

# Type 4 Safety light curtain Detector™ 3

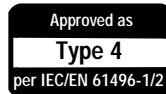
## Blanking capability: fixed and floating

## Detector™ 3 Series



### FEATURES

- Meets applicable parts of US OSHA 29CFR 1910.212, 1910.217 and ANSI B11.1, B11.2, B11.19, B11.20 and R15.06
- Certified by TÜV to be in compliance with the requirements of the IEC/EN 61496 - Part 1 and IEC/pr EN 61496 - Part 2 for Type 4 equipment
- Safety outputs: two relays with force-guided contacts
- Floating blanking (1 beam)
- Fixed blanking capability using optional external blanking windows (up to 5 contiguous beams)
- Easy to install and mount control unit
- Adaptable and versatile control unit - one or two emitter/receiver pairs can share the same control unit

**Detector™ 3**

### TYPICAL APPLICATIONS

- Area guarding
- Automated assembly
- Automatic sand blasters
- Component insertion
- Die casting machines
- Encapsulated machines
- Filter presses
- Hydraulic presses
- Injection molding
- Load/unload stations
- Packaging/converting
- Robotic systems
- Special machine guarding
- Weld lines

Honeywell's Detector™3 safety light curtain is a compact, state-of-the-art, 3-box light curtain system used to protect personnel from hazardous equipment. It provides dependable personnel protection without the interference of mechanical guards. The light curtain produces an array of invisible infrared light beams between an emitter and a receiver. If a person or object interrupts the detection field, the Detector™3 controller activates its output relays, sending a stop signal.

Detector™3 complies with OSHA 29CFR 1910.212 "General Machine Guarding" and 1910.217 "Mechanical Power Presses", ANSI B11.1 "Mechanical Power Presses", B11.2 "Hydraulic Power Presses", B11.19 "Performance Criteria for Safeguarding"; B11.20 "Manufacturing Systems/Cells"; and R15.06 "Industrial Robots and Robot Systems".

Detector™3's control unit is both adaptable and versatile. One or two emitter/receiver pairs can use the same control unit. The control unit contains a power supply, light curtain logic, relays outputs, and configuration switches. These switches are used to configure the system: one or two sets of emitter/receiver pairs and other options.

After installation, access to the controller interior is not necessary. To secure the installation and configuration, close and lock the control unit.

For added security and to comply with supervisory control requirements, the control unit is equipped with an enclosure keylock and a keyed reset switch.

### **WARNING**

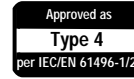
#### MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

**Failure to comply with these instructions could result in death or serious injury.**

# Type 4 Safety light curtain Detector™ 3

- Type 4 per IEC/EN 61496 - parts 1 and 2
- Blanking capability: fixed and floating

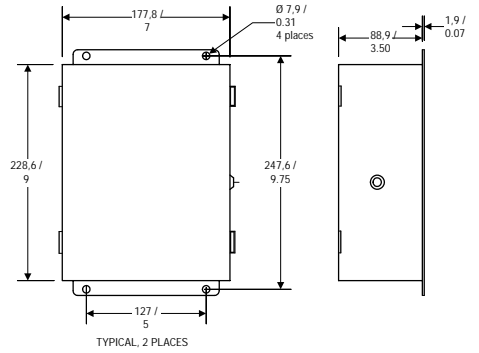
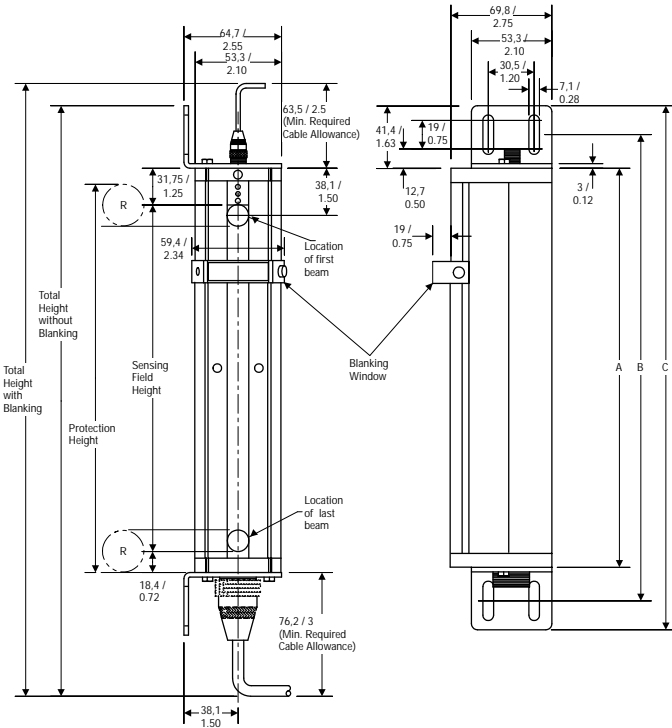


