

Understanding the IP Rating System

How do I judge the enclosure rating of an Omron STI safety interlock switch?

When Omron STI customers look at our safety interlock switches, one of the first questions they ask is - What is the NEMA rating of the enclosure. These switches use an international

system which assigns an Ingress Protection or IP rating.

While, most of us are familiar with the NEMA system, we are quick to admit that the numbers used to differentiate the different ratings hardly make logical sense. A summary of the IP system is given below. As you can see, the

IP system is relative and rational - always two letters (IP) followed by two digits. The first digit indicates the enclosure's degree of protection against solid objects while the second digit indicates a degree of protection against liquids.

First IP Digit	Degree of Protection (contact hazard and foreign object protection)
0	No special protection.
1	Protection against penetration of solid objects larger than 50mm in diameter (large objects). No protection against intentional access, e.g. by hand, but keeping larger body parts at a distance.
2	Protection against entry of solid objects larger than 12mm in diameter (medium-size objects). Keeping out fingers and other small objects.
3	Protection against entry of solid objects larger than 2.5mm in diameter (small objects). Keeping out tools, wires and other objects larger than 2.5mm in diameter.
4	Protection against entry of solid objects larger than 1mm in diameter (granular objects). Keeping out tools, wires and similar objects of a thickness exceeding 1mm.
5	Protection against harmful dust deposits. Ingress of dust is not totally prevented, but dust does not enter in sufficient quantity to interfere with operation of the equipment (dust protected). Full contact protection.
6	Protection against ingress of dust (dust-tight). Full contact protection.

Second IP Digit	Degree of Protection (water protection)
0	No special protection.
1	Protection against dripping water. It must not have any harmful effect (dripping water).
2	Protection against dripping water. Dripping water shall have no harmful effect when the enclosure is tilted at any angle 15° from its normal position (indirect dripping water).
3	Spraying water falling at any angle up to 60° from vertical shall have no harmful effect (spraying water).
4	Water splashed against the enclosure from any direction shall have no harmful effect (spraying water).
5	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect (water jets).
6	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities (flooding).
7	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (submersion).
8	This equipment suitable for continuous submersion in water under conditions which shall be specified by the manufacturer (submersion).

Conversion of IP and NEMA Enclosure Ratings

(Including but not limited to the following)

IEC	IP10	IP11	IP54	IP14	IP54	IP56	IP52	IP67	IP52	IP54
NEMA	1	2	3	3R	3S	4 and 4X	5	6 and 6P	12 and 12K	13