General Information

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Safety Standards (Last updated December 2008)

The safety of the component parts is an important consideration in equipment design. However, a part-by-part analysis of component quality and design is too time consuming for design and quality personnel. To get around this problem, safety standards have been designed to assure component safety. The following section describes the major safety standards by which Oriental Motor's motors, fans, control circuits, etc. are recognized or certified (Electrical Appliance and Material Safety Law, China Compulsory Certification System, UL, CSA and EN Standards).

■Safety Standards

●UL Standards (United States)

UL, or Underwriters Laboratories Inc., is a non-profit 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. These standards are used for common items such as electronic equipment, motor-powered devices and electronic parts. The most important aspect to the UL Standards for a manufacturer is that legal provisions in most American states require that such products must have passed the relevant UL safety tests and be listed in the UL Directory 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 recommended.

Also, UL has been accredited as a verification agency by the Standards Council of Canada (SCC) and recognized by all Canadian provinces. Therefore, it is possible to have testing for Canadian safety standards performed at UL. Products that are recognized as conforming with Canadian safety standards can display the C-UL mark and their sale and use is permitted in Canada.

There are two types of UL marks: One is the recognized component mark c UL us indicating a component or material that has been evaluated and certified by UL for incorporation into UL-certified products, and the other is the listing mark c UL us given to a final product.

●CSA Standards (Canada)

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 machinery, electrical parts, and so on, unless its safety has been confirmed by CSA. For this purpose, CSA has established standards detailing mandatory tests and requirements to ascertain component safety. Moreover, the CSA has been accredited by the United States Occupational Safety and Health Administration (OSHA) as a National Research and Testing Laboratory (NRTL) and is now able to undertake testing under American safety standards. Products that are recognized as conforming with American safety standards may display the CSA mark with NRTL added, and their sale and use is permitted in the United States.

●EN Standards (EU member states)

The European Union continues to coordinate the industrial and safety standards of individual member states under the aegis of the Council of European Standardization (CEN) and the Council of European Electrical Standardization (CENELEC). The unified standards for all of Europe are called the Harmonized Standards. The numbers for Harmonized Standards all begin with an “EN.” EN Standards apply to the design and manufacture of products exported to the EU area. (IEC and VDE Standards apply when an EN Standard has not yet been enacted.)

Certification is given by private inspection organizations such as TÜV Rheinland, VDE and DEMKO. Qualifying products may display the various safety marks.

●Electrical Appliance and Material Safety Law (Japan)

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 two 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 the Japan Electrical Safety & Environment Technology Laboratories (JET) or other test laboratory certified (or approved) by the Minister of Economy, Trade and Industry, and must also bear the diamond-shape PSE mark◇PS E◇. Products other than special electrical appliances and materials must comply with the relevant technical standards and bear the circular PSE mark(PS E).

●S Mark (Japan)

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 manufacturers. To help manufacturers fulfill their "safety check responsibility" and ensure consumer safety, Japan established a certification system based on private, specialized third-party certification body much like the systems adopted in the U.S. and European countries. Currently, four 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 applicable IEC Standards and other technical standards for electrical appliances, through testing of each product model and factory inspection. Manufacturers can display the S mark on certified products.

●JET Components and Materials Certification (Registered Inside Agency)
(Japan)

S-JET is a component certification scheme provided by the Japan Electrical Safety & Environment Technology Laboratories (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 and thereby shorten the certification period and reduce 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.

●China Compulsory Certification System (CCC System)
(People's Republic of China)

The China Compulsory Certification System (CCC System) was enacted in the People's Republic of China on May 1, 2002, thus mandating the certification of products that affect the public's health and safety, the life and health of animals and plants, environmental protection and public safety. Following a period of transition the compulsory certification system took effect on August 1, 2003.
The State General Administration for Quality Supervision and Inspection and Quarantine of the People's Republic of China (AQSIQ), an agency operating directly under the country's State Affairs Administration, is responsible for the institution of rules and systems relating to compulsory certification, while the Certification and Accreditation Administration of the People's Republic of China (CNCA) is tasked with the actual administration and management of the CCC System. The First Catalog of Products Subject to Compulsory Certification was published jointly by the AQSIQ and the CNCA. The list covers 132 items in 19 categories. The manufacturer of a product specified on the list must apply for certification by a designated body authorized by the CNCA, such as the China Quality Certification Center, the EMC Certification Center, etc. Then, once an approval is given, the company must purchase the CCC mark or receive a permit to print the CCC mark and affix/print the mark on the exterior of the product thus certified. Effective August 1, 2003, exportation to/importation from or sale within the People's Republic of China of any product not accompanied by a certificate or certification mark under the CCC System is prohibited.