Dimensions in millimeters / inches , meters / feet , weights in kg / lbs

Specifications	General	
	Protection heights	184 mm to 1860 mm / 7.25 in to 73.25 in - See Table 1
	Scanning range	<i>Standard:</i> 0 m to 7,6 m / 0 ft to 25 ft <i>Extended:</i> 0 m to 15,3 m / 0 ft to 50 ft
	Resolution (min. object sensitivity)	31,75 mm / 1.25 in - See Table 2
	Effective aperture angle	± 2,5° for emitter and receiver
	Emission	Pulsed infrared light (880 nm)
	Blanking/Floating	<i>Fixed:</i> external blanking window required (for first beam, master blanking window required; for each additional beam, 1 slave blanking window is required, up to 4 slaves) <i>Floating:</i> 1 beam floating capability standard via switch inside the control unit
	Response time	30 ms to 40 ms - See Table 1 75 ms max. - for the weld control units
	Outputs	2 stop relays with force-guided contacts; plus 1 auxiliary relay and 4 solid state indicator outputs
	Switching capacity	4 A/240 Vac or dc resistive; selectable NO or NC contact available with all outputs relays
	Indicator outputs	4 open collector NPN, opto-isolated 70 Vdc / 2 mA maximum when "ON"
	Inputs	
	Supply voltage	24 Vdc +10%, -20%; 120/240 Vac ± 10% selectable 50/60 Hz
	Power consumption	27 VA maximum, 27 watts maximum
	Emitter/Receiver sets	2 sets (any height) can be connected to same control unit
	FSDs/MPCEs Monitoring input	Dry contacts rated 20 mA when contacts are closed and 20 Vdc when open;
	Selectable restart interlock (reset required after detection field interruption)	Closure to ground. Max. on voltage 20 V / 2 mA when "ON"
	Selectable start interlock (reset required at power up)	Closure to ground. Max. on voltage 20 V / 2 mA when "ON"
	Indicators	<i>Emitter:</i> Amber (Power ON) <i>Receiver:</i> Green (unobstructed), Red (obstructed), and flashing amber (floating enabled) <i>Control box:</i> Green (unobstructed/output relays energized), Red (stop signaled/output relays de-energized), Yellow (reset required), flashing amber (floating enabled)
	Material	
	Emitter and receiver - Housing	Extruded aluminium 3 mm / 0.12 in wall minimum
	End caps	Black nylon, glass reinforced
	Window	Polymethyl methacrylate (PMMA)
	Control box (dimensions)	Lockable, 14 gauge (1,9 mm / 0.075 in) welded steel with keylock included: <i>Enclosure:</i> 178 mm x 229 mm x 89 mm / 7 in x 9 in x 3.5 in
	Cables (dimensions)	1,5 m ; 4,6 m ; 9,1 m ; 15,2 m and 30,5 m / 5 ft , 15 ft, 30 ft, 50 ft and 100 ft with connector on one end
	Environmental	
	Emitter, receiver, control box sealing	NEMA 4 / IP 65
	Cable sealing	NEMA 4 / IP 65 connector; oil-resistant PVC cable
	Operating temperature	0 °C to 50 °C / 32 °F to 122 °F
	Humidity	30 - 95% relative humidity, non condensing
	Vibration	IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm + 0,05 amplitude, 20 sweeps per axis
	Shock testing	IEC/EN 61496-1 : 10 g, 16 ms duration, 1000 bumps for each axis, for 3 axes 50 g, 11 ms pulse per MIL-STD-810 C, Method 516, Procedure 1 (applies to all 3 axes)
	Light immunity	According to IEC / pr EN 61496-2
	Electrical noise immunity	According to IEC 61000-4-2 to 4-6
	Weight	
	Emitter or receiver	From 0,64 kg to 5,17 kg / 1.4 lbs to 11.3 lbs - See Table 1
	Control unit	4 kg / 9 lbs

