



General Information

Global Regulations & Standards I-2	Global Regulations & Standards
ISO 9001, ISO 14001 I-11	ISO 9001, ISO 14001
Corporate Overview I-12	Corporate Overview
Global Sales Network I-14	Global Sales Network
How to Use Web Sizing Tool I-18	How to Use Web Sizing Tool
Conversion Charts I-19	Conversion Charts
Product Line Updates I-20	Product Line Updates
Product Index I-26	Product Index

Global Regulations and Standards (Last updated September 2014)

Overview

Systems

International Standards

North America

EU

China

Japan

Overheat Protection Devices

Protection Against Electric Shock

Safety Considerations for Certified Products

Applicable Standards

Global Voltages

Overview of Global Regulations and Standards

1. System of Standards

Safety standards can be classified into 4 levels, with the international standards at the top. By aligning the regional standards, national standards and association standards with the international standards, unified content is created.

1-1. International Standards

International standards are commonly applicable to countries around the world. The standardization organizations are ISO, IEC, ITU, etc.

1-2. Regional Standards

Regional standards are applicable in a particular region. EN standards that apply to EU member states are regional standards. The standardization organizations are CEN, CENELEC, etc.

1-3. National Standards

National standards are used in a single country. JIS standards fall under this category. The standardization organizations are JISC, ANSI, BSI, etc.

1-4. Association Standards

Association standards are used by an association. Standards established by government agencies, industry organizations, companies and factories are included in these standards. Generally, standards that are used in an industry organization are called "association standards", and the ones that are used in a company are called "company standards".



2. International Standards

2-1. IEC Standards

IEC standards are the international standards for electric, electronic, and related technologies.

IEC (International Electrotechnical Commission) was founded at the London Conference in 1906 by representatives from 13 countries. The aim of IEC is to promote international cooperation regarding the problems, conformity assessment, and other related matters on the standardization of electric, electronic, and related technologies.

2-2. ISO Standards

ISO standards are the international standards for all industrial fields (mining and manufacturing, agriculture, pharmaceuticals, etc.) excluding electric, electronic, and related technologies.

ISO (International Organization for Standardization) was established in 1947 by associations of various countries. The aim of ISO is to facilitate international exchange of materials and services, to promote the global standardization that encourages international cooperation in intellectual, scientific, technological and economic fields, and to develop other related activities.

3. North America

● United States

3-1. UL Standards

UL, or Underwriters Laboratories Inc., is a nonprofit testing organization that was founded in 1894 by a group of American fire insurance companies. Their aim was to prevent loss of human life and damage to property from fires and other hazards by ensuring that machinery, tools and materials were safe. To this end, UL developed a variety of tests and research methods for machinery, tools and materials, which resulted in the compilation of the UL Standards. The most important aspect to the UL Standards for a manufacturer is that legal provisions in most American states virtually require that such products must have passed the relevant UL safety tests before being offered for sale. There are cases where insurers refuse to cover the risk of fire or damage caused by a product that is not UL-listed. Under such circumstances, the customer will obviously only purchase items that are UL-listed. For a product that is to be sold in the United States, recognition or listing by UL is required in most cases. UL-certified products are required to have a regular factory inspection. Oriental Motor products are certified as recognized components to be incorporated in UL-certified products.



Recognized Component Mark
(UL Certified Products Recognized by UL)

3-2. UL Standards Applied to Oriental Motor Products

3-2-1. UL Standards for Motors and Fans

● UL 1004-1 Rotating Electrical Machines – General Requirements
Establishes safety requirements that are common within the UL 1004 Series for prevention of electric shock and fire from motors.

● UL 1004-2 Impedance Protected Motors

Establishes requirements for overheating protection for impedance protected motors.

● UL 1004-3 Thermally Protected Motors

Establishes requirements for overheating protection for thermally protected motors.

● UL 1004-6 Servo and Stepper Motors

Establishes evaluation requirements for servo motors and stepper motors.

● UL 1004-8 Inverter Duty Motors

Establishes evaluation requirements for inverter duty motors.

● UL 2111 Overheating Protection for Motors

Establishes requirements for overheating protection for motors. UL 2111 was replaced by UL 1004-2 and UL 1004-3.

● UL 507 Electric Fans

Establishes safety requirements for prevention of electric shock and fire from fans that have an input power of 600 V or lower.

● UL 60950-1 (IEC 60950-1) Information Technology Equipment - Safety - Part 1: General Requirements

Establishes safety requirements for information technology equipment and general business equipment.

3-2-2. UL Standards for Circuits

● UL 508 Industrial Control Equipment

Establishes safety requirements for industrial control devices or systems used to start, stop, adjust, control or protect motors. For Oriental Motor products, this standard covers speed controllers and brake packs.

- **UL 508C Power Conversion Equipment**
Establishes safety requirements for equipment used to supply power to drive motors activated by a frequency or voltage that is different from the input supply voltage. For Oriental Motor products, this standard covers brushless motor drivers, stepper motor drivers, servo motor drivers and inverters.

- **UL 1917 Solid-State Fan Speed Controls**
Establishes safety requirements for single-phase 300 VAC max. variable speed fans' control circuit.

