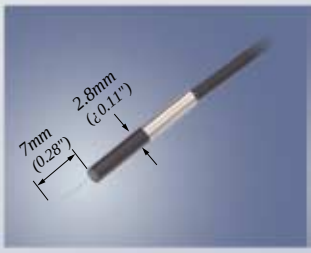
KEYENCE

Super-Compact
Separate-Amplifier Proximity Sensors
ES01 Series

SENSING SOLUTIONS

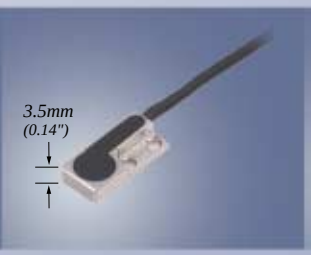
With Long Distance High Accuracy Proximity Sensors



Compact size
EH-402

Armored
EH-305S/308S/110S

Solvent resistant
EH-910



ULTRA Thin/ Space saving
EH-605

Oil/Water resistant
EH-108

CE

The highest accuracy amplifier in its class along with the widest variety of sensor heads meet your needs at every production line.

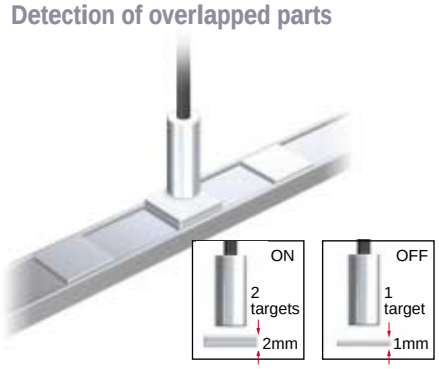
Compact Size
EH-402

ULTRA thin for space-saving
EH-605

Armored protection
EH-305S/308S/110S

Solvent resistant
EH-910

Detection of overlapped parts

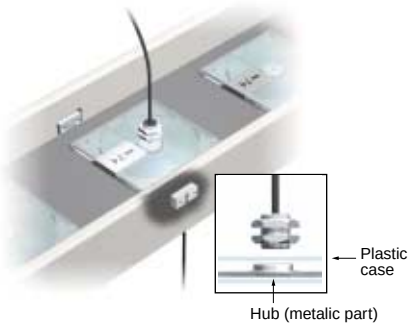


Detecting overlapped thin metal targets

Edge positioning

Positioning index table

Detection of height difference



Detecting MD hubs (metalic part)

Long Detecting Distance and Higher Accuracy

Over twice the detecting distance

Thanks to the newly designed separate-amplifier, the ES01 Series enables over twice the detecting distance of conventional built-in-amplifier type sensors. Long detecting distance of up to 7mm*(0.28") can be offered with the smallest* 2.8-mm(0.11") diameter heads. (*in its class. EH-402)

Perfect for high-accuracy positioning and height difference detection

In addition to enabling fine adjustment of detecting distance by means of a 25-turn trimmer, the ES01 Series also offers minimum hysteresis and outstanding repeatability, making it perfect for high-accuracy positioning and detection of small height differences.

Hysteresis: 0.04 mm (When using EH-302/308/110/308S/110S/402)
Repeatability: 0.002 mm (When using EH-302/303A/305/605/305S/402)

Easy adjustment of detecting distance

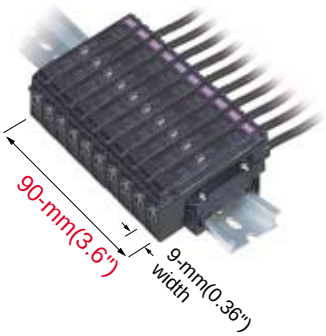
The separate-amplifier design means that the detecting distance can be easily adjusted as desired after the sensor head is installed. The result: no need to bother with minute position adjustments of sensor heads during installation or maintenance.

