Ultra-compact Pre-wired Photomicrosensor (Non-modulated)

EE-SX95

Meeting Customer Needs with Ultra-compact Sensors that Mount with M3 Screws

- Mount using M3 or M2 screws.
- Reliable sensing slot depth of 6.5 mm.
- Indication of sensing window for easy confirmation of insertion depth.
- Bright indicator for confirmation from many directions.
- Both light-ON and dark-ON outputs provided.
- All models available with either standard cable or flexible robot cable.
- Load short-circuit protection circuit provided.

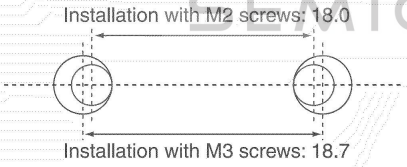
⚠ Refer to the *Safety Precautions* on page 5.

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

Features

Mount Using M2 or M3 Screws

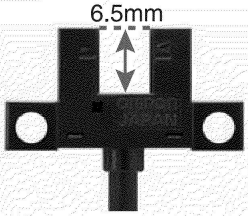
The EE-SX95 can be mounted using M2 or M3 screws, so it can easily replace an existing Sensor mounted with M2 screws.



Example for the EE-SX950-W

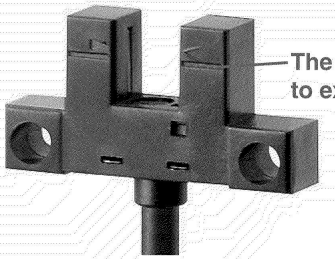
Reliable Best-in-Class Sensing Slot Depth of 6.5 mm

A deeper slot helps prevent the sensing object from coming into contact with the base of the slot, creating greater tolerance in mechanism design.



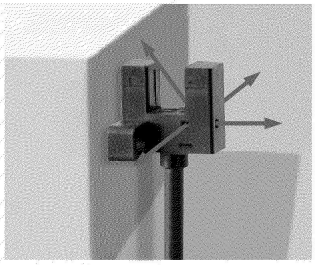
Indication of Sensing Window for Easy Confirmation of Insertion Depth

The location of the sensing window is indicated on the insertion slot so that you can visually confirm whether the sensing object covers the sensing window and easily check the insertion depth.



Bright Indicator for Confirmation from Many Directions

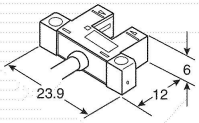
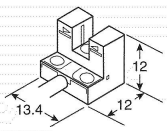
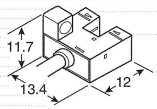
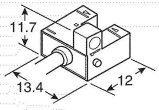
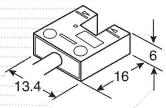
The bright light indicator can be checked from up to four directions to enable flexible selection of the installation location.



Ordering Information

Sensors

Infrared light

Appearance	Sensing method	Sensing distance	Output configuration	Connection method (Cable length)	Output type	Model	
Standard 	Through-beam (with slot)	5 mm (slot width)	Light-ON Dark-ON (2 outputs)	Pre-wired model with standard cable (1 m)	NPN	**EE-SX950-W 1M**	*1
					PNP	**EE-SX950P-W 1M**	*2
				Pre-wired model with robot cable (1 m)	NPN	**EE-SX950-R 1M**	*1
				Pre-wired connector model with robot cable (0.3 m)	NPN	**EE-SX950-C1J-R 0.3M**	
L-shaped 				Pre-wired model with standard cable (1 m)	NPN	**EE-SX951-W 1M**	*1
					PNP	**EE-SX951P-W 1M**	*2
				Pre-wired model with robot cable (1 m)	NPN	**EE-SX951-R 1M**	*1
				Pre-wired connector model with robot cable (0.3 m)	NPN	**EE-SX951-C1J-R 0.3M**	
F-shaped 				Pre-wired model with standard cable (1 m)	NPN	**EE-SX952-W 1M**	*1
					PNP	**EE-SX952P-W 1M**	*2
				Pre-wired model with robot cable (1 m)	NPN	**EE-SX952-R 1M**	*1
				Pre-wired connector model with robot cable (0.3 m)	NPN	**EE-SX952-C1J-R 0.3M**	
R-shaped 				Pre-wired model with standard cable (1 m)	NPN	**EE-SX953-W 1M**	*1
					PNP	**EE-SX953P-W 1M**	*2
				Pre-wired model with robot cable (1 m)	NPN	**EE-SX953-R 1M**	*1
				Pre-wired connector model with robot cable (0.3 m)	NPN	**EE-SX953-C1J-R 0.3M**	
U-shaped 				Pre-wired model with standard cable (1 m)	NPN	**EE-SX954-W 1M**	*1
					PNP	**EE-SX954P-W 1M**	*2
				Pre-wired model with robot cable (1 m)	NPN	**EE-SX954-R 1M**	*1
				Pre-wired connector model with robot cable (0.3 m)	NPN	**EE-SX954-C1J-R 0.3M**	

