

Safety Edge Controllers

SCC-1224 & SCC-1224ND

Installation and Operating Manual

Original Instructions



SCC-1224 & SCC-1224ND

Safety Edge Controllers

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1 IMPORTANT SAFETY MESSAGE

The Safety Edge and Controller, when used together as a system, is an emergency stop device when applied, installed, operated, and maintained in accordance with the instructions in this manual. The design and construction of this device is in accordance with CEN - European Committee for Standardization for CEN member countries. This organization provides general information and guidelines on the proper methods for manufacturing this type of a device as it relates to machine safeguarding.

Whether a specific machine or other application and Safety Edge and Controller installation fully comply with ISO 13849-1 depends on several items including: the proper application, installation, maintenance and operation of the Safety Edge and Controller. These items are the sole responsibility of the purchaser, installer and employer.

The employer is also responsible for the selection and training of the personnel necessary to properly install, operate and maintain the machine and its safety systems. For example, Safety Edge and Controller should be installed, checked out and maintained only by a qualified person.

The user is that person(s) identified and designated by the employer as being appropriately trained and qualified to perform a specific procedure. Often the user is the installer, die setter, electrician, maintenance personnel, supervisor, or foreman, etc., involved with the setup, test and checkout of the machine and all safety devices.

Definition of Qualified Person

A person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Reference ASME B30.2-2001

The equipment operator must receive specific, proper training on exactly which equipment is protected by the Safety Edge and Controller, the equipment's operating controls, warning signs and safety instructions. The equipment operator must thoroughly understand and follow the company's safety rules and always use the safeguards and proper hand tools provided by the employer. The equipment operator must notify management if the equipment, tooling or safety devices are not operating properly. Never use the equipment if it or the related safety equipment is not in proper working order.

The following additional requirements must be met before using the Safety Edge Controller E-stop system.

- The equipment on which the Safety Edge and Controller are installed must be capable of stopping motion anywhere in its stroke or cycle.
- Do not use a Safety Edge and Controller:
 - on any device with inconsistent stopping time or inadequate control devices or mechanisms.
 - where the environment, such as corrosive chemicals, may degrade the efficiency of the Safety Edge and Controller.
- When a Safety Edge and Controller are installed on a machine or other piece of equipment as an emergency stop device, the employer has the responsibility to insure that all applicable federal, state and local Occupational Safety and Health Act (OSHA) requirements and other such rules, codes and regulations are satisfied.
- All safety-related machine control circuit elements, including pneumatic, electric or hydraulic controls, must be control reliable as defined by ANSI B11.19-2003, 3.14. All other machinery or equipment must meet OSHA Standard 1910.212 on general machine guarding plus any other applicable regulations, codes and standards.

Do not use Safety Edge and Controller to initiate machine or equipment motion.

- All brakes and other stopping mechanisms must be inspected regularly to ensure proper working order. If the stop mechanisms and associated controls are not working properly, the machine may not stop safely even though the Safety Edge and Controller are functioning properly.
- Only qualified personnel must install and test the Safety Edge and Controller. Do not perform any test or repairs other than those outlined in this manual. All electrical wiring must be installed in accordance with local electrical codes and regulations.
- The user must follow all procedures in this manual for proper operation of the Safety Edge and Controller.

The enforcement of these requirements is beyond Omron STI's control. The employer has the sole responsibility to follow the preceding requirements and any procedures, conditions and requirements specific to your machinery.

2 INTRODUCTION

The Omron STI Safety Edge and Safety Edge Controller, when connected together, provide the operator controls and switching electronics for an emergency stop system that can cover large areas of a machine, door, gate, etc. Applications include machinery, gates, fences, overhead and sliding doors and other equipment where easy operator access to an emergency stop actuator is needed.

Safety Edges are watertight and are impervious to a large number of chemicals. They are available in several profiles in lengths up to 6100mm in 10mm increments.

Six wiring configurations are available in all profiles.

