VALU-BEAM® "990" Series
Sensors with Built-in Totalizing Counter

BANNER®
the photoelectric specialist

VALU-BEAM 990 series sensors boast the same high optical performance offered by the front-line 912-series, and also contain a built-in 6-digit totalizing counter. Sensor models are available for opposed, retroreflective, and convergent beam sensing modes. In addition, there are models for use with both glass and plastic fiberoptics.

A special infrared retroreflective version is available, which is designed for counting people passing through entry ways. It has built-in on/off time delays to minimize the chance of multiple counts.

The "990" series VALU-BEAM's 6-digit LCD counter is reset simply by touching the area of the housing shown with the permanent magnet supplied with the sensor (see dimension drawing, below). Standard models automatically reset to zero upon power-up.

Memory backup option: SMA990 series sensors with internal memory backup for maintaining "count memory" while power is removed are available by special order. These models will "hold" a count for over 100 hours, and are indicated by the model number suffix "MB" (i.e., "SMA990LVMB" is the memory backup version of sensor model SMA990LV). Contact the factory for availablility and pricing of these models.

SMA990-series sensors wire directly to either 10 to 250V ac (50/60Hz) or 12 to 115V dc.

SPECIFICATIONS, SMA990 SERIES VALU-BEAM SENSORS

SUPPLY VOLTAGE: 10 to 250V ac, 50/60Hz or 12 to 115V dc at less than 20 milliamps.

SENSOR RESPONSE: 15 milliseconds LIGHT, 15 milliseconds DARK. 100 millisecond delay on power up (no counts are entered during this time). Models with memory backup have no power-up delay. *Note: Some models with memory backup may increment 1 count upon reapplication of power.*

COUNT ENTRY: counts are entered on DARK-to-LIGHT transition.

COUNT RESET: in *standard* models, counter is reset to zero automatically upon applying power to the sensor. All models may be reset by touching the housing on top of the sensor (see below) with a permanent magnet (supplied with sensor).

CONSTRUCTION: reinforced black Valox™ housing, totally encapsulated circuitry, molded o-ring sealed lenses or fiber fittings, stainless steel hardware. Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12, and 13.

CABLE: 6 feet (2m) of PVC-jacketed 2-conductor cable is standard. Three-pin quick-disconnect ("QD") models are available optionally (one conductor goes unused); see page 4.

INDICATOR LED: top-mounted red LED indicator lights whenever the sensor "sees" its modulated light source.

OPERATING TEMPERATURE RANGE: 0 to 50 degrees C (32 to 122 degrees F).

DIMENSIONS, SMA990-SERIES VALU-BEAMs
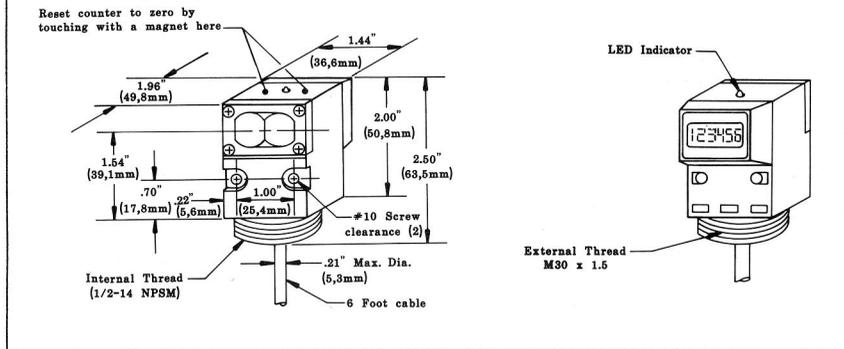
Reset counter to zero by touching with a magnet here

1.96" (49,8mm)
1.44" (36,6mm)
2.00" (50,8mm)
2.50" (63,5mm)
1.54" (39,1mm)
.70" (17,8mm)
.22" (5,6mm)
1.00" (25,4mm)
#10 Screw clearance (2)
Internal Thread (1/2-14 NPSM)
.21" Max. Dia. (5,3mm)
6 Foot cable