*1. A model is available with a 3-m cable. The model number is EE-SX95□-□ 3M.(Example: EE-SX950-W 3M)
*2. A pre-wired model with a PNP output and 1-m robot cable is available. The model number is EE-SX95□P-R 1M.(Example: EE-SX950P-R 1M)

Accessories (Order Separately)

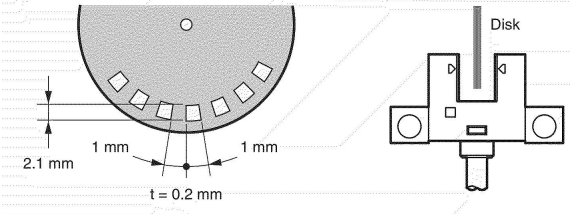
Connector with Robot Cable

Type	Cable length	Model	Remarks
Connector with Cable	2 m	**EE-1016-R 2M**	Connector with lock, AWG26, 4-core Robot Cable

Ratings and Specifications

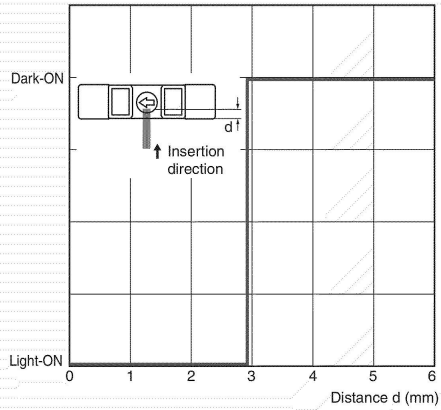
Item	Type		Standard	L-shaped	F-shaped	R-shaped	U-shaped
	NPN output	Pre-wired models	EE-SX950-□	EE-SX951-□	EE-SX952-□	EE-SX953-□	EE-SX954-□
		Pre-wired connector models	EE-SX950-C1J-R	EE-SX951-C1J-R	EE-SX952-C1J-R	EE-SX953-C1J-R	EE-SX954-C1J-R
	PNP output	Pre-wired models	EE-SX950P-□	EE-SX951P-□	EE-SX952P-□	EE-SX953P-□	EE-SX954P-□
Sensing distance			5 mm (slot width)				
Standard sensing object			Opaque: 1.8 × 0.8 mm min.				
Differential travel			0.025 mm max. *1				
Light source (wave length)			Infrared LED (940 nm)				
Indicator			Light indicator (red LED)				
Power supply voltage			5 to 24 VDC ±10%, ripple (p-p): 10% max.				
Current consumption			15 mA max.				
Control output			Load power supply voltage: 5 to 24 VDC Load current: 50 mA max. OFF current: 0.5 mA max. 50 mA load current with a residual voltage of 0.7 V max. 5 mA load current with a residual voltage of 0.4 V max.				
Protection circuit			Load short-circuit protection				
Response frequency			1 kHz min. (3 kHz average) *2				
Ambient illumination			1,000 lx max. with fluorescent light on the surface of the receiver				
Ambient temperature range			Operating: –25 to 55°C Storage: –30 to 80°C (with no icing or condensation)				
Ambient humidity range			Operating: 5% to 85% Storage: 5% to 95% (with no icing or condensation)				
Vibration resistance (destruction)			10 to 2,000 Hz (peak acceleration: 150m/s^2) with a 0.75-mm single amplitude for 2.5 h (15-min periods, 10 cycles) each in X, Y, and Z directions				
Shock resistance (destruction)			500 m/s^2 for 3 times each in X, Y, and Z directions				
Degree of protection			IEC60529 IP50				
Connection method			Pre-wired models (standard length: 1 m), Pre-wired connector models (standard length: 0.3 m)				
Weight (packed state)		Pre-wired models	Approx. 15 g				
		Pre-wired connector models	Approx. 7 g				
Materials		Case/cover	Polybutylene terephthalate (PBT)				
		Emitter/receiver	Polycarbonate (PC)				