1. “0” – configuration has no terminating resistor. This would be used as the first segment where additional segments are connected in series.
2. “1” – configuration includes the resistor, which is wired external to the Safety Edge. This allows for additional strips to be installed in the future if required.
3. “2” – configuration includes the resistor enclosed and sealed within the strip. This unit must always be the last or the only unit in the system the resistor cannot be removed without compromising the integrity of the system.
4. “3” – QD configuration has no terminating resistor. This would be used as the first segment where additional segments are connected in series. One two wire lead exits each end of the profile one is fitted with a Female Quick-disconnect and the other is fitted with a Male Quick-disconnect.
5. “4” – QD Configuration consist of one two wire lead with Male Quick-disconnect and one resistor enclosed and sealed within the strip. This unit must always be the last or the only unit in the system the resistor cannot be removed without compromising the integrity of the system.
6. “5” – QD This configuration has no terminating resistor. This would be used as the first segment where additional segments are connected in series. One two wire lead exits each end of the profile, one end has a two wire connection and the other is fitted with a Female Quick-disconnect.

3 THEORY OF OPERATION

The Safety Edge Controller and Safety Edge combine to make up a versatile and flexible emergency stop system for use in applications where a machine operator or setup person must have easy, contiguous access to an E-Stop actuator.

The Safety Edge is consists of an aluminum mounting rail, a Safety Contact and a rubber profile into which the Safety Contact is inserted. The SGE Series Edges have an integrated contact within the profile. The Safety Edge has two wires connected at each end. In an application where a single strip is used, two wires from one end are connected to the Safety Edge Controller, the two wires on the other end of the Safety Edge are factory connected to an 8.2 K Ohm resistor.

4 DESCRIPTION OF CONTROL

4.1. SAFETY OUTPUTS (OSSD's)

The positive-guided relay outputs of the SCC-1224 and SCC-1224ND are referred to as safety outputs. They are turned off when an object or person activates the Safety Edge. Two Normally Open contacts are provided across terminals 13, 14 and 23, 24.

4.2. AUXILIARY OUTPUT SCC-1224

One Normally Open contact is provided across terminals 31, 32. This contact closes for 1 to 3 seconds whenever the Safety Edge is activated. **These contacts must never be used in the safety circuit.**

4.3. AUXILIARY OUTPUT SCC-1224ND

One Normally Open contact provided across terminals 31, 32. This contact remains closed as long as the safety contacts are open. (When the Safety Edge is activated). These contacts must never be used in the safety circuit.

4.4. INDICATORS

There are four LED lamps on the SCC-1224 and SCC-1224ND Safety Edge Controller. Please see *Figure 5-2* for the physical location of each indicator. These LEDs are identified on the controller.

- *Green LED Power*

Indicates that main power has been applied to the controller. Upon removal of power, the green light will go out and the controller and Safety Edge becomes inactive and the safety contacts are opened.

- *Yellow LED Actuate (Edge Activated)*

Indicates that the Safety Edge is depressed. LED goes out upon removal of pressure from the Safety Edge.

- *Red LED Fault Indication*

Indicates an open circuit in the Safety Edge such as a broken/cut wire, a loose connection on terminals X1 and/or X2 on the controller terminal block, a missing or incorrect value of the terminating resistor at the end of the Safety Edge, or any damage to the Safety Edge that could cause an open circuit between terminals X1 and X2.

- *Yellow LED Auxiliary Output SCC-1224 (Delay to Open)*

Indicates that the safety contact has been activated, causing the auxiliary contact to close. These contacts close when the safety contact is activated and are timed to open after about one to three (1 to 3) seconds. This could be used to reverse a door so long as doing so does not present a hazard.

- *Yellow LED Auxiliary Output SCC-1224ND (No Delay to Open)*

Indicates that the safety contact has been activated, causing the auxiliary contact to close. These contacts remain closed as long as the safety Edge is activated.

5 MODES OF OPERATION

5.1. AUTOMATIC START MODE (FACTORY DEFAULT)

There is only one configurable option, the factory default for the unit is Automatic Start, (See *Figure 5-1*) when power is applied to the controller, the controller will initiate a start up self-check. When the self-check is complete the relays will close; pressing the Safety Edge will cause the safety relays in the controller to transfer to the open state. When pressure is removed from the Safety Edge, the relays will transfer back to the closed state.

