

Photoelectric Sensor E3F3

Threaded Cylindrical Photoelectric Sensor with Built-in Amplifier for Use as an Optical Proximity Sensor

High Noise-immunity with Photo-IC Technology

- Up-to-date photo-IC to increase noise immunity.
- M18 DIN-sized cylindrical housing, ABS resin case.
- Long sensing distance (30 cm) with sensitivity adjuster for diffuse type.
- Short-circuit and reverse connection protection.

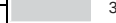


<READ AND UNDERSTAND THIS CATALOG>

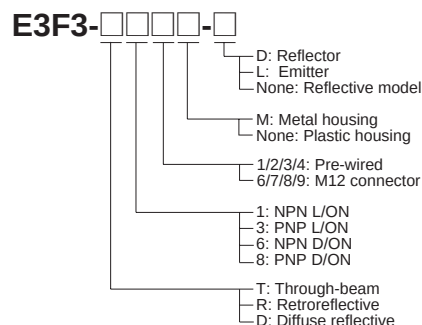
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Ordering Information

□ Infrared light ■ Red light

Sensing method	Appearance	Connection method	Sensing distance	Operating modes		Model				
						Plastic housing		Metal housing		
						NPN output	PNP output	NPN output	PNP output	
Through-beam		Pre-wired	 5 m	Light-ON		E3F3-T11	E3F3-T31	E3F3-T11M	E3F3-T31M	
		M12 CN				E3F3-T16	E3F3-T36	E3F3-T16M	E3F3-T36M	
		Pre-wired		Dark-ON		E3F3-T61	E3F3-T81	E3F3-T61M	E3F3-T81M	
		M12 CN				E3F3-T66	E3F3-T86	E3F3-T66M	E3F3-T86M	
Retro-reflective		Pre-wired	 3 m	Light-ON	Non-polarized	E3F3-R11	E3F3-R31	E3F3-R11M	E3F3-R31M	
		M12 CN		Dark-ON		E3F3-R16	E3F3-R36	E3F3-R16M	E3F3-R36M	
		Pre-wired				E3F3-R61	E3F3-R81	E3F3-R61M	E3F3-R81M	
		M12 CN				E3F3-R66	E3F3-R86	E3F3-R66M	E3F3-R86M	
		Pre-wired	 2 m	Light-ON	Polarized	E3F3-R12	E3F3-R32	E3F3-R12M	E3F3-R32M	
		M12 CN		Dark-ON		E3F3-R17	E3F3-R37	E3F3-R17M	E3F3-R37M	
		Pre-wired				E3F3-R62	E3F3-R82	E3F3-R62M	E3F3-R82M	
		M12 CN				E3F3-R67	E3F3-R87	E3F3-R67M	E3F3-R87M	
Diffuse reflective		Pre-wired	 100 mm	Light-ON		E3F3-D11	E3F3-D31	E3F3-D11M	E3F3-D31M	
		M12 CN				E3F3-D16	E3F3-D36	E3F3-D16M	E3F3-D36M	
		Pre-wired		Dark-ON		E3F3-D61	E3F3-D81	E3F3-D61M	E3F3-D81M	
		M12 CN				E3F3-D66	E3F3-D86	E3F3-D66M	E3F3-D86M	
		Pre-wired	 300 mm	Light-ON		E3F3-D12	E3F3-D32	E3F3-D12M	E3F3-D32M	
		M12 CN				E3F3-D17	E3F3-D37	E3F3-D17M	E3F3-D37M	
		Pre-wired		Dark-ON		E3F3-D62	E3F3-D82	E3F3-D62M	E3F3-D82M	
		M12 CN				E3F3-D67	E3F3-D87	E3F3-D67M	E3F3-D87M	

Model Number Legend



Accessories (Order Separately)

Name	Model
Reflector	E39-R1, E39-R3
Reflector (tape type)	E39-RS1, E39-RS2, E39-RS3
Lens Cap	E39-F31
Mounting Bracket	Y92E-B18

Note: E39-R1 is included in E3F3-R□□ and E3F3-R□□M.