LED Indicator
123456
External Thread M30 x 1.5

HOOKUP DIAGRAM

L1   L2

+ Brown   Blue −

10 to 250V ac, 50/60Hz
or 12 to 115V dc

Observe proper polarity for DC hookups.
AC hookups have no polarity.
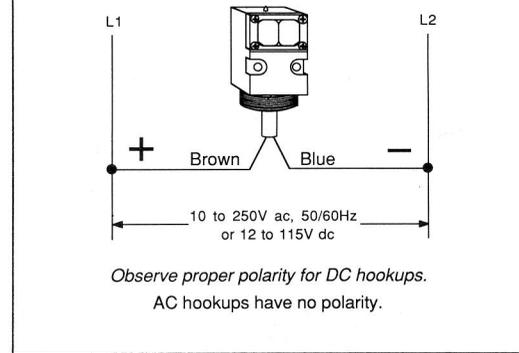
VALU-BEAM "990" Series Sensors

Sensing Mode	Models	Excess Gain	Beam Pattern
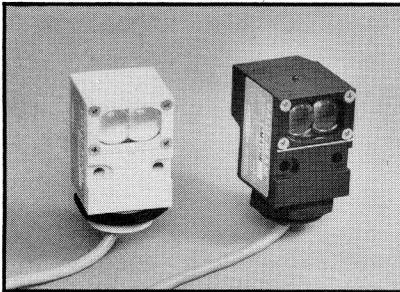
SMA91E & SMA99R

Voltage: 10 to 250V ac
or 12 to 115V dc;
("E": 10-250V ac/dc)
Range: 200 feet (60m)
Beam: infrared, 880nm;
visible red tracer beam
Effective beam: 0.5" dia.
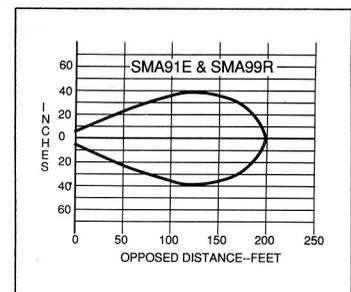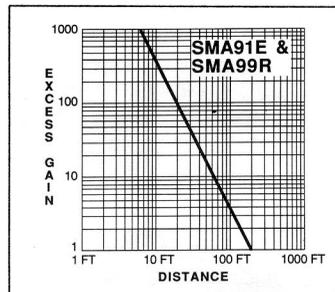
OPPOSED MODE
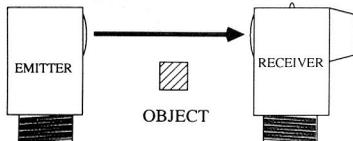
Opposed mode sensors have higher excess gain than other models, and therefore should be used whenever possible. Opposed mode is the most reliable sensing mode for counting opaque materials. The small size of these sensors makes them ideal for many conveyor applications, and their small effective beam size (particularly of the ESR/RSR models) enables them to reliably count relatively small objects. ESR and RSR models also have a wide beam angle for very forgiving alignment within the 10-foot range. VALU-BEAM opposed mode sensors have a visible red "tracer beam" which greatly simplifies sensor alignment.
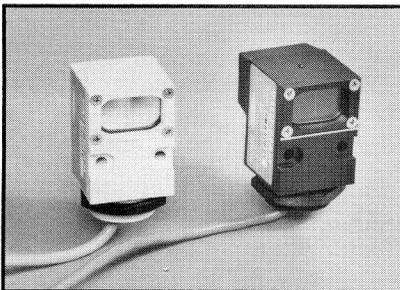
SMA91ESR & SMA99RSR

Voltage: 10 to 250V ac
or 12 to 115V dc; ("ESR": 10-250V ac/dc)
Range: 10 feet (3m)
Beam: infrared, 880nm;
visible red tracer beam
Effective beam: .12" dia.
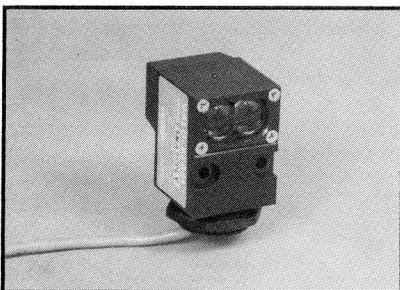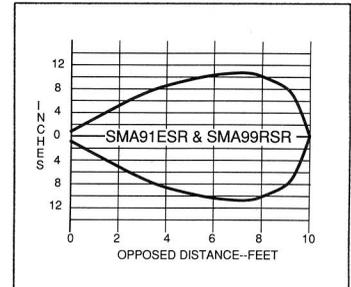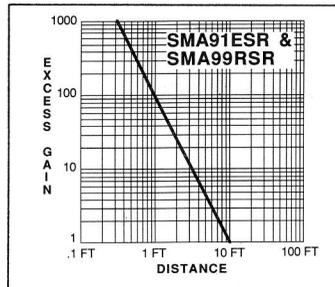
SMA990LV