- **UL 60950-1 (IEC 60950-1) Information Technology Equipment - Safety - Part 1: General Requirements**
Establishes safety requirements for information technology equipment and general business equipment.

3-2-3. UL Standards for Thermostats

- **UL 873 Temperature-Indicating and -Regulating Equipment**
Establishes safety requirements for air-conditioning, heating, cooking, freezing, and humidity electric control equipment.

- **Canada**

3-3. CSA Standards

CSA stands for "Canadian Standards Association," a private, non-profit testing organization established after an inquiry by the Canadian government. To protect human life and property from fires and accidents, provincial laws in Canada forbid the sale and use of any electrical devices, electrical parts, gas and use sale, safety tools and so on, unless its safety has been confirmed by CSA standards. For this purpose, CSA has established standards detailing mandatory tests and requirements to ascertain component safety. CSA-certified components are required to have a regular factory inspection.

The CSA Mark indicates that the CSA application to the product has been confirmed by CSA. In addition to the conventional CSA Mark, the CSA Component Acceptance Mark was established in 2012 to be displayed on the component parts. Oriental Motor fans that have obtained the CSA Certificates display this mark.



CSA Mark
(CSA Certified Products Recognized by CSA)



CSA Component Acceptance Mark
(CSA Certified Products Recognized by CSA)

3-4. CSA Certification under UL

The certification organizations of CSA Standards are managed by the Standards Council of Canada (SCC), which is delegated authority to the national standardization system in Canada. UL has been certified as the certification organization of CSA Standards by SCC. Therefore, the sale and use of products displaying a C-UL mark are permitted in Canada.



Recognized Component Mark
(CSA Certified Products Recognized by UL)



Recognized Component Mark
(UL/CSA Certified Products Recognized by UL)

3-5. CSA Standards Applied to Oriental Motor Products

3-5-1. CSA Standards for Motors and Fans

- **C22.2 No.100 Motors and Generators**
Establishes safety requirements for motors.

- **C22.2 No.77 Motors with Inherent Overheating Protection**
Establishes special safety requirements that supplement those of C22.2 No.100 for motors with an inherent overheating protection device.

- **C22.2 No.60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements**
Establishes safety requirements for information technology equipment and general business equipment.

- **C22.2 No.113 Fans and Ventilators**
Establishes safety requirements for fans.

3-5-2. CSA Standards for Circuits

- **C22.2 No.14 Industrial Control Equipment**
Establishes safety requirements for industrial control devices used to start, stop, adjust, control or protect motors. For Oriental Motor products, this standard covers speed controllers, brake packs, brushless motor drivers, stepper motor drivers, servo motor drivers and inverters.

- **C22.2 No.60950-1 (IEC 60950-1) Information Technology Equipment - Safety - Part 1: General Requirements**
Establishes safety requirements for information technology equipment and general business equipment.

3-5-3. CSA Standards for Thermostats

- **CSA C22.2 No. 24 Temperature-Indicating and -Regulating Equipment**
Establishes safety requirements for temperature display and control equipment intended for regular household and industrial applications.

4. EU

4-1. EU Directives and CE Marking

EU Directives are the common rules that all EU member states must observe. In particular, New Approach Directives are based on the framework for the elimination of technological trade barriers in the EU. The products are recognized to satisfy the required items of each directive by applying the matching standard specified for each directive. When the CE marking is required for applicable New Approach Directives, the products must have the CE marking affixed to be allowed distribution in the EU areas.

The major scope of compliance applied to Oriental Motor products is as follows:

- **Low Voltage Directive (2006/95/EC, 2014/35/EU Note 1)**
Applicable to equipment used with 50-1000 VAC or 75-1500 VDC.
Note 1) A new Low Voltage Directive (2014/35/EU) was promulgated on March 29, 2014. Application of the previous Low Voltage Directive (2006/95/EC) will be recognized up to April 19, 2016.

- **EMC Directive (2004/108/EC, 2014/30/EU Note 2)**
Applicable to devices that could cause electromagnetic interference and devices that could be affected by electromagnetic interference.
Note 2) A new EMC Directive (2014/30/EU) was promulgated on March 29, 2014. Application of the previous EMC Directive (2004/108/EC) will be recognized up to April 19, 2016.

- **Machinery Directive (2006/42/EC)**
Applicable to machinery and pieces with moving parts.

- **ErP Directive (2009/125/EC)**
Applicable to products related to energy consumption.

4-2. EN Standards

EN Standards are common to EU member states. The European Committee for Electrotechnical Standardization (CENELEC) administers the EN Standards for electric and electronic fields. For fields other than electric, electronic and communication, the European Committee for Standardization (CEN) administers the EN Standards.

4-3. Oriental Motor Products' Approach to CE Marking

4-3-1. Low Voltage Directive

Oriental Motor has issued products with a declaration with the third-party certificates based on the EN Standards imposed by the approving authorities within the EU, as well as products with a declaration with company evaluations.

• **Third-Party Certificates under EN Standards**

To be approved by the third-party certificates under EN Standards, the products are required to have been evaluated based on the EN Standard and to carry on the adaptation of the EN Standards with designing and product management. Therefore, the products undergo a regular factory inspection.