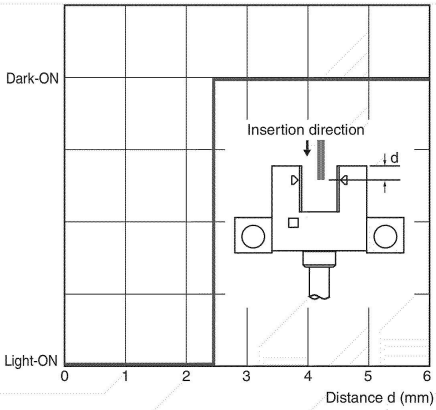
*1. The differential travel is the value when a sensing object is moved in a lateral direction to the slot.
*2. The response frequency was measured by detecting the following rotating disk.



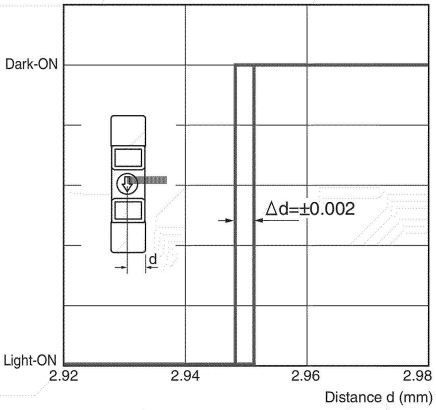
Engineering Data (Reference Value)

Sensing Position Characteristics





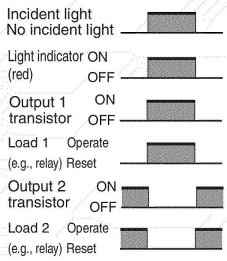
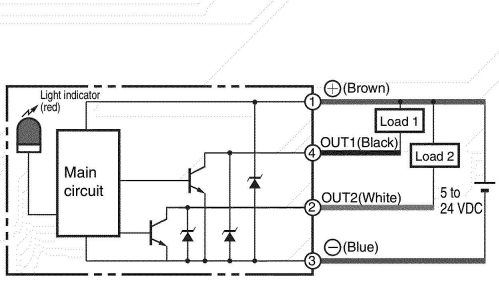
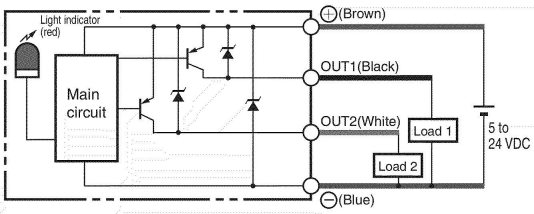
Repeated Sensing Position Characteristics



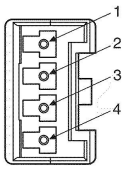
Vcc = 24 V, No. of repetitions: 20, Ta = 25°C
(Differential travel = 0.025 mm max.)

Note: The data applies to dark status. Operation may be affected by external light interference or light coming through the sensing object.