Table 5-1 Wiring Connections for Automatic Start

X1, X2	Safety Edges input
S11, S12	Jumper removed for Automatic Start
B1, B2	Supply Voltage 24VAC/DC
Z1, Z2	Reset Pushbutton or Momentary Key-switch. No connection required for automatic start.
A1, A2	Supply Voltage 115 VAC 50/60 Hz
31, 32	Auxiliary Output - SCC-1224: Contacts close when Safety Edge is operated and Delayed To Open after 1 to 3 seconds. - SCC-1224ND: Contacts close when Safety Edge is operated and remain closed until the Safety Edge is returned to normal. These contacts must never be used in the safety circuit.
13, 14	Safety Output 1
23, 24	Safety Output 2

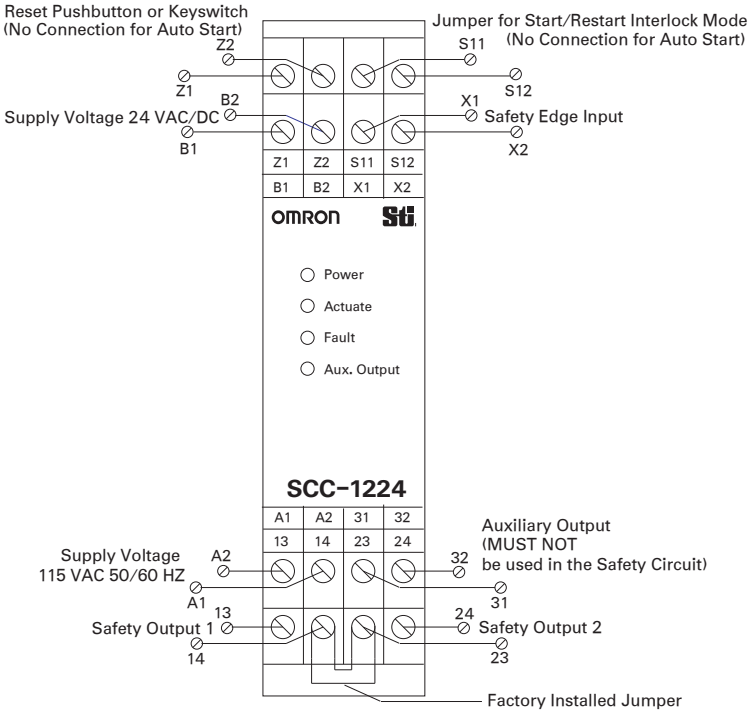


Figure 5-1 Automatic Start Connection Diagram

5.2. START/ RESTART INTERLOCK MODE

By placing a jumper between terminals S11 and S12, (See *Figure 5-2*) the unit is configured to Start/ Restart Interlock mode. When the unit is configured to the Start/Restart Interlock mode, a reset push button or key-switch must be wired to terminals Z1 and Z2. When power is applied to the controller, the controller will initiate a start up self check, when the self check is complete the relays will remain in the open state until a reset pushbutton or key-switch is closed across terminals Z1 and Z2. When the reset is closed, the contacts will transition to the closed state. Pressing the Safety Edge will cause the safety relays in the controller to transfer to the open state. When pressure is removed from the Safety Edge, the safety relays **will not** transfer back to the closed state until the pushbutton or key-switch is operated (Reset).

Table 5-1 Wiring Connections for Start/Restart Interlock

X1, X2	Safety Edge Input
S11, S12	Install jumper for Start/Restart Interlock Mode
B1, B2	Supply Voltage 24VAC/DC
Z1, Z2	Reset Pushbutton or Momentary Key-switch
A1, A2	Supply Voltage 115 VAC 50/60 Hz
31, 32	Auxiliary Output - SCC-1224: Contacts close when Safety Edge is operated and Delayed To Open after 1 to 3 seconds. - SCC-1224ND: Contacts close when Safety Edge is operated and remain closed until the Safety Edge is returned to normal. These contacts must never be used in the safety circuit.
13, 14	Safety Output 1
23, 24	Safety Output 2