VDE (Germany), TÜV Rheinland (Germany), DEMKO (Denmark), etc. are the authorized testing organizations. Qualifying products that are recognized as conforming to EN Standards may display the safety marks of each certification body.



VDE



TÜV Rheinland



DEMKO

4-3-2. EMC Directive

Oriental Motor has issued products with a declaration using the conditions of "Installing and Wiring in Compliance with EMC Directive" in the operating manual.

To conform equipment to the EMC Directive, it must undergo the EMC test as an equipment, instead of as individual components. EMC test results for equipment vary depending on the types of parts, positions and wiring methods. When confirming conformity to the EMC Directive, do so when all components, including Oriental Motor products, have been incorporated into the equipment.

4-3-3. Machinery Directive

For linear slides, cylinders, controllers and teaching pendants, we have issued a Declaration of Incorporation of Partly Completed Machinery based on the Machinery Directive. When confirming conformity to the Machinery Directive, do so when all components, including Oriental Motor products, have been incorporated into the equipment.

Built-in components are excluded from the CE Marking by the Machinery Directive. CE Marking for Oriental Motor products does not include the Machinery Directive.

4-3-4. ErP Directive

Oriental Motor has issued products with a declaration to the ErP Directive with company evaluations. For fans with 125 W or more input at maximum efficiency, the ErP Directive is compulsorily applied from January 2013. Additionally, built-in fans in the equipment are now subjected to the ErP Directive. Motors are excluded as of September 2014.

4-4. EN Standards Applied to Oriental Motor Products

4-4-1. EN Standards for Motors and Fans

● EN 60034 Series (IEC 60034 Series) Rotating Electrical Machines Establishes requirements for motors. There are over 20 parts, and the IEC 60034 series covers some parts which are not yet published by the EN 60034 Series.

● EN 60664-1 (IEC 60664-1) Insulation Coordination for Equipment within Low-Voltage Systems - Part 1: Principles, Requirements and Tests Establishes insulation distances of equipment whose rated voltage is up to 1000 VAC, 30 kHz, 1500 VDC.

● EN 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements Establishes safety requirements for information technology equipment and general business equipment.

4-4-2. EN Standards for Circuits

● EN 61800-5-1 (IEC61800-5-1) Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy Establishes safety requirements for the electricity, heat and energy of speed-control drive systems.

● EN 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements Establishes safety requirements for information technology equipment and general business equipment.

● EN 50178 Electronic Equipment for Use in Power Installations Establishes safety requirements for electronic equipment used in power facilities in terms of protection against electric shock, testing, and design and production for installations in power facilities.

4-4-3. EN Standards for EMC

● EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments Establishes the standard emission from devices used in industrial environments (requirements for external emissivity of electromagnetic waves from device).

● EN 61000-3-2 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) Establishes the limit value of the harmonic current of electric/ electronic devices that are connected to public low-voltage control pane systems of 16 A max. per phase.

● EN 61000-3-3 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection Establishes the limit value of voltage fluctuations and flicker of electronic devices that are connected to public low-voltage control pane systems of 220~250 V, 50 Hz.

● EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic Standards - Immunity for industrial environments Establishes immunity of devices used in industrial environments (requirements for resistance to electromagnetic waves from outside the devices).

● EN 61800-3 Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods Establishes EMC requirements and testing methods for speed-control drive systems used in residential areas, business areas and industrial areas.

4-4-4. EN Standards for Linear & Rotary Actuators

● EN ISO 12100 Safety of machinery - General principles for design - Risk assessment and risk reduction Establishes the general rules of designing and methodology for safety assurance of machinery. This standard has the highest priority with regard to the safety of machinery.

● EN ISO 13849-1 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design Establishes requirements for control systems that are classified using 5 performance levels (a~e) for safety assurance of the machinery.

● EN ISO 13850 Safety of machinery - Emergency stop - Principles for design Establishes the function and general rules of designing the emergency stop of machinery.

● EN 60204-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements Establishes safety requirements for electrical devices used for machinery.

Overview
Systems
International Standards
North America
EU
China
Japan
Overheat Protection Devices
Protection Against Electric Shock
Safety Considerations for Certified Products
Applicable Standards
Global Voltages

4-4-5. EN Standards for Thermostats

- EN 60730-1 Automatic Electrical Controls for Household and Similar Use - Part 1: General Requirements

Establishes the general safety requirements for automatic control equipment within, on, or used together with household devices, and those devices with a similar application (including control of heating, air conditioning, and similar applications).

- EN 60730-2-9 Automatic Electrical Controls for Household and Similar Use - Part 2-9: Particular Requirements for Temperature Sensing Controls

Establishes separate requirements for temperature sensing control equipment of automatic control equipment within, on, or used together with household devices, and those devices with a similar application (including control of heating, air conditioning, and similar applications).

4-5. Management of Chemical Substances in Products

As the RoHS Directive for the EU representatively exemplifies, there is a global movement to restrict harmful chemical substances in products. Oriental Motor's initiatives are introduced below.

