

Highly Durable Proximity Sensor for Tough Environments

- Completely stainless-steel housing
- Aluminum chip immunity
- Embedding installation to metal (steel) fittings
- Chemical resistance certified by Ecolab Europe
- Lineup includes pre-wire models and DC 3-wire NPN output models with fluororesin coating.



Be sure to read *Safety Precautions* on page 9.

Note: Models with a fluororesin coating also use vinyl chloride for the cable material and require separate protection.

* Excluding DC 3-wire M8 pre-wired models (E2FM-X1R5B□/-X1R5C□).

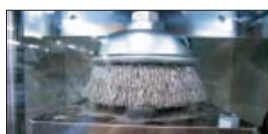
Features

One-piece completely stainless-steel housing with a face thickness of 0.8 mm

The face thickness is approximately 4 times that of previous models (E2ES) to enable sensing in even more severe conditions than ever.



Brush Test



After 3 Minutes



E2FM



E2EQ
(Spatter-resistant)

The stainless-steel head means almost no wear when cleaned with a metal brush.

Continuous Impact Test



E2ES

The E2ES with a top wall thickness of 0.2 mm was **penetrated** after 10,000 impacts.



E2FM

The E2FM was not **penetrated** after 250,000 impacts (depth: 0.26 mm).

More than 20 times the durability of the E2ES!

Chemical and Detergent Proof

The one-piece completely stainless-steel housing of the sensing section withstands the following chemicals better.

- Sodium chloride
- Gasoline
- Dilute sodium hydroxide
- Dilute hydrochloric acid
- Mineral oil
- Barium hydroxide
- Any many others

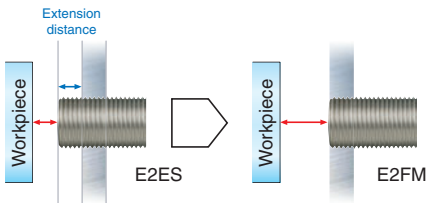
Note: Cannot be used for explosion-proof applications.

Built-in Chip Immunity

Chip immunity performance has been provided to greatly reduce false signals caused by spatter accumulation and other causes, almost eliminating the needs for cleaning, e.g., with metal brushes.



Flush Mounting



Not influenced by surrounding installation environment.

Note: When mounted in steel.



Main Performance Comparison to Previous OMRON Products

Face thickness			Sensing distance			Response frequency			Ambient operating temperature	
	E2FM	E2ES		E2FM	E2ES		E2FM	E2ES	E2FM	E2ES
M8	0.4 mm	---	M8	1.5 mm	---	M8	200 Hz	---	-25 to 70°C	0 to 50°C
M12	0.8 mm	---	M12	2.0 mm	---	M12	100 Hz	---		
M18	0.8 mm	0.2 mm	M18	5.0 mm	4.0 mm	M18	100 Hz	12 Hz		
M30	0.8 mm	0.2 mm	M30	10.0 mm	8.0 mm	M30	50 Hz	8 Hz		

The chemical resistance has been certified by Ecolab Europe

ECOLAB

Ecolab GmbH & Co. OHG
P.O. Box 13 94 05
D-40551 Düsseldorf
certifies that for

OMRON

OMRON Manufacturing of Germany GmbH
Carl-Benz-Strasse 4
71154 Nürtingen

material resistance tests

were performed with cleaning substances P3-topax 56, P3-topax 66, P3-topax 91 and demineralized water as a zero reference factor

The material resistance of the tested series

Inductive Proximity Sensor E2FM

to the P3 products used in the test can be considered to be positive according to the cleaning procedure mentioned overleaf.

Düsseldorf, 14th February 2006

Ecolab GmbH & Co. OHG

L.V. Thomas Tyborski

V. Reimund Lauff

ECOLAB

This certificate is based on:

- documented test procedures (test no.: F&EP3-E Nr. 40-1)
- according to material resistance
- defined product descriptions
- standardized cleaning procedure

Test procedure
Ecolab test F&E Nr. 40-1

Cleaning test:

- Complete immersion in solutions/liquid

Test period:

- 14 days

Temperature:

- room temperature (constant)

Analysis:

- Visual judgement like swelling, brittleness, discoloring
- compared to zero-reference factor (demineralized water)
- Photometric documentation

Product specifications:

P3-topax 56:
Acid foam cleaning substance for food and beverage industry

P3-topax 66:
Alkaline foam cleaning detergent with active chlorine for machine cleaning in food and beverage industry

P3-topax 91:
Neutral disinfection agent based on quaternary ammonium compounds (QACV) for the food industry

Cleaning plan for food and beverage industry*

Rinsing with water 40 - 50°C
Rinsing with low pressure. Rinsing from top to bottom in the direction of the chains. Cleaning of the chains.

