

the machine safety specialist

MICRO-SCREEN™

Safety Light Screens



MICRO-SCREEN™: The smallest, most esthetic safety light screens.

The perfect match for your equipment.

Banner's new MICRO-SCREEN™ safety light screen system is not only attractive, but sized right for smaller production machines.

It will give your equipment a high-tech look that will match the MICRO-SCREEN's high-tech performance.



Only 32 x 25 mm (1¼" x 1").

MICRO-SCREEN is suitable for most industrial applications, and takes up very little space. The tiny rectangular emitters and receivers measure only 32 x 25 mm (1¼" x 1"), and can be integrated perfectly into your products without being obtrusive.

All the sizes you need.

MICRO-SCREEN comes in just the right size for your machines. Rugged emitters and receivers are available to provide light screens from 102 to 1219 mm (4" to 48") in 102 mm (4") increments, plus 1422, 1626 and 1829 mm (56", 64" and 72") screens. They are rated NEMA 4, 13 and IEC IP65.

9-meter (30') range.

102 through 1219 mm (4" to 48") MICRO-SCREEN systems have a range of 9 m (30'). Longer 1422, 1626 and 1829 mm (56", 64" and 72") models have a range of 6 m (20'). Despite their small size, they are powerful enough to guard wide openings or for perimeter guarding applications using corner mirrors. *See page 13.*

Designed to comply with UL 1998 and IEC 61496.

MICRO-SCREEN was designed to meet UL 1998 *Standard for Safety-Related Software* requirements, with unique, embedded safety software that monitors and processes incoming sensor readings. In the event of a risk situation, the system initiates a signal that de-energizes the guarded machine. It is also designed to meet worldwide IEC 61496 -1 and -2 standards.

MICRO-SCREEN™: The industry's biggest light screen features.

A choice of advanced controllers.

Choose a full-size black metal enclosure, or a compact 35 mm DIN-rail-mountable enclosure that features unique, labor-saving snap-out wiring terminals.

See pages 6 & 7.



The brightest status indicators.

MICRO-SCREEN's unique green, red and yellow LED indicators are very bright and easy to read, eliminating the need for a separate light tower.

See page 5.



Available DeviceNet™ fieldbus.

The DeviceNet™ fieldbus is available for MICRO-SCREEN, which allows the system to be integrated directly into a new or existing DeviceNet network, for non-safety monitoring of system status. See page 4.



Ultra-fast response time.

When any of the light beams are broken, the MICRO-SCREEN System takes less than 38 milliseconds to send a "STOP" signal to the guarded machine. This fast response time allows work to be conducted closer to the danger point. It also achieves the industry's best balance between fast response and high noise immunity, to avoid nuisance trips.



Built-In E-stop input.

MICRO-SCREEN features a built-in, hardwired Emergency Stop Safety Input, for monitoring two normally closed emergency stop contacts.

See page 6.

Integral cable or quick-disconnect.

Choose integral cable or 305 mm (12") "pigtail" cable that allows easy disconnection of emitters and receivers. Color-coded wires and terminals also streamline wiring to the controller.

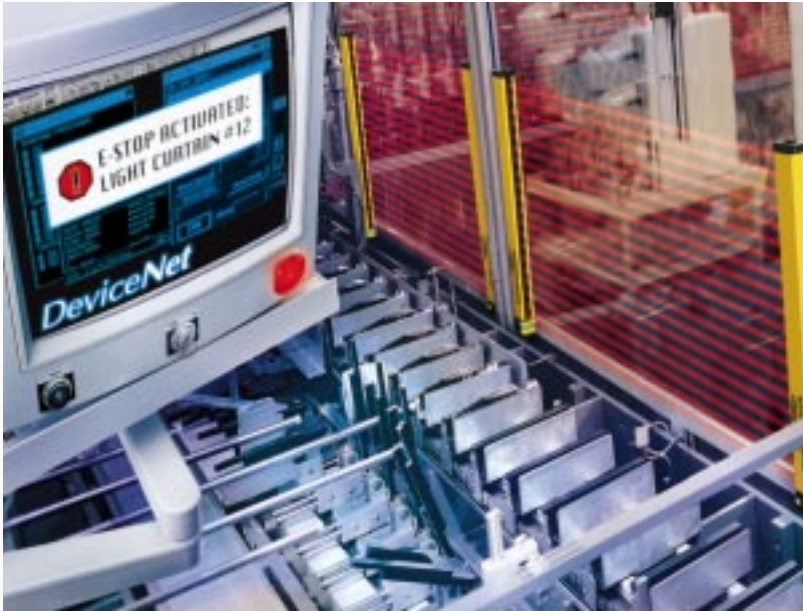


The light screen system that gets on the bus.

DeviceNet™

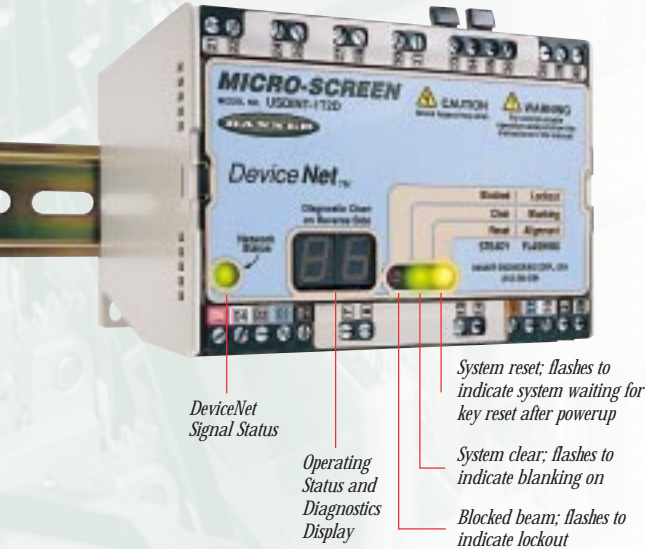
Complete system monitoring on DeviceNet fieldbus networks.

This unique MICRO-SCREEN™ system is fully compatible with the DeviceNet™ fieldbus, and can be connected directly into the fieldbus for non-safety monitoring of system status. DeviceNet is the leading low-cost communications link that connects a wide range of automated manufacturing devices for greater usability and convenience. Multiple MICRO-SCREEN Systems can be networked together with numerous other devices on a single DeviceNet network.



Centralized diagnostics and troubleshooting.

Connecting MICRO-SCREEN to a DeviceNet network affords the added efficiencies of monitoring operational status and troubleshooting from a central location. This provides huge benefits, including less downtime and lower maintenance costs through dedicated diagnostics that immediately indicate the status of each MICRO-SCREEN system on the network. Available system information on DeviceNet includes: system identification such as manufacturer and model; system status information such as operating mode, defined area status (blocked or clear), output relay status, and noise detection; sensor alignment information such as number of beams, and number and location of beams blocked; system settings such as auto powerup, floating blanking, and number and location of fixed blanked beams; plus diagnostics information such as error codes, problem descriptions and troubleshooting information. MICRO-SCREEN is your most automated solution.



Vastly superior diagnostics.

Bright, easily-visible status indication from three sides.

Bright LED indicators on MICRO-SCREEN™ emitters and receivers are significantly brighter than other systems, to make vital system information more visible. MICRO-SCREEN receivers keep you better informed of their operating status at all times with three ultra-bright, color-coded status indicators visible from the front and both sides. They are easy to see, even at a distance, so you can eliminate the need and expense of purchasing a separate light tower. Emitters have a green “POWER ON” indicator.



| | | |
|--|------------------------------|---|
| | Green: | “SYSTEM CLEAR” |
| | Flashing green: | “BLANKING ON” |
| | Red: | “BLOCKED BEAM” |
| | Flashing red: | “LOCKOUT” |
| | Yellow: | “SYSTEM RESET” |
| | Double-flashing yellow: | “WAITING FOR POWER-UP, MANUAL KEY RESET” |
| | Red steady, flashing yellow: | “OBSTRUCTION OR MISALIGNMENT” |
| | Green & yellow: | “RUN MODE, NO OBSTRUCTIONS, PROPER ALIGNMENT” |

Messages that keep you better informed.

