

Conductive Level Controller

K8AK-LS

Ideal for liquid level control in industrial facilities and equipment.

- Self-holding ON or OFF outputs can be selected using self-holding circuit.
- Sensitivity adjustment of operating resistance from 10 to 100 kΩ for application to a wide range of liquids.
- Prevents chattering of relay contacts that occurs with ripples.
- Easy wiring with ferrules.
- Use 2 × 2.5 mm² solid wire or 2 × 1.5 mm² ferrules.
- Applicable as a floatless switch.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Refer to *Safety Precautions for the K8AK Series* on page 86.

Ordering Information

Power supply voltage	Model
24 VAC/DC	K8AK-LS1 24 VAC/DC
100 to 240 VAC	K8AK-LS1 100–240 VAC

Accessories (Order Separately)

●Electrode Holders/Underwater Electrodes

Application	For general-purpose use, such as water supply lines	For areas with limited space	For liquids with low resistance	When mounting strength is required	For resistance to high-temperature or high-pressure liquids	For resistance against corrosion	For installation at long distances from the liquid level
Model	PS-3S/-4S/-5S (2-wire models are also available)	PS-31 SUS304, 300 mm	BF-1	BF-3/-5	BS-1	BS-1T	PH-1/-2
Appearance							

●Electrode Rods

Electrode Rods are available in sets with the connection nuts, lock nuts, and tightening screws.



Application	Purified water service, industrial water, and sewage	Purified water service, industrial water, sewage, and weak alkaline solutions
Model	F03-60 SUS304	F03-60 SUS316

●Others

Item	Model
Protective Cover (Electrode Holders for the PS or BF Series)	F03-11
Mounting Piece (Electrode Holder for the PS Series)	F03-12
Separator (to prevent contact between electrodes)	F03-14 1P (one pole) F03-14 3P (three poles) F03-14 5P (five poles)

K8AK-LS

Ratings and Specifications

Ratings

Rated voltage	24 VAC 50/60 Hz or 24 VDC 100 to 240 VAC 50/60 Hz
Voltage across electrodes	5 V p-p (Approx. 20 Hz)
Power consumption	24 VAC/DC: 2.0 VA/1.1 W max. 100 to 240 VAC: 4.6 VA max.
Operating resistance	10 to 100 kΩ (variable)
Reset resistance	250 kΩ max.
Response time	Approx. 0.1 to 10 s (variable)
Length of cable	100 m max. (fully insulated 3-core 0.75-mm ² cable-type cable, 600 V)
Indicators	PWR: Green, RY: Yellow
Output contact ratings	Rated load Resistive load 5 A at 250 VAC 5 A at 30 VDC Maximum contact voltage: 250 VAC or 30 VDC Max. switching current: 5 A Maximum switching capacity: 1,250 VA, 150 W Mechanical life: 10 million operations min. Electrical life: 5 A at 250 VAC or 30 VDC: 50,000 operations 3 A at 250 VAC/30 VDC: 100,000 operations
Ambient operating temperature	-20 to 60°C (with no condensation or icing)
Storage temperature	-25 to 65°C (with no condensation or icing)
Ambient humidity	25% to 85% (with no condensation)
Storage humidity	25% to 85% (with no condensation)
Altitude	2,000 m max.
Terminal screw tightening torque	0.49 N·m
Case color	N1.5
Case material	PC and ABS
Weight	Approx. 150 g
Mounting	Mounts to DIN Track.
Dimensions	22.5 × 90 × 100 mm (W×D×H)

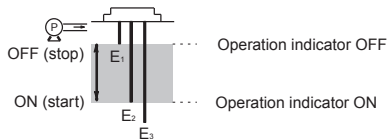
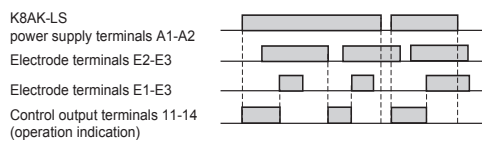
Specifications