Brushing from bottom to top:
solution: P3-topax 66: 2 - 5 % daily
acid: P3-topax 56: 2 % on demand
temperature: cold up to 40°C
contact time: 15 min. recommended

Rinsing with water 40 - 50°C
Rinsing from top to bottom with low pressure

Spray disinfection P3-topax 91 1.2 %, 30-60 minutes

*not obligatory

E2FM

Ordering Information

Sensors [Refer to *Dimensions* on page 10.]

DC 2-Wire, Pre-wired Models

Size	Sensing distance	Output	Operation mode	Model
 Shielded	M8 1.5 mm	DC 2-Wire (polarity)	NO	E2FM-X1R5D1 2M *
	M12 2 mm			E2FM-X2D1 2M *
	M18 5 mm			E2FM-X5D1 2M *
	M30 10 mm			E2FM-X10D1 2M *

* Fluororesin-coated models are also available. The model numbers are E2FM-QX□D. The cable material, however, is vinyl chloride and requires separate protection.

DC 2-wire Pre-wired Smartclick Connector Models (M12)

Size	Sensing distance	Output	Operation mode	Model
 Shielded	M8 1.5 mm	Polarity Pin allocations: 1-4	NO	E2FM-X1R5D1-M1TGJ 0.3M
	M12 2 mm	Polarity Pin allocations: 1-4		E2FM-X2D1-M1TGJ 0.3M
		No polarity Pin allocations: 3-4		E2FM-X2D1-M1TGJ-T 0.3M
	M18 5 mm	Polarity Pin allocations: 1-4		E2FM-X5D1-M1TGJ 0.3M
		No polarity Pin allocations: 3-4		E2FM-X5D1-M1TGJ-T 0.3M
	M30 10 mm	Polarity Pin allocations: 1-4		E2FM-X10D1-M1TGJ 0.3M
		No polarity Pin allocations: 3-4		E2FM-X10D1-M1TGJ-T 0.3M

DC 3-Wire, Pre-wired Models

Size	Sensing distance	Model	
		Output configuration: NPN NO	Output configuration: PNP NO
 Shielded	M8 1.5 mm	E2FM-X1R5C1 2M	E2FM-X1R5B1 2M
	M12 2 mm	E2FM-X2C1 2M	E2FM-X2B1 2M
	M18 5 mm	E2FM-X5C1 2M	E2FM-X5B1 2M
	M30 10 mm	E2FM-X10C1 2M	E2FM-X10B1 2M

DC 3-Wire, M12 Connector Models

Size	Sensing distance	Model	
		Output configuration: NPN NO	Output configuration: PNP NO
 Shielded	M8 1.5 mm	E2FM-X1R5C1-M1	E2FM-X1R5B1-M1 *
	M12 2 mm	E2FM-X2C1-M1	E2FM-X2B1-M1 *
	M18 5 mm	E2FM-X5C1-M1	E2FM-X5B1-M1 *
	M30 10 mm	E2FM-X10C1-M1	E2FM-X10B1-M1 *

* Fluororesin-coated models are also available. The model numbers are E2FM-QX□B1-M1. The cable material, however, is vinyl chloride and requires separate protection.

Accessories (Order Separately)

Sensor I/O Connectors (M12)

(Models for Connectors and with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)

[Refer to XS2, XS5.]

Appearance	Cable length	Sensor I/O Connector model number	Applicable Proximity Sensor model number
Straight 	2m	XS2F-D421-DC0-A	E2FM-X□C1-M1 E2FM-X□B1-M1
	5m	XS2F-D421-GC0-A	
L-shape 	2m	XS2F-D422-DC0-A	
	5m	XS2F-D422-GC0-A	

Note: Refer to *Introduction to Sensor I/O Connectors* for details.