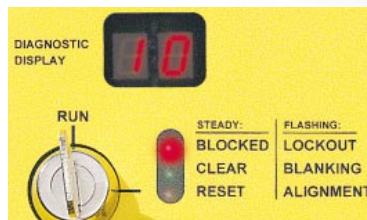
With MICRO-SCREEN, you’ll be better informed and more in control of your equipment. Controllers have a bright two-digit display indicating the number of blocked beams to simplify emitter/receiver alignment. Thirteen numerical diagnostics messages alert you of system errors so they can be immediately corrected and your downtime minimized. Bright LEDs also alert the operator to high levels of electrical or optical interference in the area.

Simplified alignment system.

Banner’s exclusive alignment system makes your job easier. It uses indicator LEDs on the controller and receiver that flash at a rate proportional to the number of beams completed so you’ll know when you’ve achieved perfect alignment. And you’re alerted if the system gets out of alignment.



DIN Control Module



Metal Control Box

- | | | |
|-----------------------------|------------------------------|-----------------------------|
| 0 E-stop open | 5 Emitter error | 10 System error |
| 1 Relay signal error | 6 Communication error | 11 Power up error |
| 2 Key input error | 7 DIP switch error | 12 Programming error |
| 3 Controller error | 8 CPU error | |
| 4 Receiver error | 9 E-stop input error | |

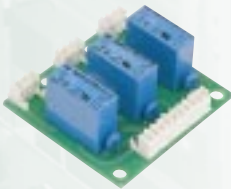
Advanced controllers for increased safety.

Built-in Emergency Stop Safety Input.

MICRO-SCREEN™ features a built-in hardwired Emergency Stop Safety Input utilizing two normally-closed emergency stop contacts to achieve a Category 4 safety level, per EN 954-1. If either or both emergency stop contacts open, power to the FSD safety output relays is removed, causing the relays to de-energize and send a stop signal to the guarded machine within 15 milliseconds. It also protects against a safety switch contact failure or wiring fault. A contact failure or wiring short will inhibit the system reset, causing the system diagnostics to indicate an emergency stop input failure.

Dual microprocessor redundancy.

Banner MICRO-SCREEN features diverse redundancy, utilizing two microprocessors of different design, running different instruction sets, which continuously check all system components (and each other) for faults, at least every 20 milliseconds.

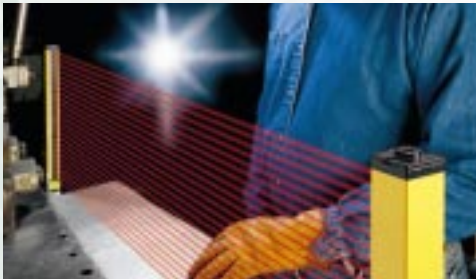


Reliable force-guided relay contacts.

MICRO-SCREEN's force-guided relays feature a fail-safe, "active," force-guided contact design ensuring that NO and NC contacts may not be simultaneously closed. They have a rated mechanical life of 10,000,000 operations minimum, and an electrical life of 100,000 operations (typical) at full-rated load.

Extensive Failure Mode and Effects Analysis.

MICRO-SCREEN has been through rigorous FMEA (Failure Mode and Effects Analysis) testing to establish an extremely high degree of confidence that no system component will fail in such a way to cause a dangerous condition. This meets the requirements of the UL 491, UL 991 and worldwide IEC 61496-1. The MICRO-SCREEN system sends a "STOP" signal to the guarded machine in the unlikely event of an internal component failure that could compromise the integrity of the system.



Immunity to interference.

In addition to meeting high standards for vibration resistance, every MICRO-SCREEN emitter, receiver, and control module undergoes extensive burn-in testing at the factory. This system is also highly immune to EMI and RFI interference, ambient light, weld flash and strobe light.



Fixed or floating blanking.

MICRO-SCREEN light screen systems can be programmed for fixed blanking or floating blanking. Floating blanking is standard on MICRO-SCREEN and is easily configured allowing you to disable one or two beams, which will allow workpieces to move through the light screen without causing a trip or latch condition. Optional fixed blanking of one to 12 beams is fast and simple for stationary objects that must be positioned in the light screen. MICRO-SCREEN's "Teach Mode" system allows you to set blanking by simply inserting the fixed object in the screen, powering up the system, moving a switch to program mode, and pushing a button. There's nothing easier!



Compact controllers for panel or DIN-rail mounting.

Save space and money.

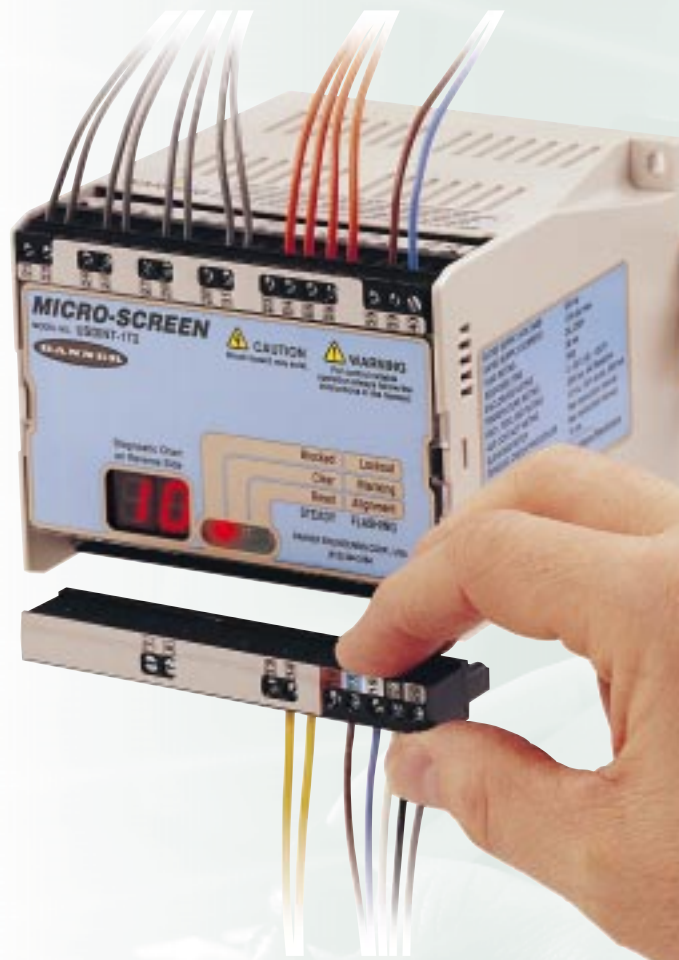
Measuring only 107 x mm x 115 mm x 81 mm (4.2" x 4.5" x 3.2"), the compact, DIN-rail-mountable controller cuts the cost and space requirements for the MICRO-SCREEN™ system.

Identical features to full-size controllers.

The MICRO-SCREEN DIN controller has the same components and safety features found in the full-size controller on page 6. You can mount it on a 35 mm DIN rail or in a separate control box.

Snap-out, removable wiring terminals and boards.

The MICRO-SCREEN DIN controller features a custom DIN-rail enclosure with features superior to competitive units. Unique, labor-saving snap-out wiring terminals save you a lot of time and costs when wiring or changing controllers allowing you to quickly replace the controller without tedious and expensive rewiring of each screw terminal. This completely modular design also allows logic, relay, and circuit boards to be easily replaced in the unlikely event of failure.



DeviceNet™ controller for fieldbus compatibility.

MICRO-SCREEN is the only choice for fieldbus automation. This model offers built-in DeviceNet fieldbus capability, so you can realize the advantages of having centralized diagnostics and troubleshooting. *See page 4.*

Banner Safety Light Screen Applications

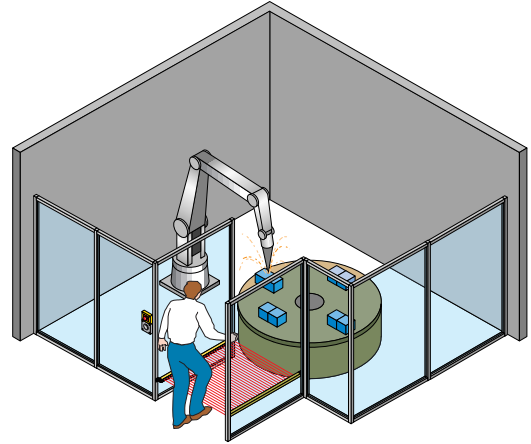
ROBOTIC WELDER

Application: Area guarding the entrance to a load/unload or inspection station of a robotic work cell.