Space-saving 9-mm(0.36-inch) wide amplifier

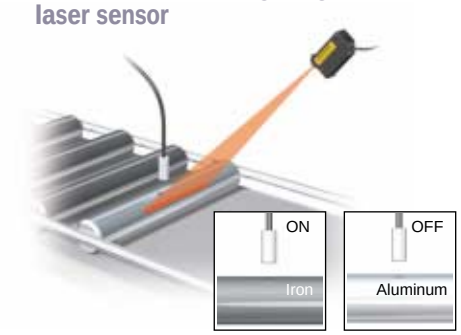
This compact size contributes to the flexibility of machine design and space-saving in facilities and equipment.

Industry's thinnest

Ten connected sensors take only 90mm(3.6") of space

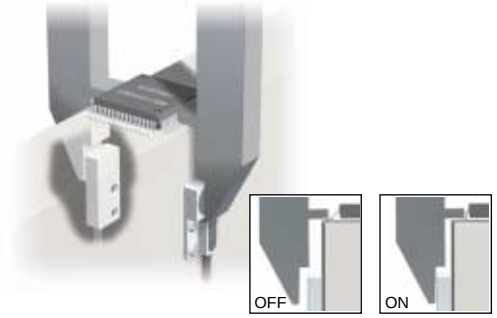


Combined with a long-range laser sensor



Shaft material detection

Detection of bent IC lead



Far Near

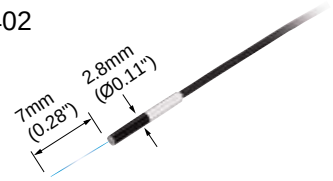
Verification of metal target passage in a mist-filled environment

Wide variety of sensor heads for all applications

Compact size

Small-design 2.8-mm(0.11") diameter head

EH-402



With long-range detection of up to 7 mm (0.28") in a small size head with an outer diameter of only 2.8 mm(0.11"), this sensor can be installed in even tight spaces.

Armored

Cable-protected chip-resistant type

EH-305S/308S/110S

A stainless steel spiral tube protects the cable against chips and spatter.

Oil/Water resistant

Special sealed construction for oil resistance

EH-108

The high-precision engineered stainless steel body and special seal construction provide enhanced resistance to oil.

ULTRA Thin/Space saving

ULTRA thin 3.5-mm(0.14") size for easy installation anywhere

NEW

EH-605

With a thickness of only 3.5 mm, this ULTRA thin sensor is the perfect solution when space-saving considerations are essential, such as when there is not enough space for cylinder-shaped sensors, or when you need a sensor to be easily added to an existing device. (Sensor head size is 3.5 mm x 8 mm x 18 mm. 0.14" x 0.32 " x 0.72 ")

Solvent resistant

Fluoropolymer cover for wet/harsh environment compatibility

NEW

EH-910

This new sensor features a fluoropolymer resin that covers everything from the sensor head to the end of the cable, allowing it to be used without problems in “wet/harsh” environments where the sensor may come into contact with oils, chemicals, or solvents. This design allows it to be compatible with a wide variety of applications ranging from metalworking machinery to medical and food facilities.

Thin/Long range

Space-saving, long-range type

EH-614A

With a detection range of up to 8 mm (0.31") and a thickness of only 4.8 mm (0.19"), this thin-design sensor can be easily set up even in situations where installation space is at a premium.

Shielded/Long range

Over twice the detecting distance of conventional sensors

EH-303A/305/308

These sensors offer over twice the detecting distance of models using the same diameter heads with a built-in amplifier. It can be easily substituted for already installed sensors.

Spatter protection

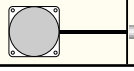
Protective cap to guard against spatter

OP-3109 (for EH-308),
OP-3108 (for EH-110),
OP-3107 (for EH-114)

This fluorocarbon polymer cap protects the sensor head from spatter during welding. Even spatter that has become attached to the cap can be easily removed.