Ratings and Specifications

DC 2-Wire (E2FM-X□D□)

Size		M8	M12	M18	M30
Shielded		Shielded			
Item	Model	E2FM-X1R5D1-□	E2FM-X2D1-□	E2FM-X5D1-□	E2FM-X10D1-□
Sensing distance		1.5 mm±10%	2 mm±10%	5 mm±10%	10 mm±10%
Set distance		0 to 1.05 mm	0 to 1.4 mm	0 to 3.5 mm	0 to 7 mm
Differential travel		15% max. of sensing distance			
Sensing object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 7.)			
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 54 × 54 × 1 mm
Response frequency *1		200 Hz	100 Hz	100 Hz	50 Hz
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Leakage current		0.8 mA max.			
Output configuration		With polarity			
Control output	Switching capacity	3 to 100 mA			
	Residual voltage	3 V max. (Load current: 100 mA max., Cable length: 2 m)			
Indicators		Operation indicator (red LED), Setting/Operation indicator (green LED)			
Operation mode (with sensing object approaching)		NO *2			
Protection circuits		Surge suppressor, Load short-circuit protection			
Ambient temperature range		Operating/Storage: -25 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)			
Temperature influence		±20% max. of sensing distance at 23°C in the temperature range of -25 to 70°C.			
Voltage influence		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range			
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s ² 10 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP67			
Connection method		Unmarked: Pre-wired Models (Standard cable length: 2 m) Models ending with -M1GJ-□: Pre-wired Connector Models (Standard cable length: 300 mm)			

E2FM

Item		Size	M8	M12	M18	M30
		Shielded	Shielded			
		Model	E2FM-X1R5D1-□	E2FM-X2D1-□	E2FM-X5D1-□	E2FM-X10D1-□
Weight (packed state)	Pre-wired Models (2 m)	Approx. 105 g	Approx. 190 g		Approx. 215 g	Approx. 295 g
	Pre-wired Connector Models	Approx. 65 g	Approx. 85 g		Approx. 110 g	Approx. 190 g
Materials	Case	Stainless steel (SUS303)				
	Sensing surface	Stainless steel (SUS303)				
	(thickness)	(0.4 mm)	(0.8 mm)			
	Clamping nuts	Stainless steel (SUS303)				
	Cable	PVC (flame retardant)				
	Toothed washer	Zinc-plated iron				
Accessories		Instruction manual				

*1. The response frequency of the DC switching section is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

*2. NC (normally closed) models are also available. Contact your OMRON representative.

DC 3-Wire (E2FM-X□C□, E2FM-X□B□)

Size		M8	M12	M18	M30
Shielded		Shielded			
Item	Model	E2FM-X1R5□	E2FM-X2□	E2FM-X5□	E2FM-X10□
Sensing distance		1.5 mm±10%	2 mm±10%	5 mm±10%	10 mm±10%
Set distance		0 to 1.05 mm	0 to 1.4 mm	0 to 3.5 mm	0 to 7 mm
Differential travel		15% max. of sensing distance			
Sensing object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 7.)			
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 54 × 54 × 1 mm
Response frequency *1		200 Hz	100 Hz	100 Hz	50 Hz
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Current consumption		10 mA max.			
Output configuration		PNP open collector output			
Control output	Switching capacity	200 mA max.			
	Residual voltage	2 V max. (Load current: 200 mA, Cable length: 2 m)			
Indicators		Operation indicator (yellow LED)			
Operation mode (with sensing object approaching)		C1 Models: NPN open collector, NO (normally open) *2 B1 Models: PNP open collector, NO (normally open) *2			
Protection circuits		Reversed power supply polarity protection, Surge suppressor, Load short-circuit protection, and Reversed output polarity protection (except the E2FM-X1R5B1-M1)			
Ambient temperature range		Operating/Storage: −25 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)			
Temperature influence		±20% max. of sensing distance at 23°C in the temperature range of −25 to 70°C.			
Voltage influence		±1% max. of sensing distance in the rated voltage ±15% range (using the sensing distance at the rated voltage as standard)			
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s ² 10 times each in X, Y, and Z directions	Destruction: 1,000 m/s ² 10 times each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67			
Connection method		Unmarked: Pre-wired Models (Standard cable length: 2 m) Models ending with -M1: Connector Models			
Weight (packed state)	Pre-wired Models (2 m)	---	Approx. 170 g	Approx. 190 g	Approx. 275 g
	Pre-wired Connector Models	Approx. 45 g	Approx. 55 g	Approx. 75 g	Approx. 160 g
Materials	Case	Stainless steel (SUS303)			
	Sensing surface	Stainless steel (SUS303)			
	(thickness)	(0.4 mm)	(0.8 mm)		
	Clamping nuts	Stainless steel (SUS303)			
	Toothed washer	Zinc-plated iron			
Accessories		Instruction manual			