I/O Circuit Diagrams

Output type	Model	Output transistor operation status	Timing charts	Output circuit
NPN output	EE-SX950-□ EE-SX951-□ EE-SX952-□ EE-SX953-□ EE-SX954-□ EE-SX950-C1J-R EE-SX951-C1J-R EE-SX952-C1J-R EE-SX953-C1J-R EE-SX954-C1J-R	OUT1: Light-ON OUT2: Dark-ON		
PNP output	EE-SX950P-□ EE-SX951P-□ EE-SX952P-□ EE-SX953P-□ EE-SX954P-□			

Connector pin arrangement for models with connectors



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

Precautions for Safe Use

Power Supply Voltage

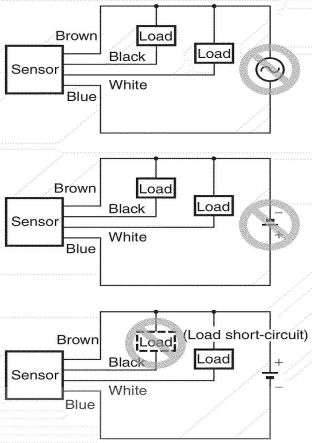
Do not exceed the voltage range indicated in the specifications. Applying a voltage exceeding the specifications or using an AC power supply may result in rupture or burning.

Faulty Wiring

Do not reverse the power supply polarity. Doing so may result in rupture or burning.

Load Short-circuit

Do not short-circuit the load. (Do not connect to the power supply.) Doing so may result in rupture or burning.



Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

●Operating Environment

- Do not install the Sensor in the following places to prevent malfunction or trouble:
  1. Places exposed to dust or oil mist
  2. Places exposed to corrosive gas
  3. Places directly or indirectly exposed to water, oil, or chemicals
  4. Outdoor or places exposed to intensive light, such as direct sunlight
- Be sure to use the Sensor under the rated ambient temperature.
- The Sensor may be dissolved by exposure to organic solvents, acids, alkali, or aromatic hydrocarbons, aliphatic chloride hydrocarbons causing deterioration in characteristics. Do not expose the Sensor to such chemicals.

●Installation

- It is assumed that EE-SX95 Sensors will be built into a device. These Sensors use non-modulated light and are not equipped to deal with interference from an external light source. When they are used in locations subject to external light interference, such as near a window or under an incandescent light, install them to minimize the effects of external light interference.
- Mount the Sensors securely on a flat surface.
- Use M3 or M2.0 screws to secure the Photomicrosensor. (The stronger M3 screws are recommended. In addition, use flat washers and spring washers to prevent the screws from loosening.) Refer to the following table for the correct tightening torque.

Screw diameter	Tightening torque
M2.0	0.15 N·m max.
M3	0.54 N·m max.

- If the Sensor is to be used on a moving part, secure the cable connection point so that it is not directly subjected to stress.

● Wiring

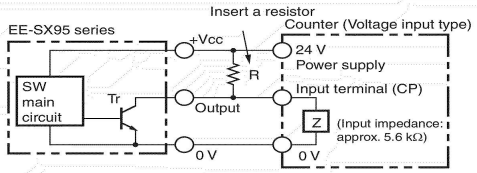
Unused Output Lines

Be sure to isolate output lines that are not going to be used.

Connecting to Devices with Voltage Input

Specifications

A Sensor with an open-collector output can be connected to a counter with a voltage input by connecting a resistor between the power source and output. Select a resistor with reference to the following example. The resistance of the resistor is generally 4.7 kΩ and its wattage is 1/2 W for a supply voltage of 24 V and 1/4 W for 12 V.



Example: EE-SX95 Series
Load Resistance of 4.7 kΩ Connected in a Counter

Counter Specifications

Input impedance	5.6 KΩ
Voltage judged as high level (input ON)	4.5 to 30 VDC
Voltage judged as low level (input OFF)	0 to 2 VDC

The high and low levels are found using the following formulas. The input device specifications must satisfy both formulas.

High level:

$$\text{Input voltage } V_H = \frac{Z}{R+Z} \quad Vcc = \frac{5.6\text{ k}}{4.7\text{ k}+5.6\text{ k}} \times 24\text{ V} = 13\text{ V}$$

Low level:

$$\text{Load current } Ic = \frac{Vcc}{R} = \frac{24\text{ V}}{R} = 5.1\text{ mA} \le 50\text{ mA}$$

Input voltage $V_L \le 1.0$ V (Residual voltage for 50-mA load current)

Note: Refer to the ratings of the Sensor for the residual voltage of the load current.

