardous parts with (non-protected) back of hand, finger, tool or wire.	Application	Additional letter where the actual protection against access to hazardous parts is higher than that indicated by the 1st characteristic numeral (e.G. IP 20C)	Symbol	IP X0	IP X1	IP X2	IP X3	IP X4	IP X5	IP X6	IP X7	IP X9	
	Protection against ingress of solid foreign objects ...	Protection against access to hazardous parts with ...	Short form: Protection against access with ...											
<b>IP 0X</b>	non-protected	non-protected												
<b>IP 1X</b>	solid foreign objects ≥ 50 mm Ø	the back of a hand	<b>A</b> the back of the hand											
<b>IP 2X</b>	solid foreign objects ≥ 12.5 mm Ø	a finger	<b>B</b> a finger		<b>IP 20</b>									
<b>IP 3X</b>	solid foreign objects ≥ 2.5 mm Ø	a tool ≥ 2.5 mm Ø	<b>C</b> a tool ≥ 2.5 mm Ø		<b>IP 30</b>	<b>IP 31</b>								
<b>IP 4X</b>	solid foreign objects ≥ 1 mm Ø	a wire ≥ 1 mm Ø	<b>D</b> a wire ≥ 1 mm Ø		<b>IP 40</b>	<b>IP 41</b>	<b>IP 42</b>	<b>IP 43</b>	<b>IP 44</b>					
<b>IP 5X</b>	dust-protected	with any auxiliary equipment (wire)							<b>IP 54</b>	<b>IP 55</b>				
<b>IP 6X</b>	dust-tight	contact with any auxiliary equipment (wire)								<b>IP 65</b>	<b>IP 66</b>	<b>IP 67</b>	<b>IP 69</b>	

**Meaning of the first characteristic numeral**

The first characteristic numeral indicates, to what extent the enclosure provides protection for persons against the access to (affecting of) hazardous parts. This protection is reached, when the penetration into an enclosure of a part of the body or a foreign object, which is held by a person, is prevented or limited. At the same time the enclosure provides protection of equipment against the penetration of solid foreign objects. This is the reason for having two descriptions and two definitions to each first characteristic numeral.

**Meaning of the second characteristic numeral**

The second characteristic numeral indicates the protection of the enclosure against ingress of water with harmful effects on the electrical equipment.

**Additional letters to the IP Code**

The IP Code can still be extended by additional letters. Additional letters indicate the degree of protection against access to hazardous parts. Additional letters follow the two characteristic numerals. Additional letters are only used, - if the actual protection against access to hazardous parts is higher than by the first characteristic numeral indicated; or - if only the protection against access to hazardous parts is indicated and the degree of protection against solid foreign objects is not considered. The first characteristic numeral being then replaced by an X. An enclosure shall only be designated with a stated degree of protection indicated by the additional letter if the enclosure also complies with all lower degrees of protection.

## Technical data

### Recommendation for outdoor installations, humid and wet areas and locations

Country-specific requirements have to be observed!

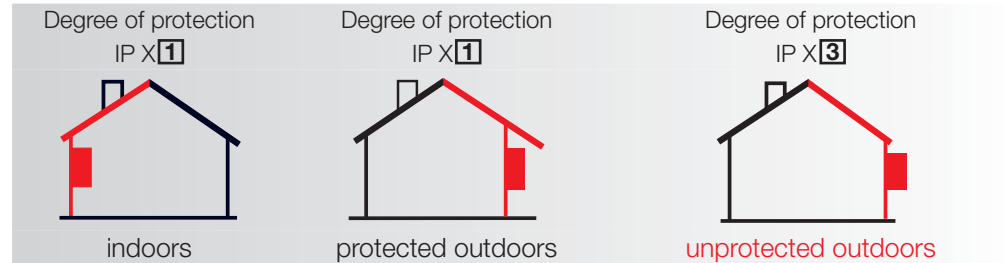
#### 1. Requirement

Protection against ingress of water for all electrical equipment (devices) with the appropriate encapsulation (2nd characteristic numeral)

#### Note for outdoor installation:

#### Requirements of German standard DIN VDE 0100 Part 737 for compliance with IP degree of protection

1.1. Minimum requirement for electrical equipment:



#### „Protected outdoors“

Electrical equipment has to be protected from precipitation (like rain, snow or hail) as well as from direct sunlight.

#### „Non-protected outdoors“

Electrical equipment can be exposed to precipitation or direct sunlight.

With both assembly sites the climatic effects on the installed equipment must be observed, for example, high or low ambient temperatures or condensation.

1.2. Minimum requirements for electrical equipment, that must withstand higher environmental stresses:

#### degree of protection IP X 4

with **non-direct** jets of water within occasional cleaning procedures, e.g. agriculture



#### degree of protection IP X 5

with **non-direct** jets of water within operational cleaning procedures, e.g. carwash



#### degree of protection IP X 5 and additional consultation with the manufacturer:

with **direct** jets of water within occasional cleaning procedures of enclosures, e.g. butcher's shop



Country-specific requirements have to be observed!

#### 2. Requirement of German Standard DIN VDE 0100 Part 737

4.1 Electrical equipment must be selected taking into account the external influences to which they may be exposed. Proper operation and the effectiveness of the required degrees of protection must be assured.

Note: Data from the manufacturer!