Specifications

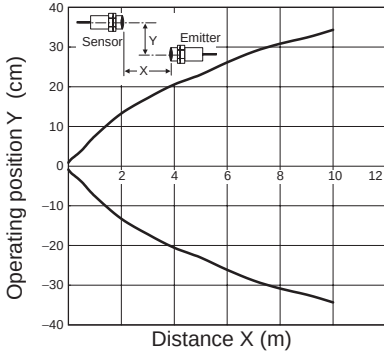
Ratings/Characteristics

Item	Sensing method	Through-beam	Retroreflective		Diffuse reflective	
	NPN output	E3F3-T11	E3F3-R11	E3F3-R12	E3F3-D11	E3F3-D12
		E3F3-T16	E3F3-R16	E3F3-R17	E3F3-D16	E3F3-D17
		E3F3-T61	E3F3-R61	E3F3-R62	E3F3-D61	E3F3-D62
		E3F3-T66	E3F3-R66	E3F3-R67	E3F3-D66	E3F3-D66
	PNP output	E3F3-T31	E3F3-R31	E3F3-R32	E3F3-D31	E3F3-D32
		E3F3-T36	E3F3-R36	E3F3-R37	E3F3-D36	E3F3-D37
		E3F3-T81	E3F3-R81	E3F3-R82	E3F3-D81	E3F3-D82
		E3F3-T86	E3F3-R86	E3F3-R87	E3F3-D86	E3F3-D87
Sensing distance		5 m	3 m (Non-polarized when using E39-R1)	2 m (Non-polarized when using E39-R1)	100 mm	300 mm
Standard sensing object		Opaque object: 11 mm min.			100 × 100 mm white mat paper	
Hysteresis		---			20% max. of sensing distance	
Light source (wavelength)		Infrared LED (860 nm)	Red LED (680 nm)		Infrared LED (860 nm)	
Power supply voltage		12 to 24 VDC±10%, ripple (p-p): 10% max.				
Current consumption		45 mA max. (light source and receiver)	25 mA max.			
Control output		Open collector transistor output, 100 mA max., residual voltage: 1 V max. at 100 mA				
Protective circuit		Output short-circuit protection, DC power supply reverse polarity protection				
Response time		1.0 ms max.				
Sensitivity adjustment		---				Single-turn adjuster
Ambient illumination		Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.				
Ambient temperature		Operating: -25 to 55 °C (with no icing or condensation) Storage: -30 to 70 °C (with no icing or condensation)				
Ambient humidity		Operating: 45% to 85% (with no condensation) Storage: 35% to 95% (with no condensation)				
Insulation resistance		20 MΩ min. (at 500 VDC) between current carry parts and case				
Dielectric strength		1,000 VAC at 50/60 Hz for 1 min between current carry parts and case				
Vibration resistance (destruction)		10 to 55 Hz, 1.5-mm double amplitude for 1 hour each in X, Y, and Z directions				
Shock resistance (destruction)		500 m/s² for 3 times each in X, Y, and Z directions				
Degree of protection		IEC 60529 IP66				
Connecting method		Pre-wired (standard length: 2 m)/M12 connector				
Indicators		Operation indicator (orange) [Power indicator of emitter (orange)]				
Weight	Pre-wired	Metal: 200 g max.	Metal housing: 100 g max.			
		Plastic: 170 g max.	Plastic housing: 85 g max.			
	M12 connector	Metal: 120 g max.	Metal housing: 60 g max.			
		Plastic: 40 g max.	Plastic housing: 20 g max.			
Packing		Nylon bag				
Material	Case	Plastic: ABS, Metal: Nickel-brass				
	Lens	PMMA				
	Accessories	Screw nuts: ABS or Nickel-brass				
Accessories		Screw nuts (4), Instruction sheet	Screw nuts (2), E39-R1 reflector, Instruction sheet		Screw nuts (2), Instruction sheet	Screw nuts (2), Instruction sheet, Adjusting driver

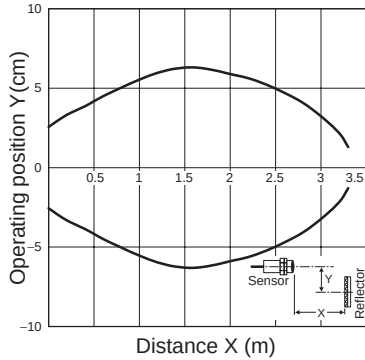
Engineering Data

Parallel Operating Range (Typical)