Guarding: All sides of the work cell are protected by walls or hard guarding. A horizontal light curtain (set at 12" above the floor) guards the entrance to the inspection station; its non-contact guarding can offer higher reliability and much longer life, compared to a safety mat.

Light Screen: MICRO-SCREEN™ system with ES-GA-5B Emergency Stop Monitoring Safety Relay.

Notes: The MICRO-SCREEN controller can stop hazardous motion either by detecting a presence in the horizontal sensing field, or by an individual activating the integral E-stop input. The safety outputs of the light curtain can be interfaced with the Emergency Stop Monitoring Safety Relay to provide a latch/reset function. By incorporating the Emergency Stop Monitoring Safety Relay, the system also allows for increased contact ratings, additional safety output contacts and PLC feedback outputs.



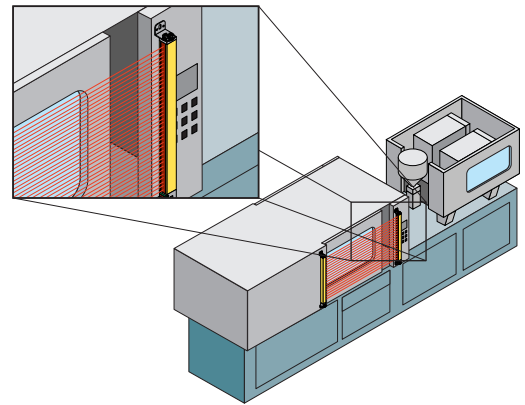
INJECTION MOLDING MACHINE

Application: Point-of-operation guarding of an automated access door used for removal of molded parts.

Guarding: A light screen is installed in front of (outside) the door, which prevents the door from closing and prevents the machine from cycling whenever the light curtain is interrupted.

Light Screen: MICRO-SCREEN system.

Notes: The door opens at the end of each molding cycle to allow the machine operator to remove mixed parts before the next cycle. A new cycle cannot be initiated if the light screen is interrupted. If the light screen is interrupted while the door is closing, the door will reverse direction, and the cycle will be canceled.



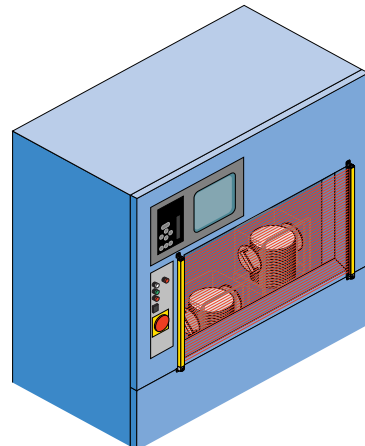
SEMICONDUCTOR WAFER STORAGE SYSTEM

Application: Point-of-operation guarding of the access to a robotic semiconductor wafer pod stacking and storage system.

Guarding: The opening is guarded with one light screen.

Light Screen: MICRO-SCREEN system.

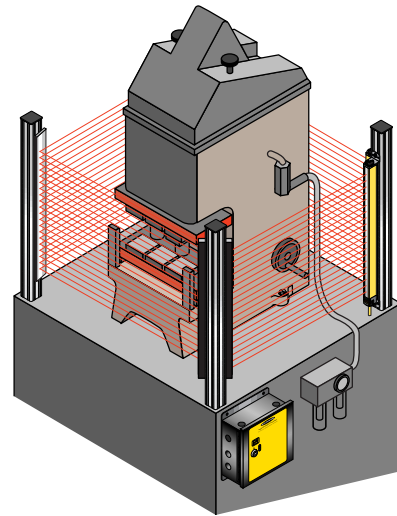
Notes: A stacker robot moves inside the storage system. Interruption of the light screen results in arrest of the robot arm motion.



Banner Safety Light Screen Applications

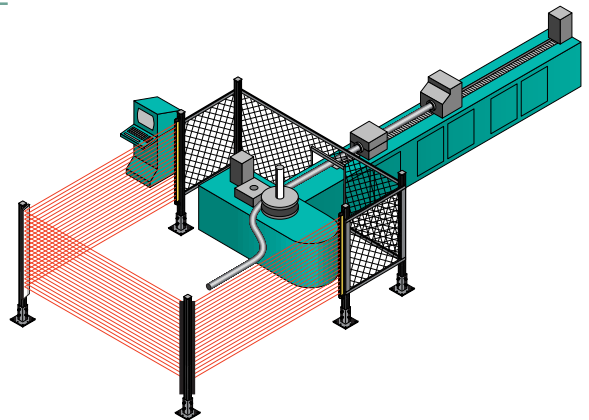
LEAD FORM AND TRIM MACHINE

- Application:** Point-of-operation guarding of a small machine designed for precision forming and trimming of gull-wing leads.
- Guarding:** All four sides of the small machine are guarded with one light screen.
- Light Screen:** MICRO-SCREEN™ system with three MSM Series corner mirrors and four MSA Series stands.
- Notes:** Both the emitter and the receiver are mounted to one MSA stand at a 90° angle from one another. The safety light screen provides guarding of the machine around a 360° perimeter through use of mirrors on the remaining three corners. This type of application allows easy access to all sides of the machine while preventing dangerous machine motion whenever the light screen is interrupted. In addition, wiring is simplified due to the close proximity of the emitter, receiver, and controller.



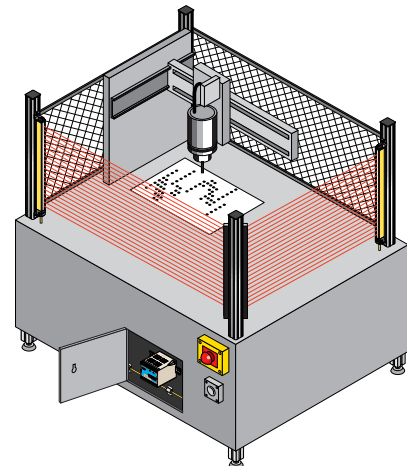
TUBE FORMING

- Application:** Perimeter guarding of a tube-bending machine.
- Guarding:** Three sides are guarded with a light screen and one side is guarded with hard guarding.
- Light Screen:** MICRO-SCREEN system with an ES-GA-5B Emergency Stop Monitoring Safety Relay, two MSM Series corner mirrors and four MSA Series stands.
- Notes:** After the light screen is interrupted, the tube-bending machine can not be allowed to operate until the defined area is cleared of all personnel. A latch/reset function can be created by taking the safety outputs of the light curtain into an Emergency Stop Monitoring Safety Relay. The reset for the light screen latch must be positioned so that the operator has a full view of the guarded area. Where a clear view is not possible, supplemental guarding (e.g., safety mats) must be used for personnel detection inside the guarded area.



DRILLING OPERATION

- Application:** Point-of-operation guarding of an automated drilling station.
- Guarding:** Two sides of the station are guarded with a light screen, and two sides are guarded with hard guarding.
- Light Screen:** MICRO-SCREEN system with DIN controller and one MSM Series corner mirror.
- Notes:** Hazardous motion is stopped with an interruption of the light screen, or by an individual activating the integral E-stop input.



MICRO-SCREEN™ Kits with Metal Control Module, 115/230V ac

Pre-packaged MICRO-SCREEN kits with metal control modules.

To simplify ordering, these pre-packaged kits include a 115/230V ac metal control module, an emitter and receiver of equal length, plus mounting hardware, and a choice of four cable options: two 7.6 m (25') integral cables; two 4.6 m (15') "pigtail" quick-disconnect cables; two 7.6 m (25') "pigtail" quick-disconnect cables; or one each, 4.6 m (15') and 7.6 m (25') "pigtail" quick-disconnect cables. Control modules can be ordered separately; see chart below. Emitters, receivers and cables can also be ordered separately; see charts on page 13.