○ Mounting dimensions

(mm/in for reference only)



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○ Table 1: Safety light curtain characteristics

Model	06		12		18		24		30		36		42		48		60		72	
Protection height (mm / in) (1)	184,2	7.25	336,6	13.25	489	19.25	641,4	25.25	793,8	31.25	946,2	37.25	1098,6	43.25	1251	49.25	1555,8	61.25	1860,6	73.25
Sensing field height (mm / in)	146,1	5.75	298,5	11.75	450,9	17.75	603,3	23.75	755,7	29.75	908,1	35.75	1060,5	41.75	1212,9	47.75	1517,7	59.75	1822,5	71.75
Total height without blanking (mm / in)(2)	314,3	12.38	466,7	18.38	619,1	24.38	771,5	30.38	923,9	36.38	1076,3	42.38	1228,7	48.38	1381,1	54.38	1685,9	66.38	1990,7	78.38
Total height with blanking (mm / in) (3)	336,6	13.25	489	19.25	641,4	25.25	793,8	31.25	946,2	37.25	1098,6	43.25	1251	49.25	1403,4	55.25	1708,2	67.25	2013	79.25
Response time with stand. control unit (ms)	30		30		30		30		35		35		35		35		40		40	
Response time with weld control unit (ms)	75		75		75		75		75		75		75		75		75		75	
Weight per device (kg / lbs)	0,64	1.4	1,05	2.3	1,46	3.2	1,87	4.1	2,29	5	2,7	5.9	3,11	6.8	3,52	7.7	4,34	9.5	5,17	11.3
	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in	mm / in
A	196,9	7.75	349,3	13.75	501,7	19.75	654,1	25.75	806,5	31.75	958,9	37.75	1111,3	43.75	1263,7	49.75	1568,5	61.75	1873,3	73.75
B	241,3	9.50	393,7	15.50	546,1	21.50	698,5	27.50	850,9	33.50	1003,3	39.50	1155,7	45.50	1308,1	51.50	1612,9	63.50	1917,7	75.50
C	279,4	11.00	431,8	17.00	584,2	23.00	736,6	29.00	889	35.00	1041,4	41.00	1193,8	47.00	1346,2	53.00	1651	65.00	1955,8	77.00

(1) Protection height for the min. object sensitivity or resolution

(2) Total height including bracket and connector

(3) Total height including connectors when a blanking window is used

○ Table 2: Safety light curtain blanking characteristics

	Without blanking		1 beam blanking		2 beam blanking		3 beam blanking		4 beam blanking		5 beam blanking	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
Resolution R*	31,75	1.25	50,80	2	69,85	2.75	88,90	3.50	107,95	4.25	127	5
Beam spacing	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75
Beam diameter	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50

\*Minimum object sensitivity

○ Safety distances per USA's OSHA/ANSI requirements (in inches, 1 in = 25,4 mm)

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$Ds = K \times (Ts + Tc + Tr) + Dpf$	Without blanking 1.25 in resolution (Minimum object sensitivity)	1-beam blanking* 2 in resolution Minimum object sensitivity
<b>Normal approach</b> 	$Ds = 63 \times (Ts + Tc + Tr) + 3.3$  <b>Note:</b> If $Hu$ is less than 48", then $Dpf = 48"$ (reach over).	$Ds = 63 \times (Ts + Tc + Tr) + 5.9$ for 1 beam blanked (2.0" resolution)  <b>Note:</b> If more than one contiguous beam is blanked, the resolution (minimum object sensitivity) becomes greater than 2.5", then : - $Dpf = 36"$ if $Hu$ is greater or equal to 48" (reach through) or, - $Dpf = 48"$ if $Hu$ is less than 48" (reach over).
<b>Parallel approach</b> 	$Ds = 63 \times (Ts + Tc + Tr) + 48$	$Ds = 63 \times (Ts + Tc + Tr) + 48$ <b>Note:</b> H is to be not greater than 39 inches. If the blanked area is not entirely obstructed, H is not to be less than : - 7" for 2 contiguous blanked beams (2.75" resolution) or, - 15" for 3 contiguous blanked beams (3.5" resolution) or, - 30" for 4 contiguous blanked beams (4.25" resolution) or, - 39" for 5 contiguous blanked beams (5" resolution).
<b>Angled approach</b> 	If $\alpha \geq 30^\circ$ then use a normal approach formula.  If $\alpha \leq 30^\circ$ then use a parallel approach formula.	