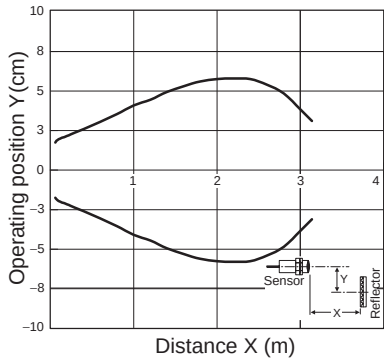
Through-beam Models
E3F3-T□1□/T□6□



Retroreflective Models
E3F3-R□1□/R□6□+E39-R1

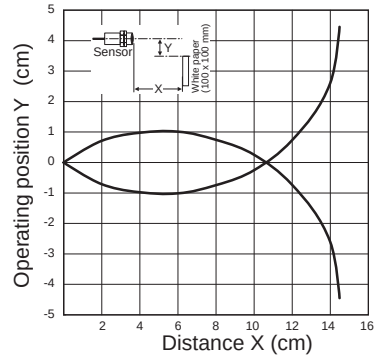


Retroreflective Models
E3F3-R□2□/R□7□+E39-R1

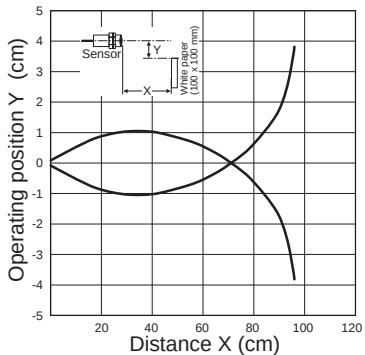


Operating Range (Typical)

Diffuse-reflective Models
E3F3-D□1□/D□6□

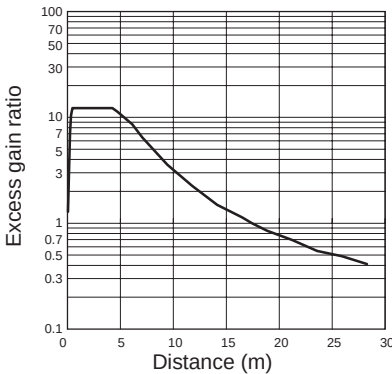


Diffuse-reflective Models
E3F3-D□2□/D□7□

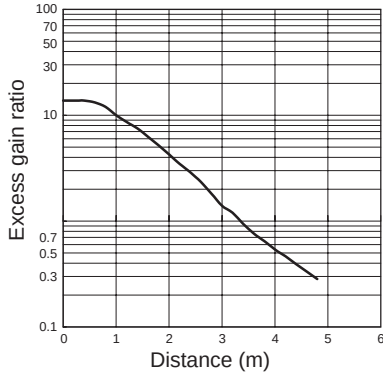


Excess Gain Ratio vs. Set Distance (Typical)

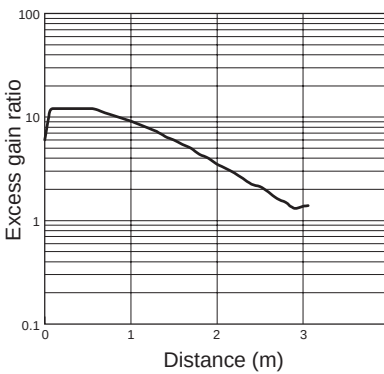
Through-beam Models
E3F3-T□1□/T□6□



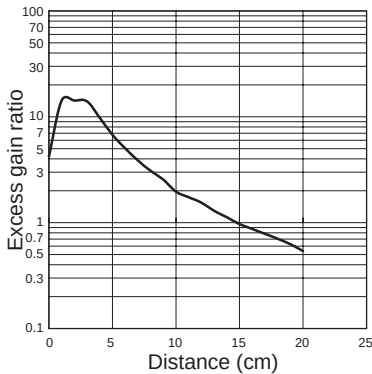
Retroreflective Models
E3F3-R□1□/R□6□+E39-R1