Sensor Head Selection Guide

Sensor head

	Shape		Detection range (stable detection range / maximum operating range)	Type	Model
Shielded (can be embedded in metal)	ø2.8 0.11"		1.2 mm 0.05" (0.6 mm) 0.02"		EH-302
	ø3.8 0.15"		2 mm 0.08" (0.8 mm) 0.03"	Shielded/Long range	EH-303A
	ø5.4 0.21"		3 mm 0.12" (1 mm) 0.04"	Shielded/Long range	EH-305
	ø5.4 0.21"		3 mm 0.12" (1 mm) 0.04"	Armored	EH-305S*1
	ø8 0.31"		5 mm 0.20" (2 mm) 0.08"	Shielded/Long range	EH-308
	ø8 0.31"		5 mm 0.20" (2 mm) 0.08"	Armored	EH-308S*1
	M8		2.5 mm 0.10" (1.5 mm) 0.06"	Oil/Water resistant	EH-108
	ø10 0.39"		4.5 mm 0.18" (2 mm) 0.18"	Solvent resistant	EH-910 NEW
	M10		5 mm 0.20" (2 mm) 0.08"		EH-110
	M10		5 mm 0.20" (2 mm) 0.08"	Armored	EH-110S*1
	M14		8 mm 0.31" (5 mm) 0.20"		EH-114
	Thin		8 mm 0.31" (5 mm) 0.20"	Thin/Long range	EH-614A
	Super-thin		3 mm 0.12" (1 mm) 0.04"	ULTRA Thin/ Space saving	EH-605 NEW
Non-shielded	ø2.8 0.11"		7 mm 0.28" (3 mm) 0.12"	Small/Long range	EH-402
	ø14.5 0.57"		13 mm 0.51" (6 mm) 0.24"		EH-416
	ø22 0.87"		18 mm 0.71" (9 mm) 0.35"		EH-422*2
	ø30 1.18"		25 mm 0.98" (12 mm) 0.47"		EH-430*2
	ø40 1.57"		36 mm 1.42" (18 mm) 0.71"		EH-440*2
	ø90 3.54"		70 mm 2.76" (35 mm) 1.38"		EH-290*1*2

*1 Indicates semi-standard product. Contact Keyence for information concerning delivery times.
*2 The EH-422/430/440/290 cannot be used with ES-M1/M2, can be used with ES-32DC/ES-12AC.

Amplifier

Shape	Type	Power supply voltage	Output	Output mode	Model
	DC type one-line expansion system	12 to 24 V DC	NPN open collector	N.O./N.C. switchable	ES-M1/M2
	DC type thin terminal block	10 to 28 V DC	NPN open collector	N.O./N.C. switchable	ES-32DC
	AC type thin terminal block	85 to 115 V AC	Thyristor	N.O./N.C. switchable	ES-12AC

Specificaitons

Sensor head

Type		Standard								Super oil-resistant	Chemical-resistant
		Shielded									
Shape		Cylindrical				Threaded		ULTRA thin	Thin	Threaded	Cylindrical
Model		EH-302	EH-303A	EH-305	EH-308	EH-110	EH-114	EH-605	EH-614A	EH-108 *1	EH-910
Stable detecting range		0 to 0.6mm 0.02"	0 to 0.8mm 0.03"	0 to 1mm 0.04"	0 to 2mm 0.08"		0 to 5mm 0.20"	0 to 1mm 0.04"	0 to 5mm 0.20"	0 to 1.5mm 0.06"	0 to 2mm 0.00"
Maximum detecting distance*2		1.2mm 0.05"	2mm 0.08"	3mm 0.12"	5mm 0.20"		8mm 0.31"	3mm 0.12"	8mm 0.31"	2.5mm 0.10"	4.5mm 0.00"
Hysteresis		0.04mm 0.002"	0.05mm 0.002"		0.04mm 0.002"		0.05mm 0.002"		0.05mm 0.002"	0.07mm 0.003"	0.06mm 0.000"
Repeatability		0.002mm 0.00008"			0.005mm 0.00002"			0.002mm 0.00008"	0.005mm 0.00002"		
Detectable object		Ferrous metals (See characteristics for non-ferrous metals)									
Standard detectable object (iron 1t 0.04")		5 × 5mm 0.20"			10 × 10mm 0.39"		15 × 15mm 0.59"	5 × 5mm 0.20"	15 × 15mm 0.59"	10 × 10mm 0.39"	
Temperature fluctuation		Within ±10% of detecting distance at +23°C when within -10 to +60°C temperature range (for EH-302/605, within +20 to -10%) (for EH-910, within +15 to -10% when within 0 to +60°C temperature range)									
Environment	Enclosure rating	IP-67									
	Ambient temperature	-10 to +60°C (14 to 140°F) No freezing									
	Relative humidity	35 to 85% (No condensation)									
Weight (including 3-m 9.8' cable)		Approx. 29g	Approx. 38g	Approx. 45g	Approx. 47g	Approx. 55g	Approx. 62g	Approx. 30g	Approx. 57g	Approx. 51g	Approx. 53g