Voltage: 10 to 250V ac
or 12 to 115V dc
Range: 6 inches to 30 feet (9m)
Beam: visible red, 650nm
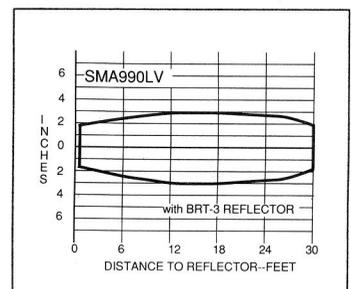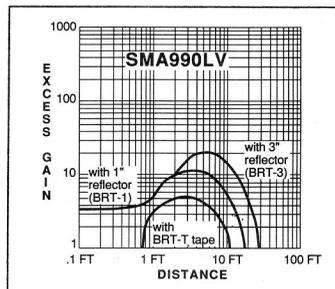
RETROREFLECTIVE MODE
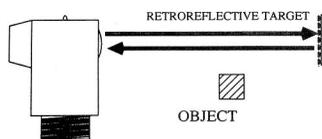
A visible-red light beam reduces the potential for false signals from highly reflective objects ("proxing") and simplifies alignment. *The AG (anti-glare) model polarizes the emitted light and filters out unwanted reflections,* making its use possible in applications otherwise unsuited to retroreflective sensing (and where reduced excess gain is acceptable). Maximum range with all units is attained when using the model BRT-3 3" corner cube retroreflector. See the Banner catalog for details about available retroreflective materials.
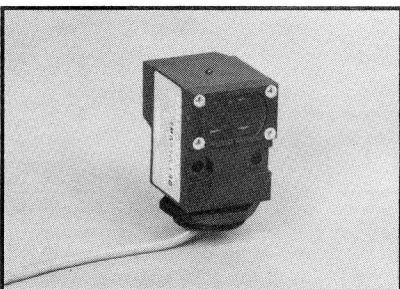
SMA990LVAG

("AG"= anti-glare filter)
Voltage: 10 to 250V ac
or 12 to 115V dc
Range: 1 to 15 feet (4.5m)
Beam: visible red, 650nm
(with polarizing filter)

VALU-BEAM "990" Series Sensors

| Sensing Mode	Models	Excess Gain	Beam Pattern

RETROREFLECTIVE MODE (continued)

SMA990LT

Voltage: 10 to 250V ac
or 12 to 115V dc
Range: 30 feet (9m)
Beam: infrared, 880nm

DOORWAY
Retro-reflector
SMA990LT

Excess Gain — SMA990LT
EXCESS GAIN vs DISTANCE (.1 FT to 100 FT)
with BRT-1 1" reflector
with BRT-3 3" reflector
with BRT-T tape
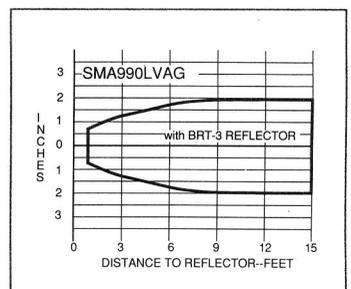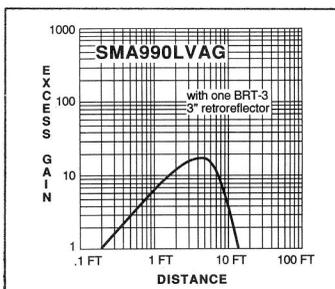
Beam Pattern — SMA990LT
INCHES vs DISTANCE TO REFLECTOR--FEET (0 to 32)
with BRT-3 reflector
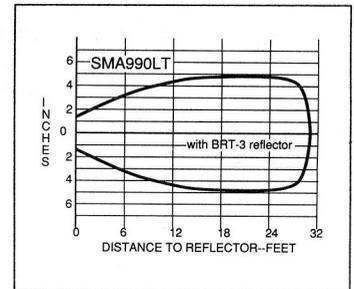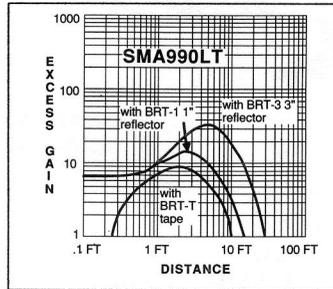
VALU-BEAM model SMA990LT is designed specifically for "people counting". Its strong (30 foot range) infrared beam is invisible to the eye, and a built-in one-tenth second on/off delay helps prevent multiple counts. Maximum retroreflective signal strength is attained when using the model BRT-3 corner-cube retroreflector. Other retroreflective materials may also be used (see the Banner catalog for descriptive information).
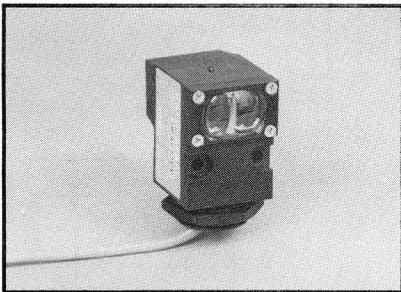
CONVERGENT MODE