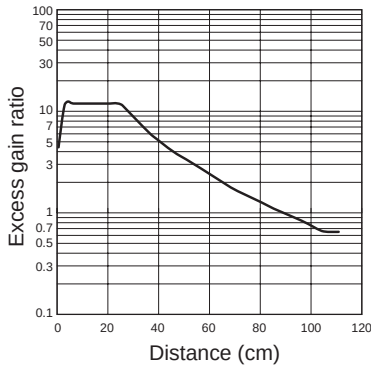
Retroreflective Models
E3F3-R□2□/R□7□+E39-R1



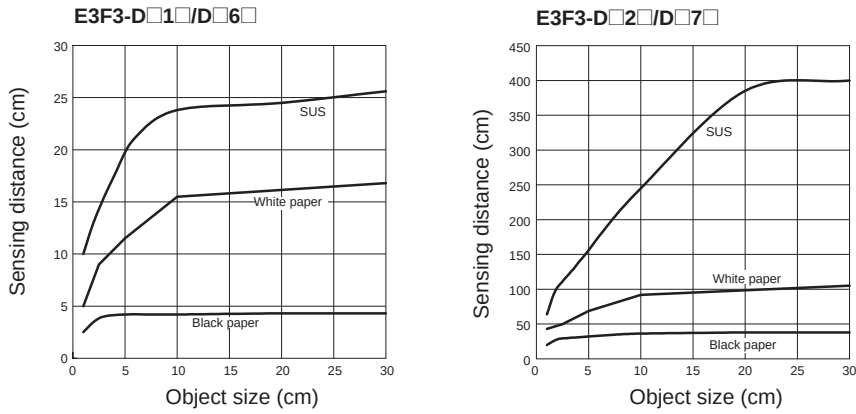
Diffuse-reflective Models
E3F3-D□1□/D□6□



Diffuse-reflective Models
E3F3-D□2□/D□7□



Sensing Distance vs. Object Size (Typical)



Operation

■ NPN Output

Model	Output transistor status	Timing chart	Output circuit
E3F3-T1□□ E3F3-R1□□ E3F3-D1□□	Light-ON	Incident light No incident light Operation indicator (orange) ON OFF Control output ON OFF Load (relay) Operate Release (Between brown and black)	
E3F3-T6□□ E3F3-R6□□ E3F3-D6□□	Dark-ON	Incident light No incident light Operation indicator (orange) ON OFF Control output ON OFF Load (relay) Operate Release (Between brown and black)	

