

Double-fed Metal Plate Detectors

DD Series

Features

- Detects double-fed metal plates
- Compact sensor head and amplifier
- Detects targets as small as 30 x 30 mm 1.18"
- Built-in bar graph indicator for output level

Smallest detectable object

30 x 30 mm (1.18")

Separation distance

30 mm (1.18")



Description

Detects metal plates with various thickness

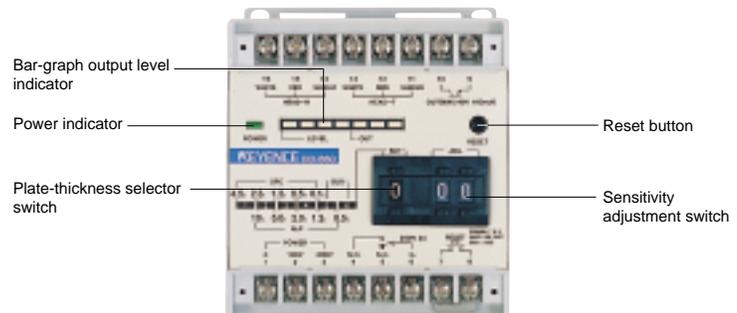
A unique detection system enables accurate detection of double-fed metal plates, regardless of target thickness. DD Series sensors reliably detect even warped or vibrating targets (30 mm 1.18" max. allowable vibration).

Easy adjustment using the bar-graph indicator

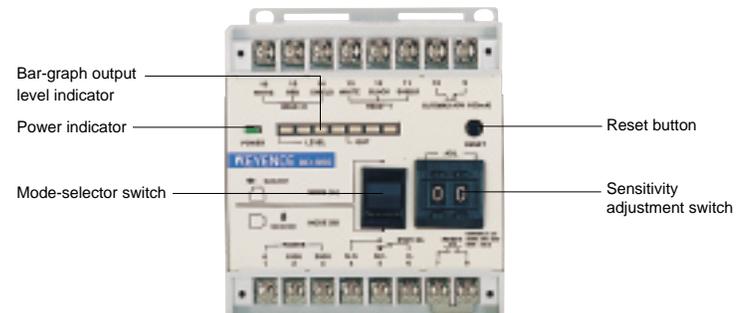
Output levels can be confirmed using the quick-response bar graph indicator. Numeric switches ensure accurate sensitivity adjustment.

Part Names and Functions

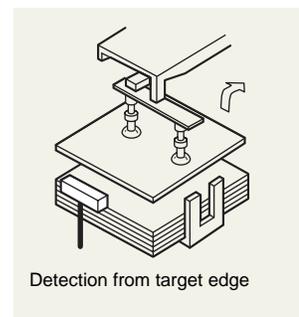
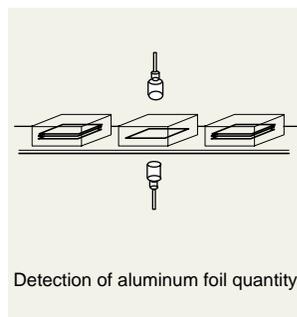
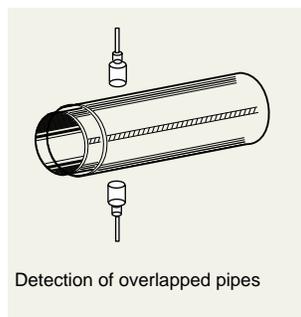
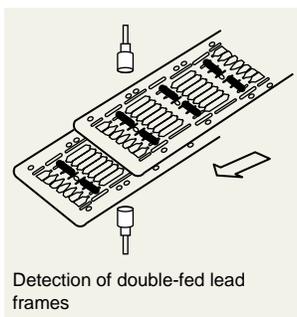
DD-860



