Beitrags-ID: 26600153

1 Degrees of protection of rotating electrical machinery

According to IEC/EN 60034 - 5 and EN 605 29

Depending on the operating and ambient conditions, the following should be avoided by selecting a suitable degree of protection.

The damaging effect of water, foreign bodies and dust; coming into contact with rotating parts inside a motor or live part.

The degree of protection for electrical machinery is specified using a code which comprises two letters and two digits. It can also include an additional code letter.

IP	(International Protection) code letter for the degree of protection against coming into contact with and the ingress of foreign bodies and water
0 to 6	1st code number for the degree of protection against coming into contact with and the ingress of foreign bodies
0 to 8	2nd code number for the degree of protection against the ingress of water (this does not represent protection against the ingress of oil)
W / S / M	Additional code letters for special protection types

1.1 Special protection types

W for weather-protected electrical machinery:

The letter W is located between the IP code letter and the degree of protection code, e.g. IPW23.

This is valid for electrical machinery "to be used under specific ambient weather conditions and with additional protective measures or equipment".

S and M for water protection:

For special applications, (for example, open, open-circuit ventilated motors on the deck of a ship, where the motor air entry and air discharge openings are closed when the motor is stationary) then a code letter can be specified after the number which specifies whether protection was proven against damaging water entry with the motor stationary (the letter S) or with the motor running (the letter M).

In this particular case, the degree of protection must be specified for both motor operating states, e.g. IP55S / IP23M.

If the additional letters are omitted, then the degree of protection is maintained in both operating conditions – which means when it is running and when it is at a standstill.

The supplementary letter R for electrical machinery with pipe connection, defined in the old Standard, is no longer included as a result of the international agreements reflected in DIN IEC 34, Part 5. A combination of degree of protection/cooling type should be used for electrical machinery with pipe connection. For example, what was previously IPR44 is now IP23/IC37 or IP23/IC31.

1.2 Overview of the standard degrees of protection

The motors are mainly supplied with the following degrees of protection:

Motor	Degree of protection	1st numeral Protection against contact	Foreign bodies	2nd numeral Protection against water
internally ventilated	**IP 21**	with the fingers	medium-size bodies with diameters greater than 12 mm	dripping water falling vertically
	IP 22			dripping water falling at an angle up to 15° from the vertical
	IP 23			water sprayed at an angle up to 60° from the vertical
surface-ventilated	**IP 44**	by tools or similar objects	small bodies with diameters greater than 1 mm	water splashed from any direction
	IP 54	complete protection	protection against harmful deposits of dust	water splashed from any direction
	IP 55			water projected by a nozzle from any direction
	IP 56			water from temporary flooding [1]) heavy stream
	IP 65 [2]**)**	complete protection	protection against ingress of dust	water projected by a nozzle from any direction
	IP 67 [2]**)**			motor submerged under fixed pressure and time conditions
	IP 68 [2]**)**			motor is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer

1) In the case of heavy seas (temporary flooding) special version is needed

2) According to DIN VDE 0530, Part 5 and EN 60 034, Part 5 there are only 5 degrees of protection for the 1st numeral and 8 degrees of protection for the 2nd numeral for rotating electrical machinery. DIN 40 050 contains IP6., which is in general valid for “electrical equipment”.