MICRO-SCREEN Kits

Light Screens with Floating Blanking

Light Screens with Floating and Fixed Blanking

| Screen Height | Kit with two 7.6 m (25') integral cables, Model Number | | Kit with two 4.6 m (15') "Pigtail" QD cables, Model Number | | Kit with two 7.6 m (25') "Pigtail" QD cables, Model Number | | Kit with one 4.6 m (15') & one 7.6 m (25') "Pigtail" QD cable, Model Number | |
|---------------|--|-------------|--|-------------|--|-------------|---|-------|
| | Part Number | Part Number | Part Number | Part Number | Part Number | Part Number | Part Number | |
| 102 mm (4") | USKD424YI | 51853 | USKD424C4YP2 | 51501 | USKD424C5YP2 | 51516 | USKD424C6YP2 | 51531 |
| | USK2D424YI | 51868 | USK2D424C4YP2 | 51546 | USK2D424C5YP2 | 51561 | USK2D424C6YP2 | 51576 |
| 203 mm (8") | USKD824YI | 51854 | USKD824C4YP2 | 51502 | USKD824C5YP2 | 51517 | USKD824C6YP2 | 51532 |
| | USK2D824YI | 51869 | USK2D824C4YP2 | 51547 | USK2D824C5YP2 | 51562 | USK2D824C6YP2 | 51577 |
| 305 mm (12") | USKD1224YI | 51855 | USKD1224C4YP2 | 51503 | USKD1224C5YP2 | 51518 | USKD1224C6YP2 | 51533 |
| | USK2D1224YI | 51870 | USK2D1224C4YP2 | 51548 | USK2D1224C5YP2 | 51563 | USK2D1224C6YP2 | 51578 |
| 406 mm (16") | USKD1624YI | 51856 | USKD1624C4YP2 | 51504 | USKD1624C5YP2 | 51519 | USKD1624C6YP2 | 51534 |
| | USK2D1624YI | 51871 | USK2D1624C4YP2 | 51549 | USK2D1624C5YP2 | 51564 | USK2D1624C6YP2 | 51579 |
| 508 mm (20") | USKD2024YI | 51857 | USKD2024C4YP2 | 51505 | USKD2024C5YP2 | 51520 | USKD2024C6YP2 | 51535 |
| | USK2D2024YI | 51872 | USK2D2024C4YP2 | 51550 | USK2D2024C5YP2 | 51565 | USK2D2024C6YP2 | 51580 |
| 610 mm (24") | USKD2424YI | 51858 | USKD2424C4YP2 | 51506 | USKD2424C5YP2 | 51521 | USKD2424C6YP2 | 51536 |
| | USK2D2424YI | 51873 | USK2D2424C4YP2 | 51551 | USK2D2424C5YP2 | 51566 | USK2D2424C6YP2 | 51581 |
| 711 mm (28") | USKD2824YI | 51859 | USKD2824C4YP2 | 51507 | USKD2824C5YP2 | 51522 | USKD2824C6YP2 | 51537 |
| | USK2D2824YI | 51874 | USK2D2824C4YP2 | 51552 | USK2D2824C5YP2 | 51567 | USK2D2824C6YP2 | 51582 |
| 813 mm (32") | USKD3224YI | 51860 | USKD3224C4YP2 | 51508 | USKD3224C5YP2 | 51523 | USKD3224C6YP2 | 51538 |
| | USK2D3224YI | 51875 | USK2D3224C4YP2 | 51553 | USK2D3224C5YP2 | 51568 | USK2D3224C6YP2 | 51583 |
| 914 mm (36") | USKD3624YI | 51861 | USKD3624C4YP2 | 51509 | USKD3624C5YP2 | 51524 | USKD3624C6YP2 | 51539 |
| | USK2D3624YI | 51876 | USK2D3624C4YP2 | 51554 | USK2D3624C5YP2 | 51569 | USK2D3624C6YP2 | 51584 |
| 1016 mm (40") | USKD4024YI | 51862 | USKD4024C4YP2 | 51510 | USKD4024C5YP2 | 51525 | USKD4024C6YP2 | 51540 |
| | USK2D4024YI | 51877 | USK2D4024C4YP2 | 51555 | USK2D4024C5YP2 | 51570 | USK2D4024C6YP2 | 51585 |
| 1118 mm (44") | USKD4424YI | 51863 | USKD4424C4YP2 | 51511 | USKD4424C5YP2 | 51526 | USKD4424C6YP2 | 51541 |
| | USK2D4424YI | 51878 | USK2D4424C4YP2 | 51556 | USK2D4424C5YP2 | 51571 | USK2D4424C6YP2 | 51586 |
| 1219 mm (48") | USKD4824YI | 51864 | USKD4824C4YP2 | 51512 | USKD4824C5YP2 | 51527 | USKD4824C6YP2 | 51542 |
| | USK2D4824YI | 51879 | USK2D4824C4YP2 | 51557 | USK2D4824C5YP2 | 51572 | USK2D4824C6YP2 | 51587 |
| 1422 mm (56") | USKD5612YI | 51865 | USKD5612C4YP2 | 51513 | USKD5612C5YP2 | 51528 | USKD5612C6YP2 | 51543 |
| | USK2D5612YI | 51880 | USK2D5612C4YP2 | 51558 | USK2D5612C5YP2 | 51573 | USK2D5612C6YP2 | 51588 |
| 1626 mm (64") | USKD6412YI | 51866 | USKD6412C4YP2 | 51514 | USKD6412C5YP2 | 51529 | USKD6412C6YP2 | 51544 |
| | USK2D6412YI | 51881 | USK2D6412C4YP2 | 51559 | USK2D6412C5YP2 | 51574 | USK2D6412C6YP2 | 51589 |
| 1829 mm (72") | USKD7212YI | 51867 | USKD7212C4YP2 | 51516 | USKD7212C5YP2 | 51530 | USKD7212C6YP2 | 51545 |
| | USK2D7212YI | 51882 | USK2D7212C4YP2 | 51560 | USK2D7212C5YP2 | 51575 | USK2D7212C6YP2 | 51590 |

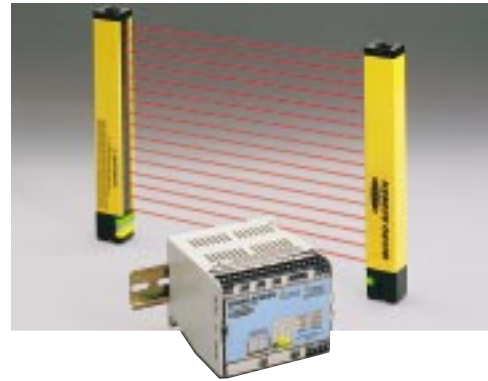
MICRO-SCREEN Metal Control Modules, 115/230V ac

| Blanking Configuration | Model Number | Part Number |
|---|--------------|-------------|
| Control Module with Floating Blanking | USCD-1T2 | 51225 |
| Control Module with Floating and Fixed Blanking | USCD-2T2 | 51224 |

MICRO-SCREEN™ Kits with DIN Control Module, 24V dc

Pre-packaged MICRO-SCREEN kits with DIN control modules.

To simplify ordering, these pre-packaged kits include a 35 mm DIN-rail- or cabinet-mountable control module, an emitter and receiver of equal length, plus mounting hardware, and a choice of four cable options: two 7.6 m (25') integral cables; two 4.6 m (15') "pigtail" quick-disconnect cables; two 7.6 m (25') "pigtail" quick-disconnect cables; or one each, 4.6 m (15') and 7.6 m (25') "pigtail" quick-disconnect cables. Control modules can be ordered separately; see chart below. Emitters, receivers and cables can also be ordered separately; see charts on page 13.