*1 Although the EH-108 uses a super oil-resistant construction, avoid use while submerged in oil.
*2 Maximum detecting distance gained by ignoring precision for fixed specifications at +23°C(73.4°F).

Sensor head

Type		Stainless steel spiral tube			Standard					
		Shielded			Non-shielded					
Shape		Cylindrical		Threaded	Cylindrical	Cylindrical and threaded				Cylindrical
Model		EH-305S *3	EH-308S *3	EH-110S *3	EH-402	EH-416	EH-422	EH-430	EH-440	EH-290 *3
Stable detecting range		0 to 1mm 0.04"	0 to 2mm 0.08"		0 to 3mm 0.12"	0 to 6mm 0.24"	0 to 9mm 0.35"	0 to 12mm 0.47"	0 to 18mm 0.71"	0 to 35mm 1.38"
Maximum detecting distance*2		3mm 0.12"	5mm 0.20"		7mm 0.28"	13mm 0.51"	18mm 0.71"	25mm 0.98"	36mm 1.42"	70mm 2.76"
Hysteresis		0.05mm 0.0002"	0.04mm 0.0002"		0.04mm 0.0002"	0.05mm 0.0002"	0.06mm 0.0002"	0.08mm 0.0003"	0.1mm 0.0004"	0.2mm 0.0008"
Repeatability		0.002mm 0.00008"	0.005mm 0.00002"		0.002mm 0.00008"	0.012mm 0.0005"	0.02mm 0.0008"	0.025mm 0.001"	0.037mm 0.001"	0.075mm 0.003"
Detectable object		Ferrous metals (See characteristics for non-ferrous metals)								
Standard detectable object (iron 1t 0.04")		5 × 5mm 0.20"	10 × 10mm 0.39"		10 × 10mm 0.39"	20 × 20mm 0.79"	25 × 25mm 0.98"	30 × 30mm 1.18"	40 × 40mm 1.47"	150 × 150mm 5.91"
Temperature fluctuation		Within ±10% of detecting distance at +23°C(73.4°F) when within -10 to +60°C(14 to 140°F) temperature range (for EH-402, within +30 to -10%)								
Environment	Enclosure rating	IP-67								
	Ambient temperature	-10 to +60°C (14 to 140°F) No freezing								
	Relative humidity	35 to 85% (No condensation)								
Weight (including 3-m 9.8' cable)		Approx. 76g	Approx. 88g	Approx. 100g	Approx. 28g	Approx. 72g	Approx. 175g	Approx. 225g	Approx. 280g	Approx. 650g

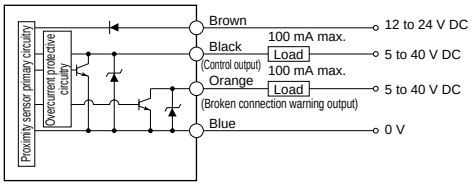
*3 EH-290, EH-305S, E-308S, and EH-110S are semi-standard products. Contact Keyence for information concerning delivery times.