SMA990CV

Voltage: 10 to 250V ac
or 12 to 115V dc
Focus at 1.5" (38mm)
Beam: visible red, 650nm

OBJECT

COUNTING GUIDED RADIUSED PRODUCTS

Excess Gain — SMA990CV
EXCESS GAIN vs DISTANCE (.1 IN to 100 IN)
(Range based on 90% reflectance white test card)

Beam Pattern — SMA990CV
INCHES vs DISTANCE TO 90% WHITE TEST CARD--INCHES (0 to 2.5)
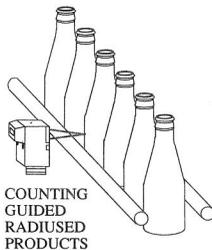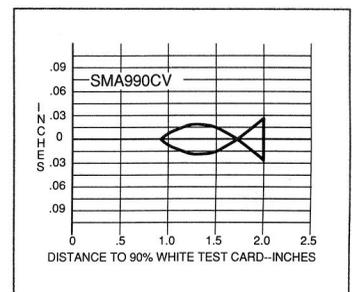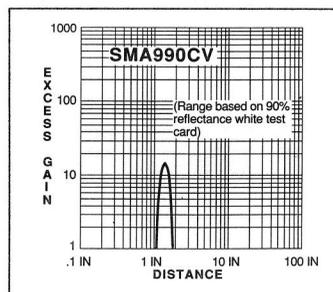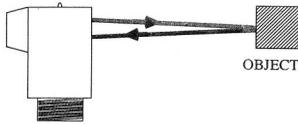
VALU-BEAM convergent sensors produce a precise .06" diameter visible red sensing spot at a focus point 1.5" in front of the sensor lens. Due to its very narrow depth of field, this model excels at counting small objects only a fraction of an inch away from backgrounds. This convergent sensor may be used for reliable counting of some radiused products which flow past at a *fixed distance* from the sensor lens.

FIBEROPTIC MODE (*plastic* fiberoptics)
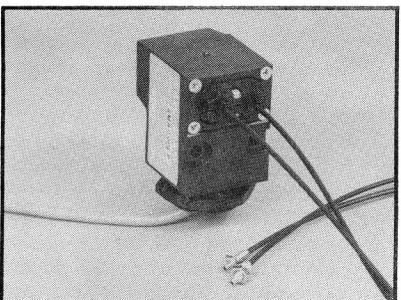
SMA990FP

Voltage: 10 to 250V ac
or 12 to 115V dc
Range: see E.G. curves
Beam: visible red, 650nm

The powerful *modulated visible beam* of this sensor makes it compatible with all Banner *plastic fiberoptic assemblies*. Banner plastic fibers are an economical alternative to glass fibers when environmental conditions allow (see below). Banner plastic fiberoptics are available in two core diameters and with various sensing tip styles. Standard length is 6 feet. More information on plastic fiberoptics may be found in the Banner catalog.