MICRO-SCREEN Kits

Light Screens and Floating Blanking

Light Screens with Floating and Fixed Blanking

| Screen Height | Kit with two 7.6 m (25') integral cables, Model Number | Part Number | Kit with two 4.6 m (15') "Pigtail" QD cables, Model Number | Part Number | Kit with two 7.6 m (25') "Pigtail" QD cables, Model Number | Part Number | Kit with one 4.6 m (15') & one 7.6 m (25') "Pigtail" QD cable, Model Number | Part Number |
|---------------|--|-------------|--|-------------|--|-------------|---|-------------|
| 102 mm (4") | USDKT424YI | 42524 | USDKT424C4YP2 | 49625 | USDKT424C5YP2 | 49637 | USDKT424C6YP2 | 49649 |
| | USDK2T424YI | 42536 | USDK2T424C4YP2 | 49661 | USDK2T424C5YP2 | 49673 | USDK2T424C6YP2 | 49685 |
| 203 mm (8") | USDKT824YI | 42525 | USDKT824C4YP2 | 49626 | USDKT824C5YP2 | 49638 | USDKT824C6YP2 | 49650 |
| | USDK2T824YI | 42537 | USDK2T824C4YP2 | 49662 | USDK2T824C5YP2 | 49674 | USDK2T824C6YP2 | 49686 |
| 305 mm (12") | USDKT1224YI | 42526 | USDKT1224C4YP2 | 49627 | USDKT1224C5YP2 | 49639 | USDKT1224C6YP2 | 49651 |
| | USDK2T1224YI | 42538 | USDK2T1224C4YP2 | 49663 | USDK2T1224C5YP2 | 49675 | USDK2T1224C6YP2 | 49687 |
| 406 mm (16") | USDKT1624YI | 42527 | USDKT1624C4YP2 | 49628 | USDKT1624C5YP2 | 49640 | USDKT1624C6YP2 | 49652 |
| | USDK2T1624YI | 42539 | USDK2T1624C4YP2 | 49664 | USDK2T1624C5YP2 | 49676 | USDK2T1624C6YP2 | 49688 |
| 508 mm (20") | USDKT2024YI | 42528 | USDKT2024C4YP2 | 49629 | USDKT2024C5YP2 | 49641 | USDKT2024C6YP2 | 49653 |
| | USDK2T2024YI | 42540 | USDK2T2024C4YP2 | 49665 | USDK2T2024C5YP2 | 49677 | USDK2T2024C6YP2 | 49689 |
| 610 mm (24") | USDKT2424YI | 42529 | USDKT2424C4YP2 | 49630 | USDKT2424C5YP2 | 49642 | USDKT2424C6YP2 | 49654 |
| | USDK2T2424YI | 42541 | USDK2T2424C4YP2 | 49666 | USDK2T2424C5YP2 | 49678 | USDK2T2424C6YP2 | 49690 |
| 711 mm (28") | USDKT2824YI | 42530 | USDKT2824C4YP2 | 49631 | USDKT2824C5YP2 | 49643 | USDKT2824C6YP2 | 49655 |
| | USDK2T2824YI | 42542 | USDK2T2824C4YP2 | 49667 | USDK2T2824C5YP2 | 49679 | USDK2T2824C6YP2 | 49691 |
| 813 mm (32") | USDKT3224YI | 42531 | USDKT3224C4YP2 | 49632 | USDKT3224C5YP2 | 49644 | USDKT3224C6YP2 | 49656 |
| | USDK2T3224YI | 42543 | USDK2T3224C4YP2 | 49668 | USDK2T3224C5YP2 | 49680 | USDK2T3224C6YP2 | 49692 |
| 914 mm (36") | USDKT3624YI | 42532 | USDKT3624C4YP2 | 49633 | USDKT3624C5YP2 | 49645 | USDKT3624C6YP2 | 49657 |
| | USDK2T3624YI | 42544 | USDK2T3624C4YP2 | 49669 | USDK2T3624C5YP2 | 49681 | USDK2T3624C6YP2 | 49693 |
| 1016 mm (40") | USDKT4024YI | 42533 | USDKT4024C4YP2 | 49634 | USDKT4024C5YP2 | 49646 | USDKT4024C6YP2 | 49658 |
| | USDK2T4024YI | 42545 | USDK2T4024C4YP2 | 49670 | USDK2T4024C5YP2 | 49682 | USDK2T4024C6YP2 | 49694 |
| 1118 mm (44") | USDKT4424YI | 42534 | USDKT4424C4YP2 | 49635 | USDKT4424C5YP2 | 49647 | USDKT4424C6YP2 | 49659 |
| | USDK2T4424YI | 42546 | USDK2T4424C4YP2 | 49671 | USDK2T4424C5YP2 | 49683 | USDK2T4424C6YP2 | 49695 |
| 1219 mm (48") | USDKT4824YI | 42535 | USDKT4824C4YP2 | 49636 | USDKT4824C5YP2 | 49648 | USDKT4824C6YP2 | 49660 |
| | USDK2T4824YI | 42547 | USDK2T4824C4YP2 | 49672 | USDK2T4824C5YP2 | 49684 | USDK2T4824C6YP2 | 49696 |
| 1422 mm (56") | USDKT5612YI | 51718 | USDKT5612C4YP2 | 51700 | USDKT5612C5YP2 | 51703 | USDKT5612C6YP2 | 51706 |
| | USDK2T5612YI | 51721 | USDK2T5612C4YP2 | 51709 | USDK2T5612C5YP2 | 51712 | USDK2T5612C6YP2 | 51715 |
| 1626 mm (64") | USDKT6412YI | 51719 | USDKT6412C4YP2 | 51701 | USDKT6412C5YP2 | 51704 | USDKT6412C6YP2 | 51707 |
| | USDK2T6412YI | 51722 | USDK2T6412C4YP2 | 51710 | USDK2T6412C5YP2 | 51713 | USDK2T6412C6YP2 | 51716 |
| 1829 mm (72") | USDKT7212YI | 51720 | USDKT7212C4YP2 | 51702 | USDKT7212C5YP2 | 51705 | USDKT7212C6YP2 | 51708 |
| | USDK2T7212YI | 51723 | USDK2T7212C4YP2 | 51711 | USDK2T7212C5YP2 | 51714 | USDK2T7212C6YP2 | 51717 |

MICRO-SCREEN DIN Control Modules, 24V dc

| Blanking Configuration | Model Number | Part Number |
|---|--------------|-------------|
| Control Module with Floating Blanking | USDINT-1T2 | 48536 |
| Control Module with Floating and Fixed Blanking | USDINT-2T2 | 49785 |

MICRO-SCREEN™ Kits with DeviceNet DIN Control Module, 24V dc

Pre-packaged MICRO-SCREEN kits with DeviceNet DIN control modules.

To simplify ordering, these pre-packaged kits include a DeviceNet, 35 mm DIN-rail- or cabinet-mountable control module, an emitter and receiver of equal length, plus mounting hardware, and a choice of four cable options: two 7.6 m (25') integral cables; two 4.6 m (15') "pigtail" quick-disconnect cables; two 7.6 m (25') "pigtail" quick-disconnect cables; or one each, 4.6 m (15') and 7.6 m (25') "pigtail" quick-disconnect cables. Control modules can be ordered separately. See chart below. Emitters, receivers and cables can also be ordered separately; see charts on page 13.