Amplifier

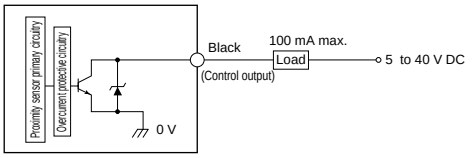
Type		One-line expansion system	
Model		ES-M1	ES-M2
Sensitivity adjustment		25-turn trimmer	
Response time		1 ms max.	
Operation mode		N.O./N.C. switch-selectable	
Temperature fluctuation		Within ± 8% of detecting distance at +23°C(73.4°F) when within 0 to +50°C(32 to 122°F) temperature range	
Timer function *4		10-ms delay / timer OFF switchable	
Output	Control output	NPN open collector 100 mA max. (40 V max.) residual voltage 1 V max.	
	Broken connection Alarm output *5	NPN open collector max. 100 mA (40 V or less) residual voltage 1 V or less	
Protection circuit		Reverse power connection protection, output overcurrent protection, output surge protection	
Ratings	Power supply	12 to 24 V DC, ripple (P-P) 10% max.	
	Current consumption	25 mA max.	
Environment	Ambient temperature	0 to +50°C *6 (32 to 122°F) No freezing	
	Relative humidity	35 to 85% (No condensation)	
Weight		Approx. 65 g (including 2-m cable)	Approx. 35 g (including 2-m cable)

*The ES-M1/M2 cannot be connected to the EH-422, 430, 440, or 290.
*4 During N.O. operating configuration, the off delay timer is 10 ms. During N.C., the on delay timer is 10 ms.
*5 Broken connection warning output is not available on the ES-M2.
*6 The ambient temperature changes according to the following conditions when expansion units are added. When adding units, always attach them to a DIN rail (metal plate) and set the output current to 20 mA or less. 1 to 10 expansion units: 0 to + 50°C 11 to 16 expansion units: 0 to +45°C

ES-M1



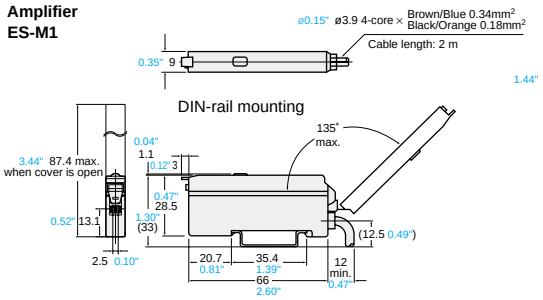
ES-M2



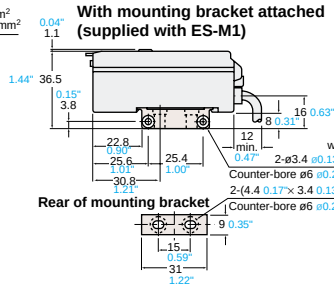
*Power is supplied from the ES-M1, PS-T1, FS-T1/M1/V1/V11/21R, LV-21A/11A, or CZ-K1.

Dimensions [unit: mm]

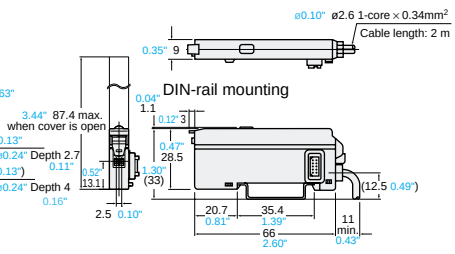
Amplifier
ES-M1



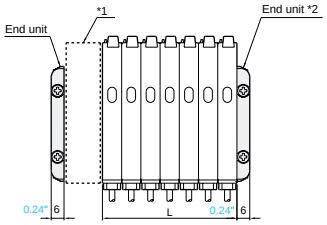
With mounting bracket attached (supplied with ES-M1)



ES-M2



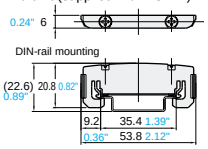
When several units are connected



*1 The ⬚ contains an ES-M1, FS-V21R, LV-21A, CZ-K1, etc.
*2 Always use an end unit when connecting additional units.