Load Short-circuit Protection

- The EE-SX95 provides load short-circuit protection. If a load short circuit occurs, the output will go OFF. Check the wiring and cycle the power supply. The load short-circuit protection circuit will be reset. The load short-circuit protection will also operate if the current exceeds the rated load current. If a capacitive load is being used, make sure that the inrush current will not exceed the rated load current.

Other Precautions

- Do not disconnect or wire the cables from the Sensor when power is supplied to the Sensor, or Sensor damage could result.
- Make sure the total length of the power cable connected to the product is less than 10 m.

●Other Precautions

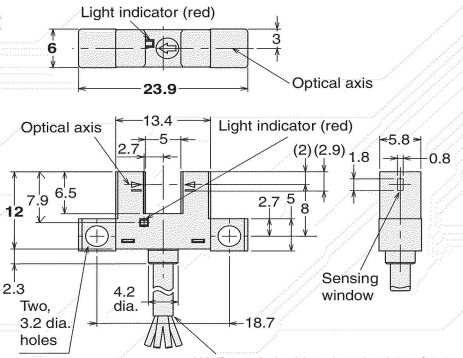
- An output pulse may occur when the power supply is turned ON depending on the power supply and other conditions. The operation of the Sensor will be stable 100 ms after turning ON the power supply.
- Dispose of this product as industrial waste.

Dimensions

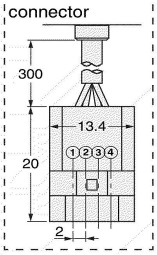
Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Sensors

EE-SX950-□ / EE-SX950P-□ / EE-SX950-C1J-R



EE-SX950-C1J-R connector

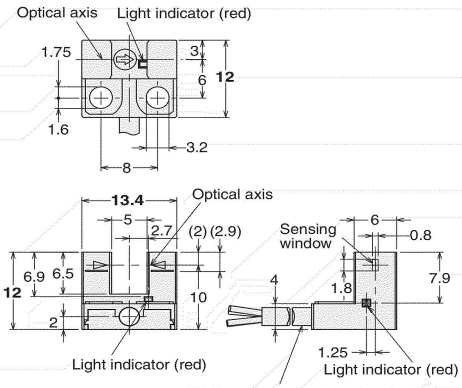


Terminal Arrangement

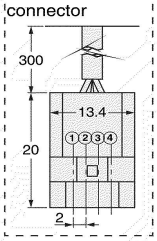
①	Vcc
②	OUT2
③	GND(0 V)
④	OUT1

-W: Round vinyl-insulated cable of 2.8 dia., 4 cores,(0.14 mm² with 0.90-mm dia. insulator); Standard length: 1 m
-R: Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.92-mm dia. insulator); Standard length: 1 m

EE-SX951-□ / EE-SX951P-□ / EE-SX951-C1J-R



EE-SX951-C1J-R connector

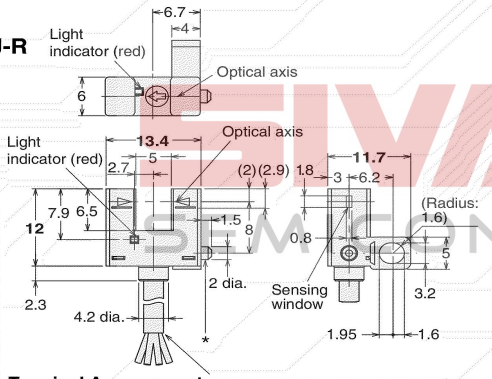


Terminal Arrangement

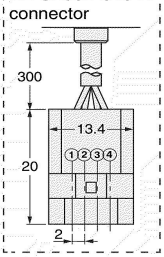
①	Vcc
②	OUT2
③	GND(0 V)
④	OUT1

-W: Round vinyl-insulated cable of 2.8 dia., 4 cores, (0.14 mm² with 0.90-mm dia. insulator);Standard length: 1 m
-R: Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.92-mm dia. insulator);Standard length: 1 m