MICRO-SCREEN Kits

Light Screens with Floating Blanking

Light Screens with Floating and Fixed Blanking

| Screen Height | Kit with two 7.6 m (25') integral cables, Model Number | Part Number | Kit with two 4.6 m (15') "Pigtail" QD cables, Model Number | Part Number | Kit with two 7.6 m (25') "Pigtail" QD cables, Model Number | Part Number | Kit with one 4.6 m (15') & one 7.6 m (25') "Pigtail" QD cable, Model Number | Part Number |
|---------------|--|-------------|--|-------------|--|-------------|---|-------------|
| 102 mm (4") | USDKTD424YI | 42548 | USDKTD424C4YP2 | 49697 | USDKTD424C5YP2 | 49709 | USDKTD424C6YP2 | 49721 |
| | USDK2TD424YI | 42560 | USDK2TD424C4YP2 | 49733 | USDK2TD424C5YP2 | 49745 | USDK2TD424C6YP2 | 49757 |
| 203 mm (8") | USDKTD824YI | 42549 | USDKTD824C4YP2 | 49698 | USDKTD824C5YP2 | 49710 | USDKTD824C6YP2 | 49722 |
| | USDK2TD824YI | 42561 | USDK2TD824C4YP2 | 49734 | USDK2TD824C5YP2 | 49746 | USDK2TD824C6YP2 | 49758 |
| 305 mm (12") | USDKTD1224YI | 42550 | USDKTD1224C4YP2 | 49699 | USDKTD1224C5YP2 | 49711 | USDKTD1224C6YP2 | 49723 |
| | USDK2TD1224YI | 42562 | USDK2TD1224C4YP2 | 49735 | USDK2TD1224C5YP2 | 49747 | USDK2TD1224C6YP2 | 49759 |
| 406 mm (16") | USDKTD1624YI | 42551 | USDKTD1624C4YP2 | 49700 | USDKTD1624C5YP2 | 49712 | USDKTD1624C6YP2 | 49724 |
| | USDK2TD1624YI | 42563 | USDK2TD1624C4YP2 | 49736 | USDK2TD1624C5YP2 | 49748 | USDK2TD1624C6YP2 | 49760 |
| 508 mm (20") | USDKTD2024YI | 42552 | USDKTD2024C4YP2 | 49701 | USDKTD2024C5YP2 | 49713 | USDKTD2024C6YP2 | 49725 |
| | USDK2TD2024YI | 42564 | USDK2TD2024C4YP2 | 49737 | USDK2TD2024C5YP2 | 49749 | USDK2TD2024C6YP2 | 49761 |
| 610 mm (24") | USDKTD2424YI | 42553 | USDKTD2424C4YP2 | 49702 | USDKTD2424C5YP2 | 49714 | USDKTD2424C6YP2 | 49726 |
| | USDK2TD2424YI | 42565 | USDK2TD2424C4YP2 | 49738 | USDK2TD2424C5YP2 | 49750 | USDK2TD2424C6YP2 | 49762 |
| 711 mm (28") | USDKTD2824YI | 42554 | USDKTD2824C4YP2 | 49703 | USDKTD2824C5YP2 | 49715 | USDKTD2824C6YP2 | 49727 |
| | USDK2TD2824YI | 42566 | USDK2TD2824C4YP2 | 49739 | USDK2TD2824C5YP2 | 49751 | USDK2TD2824C6YP2 | 49763 |
| 813 mm (32") | USDKTD3224YI | 42555 | USDKTD3224C4YP2 | 49704 | USDKTD3224C5YP2 | 49716 | USDKTD3224C6YP2 | 49728 |
| | USDK2TD3224YI | 42567 | USDK2TD3224C4YP2 | 49740 | USDK2TD3224C5YP2 | 49752 | USDK2TD3224C6YP2 | 49764 |
| 914 mm (36") | USDKTD3624YI | 42556 | USDKTD3624C4YP2 | 49705 | USDKTD3624C5YP2 | 49717 | USDKTD3624C6YP2 | 49729 |
| | USDK2TD3624YI | 42568 | USDK2TD3624C4YP2 | 49741 | USDK2TD3624C5YP2 | 49753 | USDK2TD3624C6YP2 | 49765 |
| 1016 mm (40") | USDKTD4024YI | 42557 | USDKTD4024C4YP2 | 49706 | USDKTD4024C5YP2 | 49718 | USDKTD4024C6YP2 | 49730 |
| | USDK2TD4024YI | 42569 | USDK2TD4024C4YP2 | 49742 | USDK2TD4024C5YP2 | 49754 | USDK2TD4024C6YP2 | 49766 |
| 1118 mm (44") | USDKTD4424YI | 42558 | USDKTD4424C4YP2 | 49707 | USDKTD4424C5YP2 | 49719 | USDKTD4424C6YP2 | 49731 |
| | USDK2TD4424YI | 42570 | USDK2TD4424C4YP2 | 49743 | USDK2TD4424C5YP2 | 49755 | USDK2TD4424C6YP2 | 49767 |
| 1219 mm (48") | USDKTD4824YI | 42559 | USDKTD4824C4YP2 | 49708 | USDKTD4824C5YP2 | 49720 | USDKTD4824C6YP2 | 49732 |
| | USDK2TD4824YI | 42571 | USDK2TD4824C4YP2 | 49744 | USDK2TD4824C5YP2 | 49756 | USDK2TD4824C6YP2 | 49768 |
| 1422 mm (56") | USDKTD5612YI | 51742 | USDKTD5612C4YP2 | 51724 | USDKTD5612C5YP2 | 51727 | USDKTD5612C6YP2 | 51730 |
| | USDK2TD5612YI | 51745 | USDK2TD5612C4YP2 | 51733 | USDK2TD5612C5YP2 | 51736 | USDK2TD5612C6YP2 | 51739 |
| 1626 mm (64") | USDKTD6412YI | 51743 | USDKTD6412C4YP2 | 51725 | USDKTD6412C5YP2 | 51728 | USDKTD6412C6YP2 | 51731 |
| | USDK2TD6412YI | 51746 | USDK2TD6412C4YP2 | 51734 | USDK2TD6412C5YP2 | 51737 | USDK2TD6412C6YP2 | 51740 |
| 1829 mm (72") | USDKTD7212YI | 51744 | USDKTD7212C4YP2 | 51726 | USDKTD7212C5YP2 | 51729 | USDKTD7212C6YP2 | 51732 |
| | USDK2TD7212YI | 51747 | USDK2TD7212C4YP2 | 51735 | USDK2TD7212C5YP2 | 51738 | USDK2TD7212C6YP2 | 51741 |

MICRO-SCREEN DeviceNet DIN Control Modules, 24V dc

| Blanking Configuration | Model Number | Part Number |
|---|--------------|-------------|
| Control Module with Floating Blanking | USDINT-1T2D | 48772 |
| Control Module with Floating and Fixed Blanking | USDINT-2T2D | 49786 |

MICRO-SCREEN™ Emitters, Receivers and Light Screen Accessories

MICRO-SCREEN Emitters and Receivers*

■ MICRO-SCREEN Emitters ■ MICRO-SCREEN Receivers

| Screen Height | With 30mm (12") "Pigtail" QD Cable** Model Number | Part Number | With 7.6 m (25') Integral Cable Model Number | Part Number |
|---------------|---|-------------|--|-------------|
| 102mm (4") | USE424YP2 | 49601 | USE424YI | 42500 |
| | USR424YP2 | 49602 | USR424YI | 42501 |
| 203 mm (8") | USE824YP2 | 49603 | USE824YI | 42502 |
| | USR824YP2 | 49604 | USR824YI | 42503 |
| 305 mm (12") | USE1224YP2 | 49605 | USE1224YI | 42504 |
| | USR1224YP2 | 49606 | USR1224YI | 42505 |
| 406 mm (16") | USE1624YP2 | 49607 | USE1624YI | 42506 |
| | USR1624YP2 | 49608 | USR1624YI | 42507 |
| 508 mm (20") | USE2024YP2 | 49609 | USE2024YI | 42508 |
| | USR2024YP2 | 49610 | USR2024YI | 42509 |
| 610 mm (24") | USE2424YP2 | 49611 | USE2424YI | 42510 |
| | USR2424YP2 | 49612 | USR2424YI | 42511 |
| 711 mm (28") | USE2824YP2 | 49613 | USE2824YI | 42512 |
| | USR2824YP2 | 49614 | USR2824YI | 42513 |
| 813 mm (32") | USE3224YP2 | 49615 | USE3224YI | 42514 |
| | USR3224YP2 | 49616 | USR3224YI | 42515 |
| 914 mm (36") | USE3624YP2 | 49617 | USE3624YI | 42516 |
| | USR3624YP2 | 49618 | USR3624YI | 42517 |
| 1016 mm (40") | USE4024YP2 | 49619 | USE4024YI | 42518 |
| | USR4024YP2 | 49620 | USR4024YI | 42519 |
| 1118 mm (44") | USE4424YP2 | 49621 | USE4424YI | 42520 |
| | USR4424YP2 | 49622 | USR4424YI | 42521 |
| 1219 mm (48") | USE4824YP2 | 49623 | USE4824YI | 42522 |
| | USR4824YP2 | 49624 | USR4824YI | 42523 |
| 1422 mm (56") | USE5612YP2 | 51308 | USE5612YI | 51314 |
| | USR5612YP2 | 51309 | USR5612YI | 51315 |
| 1626 mm (64") | USE6412YP2 | 51310 | USE6412YI | 51316 |
| | USR6412YP2 | 51311 | USR6412YI | 51317 |
| 1829 mm (72") | USE7212YP2 | 51312 | USE7212YI | 51318 |
| | USR7212YP2 | 51313 | USR7212YI | 51319 |

* Order in pairs of the same screen height, one emitter and one receiver.