DD-960



Applications



Specifications

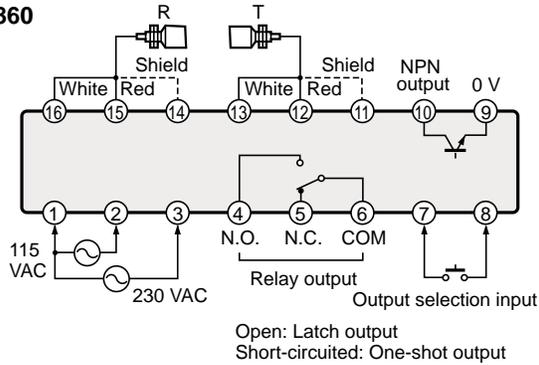
Type	2 head type				1 head type		
Shape (Sensor head)	Standard		Compact		Standard	Compact	
Model	Sensor head	DH-220		DH-214		DH-320	DH-314
	Amplifier	DD-860				DD-960	
Detection method	Detection with a target between the transmitter and the receiver				Detection from the target edge		
Plate thickness		T/R separation: 30 mm 1.18" max.		T/R separation: 20 mm 0.79" max.	T/R separation: 15 mm 0.59" max.	MODE (A) Steel plate thickness: 0.1 0.004" to 2.3 mm 0.09" MODE (B) Steel plate thickness: 0.1 0.004" to 10 mm 0.39" MODE (B) Steel plate thickness: 0.1 0.004" to 3.2 mm 0.13"	
	Steel ¹ .	0.04 mm 0.002" to 4.5 mm 0.18"	Steel ¹ .	0.1mm 0.004" to 1.2mm 0.05"	0.1 mm 0.004" to 1.6 mm 0.06"		
	Aluminum	0.02 mm 0.001" to 10 mm 0.39"	Aluminum	0.05 mm 0.002" to 5.0 mm 0.20"			
	Copper	0.01 mm 0.0003" to 5.0 mm 0.20"	Copper	0.05 mm 0.002" to 5.0 mm 0.20"			
	Brass	0.03 mm 0.001" to 5.0 mm 0.20"	Brass	0.05 mm 0.002" to 5.0 mm 0.20"			
	Stainless steel	0.1 mm 0.004" to 5.0 mm 0.20"	Stainless steel	0.2 mm 0.008" to 5.0 mm 0.20"			
Maximum separation	30 mm 1.18"		20 mm 0.79"		Maximum detecting distance 10 mm 0.39"	Maximum detecting distance 4 mm 0.16"	
Allowable vibration	30 mm 1.18" max. (100 x 100 mm 3.94" t=3.2 mm 0.13" max.)		20 mm 0.79" max. (50 x 50 mm 1.97")				± 1 mm 0.04" max.
Smallest detectable object	50 x 50 mm 1.97" (T-to-R distance: 30 mm 1.18") Vibration: ± 4 mm 0.16")		30 x 30 mm 1.18" (T-to-R distance: 15 mm 0.59") Vibration: ± 4 mm 0.16")		Detecting surface must be covered with the target edge with at least 100 mm 3.94" x 100 mm 3.94" .		30 x 30 mm 1.18" (10 x 10 mm 0.39") Vibration: ± 0.5 mm 0.02" max.)
					Detection with adjustment	5 mm 0.20"	
Output	Control output ¹	NPN: 100mA (40 V) max., Residual voltage: 1 V max. Relay output SPDT: 250 VAC, 2 A (resistive load)					
	Response time	50 ms (selectable: 5 ms)	50 ms (selectable: 5 ms)	3 ms (selectable: 30 ms)	3 ms (selectable: 30 ms)		
Power supply voltage	115/230 VAC ± 15%, 50/60 Hz		115/230 VAC ± 15%, 50/60 Hz		115/230 VAC ± 15%, 50/60 Hz	115/230 VAC ± 15%, 50/60 Hz	
Power consumption	10 VAC max.		10 VAC max.		10 VAC max.	10 VAC max.	
Ambient temperature	Sensor head: -10 to +60°C, Amplifier: 0 to +50°C						
Weight	Sensor head	Approx. 300 g	Approx. 135 g	Approx. 355 g	Approx. 365 g		
	Amplifier	Approx. 835 g	Approx. 835 g	Approx. 825 g	Approx. 825 g		