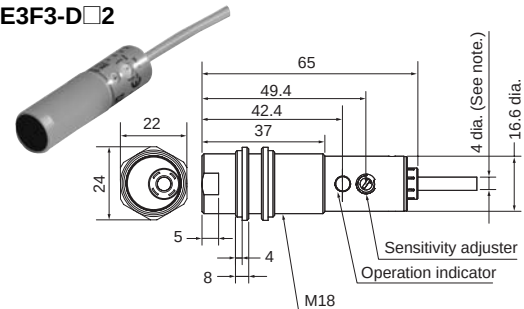
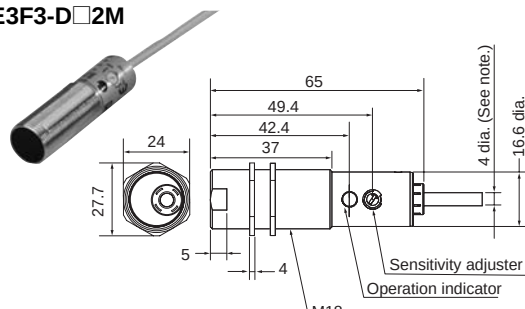
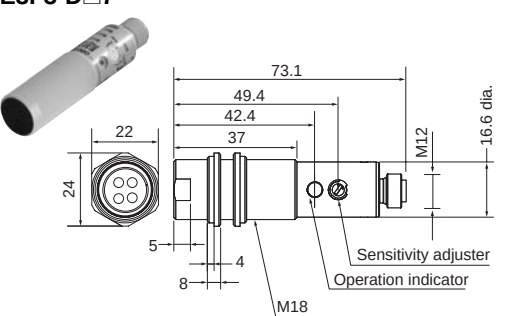
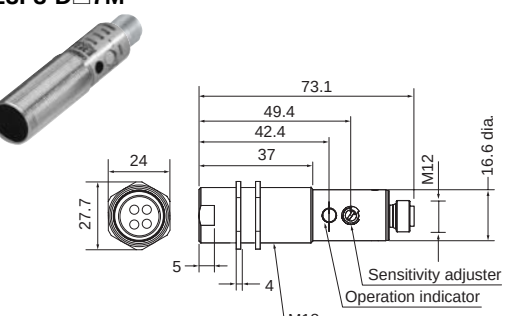
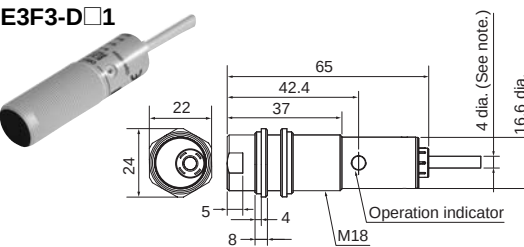
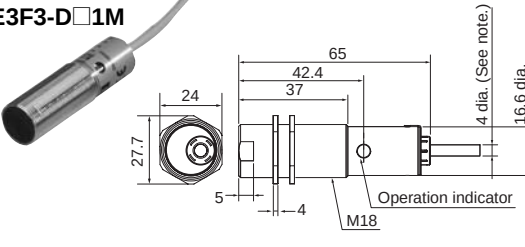
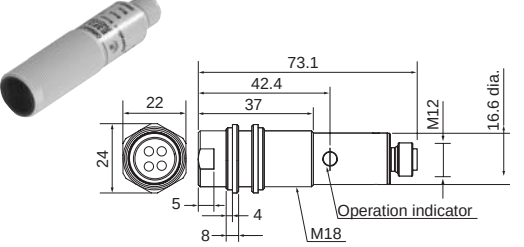
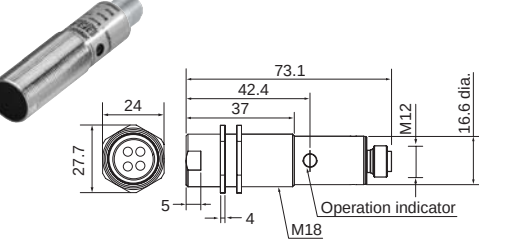
■ PNP Output

Model	Output transistor status	Timing chart	Output circuit
E3F3-T3□□ E3F3-R3□□ E3F3-D3□□	Light-ON	Incident light No incident light Operation indicator (orange) ON OFF Control output ON OFF Load (relay) Operate Release (Between blue and black)	
E3F3-T8□□ E3F3-R8□□ E3F3-D8□□	Dark-ON	Incident light No incident light Operation indicator (orange) ON OFF Control output ON OFF Load (relay) Operate Release (Between blue and black)	

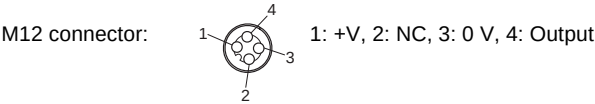
Dimensions

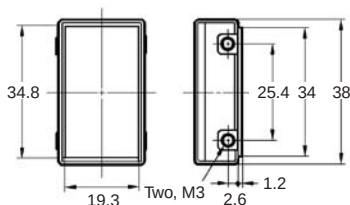
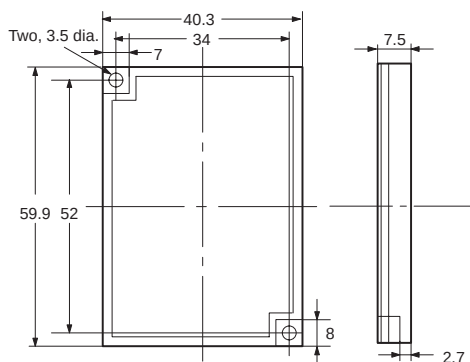
Note: All units are in millimeters unless otherwise indicated.

Sensors

	Plastic housing	Metal housing
Pre-wired	E3F3-D□2 	E3F3-D□2M 
M12 connector	E3F3-D□7 	E3F3-D□7M 
Pre-wired	E3F3-T□1 E3F3-R□1 E3F3-R□2 E3F3-D□1 	E3F3-T□1M E3F3-R□1M E3F3-R□2M E3F3-D□1M 
M12 connector	E3F3-T□6 E3F3-R□6 E3F3-R□7 E3F3-D□6 	E3F3-T□6M E3F3-R□6M E3F3-R□7M E3F3-D□6M 

Note: Pre-wired Cord: Polyvinyl chloride-covered cord, 4-mm dia. (18/0.12),
Standard length: 2 m
Emitter: 2-conductor (brown and blue)
Receiver and Reflective model: 3-conductor (brown, blue, and black)





Technical drawing of the E39-K3 lamp base, showing dimensions in millimeters (mm). The drawing includes a front view, a side view, and a detail view of the base.