*1. The response frequency of the DC switching section is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

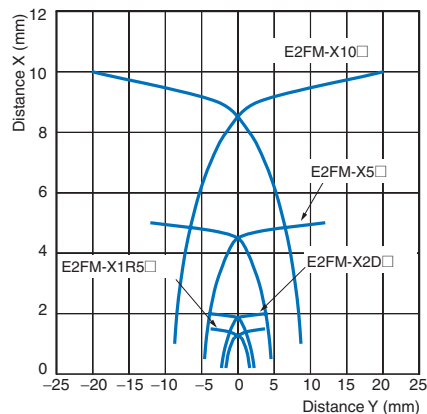
*2. NC (normally closed) models are also available. Contact your OMRON representative.

E2FM

Engineering Data (Typical)

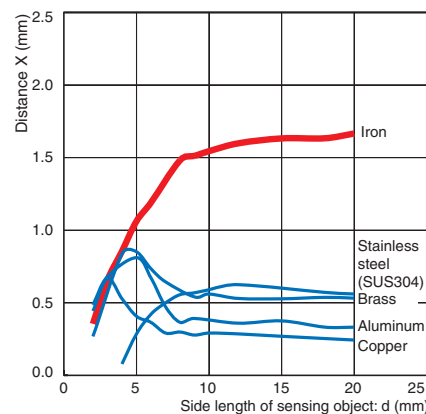
Sensing Area

E2FM-X□

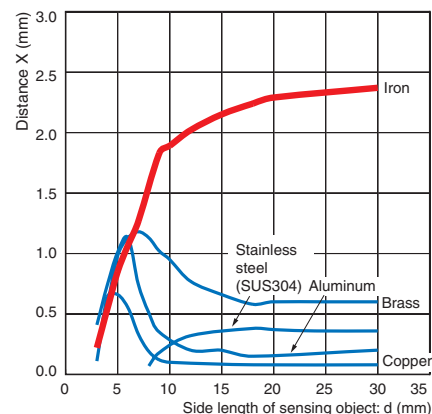


Influence of Sensing Object Size and Material

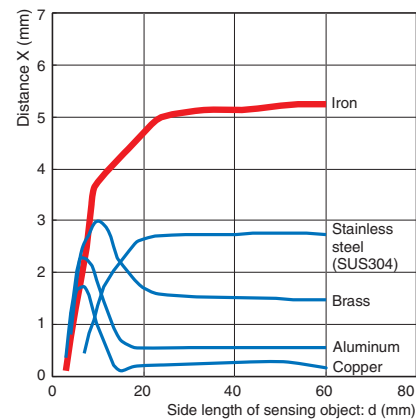
E2FM-X1R5□



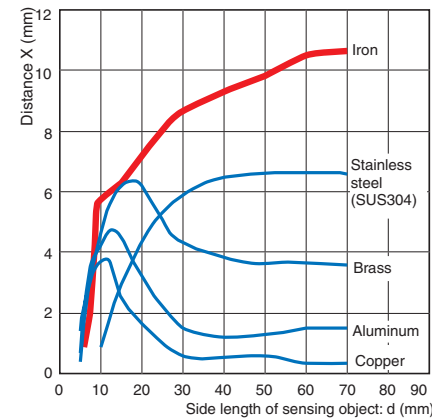
E2FM-X2□



E2FM-X5□

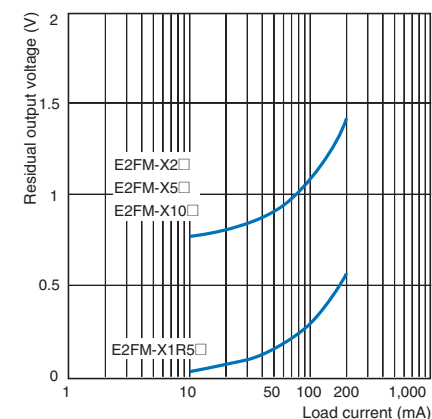


E2FM-X10□



Residual Output Voltage

E2FM-X□C□/B□



I/O Circuit Diagrams

DC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	E2FM-X□D1-□	Non-sensing area Unstable sensing area Stable sensing area Sensing object (%) 100 70 (TYP) 0 Rated sensing distance Proximity sensor ON OFF ON OFF ON OFF Setting indicator (green) Operation indicator (red) Control output	Connector Pin Arrangement Note: Pins 2 and 3 are not used. Note: The load can be connected to either the +V or 0 V side.

DC 3-Wire Models

Operation mode	Output configuration	Model	Timing chart	Output circuit
NO	NPN open-collector model	E2FM-X1R5C□ E2FM-X2C□ E2FM-X5C□ E2FM-X10C□	Non-sensing area Sensing area Sensing object (%) 100 0 Rated sensing distance Proximity sensor ON OFF ON OFF Operation indicator (yellow) Control output	Connector Pin Arrangement Note: For Connector Models, the connection between pins 1, 4 and 3 uses an NO contact, and the connection between pins 1, 2 and 3 uses an NC contact. * There is no reversed output polarity protection diode.
	PNP open-collector model	E2FM-X1R5B□ E2FM-X2B□ E2FM-X5B□ E2FM-X10B□	Non-sensing area Sensing area Sensing object (%) 100 0 Rated sensing distance Proximity sensor ON OFF ON OFF Operation indicator (yellow) Control output	Connector Pin Arrangement Note: For Connector Models, the connection between pins 1, 4 and 3 uses an NO contact, and the connection between pins 1, 2 and 3 uses an NC contact. * There is no reversed output polarity protection diode.