■Standards for Motors and Fans

●UL Standards
Shown below are four standards for motors and fans under the UL Standards.

◇UL 1004 Electric Motors
Establishes general requirements for all types of electric motors.

◇UL 2111 Overheating Protection for Motors
Establishes requirements for overheating protection for motors. Previously, requirements for impedance protected motors were established under UL 519, while requirements for thermal protectors for motors were established under UL 547. UL 2111 was published on March 28, 1997, combining UL 519 and UL 547, and partially integrating C22.2 No.77 (Motors with Inherent Overheating Protection) under the CSA Standards.

◇UL 507 Electric Fans
Establishes general requirements for electric fans that have an input power of 600 V or lower. Note that motor parts of fans must also comply with requirements of UL 2111 and UL 1004.

◇UL 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

●CSA Standards
Shown below are four standards for motors and fans under the CSA Standards.

◇C22.2 No.100 Motors and Generators
Establishes general requirements for motors.

◇C22.2 No.77 Motors with Inherent Overheating Protection
Establishes special requirements that supplement those of C22.2 No.100 for motors with inherent overheating protection.

◇C22.2 No.60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

◇C22.2 No.113 Fans and Ventilators
Establishes general requirements for fans.

●EN Standards
VDE, TÜV and DEMKO approved motors and fans are evaluated in accordance with the items required for motors under the following standards. Forty-eight hour humidity experiments are conducted in addition to experiments with motor and fan characteristics.

◇EN 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

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

◇EN 60664-1 Insulation Coordination for Equipment within Low-Voltage Systems – Part 1: Principles, Requirements and Tests
Establishes insulation distances.

●IEC Standards
Shown below are two standards for motors under the IEC Standards.

◇IEC 60034 Series Rotating Electrical Machines
Establishes general requirements for motors.

◇IEC 60664-1 Insulation Coordination for Equipment within Low-Voltage Systems – Part 1: Principles, Requirements and Tests
Establishes insulation distances.

●GB Standards
The following standard applies to small output power motors under the China Compulsory Certification System (CCC System).

◇GB 12350 Safety Requirements of Small Power Motors
Establishes general requirements for motors.

■Standards for Control Circuits

●UL Standards

◇UL 508 Industrial Control Equipment
This standard covers industrial control devices used to start, stop, regulate, control or protect motors. This standard covers speed controllers.

◇UL 508C Power Conversion Equipment
This standard covers equipment used to supply power to control motors activated by a frequency or voltage which is different from the input supply voltage. This standard covers brushless motors, stepping motors and inverters.

◇UL 1917 Solid-State Fan Speed Controls
These are standards for control of single-phase 300 VAC max. variable speed fans.

◇UL 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

●CSA Standards

◇C22.2 No.14 Industrial Control Equipment
This standard covers industrial control devices used to start, stop, regulate, control or protect motors. This standard covers speed controllers and drivers.

◇C22.2 No.60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

●EN and Other Standards
The speed controllers and drivers approved by VDE, TÜV and DEMKO conform to the following standards.

◇EN 50178 (Overvoltage test, EMC excluded) Electronic Equipment for Use in Power Installations
This standard covers general electronic equipment that can be used in power facilities.

◇EN 60950-1 (IEC 60950-1) Information Technology Equipment – Safety – Part 1: General Requirements
This standard covers information technology equipment and general business equipment.

◇EN 61800-5-1 (IEC 61800–5-1) Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy
Establishes requirements for general electronic drive system of variable flow.

◇DIN/VDE 0160 (Overvoltage test, EMC excluded) Electronic Equipment for Use in Electrical Power Installations and Assembly into Electrical Power Installations
This standard covers general electronic equipment that can be used in power facilities.