Operating voltage range	85% to 110% of rated voltage
Installation environment	Installation category II, pollution level 2
Approved standards	EN61010-1
EMC	EN61326-1
Safety standards	EN 60664-1, UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA: CAN/CSA C22.2 No.14, CCC: GB14048.5
Insulation resistance	20 MΩ min. Between all external terminals and the case Between all power supply terminals and all input terminals Between all power supply terminals and all output terminals Between all input terminals and all output terminals
Dielectric strength	2,000 VAC for 1 min Between all external terminals and the case Between all power supply terminals and all input terminals Between all power supply terminals and all output terminals Between all input terminals and all output terminals
Noise immunity	1,500 V power supply terminal common/normal mode Square-wave noise of ±1-μs/100-ns pulse width with 1-ns rise time
Vibration resistance	Frequency: 10 to 55 Hz, acceleration 50 m/s ² 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance	150 m/s ² , 3 times each in 6 directions along 3 axes However, 100 m/s ² for relay contacts.
Degree of protection	Terminals: IP20

Connections

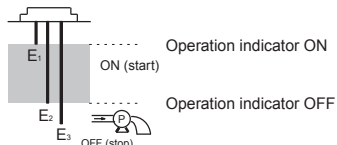
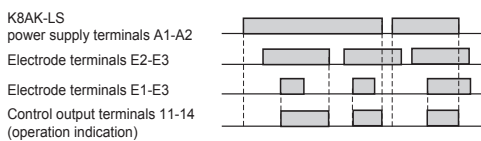
Operation Diagram

● Operation Timing Chart (DIP Switch Pin 1: OFF (Automatic Liquid Supply Operation))



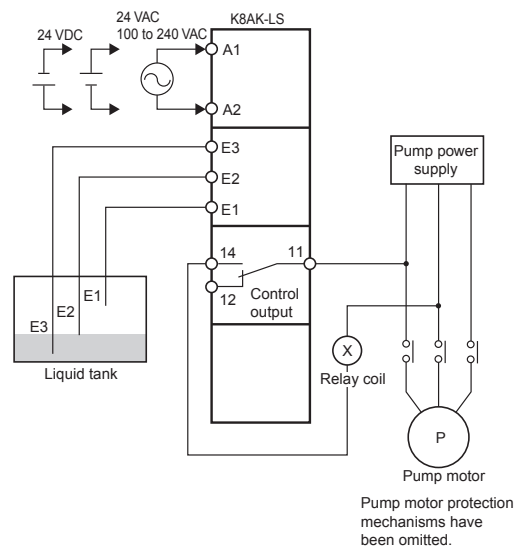
- When the liquid level falls to E2 (indicator turns ON), the pump starts.
When the liquid level rises above E1 (indicator turns OFF), the pump stops.

● Operation Timing Chart (DIP Switch Pin 1: ON (Automatic Liquid Discharge Operation))



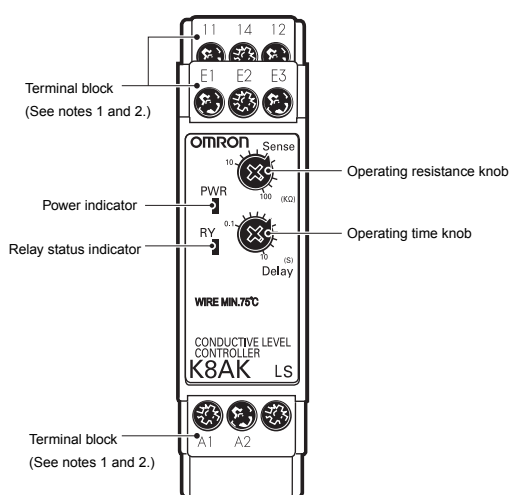
- When the liquid level reaches E1 (indicator turns ON), the pump starts.
When the liquid level falls below E2 (indicator turns OFF), the pump stops.

Wiring Diagram



Nomenclature

Front Panel



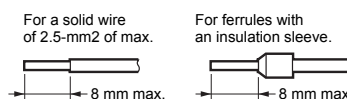
●Indicators

Item	Description
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when contacts are operating.

●Setting Knobs

Item	Description
Operating resistance knob	Used to set the resistance to 10 to 100 kΩ.
Operating time knob	Used to set the operating time to 0.1 to 10 s.

Note: 1. Use solid-core wires of 2.5-mm² max. or ferrules with an insulation sleeve to wire to this terminal. To ensure the dielectric strength of the connection, do not expose more than 8 mm of wire for insertion into the terminal.