E2FM

Safety Precautions

⚠ WARNING

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



Never use this product with an AC power supply. Otherwise, explosion may result.



Precautions for Safe Use

The following precautions must be observed to ensure safe operation.

- Do not use the Sensor in an environment where inflammable or explosive gas is present.
- Do not attempt to disassemble, repair, or modify any Sensors.
- Power Supply Voltage**
Do not use a voltage that exceeds the rated operating voltage range. Applying a voltage that is higher than the operating voltage range may result in explosion or fire.
- Incorrect Wiring**
Be sure that the power supply polarity and other wiring is correct. Incorrect wiring may cause explosion or fire.
- Connection without a Load**
If the power supply is connected directly without a load, the internal elements may explode or burn. Be sure to insert a load when connecting the power supply.

Precautions for Correct Use

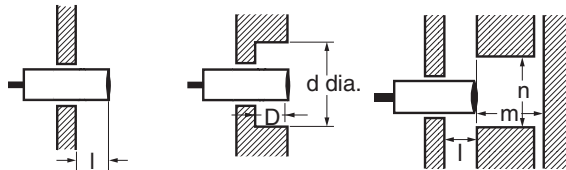
Do not use the Sensor under ambient conditions that exceed the ratings.

- Do not use the Sensor in the following locations.
 - Outdoor locations directly subject to sunlight, rain, snow, or water droplets
 - Locations subject to atmospheres with chemical vapors, in particular solvents and acids
 - Locations subject to corrosive gas
- The Sensor may malfunction if used near ultrasonic cleaning equipment, high-frequency equipment, transceivers, cellular phones, inverters, or other devices that generate a high-frequency electric field. Refer to the *Technical Guide Photoelectric Sensors* for typical measures.
- Laying the Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in incorrect operation and damage due to induction. Wire the Sensor using a separate conduit or independent conduit.
- Cleaning**
Never use thinner or other solvents. Otherwise, the Sensor surface may be dissolved.