** Requires mating cable; one for each emitter, one for each receiver. Order below, right.

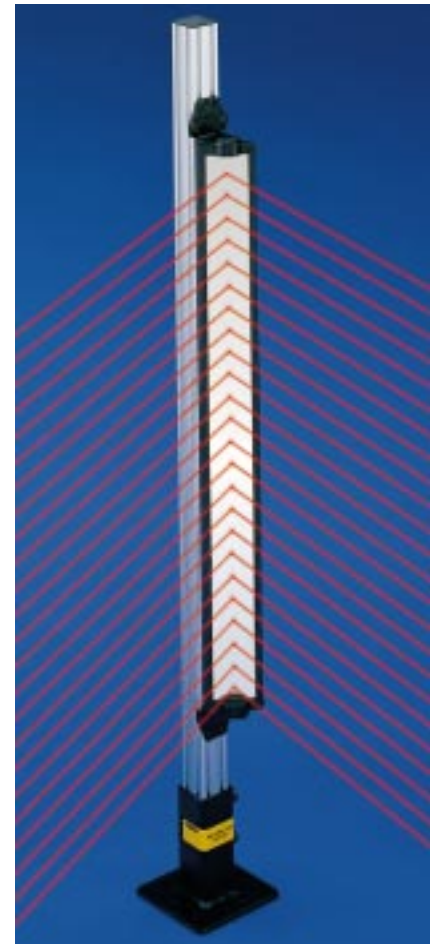
MSM Series Corner Mirrors

| Mirror Height | Model Number | Part Number | Mirror Height | Model Number | Part Number |
|----------------|--------------|-------------|---------------|--------------|-------------|
| 165 mm (6.5") | MSM4A | 43162 | 762 mm (30") | MSM28A | 43168 |
| 267 mm (10.5") | MSM8A | 43163 | 864 mm (34") | MSM32A | 43169 |
| 356 mm (14") | MSM12A | 43164 | 965 mm (38") | MSM36A | 43170 |
| 457 mm (18") | MSM16A | 43165 | 1067 mm (42") | MSM40A | 43171 |
| 559 mm (22") | MSM20A | 43166 | 1168 mm (46") | MSM44A | 43172 |
| 660 mm (26") | MSM24A | 43167 | 1270 mm (50") | MSM48A | 43173 |

MSA Series Stands

| Stand Height | Mirror/Screen Height* | Model Number | Part Number |
|---------------|----------------------------|--------------|-------------|
| 610 mm (24") | 102 to 356 mm (4" to 14") | MSA-S24-1 | 43174 |
| 1067 mm (42") | 102 to 762 mm (4" to 30") | MSA-S42-1 | 43175 |
| 1676 mm (66") | 102 to 1270 mm (4" to 50") | MSA-S66-1 | 43176 |
| 2134 mm (84") | 102 to 1829 mm (4" to 72") | MSA-S84-1 | 52397 |

* Maximum available mirror height is 1270 mm (50")



Optional corner mirrors and stands.

For multi-sided or perimeter guarding, compact, lightweight MSM Series corner mirrors are available in 12 different lengths for use with MICRO-SCREEN Systems. MSA Series stands include a welded steel base and heavy-gauge aluminum pole. They are available in three sizes to support the mirrors or MICRO-SCREEN emitters and receivers. Dual-channel design allows easy, accurate height adjustment.

MICRO-SCREEN Cables

| Cable Length | Cable Model Number | Cable Part Number |
|--------------|--------------------|-------------------|
| 4.6 m (15') | QDU-515C | 46391 |
| 7.6 m (25') | QDU-525C | 46392 |
| 15.3 m (50') | QDU-550C | 46393 |

MICRO-SCREEN™ General Specifications and Dimensions

Specifications: MICRO-SCREEN Systems

Height of defined area: 102 mm (4") to 1828 mm (72"), depending on emitter and receiver length. 12 models in 102 mm (4") increments: 102 mm to 1219 mm (4" to 48"); 3 models in 203 mm (8") increments: 1422 mm to 1828 mm (56" to 72").

Emitter/receiver separation: For 102 mm to 1219 mm (4" to 48") models: 152 mm to 9 m (6" to 30'). For 1422 mm to 1828 mm (56" to 72") models: 152 mm to 6 m (6" to 20').

Beam spacing: For 102 mm to 1219 mm (4" to 48") models: 12.7 mm (0.5"). For 1422 mm to 1828 mm (56" to 72") models: 25.4 mm (1.0").

Minimum object sensitivity: For 102 mm to 1219 mm (4" to 48") models: 19.1 mm (0.75") with no floating blanking in use; 31.8 mm (1.25") with 1-beam floating blanking on; 44.5 mm (1.75") with 2-beam floating blanking on. For 1422 mm to 1828 mm (56" to 72") models: 31.8 mm with no floating blanking in use; 57.5 mm (2.25") with 1-beam floating blanking on; 82.6 mm (3.25") with 2-beam floating blanking on.

Response time: Less than 38 milliseconds for all system lengths. Less than 15 milliseconds for E-Stop input.

Self-checking interval: 20 milliseconds.

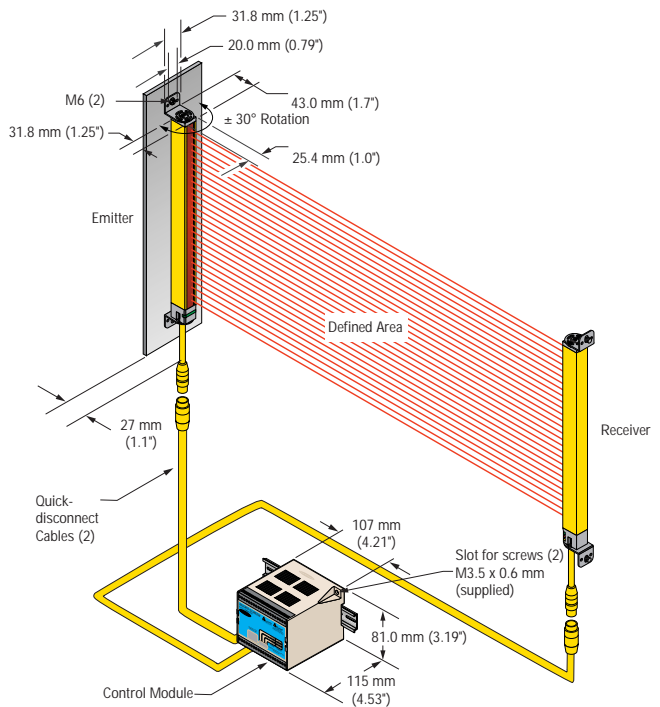
Ambient light immunity: >10,000 lux @ 5° angle of incidence.

Strobe light immunity: Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe.

Emitter elements: Infrared LEDs, 880 nm peak emission.

Operating temperature: 0° to 50°C (32°F to 122°F).

Emitter and receiver enclosure: Material: Aluminum, yellow polyester painted finish; acrylic lens cover. Rating: NEMA 4, 13; IEC IP65.



DIN-Rail-Mountable Control Module

System power requirements: 24V dc ±10% maximum ripple, 1.5 amps max.

Fuse ratings: 2 amp, 250 V (3AG or 5 x 20 mm slow blow)

Emergency Stop switch input: Emergency Stop switch must offer two normally closed contacts and be capable of switching 50 mA @ 30V dc. Function stop category 0 per NFPA 79 and EN 418, Safety Category 4 per EN 954-1.

Auxiliary monitor relay: Reed relay; 125 V ac or dc max., 500 mA max. (10VA maximum, resistive load).

Output configurations for FSD1, FSD2, and SSD: Forced-guided contact relays, 250V ac max., 4 amps max. (resistive load). Mechanical life of 10,000,000 operations (minimum). Electrical life of 100,000 operations at full load (typical).

Enclosure: Material: Grey polycarbonate, clear polycarbonate cover. Rating: NEMA 1; IEC IP20.

DIN-Rail-Mountable Control Module with DeviceNet™

DeviceNet power: 11 to 25V dc; 80mA supplied by DeviceNet Bus Network

DeviceNet connection options: Explicit Message; I/O Message; Change of State; and Poll are all supported through controller.