Recommended ferrules

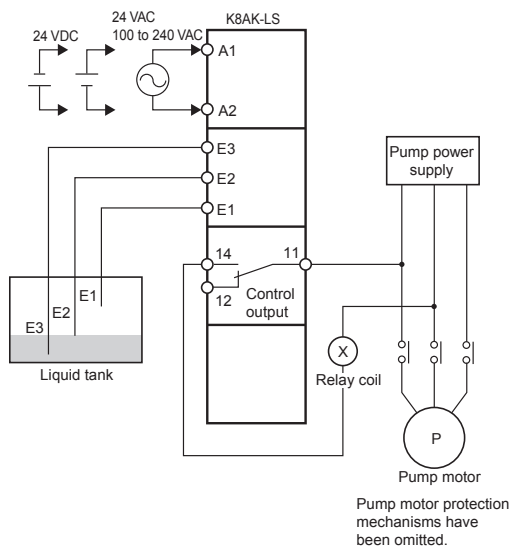
- Phoenix Contact
- AI 1,5-8BK (for AWG16)
- AI 1-8RD (for AWG18)
- AI 0,75-8GY (for AWG18)

2. Screw tightening torque: 0.49 N·m max.

Operating and Setting Procedures

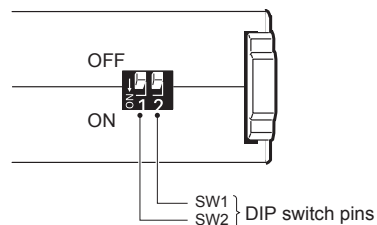
●Wiring

Wire the terminals as shown in the following figure. Use terminals 11 and 14 in both liquid supply mode and liquid drain mode.



●DIP Switch Settings

The operating mode is set using the DIP switch located at the bottom of the Unit. The K8AK-LS does not have SW2.



DIP Switch Function

Pin	OFF ● ↑	ON ○ ↓
1	●	○
2	Not used.	Not used.
Operating mode	Automatic liquid supply operation	Automatic liquid discharge operation

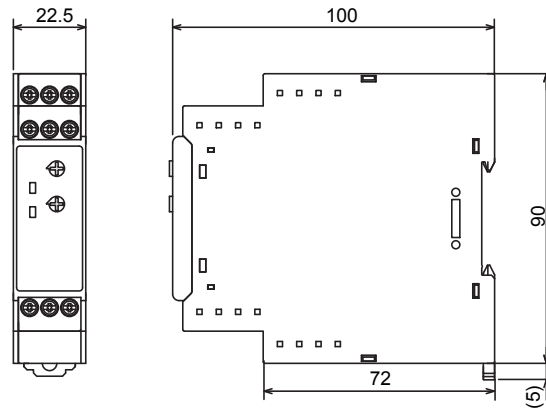
Note: All pins are set to OFF by default.

K8AK-LS

Dimensions

(Unit: mm)

K8AK-LS

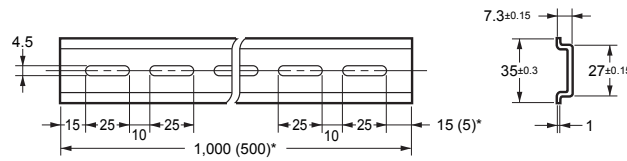
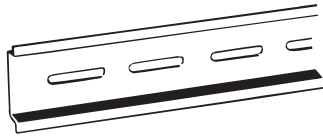


Optional Parts for DIN Track Mounting

●DIN Tracks

PFP-100N

PFP-50N




*Dimensions in parentheses are for the PFP-50N.





Safety Precautions

Be sure to read the precautions for all models in the website at the following URL: <http://www.ia.omron.com/>.

Warning Indications

 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction, or undesirable effects on product performance.

Meaning of Product Safety Symbols

	Used to warn of the risk of electric shock under specific conditions.
	Used for general prohibitions for which there is no specific symbol.
	Used to indicate prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.
	Used for general mandatory action precautions for which there is no specified symbol.

CAUTION

Electrical shock may cause minor injury.
Do not touch terminals while electricity is being supplied.



There is a risk of minor electrical shock, fire, or device failure.
Do not allow any pieces of metal, conductors, or cutting chips that occur during the installation process to enter the product.



Explosions may cause minor injuries. Do not use the product in locations with inflammable or explosive gases.



There is a risk of minor electrical shock, fire, or device failure.
Do not disassemble, modify, repair, or touch the inside of the product.



Loose screws may cause fires. Tighten terminal screws to the specified torque of 0.49 to 0.59 N·m.



Use of excessive torque may damage the terminal screws.
Tighten terminal screws to the specified torque of 0.49 to 0.59 N·m.



