

# Ingress Protection (IP) ratings

Ingress Protection (IP) ratings are developed by the European Committee for Electro Technical Standardization ([CENELEC](#)) (NEMA IEC 60529 Degrees of Protection Provided by Enclosures - IP Code), specifying the environmental protection the enclosure provides.

The IP rating normally has two (or three) numbers:

1. Protection from solid objects or materials
2. Protection from liquids (water)
3. Protection against mechanical impacts (commonly omitted, the third number is not a part of IEC 60529)

## Example - IP Rating

With the IP rating IP 54, 5 describes the level of protection from solid objects and 4 describes the level of protection from liquids.

An "X" can be used for one of the digits if there is only one class of protection, i.e. IPX1 which addresses protection against vertically falling drops of water e.g. condensation..

## IP First number - Protection against solid objects

|   |   |
|---|---|
| 0 | No special protection   |
| 1 | Protected against solid objects up to 50mm, e.g. accidental touch by hands. |
| 2 | Protected against solid objects up to 12mm, e.g. fingers.                   |
| 3 | Protected against solid objects over 2.5mm (tools and wires).               |
| 4 | Protected against solid objects over 1mm (tools, wire, and small wires).    |
| 5 | Protected against dust limited ingress (no harmful deposit).                |
| 6 | Totally protected against dust.   |

## IP Second number - Protection against liquids

|   |   |
|---|---|
| 0 | No protection.  |
| 1 | Protection against vertically falling drops of water e.g. condensation. |
| 2 | Protection against direct sprays of water up to 15° from the vertical.  |
| 3 | Protected against direct sprays of water up to 60° from the vertical.   |

|   |   |
|---|---|
| 4 | Protection against water sprayed from all directions ° limited ingress permitted.                     |
| 5 | Protected against low pressure jets of water from all directions ° limited ingress.                   |
| 6 | Protected against low pressure jets of water, e.g. for use on ship decks - limited ingress permitted. |
| 7 | Protected against the effect of immersion between 15cm and 1m.  |
| 8 | Protects against long periods of immersion under pressure.  |

**IP Third number - Protection against mechanical impacts (commonly omitted, the third number is not a part of IEC 60529)**

|   |  |
|---|--|
| 0 | No protection.   |
| 1 | Protects against impact of 0.225 joule (e.g. 150g weight falling from 15cm height).  |
| 2 | Protected against impact of 0.375 joule (e.g. 250g weight falling from 15cm height). |
| 3 | Protected against impact of 0.5 joule (e.g. 250g weight falling from 20cm height).   |
| 4 | Protected against impact of 2.0 joule (e.g. 500g weight falling from 40cm height).   |
| 5 | Protected against impact of 6.0 joule (e.g. 1.5kg weight falling from 40cm height).  |
| 6 | Protected against impact of 20.0 joule (e.g. 5kg weight falling from 40cm height).   |

In order to comply with the stringent requirements for [CE Marking](#) machine makers today fits their machines with parts certified according EU (European Union) and international standards.