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## Enclosure environmental protection ratings

### IP enclosure environmental protection ratings

The “IP” (ingress protection) rating is widely used in Europe to specify the degree of product protection against external objects and water ingress.

IP ratings are given in the form of a 2 or 3 digit code, as specified by standard IEC 60529. The IEC designation consists of the letters IP followed by two or three numerals. The first numeral indicates the degree of protection against foreign objects. The second numeral indicates the degree of protection against harmful ingress of water. The third digit (often not specified) describes the degree of protection against mechanical impact. Numbers can be replaced by “X” when the characteristic numeral is not required. (E.g. IP6X - protection against water ingress is not important).



### NEMA enclosure environmental protection ratings

NEMA is the National Electrical Manufacturers Association. Founded in 1926 and based in the USA the association promotes safety in the manufacture and use of electrical products.

NEMA ratings are widely used in North America. NEMA Standards Publication 250-1997 “Enclosures for Electrical Equipment (1000 Volts Maximum)” describes all NEMA enclosure types.

It is not possible to state that an IP rating is exactly equivalent to a NEMA type designation. This is because an IP rating considers protection against the ingress of solid foreign objects and water. The NEMA system considers these points but also considers other items such as corrosion resistance and other constructional details. For this reason it is possible to say that a NEMA type is approximately equivalent to an IP rating but not vice versa.



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K Controls designs and manufactures valve networking monitoring and control products:

Switchboxes  
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 Position Transmitters  
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 High and low temperatures  
 IP68 for submersion  
 Low powered solenoids  
 Remote I/O compatible  
 AS-interface®  
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 FOUNDATION™ FIELDBUS  
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## IP enclosure environmental protection ratings

1st	Protection against foreign objects	2nd	Protection against water	3rd	Impact Protection
0	Not protected	0	Not protected	0	None
1	Protected against objects greater than 50 mm diameter, e.g. touching by hands	1	Protected against vertically falling drops of water	1	0.225 joule
2	Protected against objects greater than 12 mm diameter, e.g. touching by fingers	2	Protected against direct sprays up to 15° from the vertical	2	0.375 joule
3	Protected against objects greater than 2.5 mm diameter, e.g. tools and wires	3	Protected against direct sprays up to 60° from the vertical	3	0.60 joule
4	Protected against objects greater than 1.0 mm diameter, e.g. tools, wires and small wires	4	Protected against sprays from all directions - limited ingress permitted	n/a	
5	Protected against dust - limited ingress (no harmful deposit)	5	Protected against low pressure jets of water from all directions - limited ingress permitted	5	2.00 joule
6	Totally protected against dust	6	Protected against strong jets of water e.g. for use on ship decks - limited ingress permitted	n/a	
		7	Protected against the effects of temporary immersion between 15cm and 1m. Duration of test 30 minutes	7	6.00 joule
		8	Protected against long periods of immersion under pressure	n/a	
				9	20.00 joule



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## NEMA enclosure environmental protection ratings (page 1 of 3)

### NEMA 1 (approximately equivalent to IP10)

Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dirt.

### NEMA 2 (approximately equivalent to IP11)

Similar to NEMA 1 but includes protection against dripping and light splashing of liquids.

### NEMA 3 (approximately equivalent to IP54)

Enclosures constructed for outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust and they will be undamaged by the external formation of ice on the enclosure.

### NEMA 3R (approximately equivalent to IP14)

Same as NEMA 3 excluding protection against windblown dust.

### NEMA 3S (approximately equivalent to IP54)

Enclosures constructed for outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust; and in which the external mechanism(s) remain operable when ice laden.

### NEMA 4 (approximately equivalent to IP55)

Type 4 enclosures are intended for indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They 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 (approximately equivalent to IP55)

Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They provide a degree of protection against corrosion falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water. They will be undamaged by the external formation of ice on the enclosure.



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## NEMA enclosure environmental protection ratings (page 2 of 3)

### NEMA 5 (approximately equivalent to IP52)

Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, to provide a degree of protection against falling dirt, against settling airborne dust, lint, fibers and to provide a degree of protection against dripping and light splashing of non corrosive liquids.

### NEMA 6 (approximately equivalent to IP67)

Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They provide a degree of protection against falling dirt, hose-directed water and the entry of water during occasional temporary submersion at a limited depth. They will be undamaged by the external formation of ice on the enclosure.

### NEMA 6P (approximately equivalent to IP67)

Same as NEMA 6 but includes protection against the entry of water during prolonged submersion at a limited depth.

### NEMA 7 (hazardous area enclosure)

Type 7 enclosures are for indoor use in hazardous locations classified as Class I, Division 1, 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. Commonly referred to as explosion proof.

### NEMA 8 (hazardous area enclosure)

Type 8 enclosures are for indoor use or outdoor use in hazardous locations classified as Class I, Division 2, Groups A, B, C, or D, as defined in the National Electrical Code. Commonly referred to as oil immersed.



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## NEMA enclosure environmental protection ratings (page 3 of 3)

### NEMA 9 (hazardous area enclosure)

Type 9 enclosures are intended for indoor use in hazardous locations classified as Class II, Division 1, 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).  
Commonly referred to as dust ignition proof.

### NEMA 10 (hazardous area enclosure)

Intended to meet the applicable requirements of the Mine Safety and Health Administration (MSHA).

### NEMA 12 (approximately equivalent to IP52)

Enclosures constructed (without knockouts) for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They provide a degree of protection against falling dirt, circulating dust, lint, fibers, and flyings and against the dripping and light splashing of non corrosive liquids.

### NEMA 12K (approximately equivalent to IP52)

Same as NEMA 12 including enclosures constructed with knockouts.

### NEMA 13 (approximately equivalent to IP54)

Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment. They provide a degree of protection against falling dirt, circulating dust, lint, fibers, and flyings and against the spraying, splashing and seepage of water, oil, and non-corrosive coolants.

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