If the setting does not match the element to be monitored, the product may behave unexpectedly and damage the machine or cause accidents. Set the K8AK-TH as described below.



- Adjust each set value on the K8AK-TH correctly for the element that is to be monitored.
- Turn OFF the power to the K8AK-TH before you change the switch settings on the side panel. The switch settings made on the side panel take effect when the power is turned ON.

If the K8AK-TH fails, the monitoring alarms and alarm outputs may fail to operate. This may result in physical damage to the facilities, equipment, or other devices that are connected to it. To reduce this risk, inspect the product regularly. To make the product fail-safe, take alternative safety measures, such as the installation of monitoring devices on a separate circuit.



Use of the product beyond its life may result in contact welding or burning. Make sure to consider the actual operating conditions and use the product within its rated load and electrical life count. The life of the output relay varies significantly with the switching capacity and switching conditions.



Precautions for Safe Use

- Do not use or store the product in the following locations.
 - Locations subject to water or oil
 - Locations subject to direct radiant heat from heating equipment
 - Outdoor locations or under direct sunlight
 - Locations subject to dust or corrosive gases (particularly sulfurizing gases, ammonia, etc.)
 - Locations subject to rapid temperature changes
 - Locations prone to icing and dew condensation
 - Locations subject to excessive vibration or shock
 - Locations subject to wind and rain
 - Locations subject to static electricity and noise
 - Habitats of insects or small animals
- Use and store the product in a location where the ambient temperature and humidity are within the specified ranges. If applicable, provide forced cooling.
- Mount the product in the correct direction.
- Check terminal polarity when wiring and wire all connections correctly. The power supply terminals do not have polarity.
- Do not wire the input and output terminals incorrectly.
- Make sure the power supply voltage and loads are within the specifications and ratings for the product.
- Make sure the type of the thermocouple matches the input type that the K8AK-TH is designed for.
- If you need to extend the length of the lead wires on the thermocouple to use with the K8AK-TH, make sure to match the type of thermocouple and always use compensating conductors.
- To extend the lead wires on the platinum resistance thermometer that is used with the K8AK-TH, use lead wires with a low resistance (5 Ω or less per wire), and make the resistance equal on all three lead wires.
- Make sure the crimp terminals for wiring are of the specified size.
- Do not connect anything to terminals that are not being used.
- Use a power supply that will reach the rated voltage within 1 second after the power is turned ON.
- After you turn ON the power, it takes 2 seconds for the outputs of the K8AK-TH to stabilize. Take this time into account when you design the control panel.
- Allow at least 30 minutes for the K8AK-TH to warm up. During this time, the temperature measurements will be incorrect.
- Keep wiring separate from high voltages and power lines that draw large currents.
Do not place product wiring in parallel with or in the same path as high-voltage or high-current lines.
- Do not install the product near equipment that generates high frequencies or surges.
- The product may cause incoming radio wave interference. Do not use the product near radio wave receivers.
- Install an external switch or circuit breaker and label it clearly so that the operator can quickly turn OFF the power supply.

19. When cleaning the product, do not use thinners or solvents. Use commercial alcohol.
20. Make sure the power and output indicators operate correctly. Depending on the application environment, the indicators and other plastic parts may wear prematurely and become difficult to see. Check and replace these parts regularly.
21. The terminal blocks may heat up to 65°C. Use care when handling them.
22. Do not use the product if it is accidentally dropped. The internal components may be damaged.
23. Be sure you understand the contents of this catalog and handle the product according to the instructions provided.
24. Do not install the product in any way that would place a load on it.
25. When discarding the product, properly dispose of it as industrial waste.
26. When using the product, remember that the power supply terminals carry a high voltage.
27. The product must be handled only by trained electrician.
28. Prior to operation, check the wiring before you supply power to the product.
29. Do not install the product immediately next to heat sources.

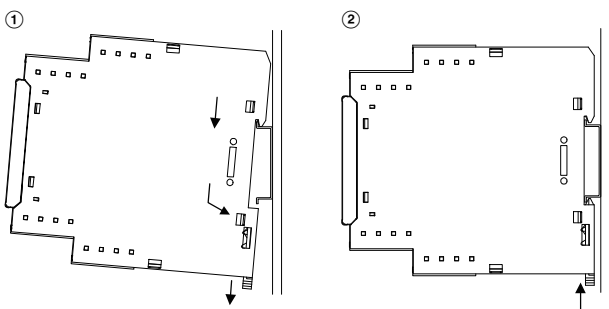
Precautions for Correct Use

Observe the following operating methods to prevent failure and malfunction.