- Refer to "RoHS" on the Oriental Motor website (www.orientalmotor.com) for the latest information.

4-5-1. RoHS Directive

DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment came into effect on July 1, 2006. It prohibits the use of lead, mercury, cadmium, hexavalent chromium, PBB and PBDE in electrical and electronic equipment.

The RoHS Directive was recast in July 2011, and came into effect on January 3, 2013 (RoHS2: Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)).

Oriental Motor recognizes its social responsibility toward protecting the environment by limiting the use of hazardous substances in products, and we have made our products that contain RoHS Directive-regulated substances at the threshold value or lower.

4-5-2. REACH Regulations

These are regulations that collectively deal with the registration, evaluation, authorization and restriction of chemical substances in the EU. (REACH: REGULATION (EC) No.1907/2006 Registration Evaluation Authorization and Restriction of Chemicals)

This law was adopted by the European Council on December 18, 2006, made public on December 30, 2006 and legislated on June 1, 2007.

- Substances of Very High Concern (SVHC)

These substances are designated according to the procedure specified in Article 59 of the Rules on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), being selected from among those substances having the characteristics specified under Article 57 of REACH (characteristics potentially associated with serious "carcinogenicity, mutagenicity, reproductive toxicity, persistence, bioaccumulation, toxicity, etc.").

(Refer to European Chemical Agency: <http://echa.europa.eu/>)

Once a SVHC is selected from among the aforementioned candidate substances and published, its users are imposed of certain obligations such as "Informing the relevant information, etc., regarding the SVHC to the recipient of an article if the SVHC is contained in the product". The term is also sometimes translated as "substances of high concern".

5. China

5-1. China Compulsory Certification System (CCC System)

In China (People's Republic of China), the CCC system applies to 160 items in 22 categories that affect safety and environment.

After an approval is given by a designated certification body (China Quality Certification Center, etc.), the applicable products may display the CCC mark. CCC certified components are required to have a factory inspection once a year. Exportation to/importation from or sale within China of any product not accompanied by a certificate under the CCC System is prohibited. Component parts that are built into products from countries other than China and are exported or sold in China are excluded from the CCC System. Even if compulsory certification applies to the actual product, CCC certification will not be required for internal parts. However, because component parts will be evaluated based on product standards, using a CCC certified component will make product testing and certification easier.



CCC Mark (GB Standards Products)

5-2. Determining Whether Oriental Motor Products are Applicable to CCC System or Not

The items for which the CCC System is applicable are stipulated in the Certification and Accreditation Administration of the People's Republic of China (CNCA) publication addendum "Compulsory Certification List Guide and Applicable Scope Table". Standard AC motors and low-speed synchronous motors from Oriental Motor are applicable to the CCC system. Information on control motors is not included (for example, servo motors, stepper motors, automated synchronizer equipment, rotary transformers, power generators for speedometer use, and induction phase adjustment regulators) in Note 2 under small power motors on "Compulsory Certification List Guide and Applicable Scope Table". In accordance with these regulations, Oriental Motor's brushless motors and stepper motors are not applicable. Additionally, in the electrical fan remarks column, the following information exists: "Typical products that do not apply the product scope of electrical fans with regard to CCC certification:

1. A fan used only as a part of a piece of equipment, that is not used by itself.
2. Fans that are not used in proximity to regular public users, but are used only in industrial applications". As such, our cooling fans do not fall within this scope and are therefore not applicable.

5-3. China Energy-Saving Labeling System

There are multiple energy-saving labeling systems in China. For energy efficiency of motors, the Energy Efficiency Labeling and Management System is the enforceable one, and China Certificate for Energy Conservation Product is the one on a voluntary basis. Oriental Motor products are excluded from the Energy Efficiency Labeling and Management System.

Some products have obtained third-party certification under China Certificate for Energy Conservation Product.

5-4. Standards for Motors Applied to Oriental Motor Products

- GB Standards

GB (Guojia Biaozhun) is the national standard in China, and is controlled by the China State Bureau of Quality and Technical Supervision (CSBTS).

The following standard applies to small power motors under the CCC System.

- GB 12350 Safety Requirements of Small-Power Motors
Establishes safety requirements for small power motors.

The following standard applies to the energy efficiency of motors.

- GB 25958 Minimum allowable values of energy efficiency and values of efficiency grade for small-power motors

Establishes requirements for energy efficiency of 10 W~2.2 kW output power induction motors. The applicable standards of the voluntary China Certificate for Energy Conservation Product are also followed.

5-5. The Measures for Administration of the Pollution Control of Electronic Information Products Act

In the People's Republic of China, the Measures for Administration of the Pollution Control of Electronic Information Products Act (Ministry of Information Industry Order No. 39) was established to protect the health of people and the environment through the prevention of environmental pollution caused by the disposal of electronic information products, and through promoting the production and sales of electronic information products with few hazardous substances.

This law has been legislated in 2 steps: the first being the demand for labeling of information of hazardous substances. Oriental Motor provides the following information in accordance with its B to B business.

- Whether there are hazardous substances in the product, or the element name and whether it is included
- Product environmental protection usage period

For more details, refer to the website

<http://www.orientalmotor.com.cn/> (Chinese) or contact your nearest Oriental Motor sales office.