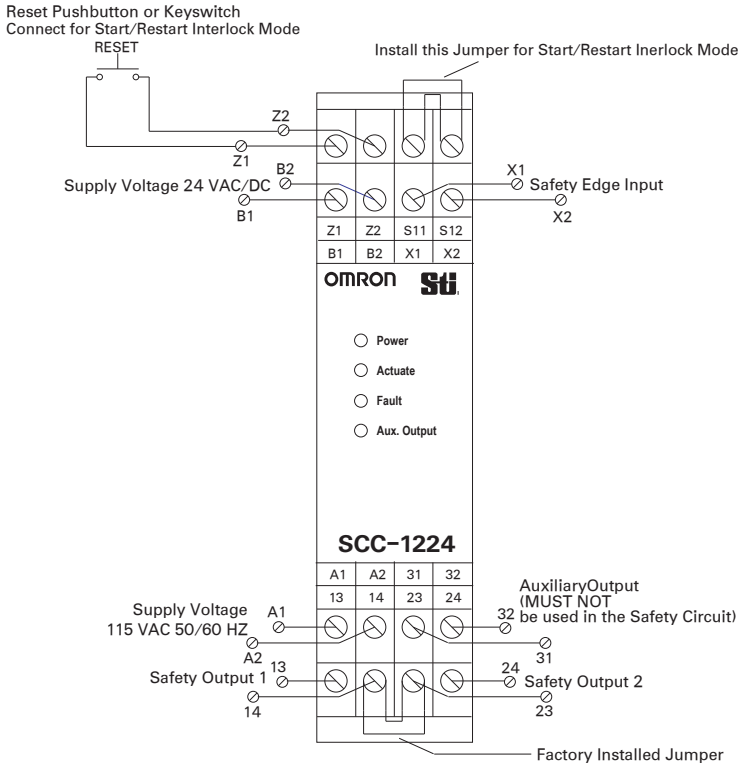


Figure 5-2 Start/Restart Interlock Connection Diagram

6 SPECIFICATIONS

6.1. MAXIMUM RESPONSE TIME: <13 MS

Indicators:

- Green LED = Power On
- Yellow LED = Sensor Activated
- Red LED #1 = Safety Circuit Interrupted
- Yellow LED = Auxiliary Output Activated

6.2. ELECTRICAL

Supply Voltage:

115 VAC, 50Hz. 3.3 VA or

24 VDC, 1.5 W or

24 VAC, 2.1 VA

Input: 2-Wire, Safety Edge with 8.2 K ohm resistor

Safety Outputs:

2 Safety Outputs max. current and voltage

4A @ 250 VAC, 4 A @ 30VDC.

2 Safety Outputs current and voltage, electrical life at 2.5A @ 250 VAC, 2.5A @ 30VDC.

Auxiliary Output:

1 Aux. Output, max. current and voltage

4A @ 250 VAC, 4A @ 30VDC.

1 Aux. Output current and voltage, electrical life at 2.5A @ 250 VAC, 2.5A @ 30VDC.

**Auxiliary outputs must never to be used in the safety circuit.*

Switching Times Safety Outputs

- Response time < 13 ms;
- Release time 1 s

Switching Times Aux Outputs:

** These contact must never to be used in the safety circuit.*

- Response time 0.5 s
- Release time 3 s

6.3. MECHANICAL

Enclosure: Polyamide, Self extinguishing in accordance with UL 94-V2

DIN Rail Mount Dimensions:

Height 99.0 mm (3.89in.)

Width 22.5 mm (0.885in.)

Depth: 114.0 mm (4.89in.)

Environmental Protection Rating: Housing: IP40; Terminal: IP20.

Operating Temperature: -20°C to +55°C

Approvals:

- Conforming to standards ISO 13849-1:2008
- Category 3
- Other approvals: CE, TUV
- Reliability Parameters:
 - PFHd [1/h]: 8.84e-8
 - PL d
 - MTTFd[a] = 329
 - DC[%] = 97

7 INSTALLATION

7.1. MOUNTING

The SCC-1224 controller is a DIN rail mounted controller.

7.2. CONNECTING THE SAFETY EDGES

7.2.1 WIRING

Caution must be used when installing, connecting and operating the SCC-1224 and SCC-1224ND Safety Edge Controller and SCS and SGE Safety Edge. Please observe all local electrical codes.

- When using 24 VDC, connect +24 VDC to terminal B1 and – 24VDC to terminal B2.
- When using 115 VAC, connect to terminals A1 and A2.
- Connect the two wires from the Safety Edge to terminals X1 and X2 of the Controller. Polarity does not have to be observed.