No. of units	L
1	9
2	18
3	27
4	36
5	45
6	54
7	63
8	72
9	81
10	90
11	99
12	108
13	117
14	126
15	135
16	144

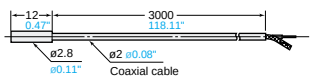
End unit (supplied with ES-M2)



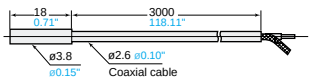
ES-M1 accessories	1 Mounting bracket 1 Metal screwdriver
ES-M2 accessories	1 Metal screwdriver 2 End units
EH-108/110/110S/114/ 416/422/430/440 accessories	2 Nuts
EH-910 Accessories	1 Mounting bracket

Sensor heads

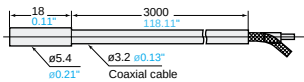
EH-302



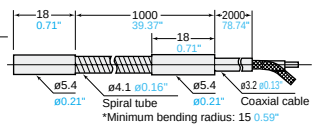
EH-303A



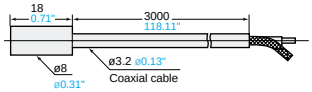
EH-305



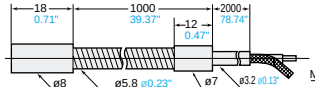
EH-305S



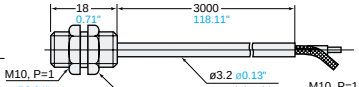
EH-308



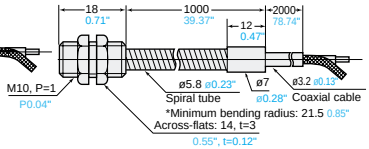
EH-308S



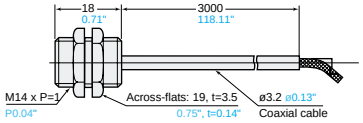
EH-110



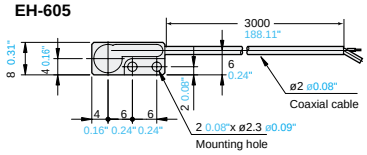
EH-110S



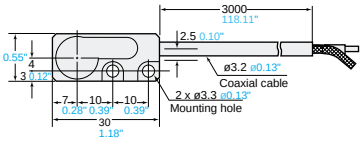
EH-114



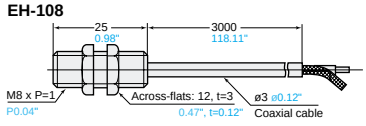
EH-605

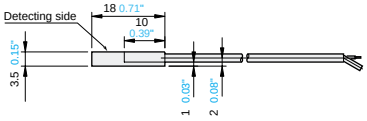


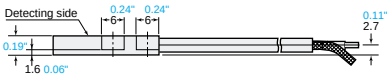
EH-614A



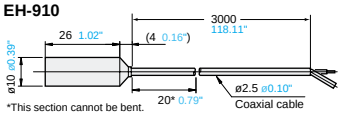
EH-108



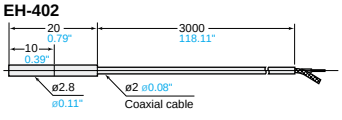




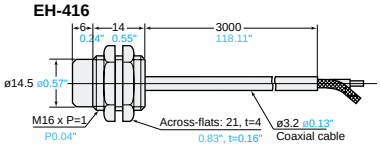
EH-910



EH-402

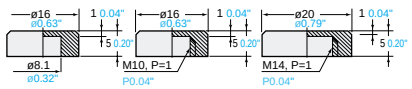


EH-416



Weld spatter protective cap

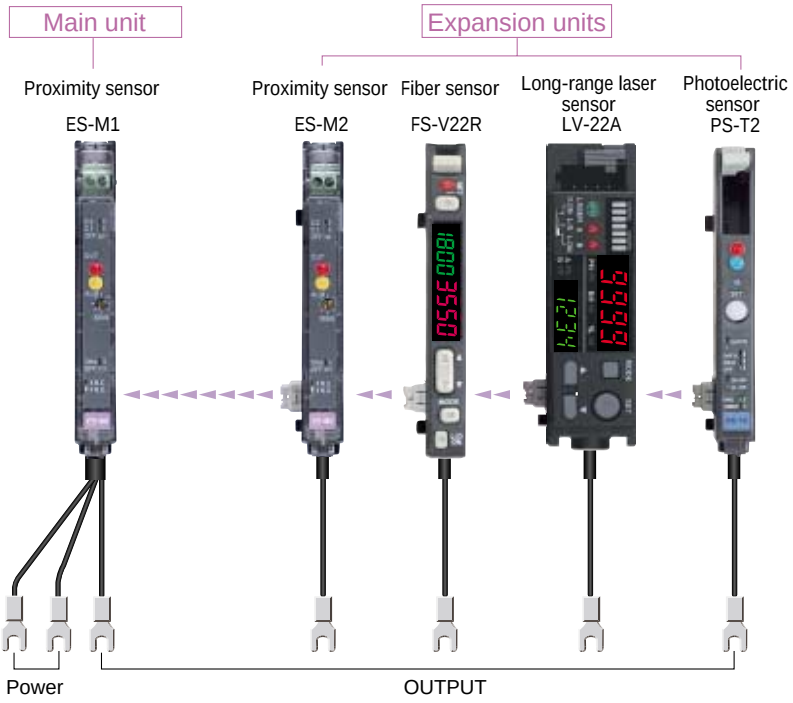
OP-3109 (for EH-308), OP-3108 (for EH-110), OP-3107 (for EH-114)



New wire-saving system can be mixed with fiber sensors

The industry's first expansion system for proximity sensors

On automated production lines, multiple types of sensors are frequently used. The ES01 Series is the first series of proximity sensors to offer compatibility with the one-line expansion system whereby sensors starting with the second unit share a single output line. In addition to offering reduced wiring for multiple-unit installations, the system also enables the creation of a mixed sensor environment by allowing the addition of other sensor types such as fiber sensors.