● Design

Influence of Surrounding Metal

When the Proximity Sensor is embedded in metal, make sure that the clearances given in the following table are maintained. The values depend on the type of nuts used for mounting. Be sure to use the supplied nuts (SUS303).



(Unit: mm)

Model	Item Embedding material	l	d	D	m	n
E2FM-X1R5□	Iron	0	8	0	4.5	30
	Aluminum	10	50	10	4.5	50
E2FM-X2□	Iron	0	12	0	8	40
	Aluminum	16	70	16	8	70
E2FM-X5□	Iron	0	18	0	20	60
	Aluminum	16	80	16	20	80
E2FM-X10□	Iron	0	30	0	40	100
	Aluminum	24	120	24	40	120

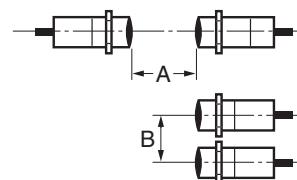
Note: The influence from other non-magnetic surrounding metals is nearly the same as that from aluminum.

Mutual Interference

When installing two or more Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.

(Unit: mm)

Model	Item	A	B
E2FM-X1R5□		35	30
E2FM-X2□		40	35
E2FM-X5□		65	60
E2FM-X10□		110	100

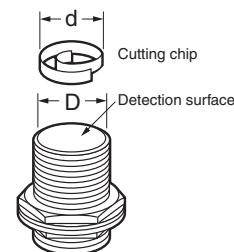


Chips from Cutting Aluminum

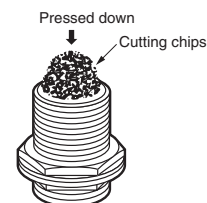
Normally, chips from cutting aluminum or cast iron will not cause a detection signal to be output even if it adheres to or accumulates on the detection surface. In the following cases, however, a detection signal may be output. Remove the cutting chips in these cases.

- If $d \geq \frac{2}{3} D$ at the center of the detection surface where d is the cutting chip size and D is the detection surface size

Model	Dimension (mm)	D
E2FM-X1R5□		6
E2FM-X2□		10
E2FM-X5□		16
E2FM-X10□		28



- If the cutting chips are pressed down



● Mounting

Do not tighten the nut with excessive force. A washer must be used with the nut. Do not use tightening force that exceeds the values in the following table.

