ELECTRIC MOTORS
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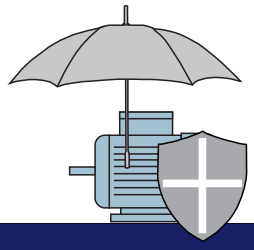
DEGREE OF PROTECTION

IP00

IEC 60529 (extended by DIN 40050-9)



Protection against penetration of mechanical particles

Protection against ingress of water (not oil)

First Digit	Protection against mechanical particles	Description
0	—	No protection against contact and ingress of objects
1	>50 mm	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part
2	>12.5 mm	Fingers or similar objects
3	>2.5 mm	Tools, thick wires, etc.
4	>1 mm	Most wires, slender screws, large ants etc.
5	Dust protected	Ingress of dust is not entirely prevented, but it must enter in sufficient quantity to interfere with the satisfactory operation of the equipment.
6	Dust tight	No ingress of dust; complete protection against contact (dust tight). A vacuum must be applied. Test duration of up to 8 hours based on air flow.

Second Digit	Protection against water	Description	Details
0	None	No protection against ingress of water	—
1	Dripping water	Dripping water (vertically falling drops) shall have no harmful effect.	Test duration: 10 minutes Water equivalent to 1 mm rainfall per minute
2	Dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.	Test duration: 2.5 minutes for every duration of tilt Water equivalent to 3 mm rainfall per minute
3	Spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.	For a Spray Nozzle: Test duration: 1 minute per square meter for at least 5 minutes Water volume: 10 litres per minute Pressure: 50–150 kPa For an oscillating tube: Test duration: 10 minutes Water Volume: 0.07 l/min per hole
4	Splashing of water	Water splashing against the enclosure from any direction shall have no harmful effect.	Same as IPX3 Spray Nozzle
5	Water jets	Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects.	Test duration: 1 minute per square meter for at least 3 minutes Water volume: 12.5 litres per minute Pressure: 30 kPa at distance of 3 m
6	Powerful water jets	Water projected in powerful jets (12.5 mm nozzle) against the enclosure from any direction shall have no harmful effects.	Test duration: 1 minute per square meter for at least 3 minutes Water volume: 100 litres per minute Pressure: 100 kPa at distance of 3 m
6K DIN 40050-9	Powerful water jets with increased pressure	Water projected in powerful jets (6.3 mm nozzle) against the enclosure from any direction, under elevated pressure, shall have no harmful effects.	Test duration: at least 3 minutes Water volume: 75 litres per minute Pressure: 1000 kPa at distance of 3 m
7	Immersion, up to 1 m depth	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).	Test duration: 30 minutes Tested with the lowest point of the enclosure 1000 mm below the surface of the water, or the highest point 150 mm below the surface, whichever is deeper.
8	Immersion, 1 m or more depth	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. However, with certain types of equipment, it can mean that water can enter but only in such a manner that it produces no harmful effects. The test depth and/or duration is expected to be greater than the requirements for IPx7.	Test duration: Agreement with Manufacturer Depth specified by manufacturer, generally up to 3 m
9K DIN 40050-9	Powerful high temperature water jets	Protected against close-range high pressure, high temperature spray downs. Smaller specimens rotate slowly on a turntable, larger specimens are tested freehand for a longer time. Smaller specimens are tested from 4 specific angles. There are specific requirements for the nozzle used for the testing.	Test duration: 30 seconds in each of 4 angles (2 minutes total) Water volume: 14–16 litres per minute Pressure: 8–10 MPa (80–100 bar) at distance of 0.10–0.15 m Water temperature: 80 °C

Additional Letter	Description
f	Oil resistant
H	High voltage device
M	Device moving during water test
S	Device standing still during water test
W	Weather conditions

IP67 & IP68 Online Explanation

IP Code	IP21	IP54	IP55	IP65	IP66	IP67	IP69
Min. NEMA rating	3R	3	12	4	4X	6	6P