Front View Dimensions:

- Overall width: 29 mm
- Top flange width: 6 mm
- Top flange thickness: 4.5 mm
- Base diameter: 14.5 mm
- Base thickness: 0.2 mm
- Base width: 11 mm
- Base height: 20 mm
- Base to top flange distance: 18.45 mm
- Base to top flange distance (alternative): 22.9 mm
- Base to top flange distance (alternative): 28 mm
- Base to top flange distance (alternative): 3.4 mm
- Base to top flange distance (alternative): 7 mm

Side View Dimensions:

- Overall height: 34 mm
- Base diameter: 14.5 mm
- Base thickness: 0.2 mm
- Base width: 11 mm
- Base to top flange distance: 18.45 mm
- Base to top flange distance (alternative): 22.9 mm
- Base to top flange distance (alternative): 28 mm
- Base to top flange distance (alternative): 3.4 mm
- Base to top flange distance (alternative): 7 mm

Detail View Dimensions:

- Overall width: 16 mm
- Base diameter: 14.5 mm
- Base thickness: 0.2 mm
- Base width: 11 mm
- Base to top flange distance: 18.45 mm
- Base to top flange distance (alternative): 22.9 mm
- Base to top flange distance (alternative): 28 mm
- Base to top flange distance (alternative): 3.4 mm
- Base to top flange distance (alternative): 7 mm

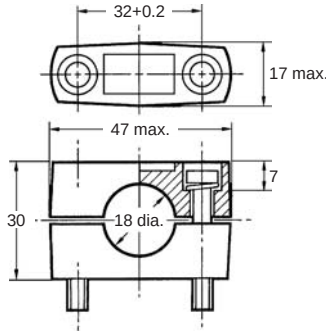
Other Dimensions:

- Top flange thickness: 4.5 mm
- Top flange width: 6 mm
- Top flange diameter: 14.5 mm
- Top flange to base distance: 18.45 mm
- Top flange to base distance (alternative): 22.9 mm
- Top flange to base distance (alternative): 28 mm
- Top flange to base distance (alternative): 3.4 mm
- Top flange to base distance (alternative): 7 mm

Technical drawing of a rectangular plate. The drawing includes a perspective view of the textured surface, a top view with dimensions 80 and 70, and a side view showing the thickness 0.6 and the adhesive tape side. The fillet radius is labeled 4-R1.

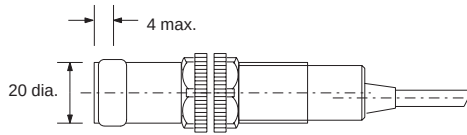
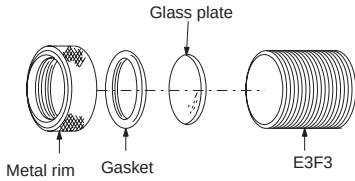
Material: Acrylic resin

Y92E-B18 Mounting Bracket



Note: Hexagonal bolt: M5 x 32
Material: plastic

E39-F31 Lens Cap



Precautions

If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photoelectric sensor could be induced to malfunction, or even be damaged, by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the photoelectric sensor.

Do not subject the photoelectric sensor to excessive shock when mounting, in keeping with IP66 standards.

When you use the photoelectric sensor in the vicinity of an inverter motor, be sure to connect the protective ground wire of the motor to ground. Failure to ground the motor may result in malfunction of the sensor.

Mounting

Do not exceed a torque of 20 kgf·cm (2.0 N·m) when tightening mounting nuts.



⚠ WARNING

The E3F3 Photoelectric sensor is not a safety component for ensuring the safety of people as defined by EC Directives (91/386 EEC) and covered by separate European standards or by any other regulations or standards.

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E365-E1-01

In the interest of product improvement, specifications are subject to change without notice.

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