

## IP Ratings.

The first number defines the level of protection against penetration of solid objects into the housing. The second number defines the level of protection against penetration of liquids into the housing. Additional information can be found in the 1976 IEC Publication, Classification of Degrees of Protection Provided by Enclosures.

### IP s l

*s = solids and l=liquids*

Number	Degree of Protection	Number	Degree of Protection
0	No protection against contact or entry of solids.	0	No protection.
1	Protection against accidental contact by hand, but not deliberate contact. Protection against large objects. (greater than 50mm)	1	Protection against drops of condensed water. Condensed water falling on housing shall have no effect.
2	Protection against contact by fingers. Protection against medium-size foreign objects. (greater than 12mm)	2	Protection against drops of liquid. Drops of falling liquid shall have no effect when housing is tilted to 15 degrees from vertical.
3	Protection against contact by tools, wire, etc. Protection against small foreign objects. (greater than 2.5mm)	3	Protection against rain. No harmful effect from rain at angle less than 60 degrees from vertical.
4	Protection against contact by small tools and wires. Protection against small foreign objects. (greater than 1mm)	4	Protection against splashing from any direction.
5	Complete protection against contact with live or moving parts. Protection against harmful deposits of dust.	5	Protection against water jets from any direction.
6	Complete protection of live or moving parts. Protection against penetration of dust.	6	Protection against conditions on ships' decks. Water from heavy seas will not enter.
		7	Protection against immersion in water. Water will not enter under stated conditions of pressure and time.
		8	Protection against indefinite immersion in water under a specified pressure.

# **NEMA ratings.**

## **NEMA 1**

Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment or locations where unusual service conditions do not exist.

## **NEMA 2**

Type 2 enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.

## **NEMA 3**

Type 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, and sleet; and to be undamaged by the formation of ice on the enclosure.

## **NEMA 3R**

Type 3R enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain; and to be undamaged by the formation of ice on the enclosure.

## **NEMA 4**

Type 4 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; and to be undamaged by the formation of ice on the enclosure.

## **NEMA 4X**

Type 4X enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure.

## **NEMA 6**

Type 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during temporary submersion at a limited depth; and to be undamaged by the formation of ice on the enclosure.

## **NEMA 7**

Type 7 enclosures are for indoor use in locations classified as Class I, Groups A, B, C, or D, as defined in the National Electrical Code.

Type 7 enclosures shall be capable of withstanding the pressures resulting from an internal explosion of specified gases, and contain such an explosion sufficiently that an

explosive gas-air mixture existing in the atmosphere surrounding the enclosure will not be ignited. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting explosive gas-air mixtures in the surrounding atmosphere. Enclosures shall meet explosion, hydro-static, and temperature design tests.

**NEMA 9**

Type 9 enclosures are intended for indoor use in locations classified as Class II, Groups E, F, or G, as defined in the National Electrical Code.

Type 9 enclosures shall be capable of preventing the entrance of dust. Enclosed heat generating devices shall not cause external surfaces to reach temperatures capable of igniting or discoloring dust on the enclosure or igniting dust-air mixtures in the surrounding atmosphere. Enclosures shall meet dust penetration and temperature design tests, and aging of gaskets (if used).

**NEMA 12**

Type 12 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.

**NEMA 13**

Type 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.

**Comparing NEMA and IP enclosure ratings.**

This is a cross reference for comparing NEMA and IP enclosure ratings. This comparison is only approximate, and it is the responsibility of the user to verify the enclosure rating necessary for the given application.

Enclosure type	IP23	IP30	IP32	IP55	IP64	IP65	IP66	IP67
1	X							
2		X						
3					X			
4							X	
4X							X	
6								X
12				X		X		
13						X		