1. NPN output can easily be converted to PNP output by connecting the optional OP-5148 PNP output converter.

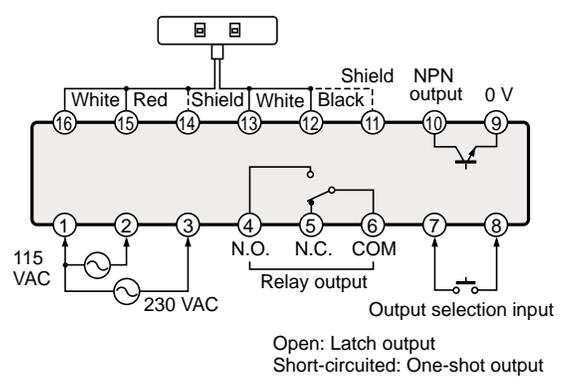
DD Double-fed Metal Plate Detectors

Connections

DD-860

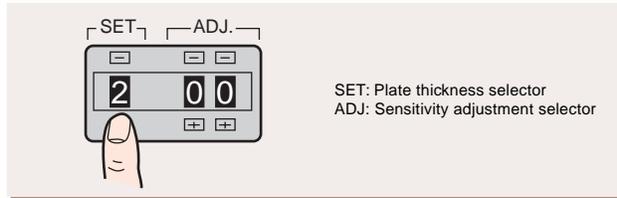


DD-960



Adjustment

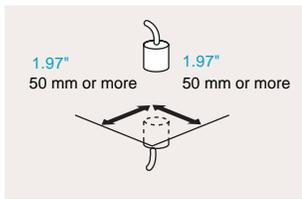
DD-860 (2 head type)



1. Choose the thickness range that matches the plate thickness using SET switch.

Scale/ Material	1	2	3	4	5	6
Steel	4.5 0.18" to 2.3 0.09"	2.3 0.09" to 1.2 0.05"	1.2 0.05" to 0.5 0.02"	0.5 0.02" to 0.1 0.004"	0.1 0.004" to 0.08 0.003"	0.08 0.003" to 0.04 0.002"
Aluminum	10 0.39"	10 0.39" to 5.0 0.20"	5.0 0.20" to 2.0 0.08"	2.0 0.08" to 1.2 0.05"	1.2 0.05" to 0.5 0.02"	0.5 0.02" to 0.02 0.0008"
Stainless steel	—	—	—	—	—	5.0 0.20" to 0.1 0.004"
Copper	—	5.0 0.20"	5.0 0.20" to 2.0 0.08"	2.0 0.08" to 1.2 0.05"	1.2 0.05" to 0.5 0.02"	5.0 0.02" to 0.1 0.004"
Brass	—	—	—	5.0 0.20" to 2.0 0.08"	2.0 0.08" to 0.5 0.02"	0.5 0.02" to 0.5 0.001"

2. Place a target between the transmitter and receiver. Increment the sensitivity adjustment switch (ADJ) from "00" until the red detection indicator turns OFF.



3. Place two target plates between the transmitter and receiver. Increment the sensitivity adjustment switch until the detection indicator turns OFF.

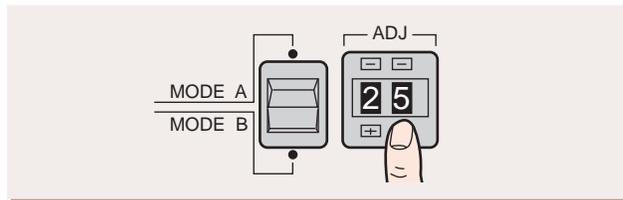
4. Set the sensitivity adjustment switch halfway between the values in steps 2 and 3.

DD-960 (1 head type)

Set the mode selector switch according to the detecting method.

Mode	Detecting method	Sensor head and target positions at adjustment
MODE (A)	Detection from upper or lower side of target	Adjust the sensor with the target covering half of the detecting surface.
MODE (B)	Detection from the target edge	Adjust the sensor with the target center-aligned with the detecting surface.