Where

$Ds$ : Minimum safety distance

$K$ : Approach speed (called "hand speed") = 63 in/s

$Ts$ : Worst case stopping time of the machine (seconds)

$Tc$ : Worst case response of the machine's control (seconds)

$Tr$ : Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)

$Dpf$ : Depth penetration factor (inches)

$H$ : Height of the detection plane above the reference floor (inches)

$Hu$ : Height of the uppermost beam above the reference floor (inches)

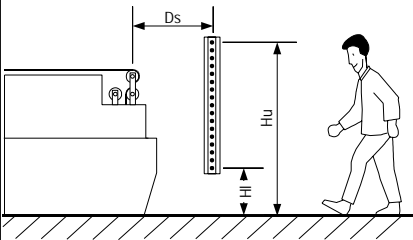
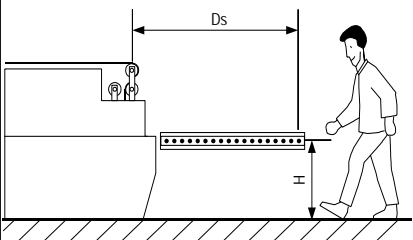
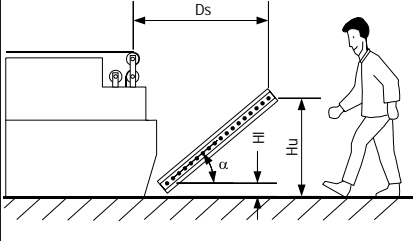
$Hl$ : Height of the lowest beam above the reference floor (inches). For Normal approach, assumption is that  $Hl$  is not greater than 12 inches unless the application prevents access even with  $Hl$  at a distance greater than 12 inches)

(\*) Floating or fixed blanking windows affect safety distance

USA's OSHA and ANSI safety distance formulas state that if the resolution (minimum object sensitivity) increases, the safety distance must also increase. If the blanked area is not completely physically obstructed, use of blanking windows requires moving the light curtain farther back from the hazardous area. The rule for increasing the safety distance is to add 2.6 in to the safety distance for one beam blanked if the blanked area is not obstructed physically. If two or more contiguous beams are blanked then the Depth penetration factor (Dpf) is at least 36" when  $Hu$  is greater or equal to 48" (personnel are detected while reaching through the light curtain field). However Dpf is at least 48" if the  $Hu$  is less than 48" (personnel are detected reaching over the light curtain field). The light curtain must be sized and installed such that a stop would be signaled and the hazard cease prior to a person accessing the hazard. If the blanked area is entirely blocked by a fixture, the safety distance remains unchanged. Blanking two beams or more can create a large unprotected area through the light curtain. If this passageway is not completely filled by a fixture, personnel would be subject to a dangerous working environment.

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19, B11.20 and R15.06).

○ Safety distances per EN 999 standard requirements (in/mm - 100 mm = 3.9 in)

$S = K \times (T1 + T2) + C$	<b>Without blanking</b> (resolution = 31,75 mm)	<b>With blanking*</b> (resolution $\geq$ 50,8 mm)
<p><b>Normal approach</b></p> 	<p> <math>S \geq 2000 (t1 + t2) + 142</math>, with <math>S \geq 100</math> </p> <p>                     if <math>S \geq 500</math>, then use :  <math>S \geq 1600 (t1 + t2) + 142</math>,                      With <math>S \geq 500</math> </p>	<p> <math>S \geq 1600 (t1 + t2) + 850</math>,                      with <math>Hu \geq 900</math> and <math>Hl \leq 300</math> </p>
<p><b>Parallel approach</b></p> 	<p>                     if <math>H \leq 875</math>, then use :  <math>S \geq 1600 (t1 + t2) + (1200 - 0,4 H)</math> </p> <p>                     if <math>875 \leq H \leq 1000</math>, then use :  <math>S \geq 1600 (t1 + t2) + 850</math> </p> <p>                     With <math>0 \leq H \leq 1000</math>.                 </p>	<p>                     if <math>H \leq 875</math>, then use :  <math>S \geq 1600 (t1 + t2) + (1200 - 0,4 H)</math> </p> <p>                     if <math>875 \leq H \leq 1000</math>, then use :  <math>S \geq 1600 (t1 + t2) + 850</math> </p> <p>                     With <math>15 (R-50) \leq H \leq 1000</math> mm, where R is the light curtain resolution (see Table 2). <b>Blanking 5 successive beams is not allowed on parallel approach applications.</b> </p>
<p><b>Angled approach</b></p> 	<p>                     If <math>\alpha \geq 30^\circ</math> then use one of the formula given for a normal approach, with <math>Hu \geq 900</math> mm and <math>Hl \leq 300</math> mm when the light curtain is used with a floating blanking window and without additional protection                 </p> <p>                     If <math>\alpha \leq 30^\circ</math> then use one of the formula given for a parallel approach with <math>Hu \leq 1000</math> mm and <math>15 (R-50) \leq H \leq 1000</math> mm, where R is the light curtain resolution (see Table 2).                 </p>	