Model	Torque
E2FM-X1R5□	9 N·m
E2FM-X2□	30 N·m
E2FM-X5□	70 N·m
E2FM-X10□	180 N·m



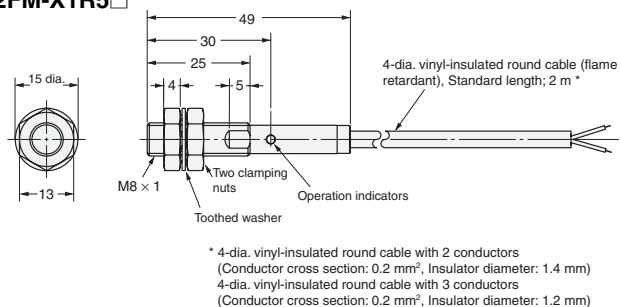
Dimensions

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

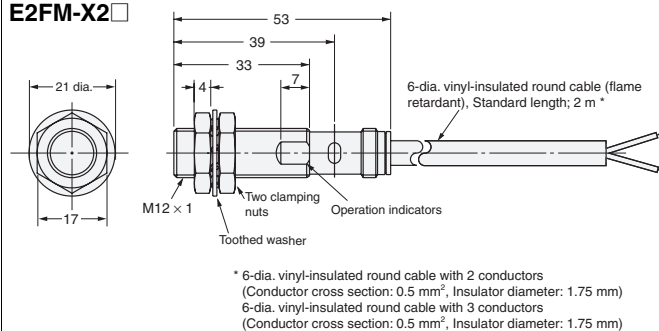
Sensors

Pre-wired Models

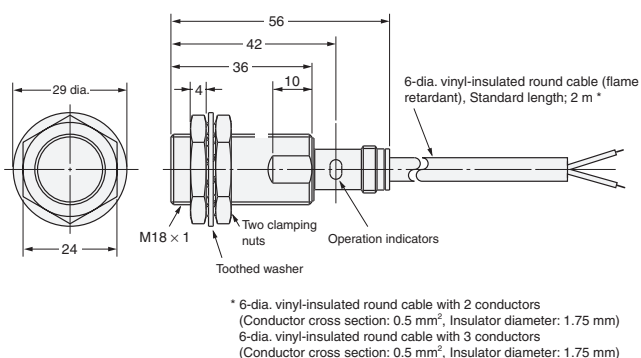
E2FM-X1R5□



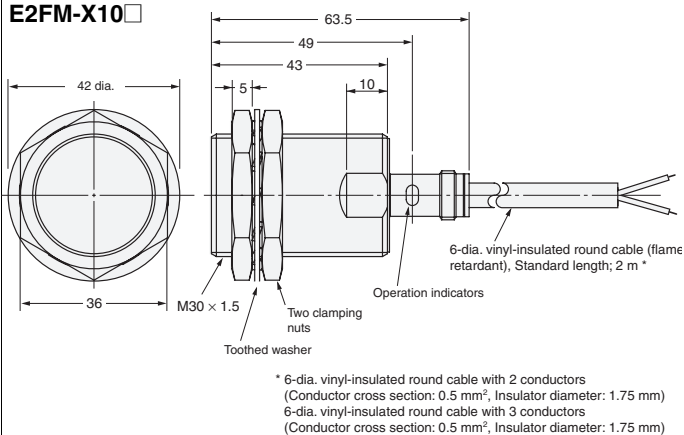
E2FM-X2□



E2FM-X5□

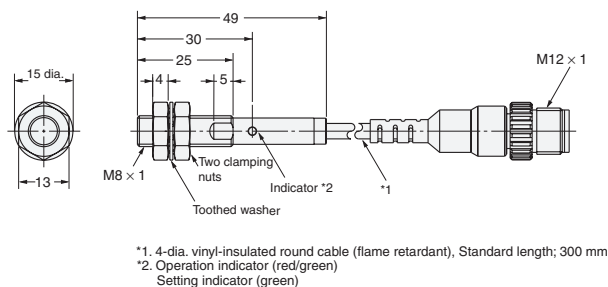


E2FM-X10□

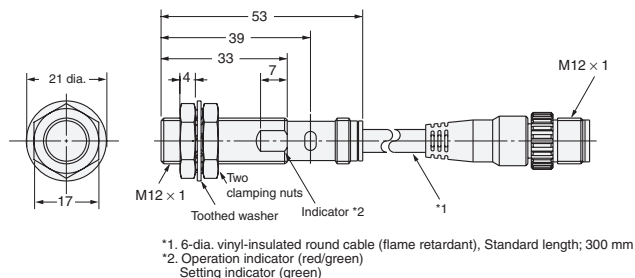


Pre-wired Connector Models

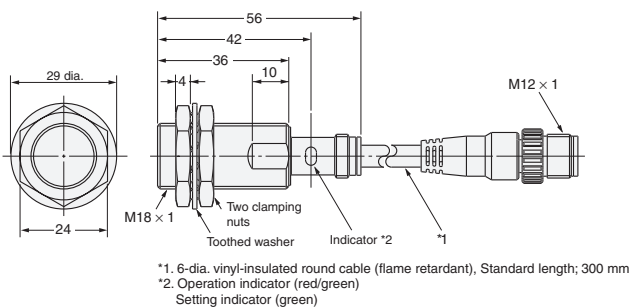
E2FM-X1R5D□-M1GJ-□



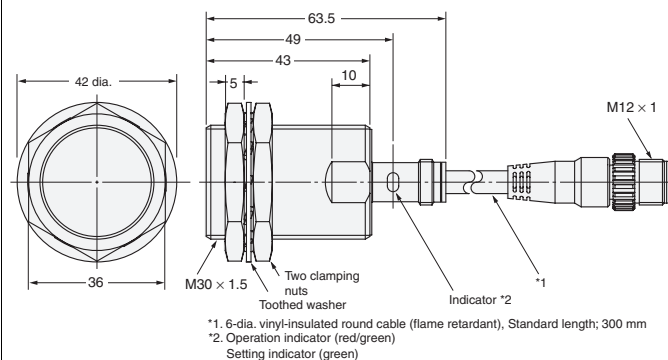
E2FM-X2D□-M1GJ-□



E2FM-X5D□-M1GJ-□

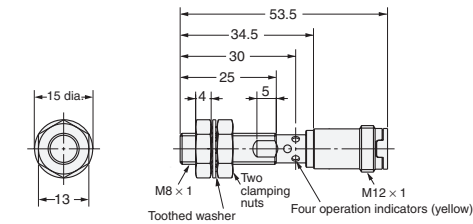


E2FM-X10D□-M1GJ-□

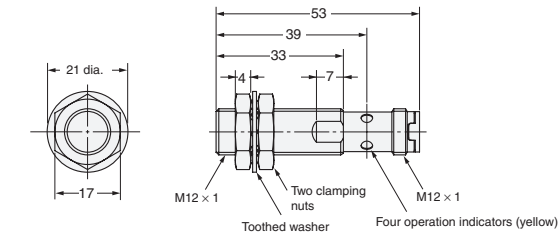


M12 Connector Models

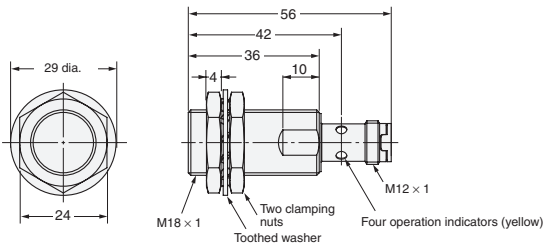
E2FM-X1R5-M1



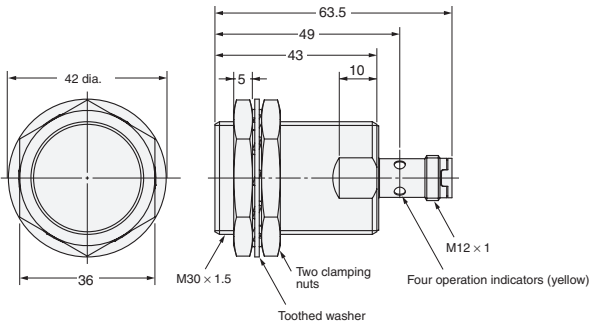
E2FM-X2-M1



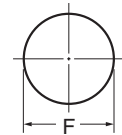
E2FM-X5-M1



E2FM-X10-M1



Mounting Hole Dimensions



Dimension	M8	M12	M18	M30
F (mm)	8.5 ^{+0.5} ₀ dia.	12.5 ^{+0.5} ₀ dia.	18.5 ^{+0.5} ₀ dia.	30.5 ^{+0.5} ₀ dia.

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS 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 OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear 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.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

