

Degree of protection of the rotating electrical machines

■ Degree of protection of rotating electrical machines (IP code)

JIS C 4034-5: 1999 Rotating electrical machines-Classification of degrees of protection provided by enclosures of rotating electrical machines

(NOTE) This standard was established to align the protection methods (JP code) in the former JISC4004 General rules for rotating electrical machines with international standards (IEC standards).

● Degree of protection by enclosures for rotating machines

1. Degree of protection against access to hazardous parts and ingress of solid objects (first digit)

The first digit following the IP indicates the degree of protection of enclosed equipment against people accessing hazardous parts such as rotating or conductive parts of the rotating machines and the degree of protection against ingress of solid foreign objects.

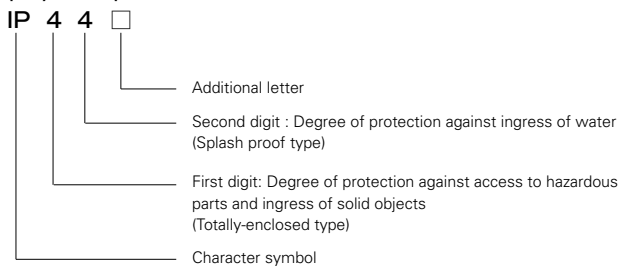
It is classified into six types in the table below.

2. Degree of protection against ingress of water (second digit)

It is classified into nine types in the table below.

The symbol indicating the degree of protection consists of the letter symbol IP followed by two numbers. The former is called the first digit (first model name), and the latter is called the second digit (second model name).

[Display example]



[Remarks]

Additional information shall be indicated by additional letters. When two or more letters added, they are added in alphabetical order.

(1) A single letter may be added to indicate whether protection against water ingress has been verified or tested against rotating machine that is not operating (letter S) or is operating (letter M). If the letters S and M are not shown, this means that the degree of protection is provided under all normal operating conditions.

(2) To indicate an outdoor rotating machine, add W after the second digit.

If the letters S and M are already added, W follows. The letter W for the outdoor rotating machine shall be used only for an open passage cooling type rotating machine (the cooling method is IC0X to IC3X type), and the letter W shall not be used for other measures such as totally enclosed type that structurally have the same performance as the outdoor type.

(NOTE) In the former JIS C4004, the letter W for outdoor type was added to the totally enclosed splash-proof type and outdoor type, but it is not added in this standard.

■ IP Ratings

Table 1

Protection against ingress of water		Second digit		0	1	2	3	4	5	6	7	8
		Definitions		Non-protected	Drip-proof 1	Drip-proof 2	Spray-proof	Splash-proof	Water-jet-proof	Sea-wave-proof	Immersion-proof	Submersible
First digit	Definitions			No special protection against water ingress	Protection against water drops falling vertically	Protection against water drops from directions within a range of 15° relative to the vertical plane	Protection against raindrops from directions within a range of 60° relative to the vertical plane	Protection against ingress of splashes from all directions	Protection against water jet from all directions	Protection against strong water jet such as ocean waves	Usable after immersion in water under specified conditions	Usable under water
0 Non-protected.	No special protection against human contact and ingress of solid objects											
1 Semi-protected	Protection against inadvertent contact with rotating and conductive parts inside the machine by hand or other critical parts of human body (except for intentional approach). Protection against ingress of solid objects exceeding 50mm in diameter.					IP12						
2 Protected	Protection against contact or approach of fingers or similar objects not exceeding 80 mm in length to conductive or rotating parts inside the enclosure. Protection against ingress of solid objects exceeding 12mm in diameter.				IP21	IP22	IP23					
3 Closed	Protection against contact or approach of tools or wire exceeding 2.5 mm in diameter to conductive or rotating parts inside the enclosure. Protection against ingress of solid objects exceeding 2.5mm in diameter.											
4 Totally enclosed	Protection against contact or approach of wire or thin section exceeding 1.0 mm in diameter to conductive or rotating parts inside the enclosure. Protection against ingress of solid objects exceeding 1.0mm in diameter.							IP44				
5 Dust proof	Protection from contact or access by objects from the outside to conductive or rotating parts within the enclosure. Constructed for maximum protection against harmful dust from accumulation. Even if dust enters, it does not interfere with normal operation.							IP54	IP55			