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Where:

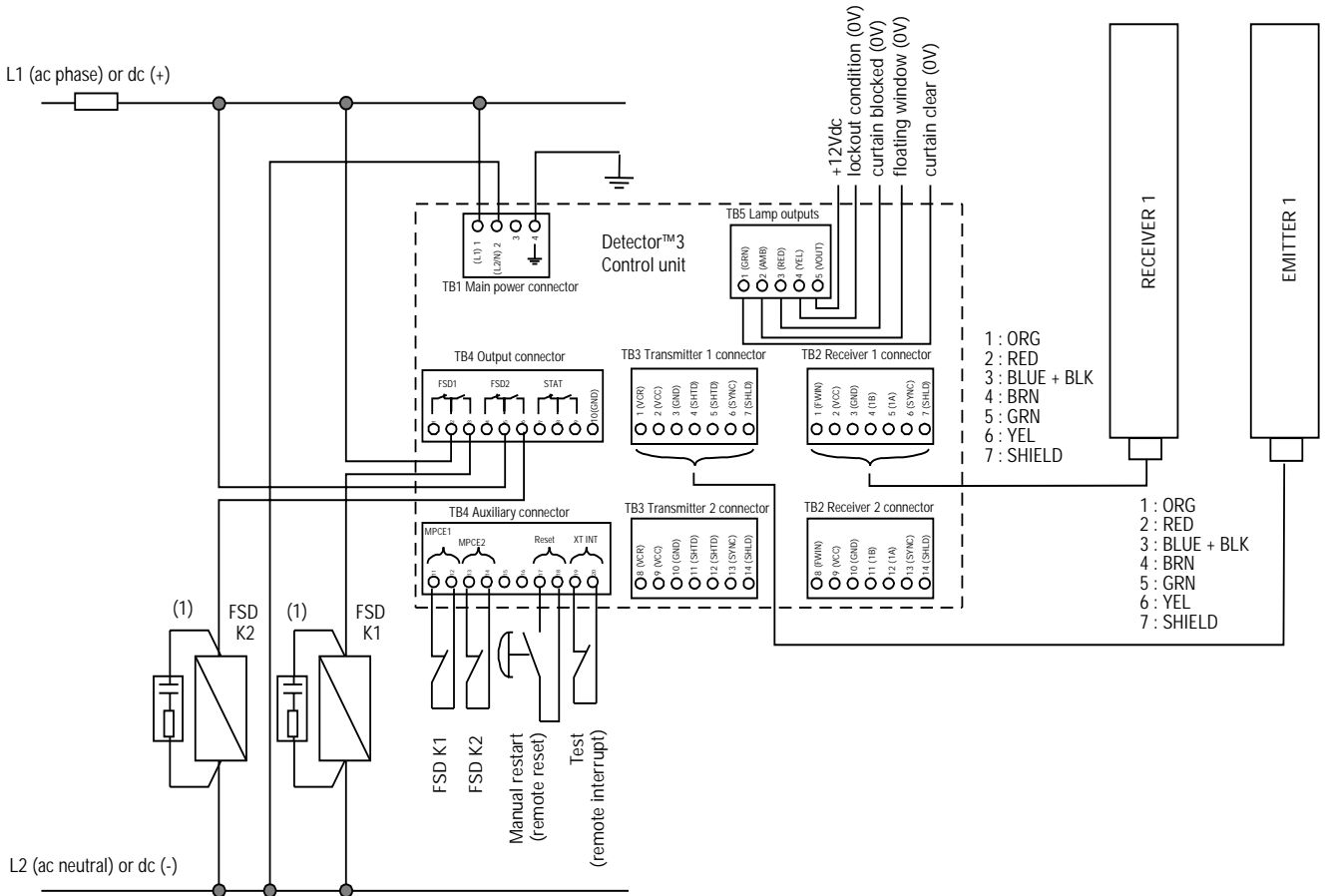
- S: Minimum safety distance (in mm, 100 mm = 3.9 in)
- K: Approach speeds of the body or parts of the body (in mm/s)
- t1: Light curtain response time (in s)
- t2: Machine stopping time (in s)
- C: Additional distance based on intrusion prior to actuation of the protective equipment (in mm)
- H: Height of the detection plane above the reference floor (in mm)
- Hu: Height of the uppermost beam above the reference floor (in mm)
- Hl: Height of the lowest beam above the reference floor (in mm)