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.
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.
2. **Programmable Products.** Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. **Performance Data.** Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
4. **Change in Specifications.** Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
5. **Errors and Omissions.** Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.



OMRON INDUSTRIAL AUTOMATION • THE AMERICAS HEADQUARTERS

Schaumburg, IL USA • 847.843.7900 • 800.556.6766 • www.omron247.com

OMRON CANADA, INC. • HEAD OFFICE

Toronto, ON, Canada • 416.286.6465 • 866.986.6766 • www.omron247.com

OMRON ELECTRONICS DE MEXICO • HEAD OFFICE

México DF • 52.55.59.01.43.00 • 001.800.556.6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO • SALES OFFICE

Apodaca, N.L. • 52.81.11.56.99.20 • 001.800.556.6766 • mela@omron.com

OMRON ELETRÔNICA DO BRASIL LTDA • HEAD OFFICE

São Paulo, SP, Brasil • 55.11.2101.6300 • www.omron.com.br

OMRON ARGENTINA • SALES OFFICE

Cono Sur • 54.11.4783.5300

OMRON CHILE • SALES OFFICE

Santiago • 56.9.9917.3920

OTHER OMRON LATIN AMERICA SALES

54.11.4783.5300

OMRON EUROPE B.V. • Wegalaan 67-69, NL-2132 JD, Hoofddorp, The Netherlands. • Tel: +31 (0) 23 568 13 00

Fax: +31 (0) 23 568 13 88 • www.industrial.omron.eu