■Standards for Thermostats

●The Technical Standards Based on the Provision in Section 2 of the Ministerial Ordinance for Electrical Appliance

◇J60730-1 (IEC 60730-1) Automatic Electrical Controls for Household and Similar Use - Part 1: General Requirements

◇J60730-2-9 (IEC 60730-2-9) Automatic Electrical Controls for Household and Similar Use - Part 2-9: Particular Requirements for Temperature Sensing Controls
UL 873 Temperature-Indicating and -Regulating Equipment
CSA C22.2 No.24 Temperature-Indicating and –Regulating Equipment
IEC 60730-1 Automatic Electrical Controls for Household and Similar Use - Part 1: General Requirements
IEC 60730-2-9 Automatic Electrical Controls for Household and Similar Use - Part 2-9: Particular Requirements for Temperature Sensing Controls

IEC : International Electrotechnical Commission
The IEC promotes unification and coordination of international standards on electrical and electronic equipment. IEC Standards are issued with the ultimate goal of having individual countries reflect international standards within their own standards.
DIN : Deutsches Institut für Normung e.V.
The German standards association. This standard is utilized from basic to wide-ranging standards that cover all industrial fields.
VDE : Verband Deutscher Elektrotechniker e.V.
This German association of electrical engineers enacts safety standards for electricity that are issued as DIN-VDE Standards.
GB : Guojia Biaozhum (Chinese National Standards)
Chinese national standards administered by the China State Bureau of Quality and Technical Supervision.

■Safety Considerations of Certified Product

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

[Motors and Fans]

●Construction

◇Overheating Protection Devices

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

◇Insulation Class and Insulation Materials

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

Table 1: Insulation Class and Maximum Permissible Temperature

Insulation Class	Maximum Permissible Temperature
Class Y	90˚C (194˚F)
Class A	105˚C (221˚F)
Class E	120˚C (248˚F)
Class B	130˚C (266˚F)
Class F	155˚C (311˚F)
Class H	180˚C (356˚F)

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 that is the material experiment organization for the Electrical Appliance and Material Safety Law, and have been assigned a heat resistance grade of class E (120˚C) are used.
UL Standards (Motors, Fans) CSA Standards (Motors, Fans)	All lead wires and some slot insulations are approved products, while all other insulation materials satisfy UL and CSA Standards requirements.
EN Standards (Motors, Fans) IEC Standards	The insulation materials satisfy EN or IEC Standards requirements.
CCC System (Motors, GB Standards)	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's 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.

[Example] I P 6 7

- Second number: Degree of protection against ingress of water
- First number: Degree of protection against contact or ingress 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 Code 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.

◇Capacitor

Certification under the safety standards applicable to single-phase AC motors and fans will be given in regard to an individual motor or fan (excluding a model equipped with built-in capacitor).
Capacitors that are provided as accessories are individually recognized by UL/VDE or by UL (some capacitors are not certified).

◇Finger Guards (Cooling Fan Protective Gear)

When a fan is used in a machinery, measures must be taken to protect people from harm.
Oriental Motor's finger guards are designed to pass tests stipulated under the UL Standards, CSA Standards and Electrical Appliance and Material Safety Law when used on an applicable product.
(Finger guards cannot be certified as stand-alone equipment, since it is used when installed on another product as an accessory.)

◇Plug Cords for Connection to Power Supply

The plug cord (accessory) that can be used with the **MU** Series fans, connecting to power supply with terminals, is recognized by UL, certified by CSA and complies with Electrical Appliance and Material Safety Law (PS E).

●Performance

◇Temperature Test

Test Item \ Standard	UL 2111, CSA C22.2 No.77 (Class A and Class B Insulation)
Overload operation test for thermally protected motor	Winding temperature is 140˚C/165˚C or less when temperature is stabilized and the thermal protector is not activated with applying maximum load at a test voltage of 120 VAC or 240 VAC (when each rated voltage is 115 VAC or 230 VAC).
Locked-rotor temperature rise test for impedance protected motor	Winding temperature is 150˚C/175˚C or less when a 72-hour locked-rotor test is performed at a test voltage of 120 VAC or 240 VAC (when each rated voltage is 115 VAC or 230 VAC) with rated capacitor connected or capacitor short-circuited. No deterioration on insulation material of the windings after above test.
Locked-rotor temperature rise test for thermally protected motor	Winding temperature is in the following range when 72-hour locked-rotor test is performed at a test voltage of 120 VAC or 240 VAC (when each rated voltage is 115 VAC or 230 VAC) with rated capacitor connected. ・Maximum temperature in first hour is 200˚C/225˚C or less. ・Maximum temperature after one hour is 175˚C/200˚C or less. ・Calculated average value of maximum temperature and minimum temperature after one hour is 150˚C/175˚C or less.