Metal Control Box

System power requirements: 115/230V ac ±15% (50/60Hz), 55VA

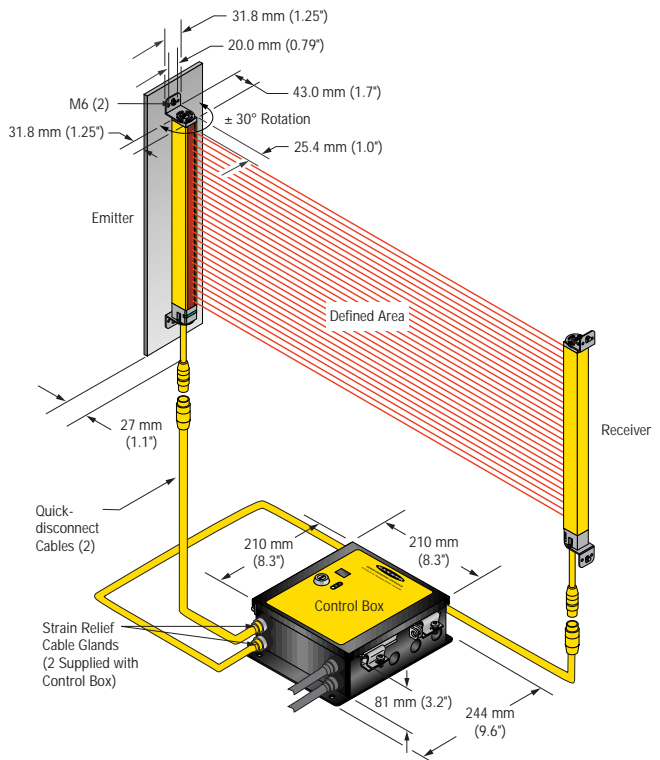
Fuse ratings: 115V ac: 1 amp, 250V ac; 230V ac: 1/2 amp, 250 V

Emergency Stop switch input: Emergency Stop switch must offer two normally closed contacts and be capable of switching 50 mA @ 30V dc. Function stop category 0 per NFPA 79 and EN 418, Safety Category 4 per EN 954-1.

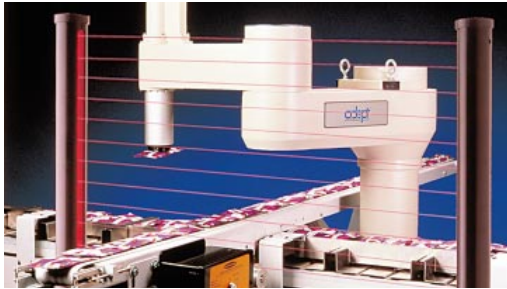
Auxiliary monitor relay: Reed relay; 125 V ac or dc max., 500 mA max. (10VA maximum, resistive load).

Output configurations for FSD1, FSD2, and SSD4: Forced-guided contact relays, 250V ac max., 4 amps max. (resistive load). Mechanical life of 10,000,000 operations (minimum). Electrical life of 100,000 operations at full load (typical).

Enclosure: Material: Welded steel box with black polyester powder paint finish. Rating: NEMA 13; IEC IP64



Additional Machine Safety Products from Banner



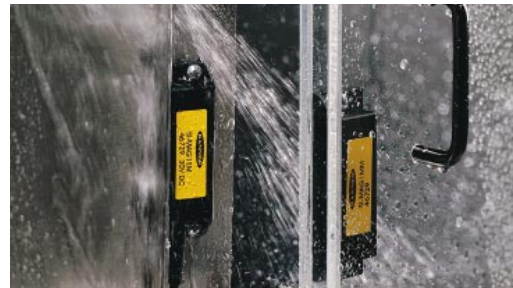
MACHINE-GUARD Light Screens. Rugged, full-size light screens in 57 mm (2¼") aluminum tubing for demanding environments such as dust, dirt, fog or mist. Sizes from 152 to 1829 mm (6" to 6'), with ranges up to 13.7 m (45'), rated NEMA 4, 13 and IEC IP65.



Safety Interlock Switches. Remove power to protected machinery if guarding is removed, or ensure that guards are locked in place until machine operating sequence is complete. Dozens of models in limit switch styles, locking types and flat pack styles.



MINI-SCREEN® Light Screens. Compact, esthetic light screens in 38 by 38 mm (1½" x 1½") rectangular tubes. Choose metal or DIN rail mountable enclosure. Standard 9 m (30') or optional 18 m (60') range. Complies with new UL 1998 software standard.



Magnetic Safety Switches. Include a coded magnet, reed switch sensor and 1/2" controller module. Withstand repeated hose washdown and are tolerant to dirt buildup, sensing distance and alignment. Sealed design achieves NEMA 4X and IEC IP67 rating.



MULTI-SCREEN® Light Screens. Allow two light screens to be connected to the same controller to guard two areas, providing significant cost savings. Includes control box, two emitters and two receivers. MACHINE-GUARD or MINI-SCREEN emitters and receivers.



DUO-TOUCH® Two-hand Controls. Machine safety device meets EN 574 standards, and requires the use of both hands of one person closing both inputs simultaneously to start and maintain a normal machine cycle. Triple-redundant output design.



PERIMETER-GUARD Systems. Monitor the boundary around a machine, robot or assembly system to detect any intrusion into the hazardous area. Control can be two-, three- or four-sided using Banner corner mirrors and one emitter/receiver pair.



Safety Relays. Monitor against contact failures or wiring faults in Emergency Stop switch and relay circuits. Failures cause the relay output to be disabled and not able to be reset. Approved by UL® as category NISD emergency stop devices.

Banner: Industry's number one supplier of photoelectric systems.

When you buy your machine safety equipment from Banner, you gain the confidence of dealing with the nation's largest, most knowledgeable and experienced photoelectric company. We have the broadest line of products and the most advanced manufacturing capabilities in the industry. We can handle any size order, large or small, utilizing the most advanced manufacturing capabilities. We can deliver any of more than 10,000 different products in just three days—most can ship within hours!

Just as important, we have the largest photoelectric sales and support network in the industry, a collection of the industry's most knowledgeable distributors and sales engineers, available worldwide. We're close by wherever you're located, and we're ready to help you with your applications, plus give you excellent service support.

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Banner Engineering Corporation
P.O. Box 9414
Minneapolis, MN 55440 U.S.A.
Phone (612) 544-3164
FAX (612) 544-3213
www.baneng.com
email: sensors@baneng.com

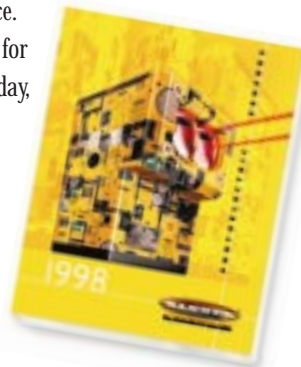
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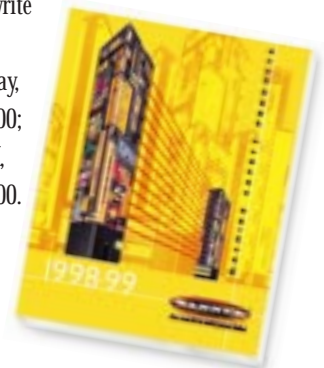
The Banner Sensor Catalog and CD ROM.

The industry's most complete catalog; over 700 pages of detailed product and technical information on over 10,000 photoelectric and ultrasonic sensors. Simple selection charts make specifying the correct sensors easier than ever. Additional technical information includes hook-up diagrams and application notes, plus complete specifications, glossary of terms and data reference. Call or write for your copy today, P/N 98000; CD ROM, P/N 98100.



The Banner Safety Products Catalog and CD ROM.

A complete catalog of Machine Safety Products including Banner's extensive line of safety light screen controllers, emitters and receivers, including MICRO-SCREEN™, MINI-SCREEN®, MACHINE-GUARD, MULTI-SCREEN® Dual Systems and PERIMETER-GUARD Systems. Also included are Banner's two-hand anti-tiedown controls and full line of safety interlock switches, E-stop relays and safety relays. Call or write for your copy today, P/N 98500; CD ROM, P/N 98100.



IMPORTANT NOTICE

The product information and applications presented in this brochure are descriptive only. These descriptions are not for use as system installation information. Banner has made every effort to provide complete application, installation, operation, and maintenance information in the instructions supplied with each product. Copies of the instructions are available; contact the factory or your local Banner sales office.