- What is the Measures for Administration of the Pollution Control of Electronic Information Products Act?

The Measures for Administration of the Pollution Control of Electronic Information Products Act was made public on February 28, 2006, then legislated on March 1, 2007. Lead, mercury, cadmium, hexavalent chromium, PBB, PBDE and other poisonous, hazardous substances or elements (that are not currently stipulated) in electronic information products are treated as hazardous substances. In the first step, information labeling of hazardous substances is required, and in the second step, a detailed control list used for compulsory certificate control is planned.

- Max. Allowable Concentration

GB/T 26572-2011 "Requirements of concentration limits for certain restricted substances in electrical and electronic products"

4. Concentration limiting value requirements

Inhomogeneous materials

Lead, hexavalent chromium, mercury, PBB, PBDE..... 0.1 wt%
 Cadmium 0.01 wt%

- Coverage

- Electronic information products that are manufactured and sold in the People's Republic of China
 - Electronic information products that are imported and sold in the People's Republic of China
- (The details of the electronic information products are based on the "electronic information products classification and explanations".)

- Hazardous Substances Information Display Requirements

- Whether there are hazardous substances in the product, or the element name and whether it is included
- Product environmental protection usage period

6. Japan

6-1. Electrical Appliance and Material Safety Law

6-1-1. PSE Mark

Effective April 1, 2001, Japan's Electrical Appliance and Material Control Law was revised and renamed the "Electrical Appliance and Material Safety Law." The purpose of the new law is to regulate the manufacture, sales and other activities involving electrical appliances and materials, while preventing the occurrence of danger and trouble resulting from electrical appliances and materials by promoting the voluntary efforts of private businesses in order to ensure their safety. Accordingly, the authorizations (tests) and other safety checks, which under the old law were conducted directly by the government, have become the responsibility of the manufacturers, which must now ensure the safety of their own products through the introduction

of a third-party certification system. The Electrical Appliance and Material Safety Law applies to the electrical appliances and materials generally used in homes, offices, etc. They are classified into 2 categories; "special electrical appliances and materials" and "products other than special electrical appliances and materials," according to the level of danger they present. Special electrical appliances and materials are subject to compliance tests and the retention of compliance certificates performed/issued by a testing organization certified (or approved) by the Minister of Economy, Trade and Industry, and must also bear the diamond-shaped PSE mark. Products other than special electrical appliances and materials must comply with the relevant technical standards and bear the circular PSE mark.



Special electrical appliances



Products other than special electrical appliances and materials

6-1-2. S Mark

The July 1995 revision of the Electrical Appliance and Material Control Law prompted a major change in the safety assurance system for electrical products in Japan from the traditional system based on government approvals to one placing more safety check responsibility on the manufacturers. To help manufacturers fulfill their "safety check responsibility" and ensure consumer safety, Japan established a certification system based on a private, specialized third-party certification body much like the systems adopted in the U.S. and European countries. Currently, 4 organizations are recommended by the Steering Council of Safety Certification for Electrical and Electronic Appliances and Parts of Japan as third-party certification bodies to provide safety certification service. They are the Japan Electrical Safety & Environment Technology Laboratories (JET), Japan Quality Assurance Association (JQA), UL Japan, and TÜV Rheinland Japan.

The above bodies certify products for safety, mainly under the ministerial ordinances of applicable technical standards for electrical appliances, through testing of each product model and factory inspection. Manufacturers can display the S mark (e.g. S-JET Mark) on certified products.

S-JET certified products are required to have a factory inspection once a year.



S-JET Mark

6-1-3. JET Component Certification (Excluded products from Electrical Appliance and Material Safety Law)

S-JET is a component certification scheme provided by JET. Built-in components, materials and accessories for electrical products are tested and registered, and the list of registered items is utilized in the product testing for S-JET certification to prevent the same components from being tested repeatedly, thereby shortening the certification time and reducing associated costs. Specifically, JET examines components for compliance with the applicable standards (such as the IEC Standards and other technical standards for electrical appliances) as well as the requirements for quality control at the factory. Certified components are registered and shipped with the certification mark displayed on them.



- Overview
- Systems
- International Standards
- North America
- EU
- China
- Japan
- Overheat Protection Devices
- Protection Against Electric Shock
- Safety Considerations for Certified Products
- Applicable Standards
- Global Voltages

6-1-4. Relationship of Registered Testing Organizations

The following outlines the relationship of applicable products and excluded products for the Electrical Appliance and Material Safety Law with the relevant registered testing organizations. The S-JET Mark and JET Components and Materials Certification are also described.



6-1-5. Standards Applied to Oriental Motor Products

6-1-5-1. Electrical Appliance and Material Safety Law Related to the MU Series of Axial Flow Fans

Appended Table 8 is applicable to the **MU** Series fan body, and Appended Table 4 is applicable to the cord for connection to power supply (accessory).

- Appended Table 8: Alternating-Current Electrical Machinery, Apparatus and Portable Generator

Applicable for common items of 1, and for electric fans, ventilation fans, circulators, and air blowers described in 2 (41).