- For winding temperature rise, Oriental Motor's products are designed to meet the UL and CSA Standards for Class A insulation. The insulation material is also heat-resistant grade of Class E insulation under the Electrical Appliance and Material Safety Law. (See the "General Specifications" table for each product line for the actual insulation class for each product.)
- The following are tested by the Electrical Appliance and Material Safety Law:
  Rated operation: The constant winding temperature reached for rated operation must be 115˚C or less.
  Locked-rotor protection performance: When the test piece is placed on a wooden table at least 10 mm thick and covered with gauze, and the locked-rotor test is run at rated frequency and rated voltage until the temperature stabilizes, the test piece, wooden table and gauze must not burn and the insulation resistance at 500 VAC must be 0.1 MΩ minimum.
- Temperature tests are stipulated in the EN and IEC Standards (Class E insulation/Class B insulation) and GB Standards (Class B insulation). Oriental Motor's products have all been certified to perform normally in these tests.

◇Endurance Test

Test Item \ Standard	UL 2111, CSA C22.2 No.77
Endurance test for impedance protected motor	The following items must be satisfied when continuing the locked-rotor test for another 15 days after the aforementioned 72-hour locked-rotor test, for a total of 18 days. (UL 60950-1 is required another 12 days, for a total of 15 days) a) No deterioration on insulation material of windings. b) The fuse between the motor case and ground shall not open. c) The motor shall still electrically operate.
Endurance test for thermally protected motor	The following items must be satisfied when continuing the locked-rotor test for another 15 days after the aforementioned 72-hour locked-rotor test for a total of 18 days. a) No deterioration on insulation material of windings. b) The fuse between the motor case and ground shall not open. c) The motor shall still electrically operate.

- The UL and CSA Standards cover the endurance tests as noted above. These rules were established to prevent motors and fans from burn-out after overheating when they are locked.
- Our approved fans employ high flammability grade (V-0) resins for the fan blades.
- Endurance tests are stipulated in the EN, IEC and GB Standards. Oriental Motor's products have all been certified to perform normally in these tests.

◇Dielectric Voltage – Withstand Test

Sufficient to withstand the voltage in the table below applied between the lead wire and the motor case for 1 minute.

Rated Voltage \ Standard	Electrical Appliance and Material Safety Law	UL 2111, CSA C22.2 No.77
150 VAC or less	1000 VAC, 1 minute	60 Hz, 1000 VAC, 1 minute (Common to impedance protected motor and thermally protected motor)
Over 150 VAC	1500 VAC, 1 minute	

- The EN, IEC and GB Standards stipulate 1500 VAC for 1 minute.

[Control Circuit]

The table below lists some of the standards under which Oriental Motor's products are certified, as well as the corresponding tests and test methods.

◇Examples of Tests for Control Circuit

Item	Test	Standard
Product specifications	Power Interface Mains Supply Rating	EN 60950-1 EN 61800-5-1 UL 508C
Protection against electric shock	Discharge of Capacitors in Equipment Capacitor Discharge	EN 60950-1 EN 61800-5-1
	Earthing Test	EN 60950-1
	Electric Strength Test AC or DC Voltage Test Dielectric Voltage Withstand Test	EN 60950-1 EN 61800-5-1 UL 508C
	Touch Current Test Touch Current Measurement	EN 60950-1 EN 61800-5-1
	Insulation Resistance Test in the Power Installation	EN 50178
	Impulse Voltage Test	EN 61800-5-1
Environmental resistance	Humidity Conditioning	EN 60950-1
	Damp Heat Test	EN 50178
	Temperature Tests Temperature Rise Test Temperature Test	EN 60950-1 EN 61800-5-1 UL 508C
	Vibration Test	EN 50178
Safety design	SELV Circuit Hazardous Voltage Measurement Test	EN 60950-1
	Working Voltage Measurement Test	EN 60950-1
	Limiting Impedance Circuit	UL 508C
Abnormal operation	Transformer Abnormal Operation Test	EN 60950-1
	Breakdown of Components Test	EN 61800-5-1 UL 508C
	Abnormal Operating and Fault Conditions Test	EN 60950-1
	Short-Circuit Withstand Capability Short-Circuit Test Short Circuit Test	EN 50178 EN 61800-5-1 UL 508C
	Loss of Phase	EN 61800-5-1
	Clogged Filter	EN 61800-5-1
Safety operation	Solid State Motor Overload Protection Test	UL 508C
Component structure and substitution requirement	Testing in Lieu of Spacing	UL 508C
	PWB Abnormal Operation Test	UL 508C
	PWB Short-Circuit Test	EN 61800-5-1

◇Tests for Control Circuit and Their Overview (Representative examples)

Test	Limiting Impedance Circuit (UL 508C)
Overview	Check the circuit diagram to confirm that key components do not exceed the impedance limit (= are less than 15 W).