Detection without re-adjustment even if target size has changed

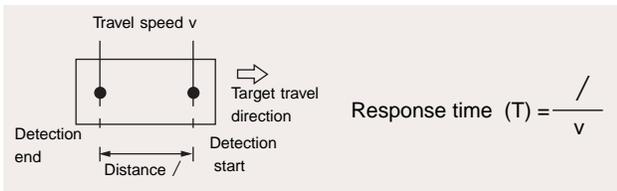


1. Place the thinnest target as close to the detecting surface as vibration amplitude allows. Increment the sensitivity adjustment switch (ADJ) from "00" until the red detection indicator turns ON.
2. Place two of the thickest targets as far from the detecting surface as vibration amplitude allows. Decrement the level adjustment switch until the red detection indicator turns OFF.
3. Set the sensitivity adjustment switch halfway between the values in steps 1 and 2.

Hints on Correct Use

Obtaining the response time (DD-860)

Place two target plates between the transmitter and receiver and measure the distance that the plates travel from the start of detection to the end of detection.

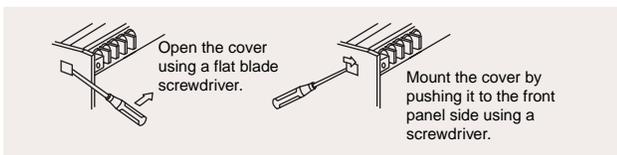


Response time (T)	Response time selection
50 ms or more	50 ms
5 ms to 50 ms	5 ms

Response time selection

DD-860

Response time can be decreased from the factory-set 50 ms down to 5 ms for detection of minute targets and rapidly moving targets.



DD-960

If there is heavy noise interference, switch the response time to 30 ms.
(The response time has been factory set to 3 ms.)

Target

When using targets with finished surfaces (e.g. zinc-plated), contact KEYENCE for further information.

Surrounding metal

For information on the influence of surrounding metals, contact KEYENCE.

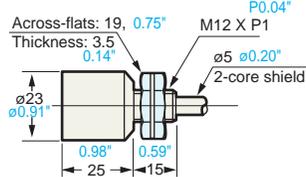
Sensor cable

When a power line is present near the sensor cable, use a separate metallic-conduit tube for the sensor cable to prevent surge voltage and noise interference causing sensor malfunction. To extend the sensor cable, use the optional extension cable. The cable extension length is limited to within 20 m 65.6'.

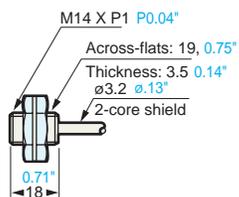
Dimensions

Sensor head (2 head type)

DH-220

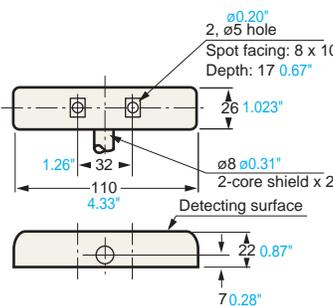


DH-214

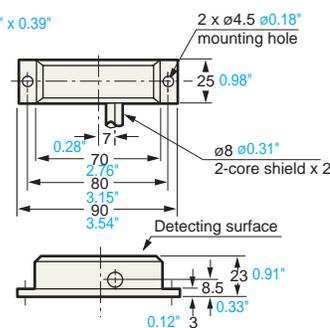


(1 head type)

DH-320



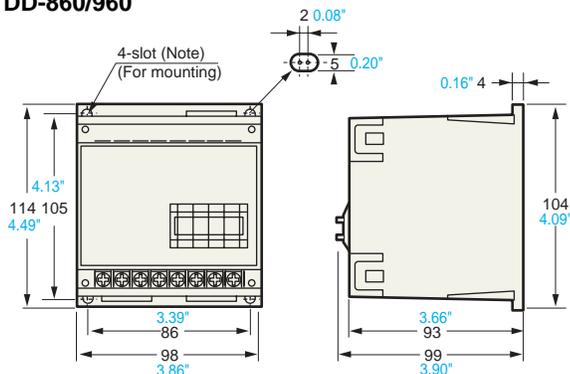
DH-314



Unit: mm Inch

Amplifier

DD-860/960



When mounting the terminal cover (optional OP-048) (Common to DD-860/960)