- Appended Table 4: Wiring Instruments

Applicable for common items of 1, and connection devices described in 6.

6-1-5-2. Electrical Appliance and Material Safety Law Related to Thermostats

For thermostats, although excluded from the Electrical Appliance and Material Safety Law, the following standards are applied on the premise of them being included within a product applicable to the Electrical Appliance and Material Safety Law.

- J 60730-1 Automatic Electrical Controls for Household and Similar Use – Part 1: General Requirements

The general requirements are established regarding automatic control equipment within, thereon, or used together with household devices, and those devices with a similar application (including control of heating, air conditioning, and similar applications).

As technical standards to comply with Section 2 of the Ministerial Ordinance for Electrical Appliances, they were established based on IEC 60730-1.

- J 60730-2-9 Automatic Electrical Controls for Household and Similar Use – Part 2-9: Particular Requirements for Temperature Sensing Control Equipment

The individual requirements are established regarding temperature sensing control equipment of automatic control equipment within, thereon, or used together with household devices, and those devices with a similar application (including control of heating, air conditioning, and similar applications).

As technical standards to comply with Section 2 of the Ministerial Ordinance for Electrical Appliances, they were established based on IEC 60730-2-9.

Overheating Protection for Motors and Fans

1. Motors and Fans with Inherent Overheating Protection

1-1. Products with Built-In Thermal Protector

Torque motors with a frame size of 60 mm (2.36 in.) sq., excluding a portion thereof, AC motors with a frame size of 70 mm (2.76 in.) sq., 80 mm (3.15 in.) sq., 90 mm (3.54 in.) sq., or 104 mm (4.09 in.) sq., and AC fans – **MR** Series, **MRS** Series, **MRE** Series, **MB** Series (impeller diameter · 80 mm (3.15 in.) or more), and **MF** Series – contain a built-in automatic return type thermal protector. The structure of a thermal protector is shown in the following figure.

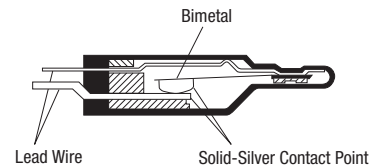


Figure 1: Structure of a Thermal Protector

The thermal protectors employ a bimetal contact, using solid silver. Solid silver has the lowest electrical resistance of all materials and has thermal conductivity second only to copper.

*Operating Temperature of Thermal Protector

open AC motor: $130 \pm 5^\circ\text{C}$ ($266 \pm 9^\circ\text{F}$) (**BH** Series: $150 \pm 5^\circ\text{C}$ ($302 \pm 9^\circ\text{F}$))

AC fan: $120 \pm 5^\circ\text{C}$ ($248 \pm 9^\circ\text{F}$)

close AC motor: $82 \pm 15^\circ\text{C}$ ($179.6 \pm 27^\circ\text{F}$) (**BH** Series: $96 \pm 15^\circ\text{C}$ ($204.8 \pm 27^\circ\text{F}$), Torque motor 3 W type: $90 \pm 15^\circ\text{C}$ ($194 \pm 27^\circ\text{F}$))

AC fan: $77 \pm 15^\circ\text{C}$ ($170.6 \pm 27^\circ\text{F}$)

(The motor winding temperature, where the thermal protector is working, is slightly higher than the operating temperature listed above.)

1-2. Impedance Protected Products

Impedance protection is used in AC motors with a frame size 60 mm (2.36 in.) sq. or less, AC fans **MU** Series and **MB** Series (impeller diameter · 60 mm (2.36 in.) or less), and low-speed synchronous motors.

Impedance protected motors are designed with higher impedance in the motor windings so that even if the motor locks, the increase in current (input) is minimized and the temperature will not rise above a certain level.

1-3. DC Fans

DC fans are equipped with an overheat prevention circuit that cuts the power to the windings or limits the current when the rotor is locked.

2. Motors without Inherent Overheat Protection

2-1. AC Motors

Some AC motors do not have an overheat protection function. They are designed so that overheat protection is provided with the electrothermal function of an inverter when combined with an inverter, or with the built-in thermal relay of an electromagnetic switch when combined with an electromagnetic switch.

2-2. Brushless Motors and Servo Motors

Brushless motors and servo motors are equipped with overload protection features to control temperature rises by cutting off the input current from the driver to the motor when a malfunction occurs.

- Overview
- Systems
- International Standards
- North America
- EU
- China
- Japan
- Overheat Protection Devices
- Protection Against Electric Shock
- Safety Considerations for Certified Products
- Applicable Standards
- Global Voltages

2-3. Stepper Motors

0.72°/0.36° stepper motors are designed to ensure the temperature will not rise above a certain level when stopping 0.72°/0.36° excitation at the rated current, and 1.8°/0.9° stepper motors are designed to ensure the temperature will not rise above a certain level when stopping 2-phase excitation at the rated voltage.

Protection against Electric Shock

1. Installation Conditions

Oriental Motor products are designed for the following installation conditions. ^{Note 1)}

Overvoltage Category: I (For DC input products)
 II (For AC input products)*
 * III for some products.