Test	Breakdown of Components Test (UL 508C) Abnormal Operating and Fault Condition Test (EN 60950-1)
Overview	Based on the results of Limiting Impedance Circuit Test and Voltage Measurement Test, this test checks specified locations by deliberately shortening or opening the contacts.

■Marks of Approved Products

●The following marks are indicated on the nameplates of approved products.

●Electrical Appliance and Material Safety Law...

●S mark.....
Certified by Japan Electrical Safety & Environment Technology Laboratories (JET)

●JET components and materials certification.....

●UL recognized component.....

●Recognized by Canadian safety requirements under the Component recognition program of Underwriters Laboratories Inc. .....

●Recognized by Canadian safety requirements and UL under the recognition program of Underwriters Laboratories Inc. .....

●CSA certified component.....

●EN and IEC certified component.....
(indicates that VDE, TÜV Rheinland or DEMKO has certified that the product meets EN or IEC Standards.)

●CCC certified component .....
(GB certified component)

●Contact the nearest Oriental Motor sales office for the documents required to apply to various safety standards.

●Factory Inspection

Our production lines for certified products receive factory audits at irregular intervals, in which the process and product are checked by a relevant body in charge of such standards.

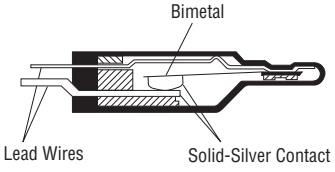
UL	: Four times a year
CSA	: Four times a year
TÜV	: Once a year
VDE	: Once a year
DEMKO	: Once a year
JET	: Once a year
CCC	: Once a year

■Overheating Protection Device

If a motor (fan) in operation is locked as a result of overload, ambient temperature rises rapidly, or when the motor input current increases for some reason, the motor (fan) temperature will rise abruptly. If left in this state, the performance of the insulation within the motor (fan) will be negatively affected and the life of the motor (fan) may decrease, and in the extreme cases a fire may break out due to a burned coil. To protect the motor (fan) against such thermal abnormalities, our motors (fans) recognized by UL and CSA Standards and conform to EN and IEC Standards are equipped with the following overheating protection device.

●Thermally Protected Motors

Torque motors with a frame size 60 mm (2.36 in.) sq., AC motors with frame sizes 70 mm (2.76 in.) sq., 80 mm (3.15 in.) sq., 90 mm (3.54 in.) sq. and 104 mm (4.09 in.) sq. and AC fans — **MRS** Series, **MB** Series (impeller diameter ϕ80 mm (ϕ3.15 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.



Structure of 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±5°C (266±9°F) [**BH** Series: 150±5°C (302±9°F), synchronous motor: 120±5°C (248±9°F)] AC fan: 120±5°C (248±9°F)
close	AC motor: 82±15°C (179.6±27°F) [**BH** Series: 96±15°C (204.8±27°F), torque motor 3 W type: 90±15°C (194±27°F), synchronous motor: 77±15°C (170.6±27°F)] AC fan: 77±15°C (170.6±27°F)

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

●Impedance Protected Motors

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 ϕ60 mm [ϕ2.36 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 temperature will not rise above a certain level.

●Brushless Motors

The motor and driver are equipped with overloading and/or overheating protection features to control temperature rises by cutting off the input current from the driver to the motor when a malfunction occurs.

●Stepping Motors

5-phase stepping motors are designed to ensure the temperature will not rise above a certain level when stopping 5-phase excitation at the rated current, and 2-phase stepping motors are designed to ensure the temperature will not rise above a certain level when stopping 2-phase excitation at the rated voltage.

●DC Fans

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

■CE Marking

To distribute equipment within the European Union, the CE Marking is mandatory for certifying that the equipment complies with EC Directives (safety) to manufacturer.
To obtain a ruling that the equipment satisfies the required items of each directive, the manufacturer must usually verify that the equipment complies with the EN Standards or, if not available, with the IEC Standards.
The manufacturer then composes a declaration stating compliance with the directives and applies the CE Marking. (However, depending on the risk of danger, formal testing by an approving authority may be required and the self composed declaration is then issued after receiving proof of formal testing.)
Products with a declaration of voluntary compliance have the following mark either on the nameplate or on the package label.

