

REFERENCE

UL Insulation Class

The insulation class of a motor reflects the maximum temperature the motor can endure without damage to the internal insulation materials. The following are recognized insulation class ratings by Underwriters Laboratory:

Class	A	E	B	F	H	N
Temperature (°C)	105	120	130	155	180	200

Type of Motor Duty

The International Electrotechnical Commission uses eight duty cycle designations to describe an electrical motor's operating conditions:

S1 = Continuous duty

The motor works at a constant load for enough time to reach temperature equilibrium.

S2 = Short-time duty

The motor works at a constant load, but not long enough to reach temperature equilibrium. The rest periods are long enough for the motor to reach ambient temperature.

S3 = Intermittent periodic duty

Sequential, identical run and rest cycles with constant load. Temperature equilibrium is never reached. Starting current has little effect on temperature rise.

S4 = Intermittent periodic duty with starting

Sequential, identical start, run and rest cycles with constant load. Temperature equilibrium is not reached, but starting current affects temperature rise.

S5 = Intermittent periodic duty with electric braking

Sequential, identical cycles of starting, running at constant load, electric braking, and rest cycles.

S6 = Continuous operation with intermittent load

Sequential, identical cycles of running with constant load and running with no load. No rest periods.

S7 = Continuous operation with electric braking

Sequential identical cycles of starting, running at constant load and electric braking. No rest periods.

S8 = Continuous operation with periodic changes in load and speed

Sequential, identical duty cycles run at constant load and given speed, then run at other constant loads and speeds. No rest periods.

Protection Degree

The protection designation indicates the level of prevention between live (electrical) parts of the motor and people or foreign matter and the ability of the motor to prevent the penetration of water.

Designation IPxx

IP First number - Protection against solid objects

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- 0** = No special protection

 - 1** = Protected against solid objects over 50 mm, e.g. accidental touch by persons hands

 - 2** = Protected against solid objects over 12 mm, e.g. persons fingers

 - 3** = Protected against solid objects over 2.5 mm (tools and wires)

 - 4** = Protected against solid objects over 1 mm (tools, wires, and small wires)

 - 5** = Protected against dust limited ingress (no harmful deposit)

 - 6** = Totally protected against dust

IP Second number - Protection against liquids

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- 0** = No protection

 - 1** = Protection against vertically falling drops of water e.g. condensation

 - 2** = Protection against vertically falling drops of water with enclosure tilted 15°

 - 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 temporary flooding of water, e.g. for use on ship decks - limited ingress permitted

 - 7** = Protected against the effect of immersion between 15 cm and 1 m

 - 8** = Protects against long periods of immersion under pressure