Pollution Degree: Class 2 (Products with the protection class of IP54 are in pollution degree of class 3)

Degree of Protection: It depends upon the model. Refer to the specifications on the pages of each product.

Note 1)

Under EN 60664-1 (Insulation Coordination for Equipment within Low-Voltage Systems - Part 1: Principles, Requirements and Tests), the overvoltage category, pollution degree and degree of protection are specified as follows:

● Overvoltage Category

This signifies the size of the impact voltage produced at an input power terminal to which the equipment is directly connected.

Category I: The circuit incorporates measures to limit the transient overvoltage to a sufficiently low level. The electronic circuit equipment protected by a power supply unit etc. connected via an insulated transformer.

Category II: The secondary circuits on transformers in industrial machinery, office equipment and other power sources where major overvoltage is not produced.

Category III: Power supplies from primary circuits on transformers, general plant control panels and other power sources where major overvoltage is anticipated.

● Pollution Degree

This signifies the level of pollution in the environment where the equipment can be used.

Degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence (clean room, etc.).

Degree 2: There are conductive substances that result in some pollution, and these are thought to have an effect at times on the device (offices, research laboratories).

Degree 3: Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected (boiler rooms and general plants).

In the event that the construction of the equipment creates internal pollution in equipment in a Degree 2 environment, that equipment must be designed to comply with a lower degree.

● Degree of Protection (Signified by IP Code)

This refers to the degree of dust-resistance and waterproofing of equipment. Device can be given a higher IP classification by providing protection with an appropriate enclosure.

2. Protection against Electric Shock ^{Note 2)}

Oriental Motor products are designed with Class I Equipment basic insulation. Always observe the following when using it:

1) Install products inside protective grounded enclosures so that they are out of the direct reach of users.

or

2) Always ground any product housing that is within the direct reach of users. Be sure to ground any product using the protective earth terminal.

Equipment with DC input is designed with a Class III Equipment structure. The power should be supplied from the safety power supply insulated from primary power supply.

Note 2)

Methods of protection against electric shock by equipment are divided into the following protection classes by EN 61140 (Protection against Electric Shock - Common Aspects for Installation and Equipment). (Protection Class)

Class I Equipment

Equipment in which protection against electric shock is achieved through basic insulation and equipment that provides a means of connecting to the protective earth conductor in the building wiring

of those conductive parts that are otherwise capable of assuming hazardous voltages if the basic insulation fails.

Class II Equipment

Equipment in which protection against electric shock does not rely on basic insulation only, but, in which safety precautions, such as double insulation or reinforced insulation are provided without reliance on protective earth.

Class III Equipment

Equipment in which protection against electric shock relies upon supply from SELV circuits and in which hazardous voltages are not generated.

Safety Considerations for Certified Products

A comparison of the items evaluated by various standards reveals that there are a few points of particular concern for motors and fans.

1. Motors and Fans

● Structure

◇ Overheat Protection Device

UL, CSA, EN, IEC and GB Standards require that any equipment using a motor also possess a device to protect the motor from overload. Oriental Motor-approved products are impedance protected or contain a built-in thermal protector. (Servo motors and brushless motors excluded.)

◇ Heat-Resistant Class and Insulating Materials

The heat-resistant class indicates the division of heat-resistant grades, and is specified as shown in Table 1 below by JIS C 4003 (Electrical insulation-Thermal evaluation and designation) (IEC 60085). Table 2 lists the insulation materials used by Oriental Motor to ensure compliance with the various safety standards.

Table 1: Heat-Resistant Class

Heat-Resistant Class
90 (Y)
105 (A)
120 (E)
130 (B)
155 (F)
180 (H)
200 (N)
220 (R)
250 (—)

Table 2: Insulation Materials

Safety Standards	Insulation Materials
Electrical Appliance and Material Safety Law (Fans, Approved by JET)	Insulation materials that are registered or temporarily registered with the Japan Electrical Safety & Environment Technology Laboratories (the material experiment organization for the Electrical Appliance and Material Safety Law), and have been assigned an upper limit of 120 (E) for usage temperature.
UL Certified Products (Motors, Fans) CSA Certified Products (Motors, Fans)	All lead wires and some slot insulations are approved products, while all other insulation materials satisfy UL and CSA Standards requirements.
EN Certified Products (Motors, Fans) IEC Certified Products	The insulation materials satisfy EN or IEC Standards requirements.
CCC Certified Components (Motors, GB Standards Certified Products)	The insulation materials satisfy GB Standards requirements.

◇ Air Clearance and Creeping Distance

To prevent accidents caused by short circuits between live materials and user-accessible materials (normally not live materials), air clearance and creeping distance between such materials have been defined. All Oriental Motor products comply with the relevant requirements.

◇ Degree of Protection

The dust-resistance and waterproofing degrees of protection for the equipment are classified according to EN 60529 (Specification Degrees of Protection Provided by Enclosures (IP Code)) (=IEC 60529), EN 60034-5 (Rotating Electrical Machines - Part 5: Degrees of Protection Provided by The Integral Design of Rotating Electrical Machines (IP Code) – Classification) (=IEC 60034-5), the testing method of which is indicated below.