CE

The major scope of compliance is as follows:

Machinery Directive (98/37/EC)

Applicable to equipment with moving parts that could cause human injury. Generally applicable to industrial equipment such as machine tool.

EMC Directive (89/336/EEC, 92/31/EEC, 2004/108/EC)*

Applicable to equipment that could cause electromagnetic interference (EMI) and equipment that could be affected by electromagnetic interference (EMS).

Low Voltage Directive (2006/95/EC)

Applicable to equipment used with 50-1000 VAC or 75-1500 VDC.

* The new EMC Directive (2004/108/EC) is applicable from December 31, 2004.
The former EMC Directive (89/336/EEC, 92/31/EEC) has been superseded July 20, 2007, but its application is approved until July 20, 2009.

●The Advantages of Approved Components

Under EC Directives, not all components in a device or piece of equipment have to be approved. However, when non-approved components are used, the manufacturer of the equipment must evaluate and verify the safety of the component itself. If approved components are used, the manufacturer has the advantage of the benefits listed below, and it is easy for the manufacturer to apply their equipment for the required items compared to using non-approved components:

1) Simplified component safety evaluation
2) Simplified documentation and testing when lodging equipment standards applications with an approving authority

●Oriental Motor's Approach to CE Marking

To ensure that Oriental Motor's products comply with the low voltage directives, EMC Directive or both of them, we have issued a self-declaration of conformity with the standards imposed by the approving authorities within the EU or a self-declaration of conformity based on the EN Standards.
The EMC Directive applies to the entire equipment, including the Oriental Motor's products, control devices and other electrical parts used within or together with the equipment. For those products that bear the CE mark certifying compliance with the EMC Directive, please refer to the section "Installing and Wiring in Compliance with EMC Directive" in the operating manual.
The EMC performance of the customer's equipment will be affected by various conditions such as the configuration, wiring/wiring condition and hazard levels of the control devices and electrical parts used within or together with the equipment. Therefore, the customer is ultimately responsible for confirming the equipment's conformance with the EMC Directive.
Linear slides, controllers and teaching pendant are not subject to the machinery directives, because they are designed and manufactured for incorporation into general industrial machinery and equipment. However, we still evaluate these products based on the requirements of the machinery directive.

●Compliance Note 1)

Refer to the list of safety standard approved products starting on page G-11.

- Refer to page G-2 for the details of applicable standards of Oriental Motor's recognized or certified products. Customers should inquire at their local Oriental Motor sales office when a copy of the company's product approval or declaration of voluntary compliance with the EC Directives is required for lodging an application with approving authorities.

●Installation Conditions

The following installation conditions must be rigidly adhered to in order to ensure that products are used with greater safety. Note 2)

Overvoltage Category: Category Ⅱ (For AC input products)*
Pollution Degree: Class 2 (Products with the protection class of IP54 can be used in pollution degree of class 3.)
Degree of Protection: It depends upon the models. Refer to the specifications on pages of each product.

* For **BH** Series (terminal box type, single-phase 110/115 VAC and single-phase 220/230 VAC type), **BX** Series, **BLF** Series and **BLU** Series, overvoltage category: Ⅲ

●Protection against Electric Shock Note 3)

Oriental Motor's products are designed with Class Ⅰ Equipment basic insulation. When being used, the following must always be observed:

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 Class Ⅲ Equipment structure. The power should be supplied from the safety power supply insulated from primary power supply.

Note 1)
Generally, EN 60204-1 applies to electricity in industrial equipment and EN 60950-1 applies to business equipment and information technology equipment. EN 60204-1 satisfies the requirements of EN 60034-1 (IEC 60034-1) but, for the incorporation of equipment, EN 60950-1-conforming motors can be handled likewise.

Note 2)
Under IEC 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: Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected (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 grade of dust-resistance and waterproofing of equipment (Refer to page G-5). Equipment can be given a higher protection classes by providing protection with an appropriate enclosure.

Note 3)

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

Class Ⅰ Equipment

Equipment where protection against electric shock is achieved by using basic insulation and providing a means of connection to the protective earthing conductor in the building wiring 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 additional safety precautions, such as double insulation or reinforced insulation are provided, there being no reliance on protective earthing.

Class Ⅲ Equipment

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