Power is supplied from the side of the amplifier

The ES01 Series eliminates two wires per unit, enabling a wiring savings that increases dramatically as the number of units is expanded. This also eliminates the need for optional accessories and additional work.

Space-saving 9-mm(0.36") wide amplifier

Industry s thinnest

This compact size contributes to the flexibility of machine design and space-saving in facilities and equipment.

Specifications are subject to change without notice.

KEYENCE

KEYENCE CORPORATION OF AMERICA
Corporate Office
50 Tice Blvd., Woodcliff Lake, NJ 07677
Phone:201-930-0100 Fax:201-930-0099 E-mail: keyence@keyence.com

Boston Office
Phone:781-453-2244 Fax:781-453-2255
New Jersey Office
Phone: 201-474-1480 Fax: 201-474-1481
Pennsylvania Office
Phone:610-768-8993 Fax:610-337-1067
Charlotte Office
Phone:704-423-0070 Fax:704-423-0066
Atlanta Office
Phone:770-951-1222 Fax:770-951-1958
Tampa Office
Phone:813-998-9886 Fax:813-998-9887
Cleveland Office
Phone:216-464-7530 Fax:216-464-7540
Columbus Office
Phone:614-799-3400 Fax:614-799-3401
Cincinnati Office
Phone:513-554-1227 Fax:513-554-1229
Michigan Office
Phone:734-591-9922 Fax:734-591-1722
Indianapolis Office
Phone:317-843-2616 Fax:317-843-2647
Chicago Office
Phone:847-969-0001 Fax:847-969-0453
Minneapolis Office
Phone:952-924-9779 Fax:952-249-9143
St. Louis Office
Phone:314-275-9174 Fax:314-275-9175
Texas Office
Phone:972-733-6790 Fax:972-733-6791
Denver Office
Phone:303-756-5242 Fax:303-756-8301
Phoenix Office
Phone:602-225-2400 Fax:602-225-2425
Portland Office
Phone:503-699-0500 Fax:503-699-8400
Northern California Office
Phone:925-225-1550 Fax:925-225-1440
Los Angeles Office
Phone: 562-552-9980 Fax: 562-552-9981