[Display example] IP 67

Second number: Degree of protection against ingress of water
First number: Degree of protection against contact or entry of human body parts and solid objects

An "X" is used when one of the two protection classes is not specified in the name (e.g. IPX5, IP4X).

Table 3: Meanings of IP Codes and Testing Conditions

IP Code	Protection against Contact or Ingress of Human Body Parts and Solid Objects	
First Number	Protection Level	Test Condition
IP0X	None	None
IP1X	Protection against approach by hands	Solid objects with a diameter of 50 mm or more do not enter
IP2X	Protection against approach by fingers	Solid objects with a diameter of 12 mm or more do not enter
IP3X	Protection against tips of tools, etc.	Solid objects with a diameter of 2.5 mm or more do not enter
IP4X	Protection against ingress of wires, etc.	Solid objects with a diameter of 1.0 mm or more do not enter
IP5X	Protection against powdery dust	Powdery dust that may inhibit normal operation does not enter
IP6X	Completely dust-proof design	Cannot be penetrated by powdery dust

IP Code	Protection against Ingress of Water	
Second Number	Protection Level	Test Condition
IPX0	None	None
IPX1	Protection against water drops falling vertically	Water drops at a rate of 3 to 5 mm/min for 10 minutes from a height of 200 mm
IPX2	Protection against water drops from directions within a range of 15° relative to the vertical plane	Water drops at a rate of 3 to 5 mm/min for 10 minutes from directions within 15° from a height of 200 mm
IPX3	Protection against raindrops from directions within a range of 60° relative to the vertical plane	Sprayed water at a rate of 10 ℓ/min for 10 minutes from directions within 60° from a height of 200 mm
IPX4	Protection against ingress of splashes from all directions	Sprayed water at a rate of 10 ℓ/min for 10 minutes from all directions at a distance of 300 to 500 mm
IPX5	Protection against water jet from all directions	Sprayed water jet of 30 kPa at a rate of 12.5 ℓ/min for 3 minutes from all directions at a distance of 3 m
IPX6	Protection against strong water jet such as ocean waves	Sprayed water jet of 100 kPa at a rate of 100 ℓ/min for 3 minutes from all directions at a distance of 3 m
IPX7	Usable after immersion in water under specified conditions	Immersion to a depth of 1 m for 30 minutes
IPX8	Usable under water	Determined through cooperation between user and manufacturer

About Applicable Standards

This catalog does not contain a list of safety standard approved products or information on standards. Please check the web catalog on the website for the applicable standards, certification body, and File No. for each product.

● How to Check Detailed Information on Standards



Select "Safety Standards" in the red box on the top page.



Click on the link in the red box to open the PDF file. Confirm the Safety Standards in the file.

Global Regulations & Standards

ISO 9001, ISO 14001

Corporate Overview

Global Sales Network

How to Use Web Sizing Tool

Conversion Charts

Product Line Updates

Product Index

Power Supply Voltage in Major Countries

Power Supply Voltage Specifications are shown below.

Region/Country	Frequency	Voltage
North America	U.S.A.	60 Hz Single-Phase 115/230 VAC, Three-Phase 230 VAC
	Canada	60 Hz Single-Phase 120/347 VAC, Three-Phase 208/240/600 VAC
Europe	Austria	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Belgium	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Bulgaria	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Denmark	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Finland	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	France	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Germany	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Greece	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Hungary	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Italy	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Luxembourg	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Netherlands	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
	Norway	50 Hz Single-Phase 220/230 VAC, Three-Phase 380 VAC
	Poland	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Portugal	50 Hz Single-Phase 230 VAC, Three-Phase 400/480 VAC
	Romania	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Spain	50 Hz Single-Phase 127/220 VAC, Three-Phase 220/380 VAC
	Sweden	50 Hz Single-Phase 230/400 VAC, Three-Phase 400/690 VAC
	Switzerland	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC
United Kingdom	50 Hz Single-Phase 230 VAC, Three-Phase 400 VAC	
Czech	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC	
Japan	50/60 Hz Single-Phase 100/200 VAC, Three-Phase 200 VAC	
Asia	Korea	60 Hz Single-Phase 220 VAC, Three-Phase 200/220/380 VAC
	China	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Taiwan	60 Hz Single-Phase 110/220 VAC, Three-Phase 220/380 VAC
	Hong Kong	50 Hz Single-Phase 200/220 VAC, Three-Phase 346/380 VAC
	Singapore	50 Hz Single-Phase 230/240 VAC, Three-Phase 400/415 VAC
	Malaysia	50 Hz Single-Phase 240 VAC, Three-Phase 415 VAC
	Thailand	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	India	50 Hz Single-Phase 230/240 VAC, Three-Phase 400/415 VAC
	Indonesia	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Philippines	60 Hz Single-Phase 220 VAC, Three-Phase 480 VAC
Oceania	Viet Num	50 Hz Single-Phase 220 VAC, Three-Phase 380 VAC
	Australia	50 Hz Single-Phase 240 VAC, Three-Phase 415 VAC
	New Zealand	50 Hz Single-Phase 230 VAC, Three-Phase 230/415 VAC

Note

● Depending on countries or cities, voltages other than those shown above may be used.