**(\*) Floating or fixed blanking windows affect safety distance**

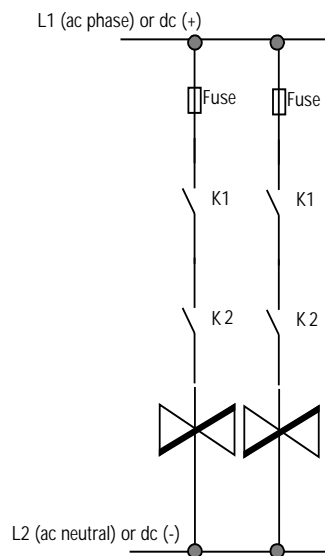
Blanking one or more beams increases the Detector™3 resolution and the safety distance. The EN 999 European standard states that safety light curtain with a resolution greater than 40 mm will not detect hand intrusion and therefore shall only be used where the risk assessment indicates that detection of hand intrusion is not necessary. Blanking one or more beams sets the Detector™3 resolution to values greater than 40 mm. If the blanked area is entirely blocked by a fixture such that the operator intrusion would be impossible, the light curtain resolution and the safety distance remain unchanged.

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by type C European standard if existing for the considered machine.

○ Wiring diagram example using external relaying and manual restart (remote reset)



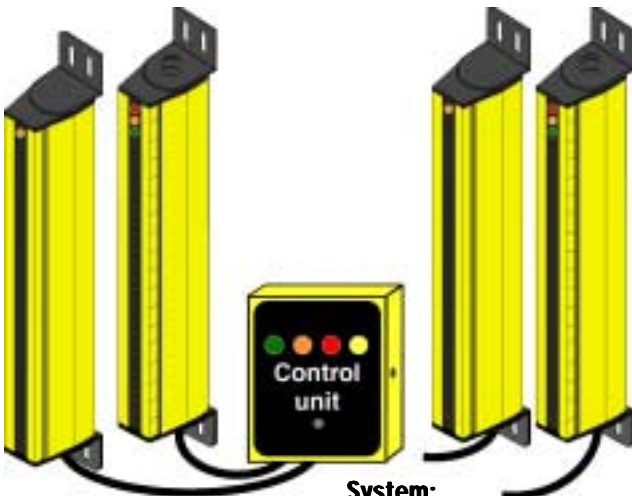
Dual channel machine control circuit



(1) RC (220 Ω + 0.22 μF) for ac interfaces, varistors (31 Vdc) for dc interfaces

For other configurations and capabilities, see the product installation manual.

○ Ordering a system



**System:  
1 or 2 emitter / receiver pairs,  
2 or 4 cables and control box**

1. Select the appropriate control box.
2. Determine the protected height requirements.
3. Select the appropriate emitter/receiver pair to match the application requirements.
4. Select the appropriate cable length to match the installation requirements.

○ Control box order guide

Catalog Listing	Description
3LCE-B	NEMA 4 and IP 65 enclosure, 120/240 Vac (selectable)
3LCE-BW	NEMA 4 and IP 65 enclosure with 75 ms response for welding applications, 120/240 Vac (selectable)
3LCE-B24	NEMA 4 and IP 65 enclosure, 24 Vdc
3LCE-B24W	NEMA 4 and IP 65 enclosure with 75 ms response for welding applications, 24 Vdc

Note: cable glands are not included (customer supplied)