EE-SX952-□ / EE-SX952P-□ / EE-SX952-C1J-R



EE-SX952-C1J-R connector



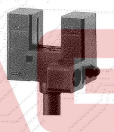
Terminal Arrangement

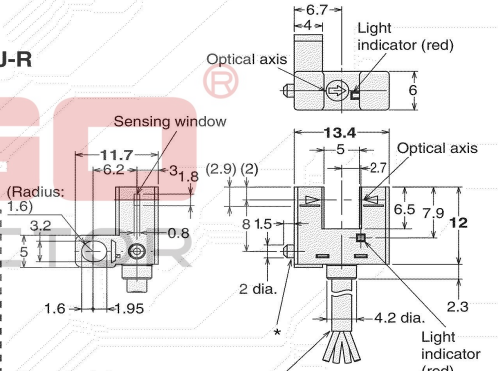
①	Vcc
②	OUT2
③	GND(0 V)
④	OUT1

-W: Round vinyl-insulated cable of 2.8 dia., 4 cores,(0.14 mm² with 0.90-mm dia. insulator); Standard length: 1 m
-R: Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.92-mm dia. insulator); Standard length: 1 m

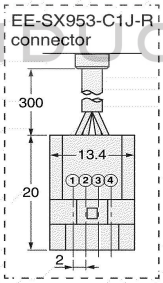
* The lug is used to prevent turning. When installing, make a fixed hole of 2.1 to 2.3 mm dia.

EE-SX953-□ / EE-SX953P-□ / EE-SX953-C1J-R





EE-SX953-C1J-R connector



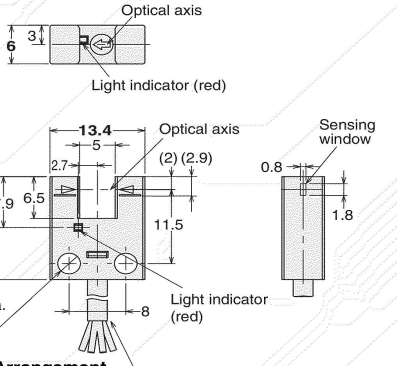
Terminal Arrangement

①	Vcc
②	OUT2
③	GND(0 V)
④	OUT1

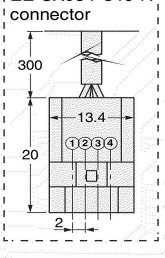
-W: Round vinyl-insulated cable of 2.8 dia., 4 cores, (0.14 mm² with 0.90-mm dia. insulator);Standard length: 1 m
-R: Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.92-mm dia. insulator);Standard length: 1 m

* The lug is used to prevent turning. When installing, make a fixed hole of 2.1 to 2.3 mm dia.

EE-SX954-□ / EE-SX954P-□ / EE-SX954-C1J-R



EE-SX954-C1J-R connector



Terminal Arrangement

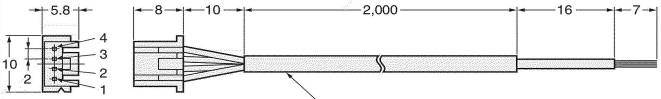
①	Vcc
②	OUT2
③	GND(0 V)
④	OUT1

-W: Round vinyl-insulated cable of 2.8 dia., 4 cores, (0.14 mm² with 0.90-mm dia. insulator); Standard length: 1 m
-R: Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.92-mm dia. insulator); Standard length: 1 m

Accessories (Order Separately)

Connector with Robot Cable

EE-1016-R



Terminal Arrangement

①	⊕	Brown
②	OUTPUT 2	White
③	⊖	Blue
④	OUTPUT 1	Black

Note: The Connector fits into a connector of the Sensor, so there is no protrusion from the surface of the connector of the Sensor.

Legal Disclaimer Notice

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

SIVAGO SEMICONDUCTOR CO.,LTD its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively,"SIVAGO"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

SIVAGO makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, SIVAGO disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special,consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on SIVAGO's knowledge of typical requirements that are often placed on SIVAGO products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify SIVAGO's terms and conditions of purchase,including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, SIVAGO products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the SIVAGO product could result in personal injury or death.Customers using or selling SIVAGO products not expressly indicated for use in such applications do so at their own risk.Please contact authorized SIVAGO personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of SIVAGO. Product names and markings noted herein may be trademarks of their respective owners.