With the jumper wire is installed across terminals 14 and 23 (factory default) both safety relays are used in the safety output circuit only one machine primary control element (MPCE) is used. (See *Figure 5-2 Start/Restart Interlock Connection Diagram on page 12*) external fusing (not to exceed 4.0 amps) is required to protect internal safety relay contacts.

- With the jumper wire removed from terminals 14 and 23, each MPCE is individually wired. (See *Figure 5-2 Start/Restart Interlock Connection Diagram on page 12*) external fusing (not to exceed 4.0 amps) is required to protect internal safety relay contacts.

7.2.2 CONNECTING SEVERAL SAFETY EDGE

WARNING! Safety Edges Input MUST NOT be switched in parallel.

The Safety Edge input X1, X2 can be used to connect one or several Safety Edges. To do so, the individual Safety Edges are switched in series.

Safety Edge is suitable for connecting a maximum of 5 (total resistance 11.5K Ohm max. including terminal register 8.5K Ohm). Before connecting them, the resistance value of the series connected the Safety Edges must be measured.



Figure 7-1 Connecting Several Safety Edges

7.3. SETUP

Only qualified persons should install safety contacts.

7.3.1 PREPARING ALUMINUM RAIL

Drill 1/8 in. countersunk holes in the aluminum rail every 12 in. for mounting.



Figure 7-2 Aluminum Rail

7.3.2 MOUNTING THE ALUMINUM RAIL

Attach the aluminum-mounting rail to an even surface. The aluminum rail should be mounted only with rivets or countersunk screws.



Figure 7-3 Mounting Aluminum Rail

7.3.3 WIRE ROUTING

If the wire is to be fed through the aluminum rail, drill a 5/16" hole in the mounting rail. Be sure that the hole is properly de-burred to prevent damage to the wire.

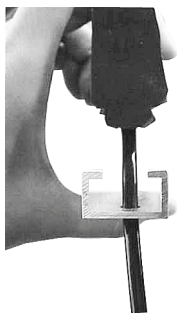


Figure 7-4 Feeding through Aluminum Rail

7.3.4 INSERTING THE PROFILE INTO ALUMINUM RAIL

(Models SCS2525N, SCS2540N, SCS3580, SGE365, SGEY365)

When inserting the rubber profile into the aluminum rail, liquid soap may be sprayed on the Safety Edge to make it easier to install. Insert one side first, then insert the other side. Once the soap has evaporated the strip is securely fastened to the mounting rail.

Never use talcum, oils or other permanent lubrication agents.

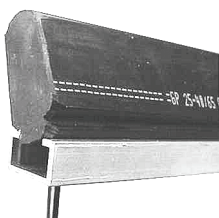


Figure 7-5 Inserting the Rubber Profile

7.3.5 WARNING: INCORRECT MOUNTING METHOD

Do not attempt to push or pull the Safety Edge into the aluminum rail. This can cause damage to the safety contact.

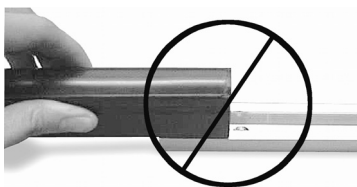


Figure 7-6 Incorrect Mounting Method

7.3.6 INSERTING THE PROFILE INTO ALUMINUM RAIL

(Models SGE1510,SGE125, SGE225, SGE245)



Figure 7-7 Safety Edges in position

Please Note: The SGE1510,SGE125, SGE225, SGE245 (shown above), may be inserted into the track by sliding it into position, all others Safety Edges must be installed as outlined in Section 7.3.4 above.

8 WARRANTY & ADDITIONAL INFORMATION

8.1. WARRANTY

Omron STI warrants its products to be free from defects of material and workmanship and will, without charge, replace or repair any equipment found defective upon inspection at its factory, provided the equipment has been returned, transportation prepaid, within one year from the date of installation and not to exceed 18 months from date of factory shipment.