○ Emitter/receiver pair order guide

Standard Range - up to 7,6 m / 25 ft scanning range		
Catalog Listing	Protection Height	
	mm	in
3LCE06	184,2	7.25
3LCE12	336,6	13.25
3LCE18	489	19.25
3LCE24	641,4	25.25
3LCE30	793,8	31.25
3LCE36	946,2	37.25
3LCE42	1098,6	43.25
3LCE48	1251	49.25
3LCE60	1555,8	61.25
3LCE72	1860,6	73.25

Extended Range - up to 15,3 m / 50 ft scanning range		
Catalog Listing	Protection Height	
	mm	in
3LCE06X	184,2	7.25
3LCE12X	336,6	13.25
3LCE18X	489	19.25
3LCE24X	641,4	25.25
3LCE30X	793,8	31.25
3LCE36X	946,2	37.25
3LCE42X	1098,6	43.25
3LCE48X	1251	49.25
3LCE60X	1555,8	61.25
3LCE72X	1860,6	73.25

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○ Cables\* order guide (m / ft)

Catalog Listing	Description	
	m	ft
3LC-C05	1,52	5
3LC-C15	4,57	15
3LC-C30	9,14	30
3LC-C50	15,24	50
3LC-C100	30,48	100

\*Order two cables for a complete emitter and receiver pair.

○ Blanking window\* order guide

Catalog Listing	Description
3DBWM-24	Master, 0,61 m / 24 in cable length
3DBWM-48	Master, 1,22 m / 48 in cable length
3DBWM-72	Master, 1,83 m / 72 in cable length
3DBW-S	Slave for any size
*Order 1 master and up to 4 slaves	

Maximum of five beams may be blanked; this does not include the floating blanking window.

Fixed blanking windows can be used with floating blanking window.

Master fixed blanking windows have cables that connect to the top of the receiver.

Slave fixed blanking windows look like a master window, but have no cable.

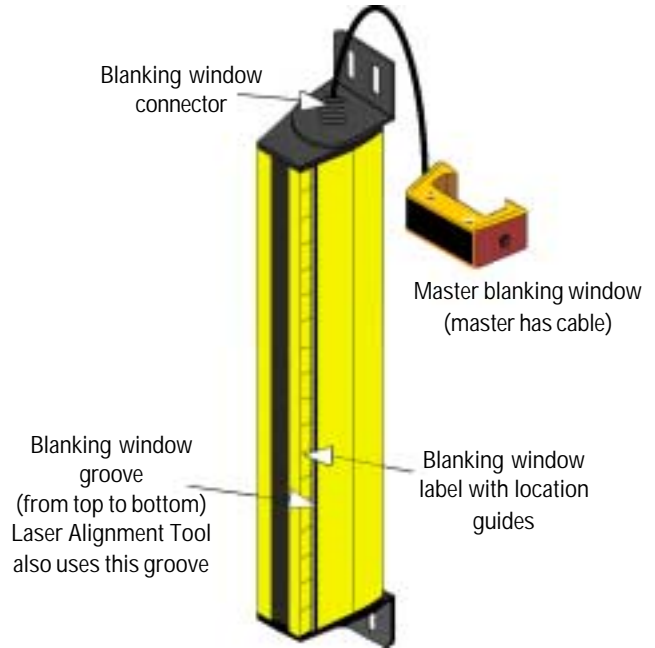
Slave fixed blanking windows snap on top of Master – no jumpers are required.

○ Weld shield kits\*\* order guide

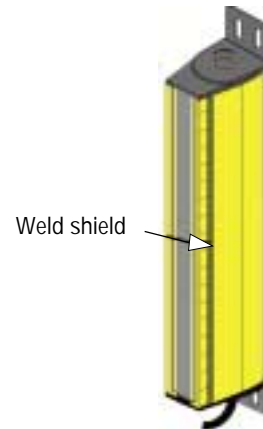
Catalog Listing	Protection Heights	
	mm	in
3WS06	184,2	7.25
3WS12	336,6	13.25
3WS18	489	19.25
3WS24	641,4	25.25
3WS30	793,8	31.25
3WS36	946,2	37.25
3WS42	1098,6	43.25
3WS48	1251	49.25
3WS60	1555,8	61.25
3WS72	1860,6	73.25
**Weld shield kit; 1 clear acrylic (plastic) shield with mechanical clips that attach to blanking window grooves		

○ Other accessories order guide

Catalog Listing	Description
3LC-LAT	Laser alignment tool, 3V lithium battery, 20-hour life



○ Weld shields (external)



○ Laser alignment tool