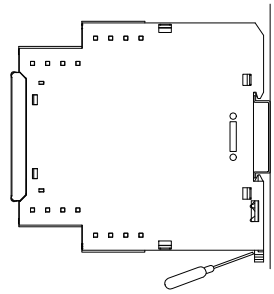
1. Use operating power, input power, and other power supplies and converters with suitable capacities and rated outputs.
2. Allow only qualified personnel to manage or handle the product.
3. Use a precision screwdriver or similar tool to adjust the setting knobs.
4. The distortion in the input waveform for the K8AK-AS, K8AK-AW, K8AK-PH, K8AK-PA, K8AK-PM, or K8DS-PH must be 30% max. If the input waveform is distorted beyond this level, it may cause unnecessary operation.
Do not use the K8AK-VS or K8AK-VW in circuits with waveform distortion. Error will be large due to waveform distortion.
5. Error will be large if the K8AK-AS, K8AK-AW, K8AK-VS, or K8AK-VW is used for thyristor or inverter control. The K8AK-PH, K8AK-PA, K8AK-PM, K8AK-PW, or K8DS-PH cannot be used on the secondary side of an inverter. To use the product on the load side of an inverter, install a noise filter on the primary side of the inverter.
6. To reduce the error in the setting knob, always turn the setting knob from the minimum setting toward the maximum setting.
7. Phase loss is detected for the K8AK-PA or K8AK-PM only when the phase loss occurs between the input contacts and the power supply. Phase loss is not detected on the load side.
8. Phase loss can be detected only from the input contacts to the power supply side by the K8AK-PH, K8AK-PA, K8AK-PM, or K8DS-PH. Phase loss cannot be detected from the input contacts to the load side.

Mounting and Removing the K8AK

- Mounting to DIN Track
 1. Catch the upper hook on the DIN Track.
 2. Push the product onto the Track until the hooks lock into place.



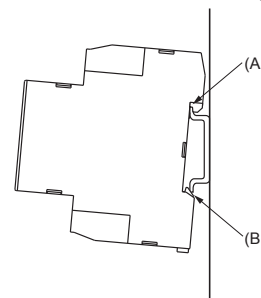
- To remove the product, pull down on the bottom hook with a flat-blade screwdriver and lift up on the product.



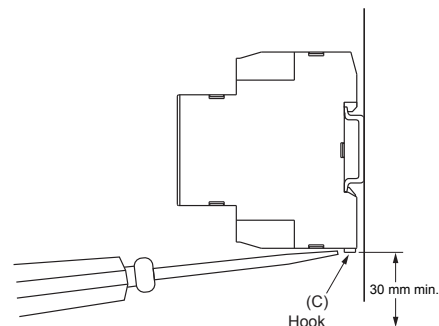
Applicable DIN Tracks:
PFP-100N (100 cm)
PFP-50N (50 cm)

Mounting and Removing the K8DS

- The product may be mounted in any direction, but it must be mounted securely and as level as possible.
- To mount the product to the DIN Track, hook it on the DIN Track at (A) and then press in on the Unit in direction (B).



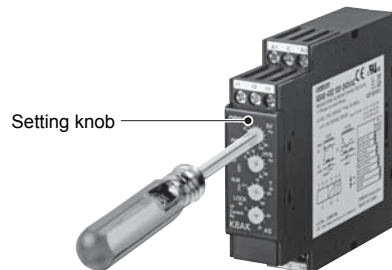
- To remove the product, insert a flat-blade screwdriver at (C) and pull down the hook to release the Unit.



- Leave at least 30 mm of space between the product and other devices to allow easy installation and removal.

Adjusting the Setting Knobs

- Use a screwdriver to adjust the setting knobs. The knobs have a stopper that prevents them from turning beyond the full right or left position. Do not force a knob beyond these points.



* (Not applicable to the K8AK-PH and K8DS-PH.)

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.
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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; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. **Miscellaneous.** (a) **Waiver.** No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) **Assignment.** Buyer may not assign its rights hereunder without Omron's written consent. (c) **Law.** These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) **Amendment.** These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) **Definitions.** As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. **Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given: (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document. (ii) Use in consumer products or any use in significant quantities. (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations. (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product. NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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