The foregoing warranty is in lieu of and excludes all other warranties not expressly set forth herein, whether expressed or implied by operation of law or otherwise including but not limited to any implied warranties of merchantability or fitness for a particular purpose. No representation or warranty, express or implied, made by any sales representative, distributor, or other agent or representative of Omron STI which is not specifically set forth herein shall be binding upon Omron STI. Omron STI shall not be liable for any incidental or consequential damages, losses or expenses directly or indirectly arising from the sale, handling, improper application or use of the goods or from any other cause relating thereto and Omron STI's liability hereunder, in any case, is expressly limited to repair or replacement (at Omron STI's option) of goods.

Warranty is specifically at the factory or an Omron STI authorized service location. Any on site service will be provided at the sole expense of the Purchaser at standard field service rates.

All associated equipment must be protected by properly rated electronic/electrical protection devices. Omron STI shall not be liable for any damage due to improper engineering or installation by the purchaser or third parties. Proper installation, operation and maintenance of the product becomes the responsibility of the user upon receipt of the product.



8.2. REPAIRS

Omron STI offers product repair service at our factory. If you need repairs made to any Omron STI product Contact our Customer Service Department.

8.3. RETURNS

Whenever you return a product to Omron STI (even if the product is in warranty) please Contact our Customer Service Department and request a Returned Goods Authorization number (RGA).

APPENDIX A - DECLARATION OF CONFORMITY INFORMATION

OMRON SCIENTIFIC TECHNOLOGIES INCORPORATED *EC Declaration of Conformity*

OMRON Scientific Technologies Incorporated (at 6550 Dumbarton Circle, Fremont, CA 94555-3605, U.S.A.) hereby declares that the following series manufactured products listed below conform with the relevant Essential Health and Safety Requirements (EHSRs) of the European Machinery Directive (2006/42/EG). This Declaration of Conformity is in accordance with EN 45014 (General criteria for suppliers' declaration of conformity).

Safety Contact Edge Models:

SGE88, SGE1510, SGE125, SGE225, SGE245, SGE365, SGEY365,

***SCS2525, SCS2540, in combination with safety controller models:**

SCC-1224 (Part Number 43872-0020, Serial Number yymmnnnn) or

SCC-1224ND (Part Number 43872-0021, Serial Number yymmnnnn)

These products have been type-examined using the applicable transposed harmonized European standards that were used as a basis for the requirements and tests:

EN ISO 13849-1:2008 - Safety of machinery – Safety-related parts of control systems, Part 1: General principle for design.

EN ISO 13849-2:2008 - Safety of machinery – Safety-related parts of control systems, Part 2: Validation

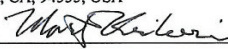
DIN EN 1760-2:2009 Safety of Machinery – Pressure sensitive protective devices - Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars.

*EN 954-1:1996: Safety of machinery – Safety-related parts of control systems - Part 1: General principles for design.

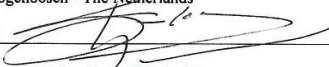
EC-type approval Notified Body 0044 TUV NORD CERT GmbH Langemarkstrasse 20, D-45141 Essen, Germany. EC-type approval no. 44 205 11 395675

This Declaration of Conformity does not relieve the gate manufacturer of its obligation to determine and keep the forces at crushing and shearing points of the finished gate in accordance with EN 12453: Safety of Machinery – Industrial, commercial and garage doors and gates - Safety in use of power operated doors- Requirements.

*EN 954-1:1996: (Not applicable for SCS2525, SCS2540)

Date June 7, 2011
Fremont, CA, 94555, USA
Signed 

Martin D. Krikorian
Quality Director
(Authorized Signer of Declarations of Conformity)
OMRON Scientific Technologies, Inc.

Date 9.6.2011
's-Hertogenbosch - The Netherlands
Signed 

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Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. **Prices; Payment Terms.** All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. **Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. **Orders.** Omron will accept no order less than \$200 net billing.
6. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. **Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
 - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
 - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 - d. Delivery and shipping dates are estimates only; and
 - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. **Warranties.** (a) **Exclusive Warranty.** Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) **Limitations.** OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) **Buyer Remedy.** Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See <http://www.omron247.com> or contact your Omron representative for published information.
14. **Limitation on Liability; Etc.** OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.
15. **Indemnities.** Buyer shall indemnify and hold harmless Omron Companies and their employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Omron is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
16. **Property; Confidentiality.** Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
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