OPPOSED
OBJECT

DIFFUSE
OBJECT

Excess Gain — SMA990FP (Opposed)
EXCESS GAIN vs DISTANCE (.1 IN to 100 IN)
PIT46U, no lenses — Opposed mode, plastic fibers
PIT46U with L2 lenses
PIT26U, no lens

Beam Pattern — SMA990FP (Opposed)
INCHES vs OPPOSED DISTANCE--INCHES (0 to 5)
Opposed mode
PIT26U — PIT46U

Excess Gain — SMA990FP (Diffuse)
EXCESS GAIN vs DISTANCE (.01 IN to 10 IN)
Diffuse mode, plastic fibers
(Range based on 90% reflectance white test card)
with PBT46U fiber
with PBT26U fiber

Beam Pattern — SMA990FP (Diffuse)
INCHES vs DISTANCE TO 90% WHITE TEST CARD--INCHES (0 to 1.5)
PBT26U — PBT46U
Diffuse mode

ENVIRONMENTAL FACTORS FOR PLASTIC FIBEROPTICS

OPERATING TEMPERATURE OF FIBEROPTIC ASSEMBLIES: -30 to +70° C (-20 to +158° F).
CHEMICAL RESISTANCE OF FIBEROPTIC ASSEMBLIES: the acrylic core of the monofilament optical fiber will be damaged by contact with acids, strong bases (alkalis), and solvents. The polyethylene jacket will protect the optical fiber from most chemical environments; however, materials may migrate through the jacket with long-term exposure. Samples of plastic fiberoptic material are available from Banner for testing and evaluation.

VALU-BEAM "990" Series Sensors

Sensing Mode	Models	Excess Gain	Beam Pattern
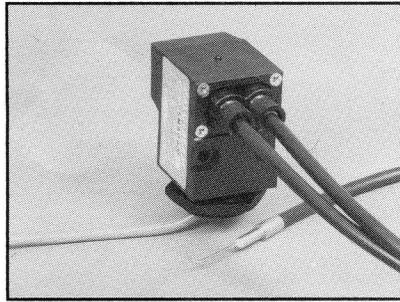
SMA990F
Voltage: 10 to 250V ac
or 12 to 115V dc
Range: see E.G. curves
Beam: infrared, 880nm

Fiberoptic sensing is often the answer when, due to space or environmental limitations, the sensor itself cannot be placed at the actual sensing position. This sensor's powerful modulated *infrared* beam is compatible with all Banner *glass* fiberoptics in the opposed, retroreflective, and diffuse sensing modes. Glass fiberoptic selection information may be found in the Banner catalog. The sensor/fiber interface is waterproof to maintain complete sensing system moisture rejection.

Opposed mode fiberoptic sensing is often employed in parts counting applications. Fiberoptics can be built with sensing ends having windows that conform to the size and profile of the part. This allows most efficient use of the sensor's emitted light energy. Refer to the "Glass Fiberoptics" section of the Banner catalog.

FIBEROPTIC MODE
(glass fiberoptics)

OPPOSED

OBJECT

RETRO

OBJECT

RETROREFLECTIVE TARGET

DIFFUSE

OBJECT
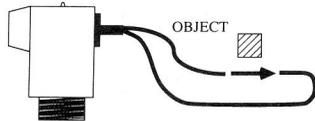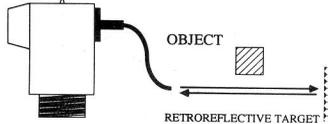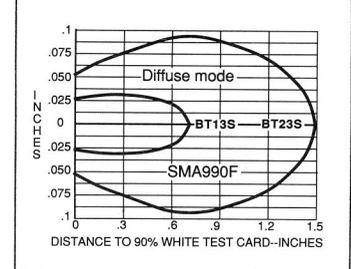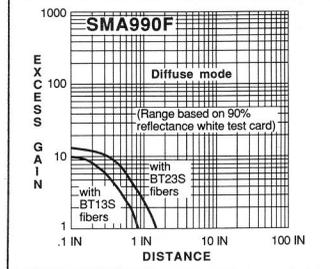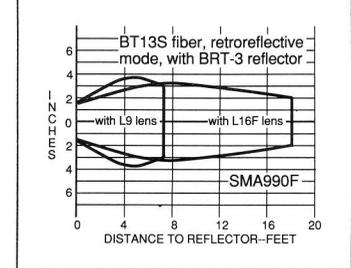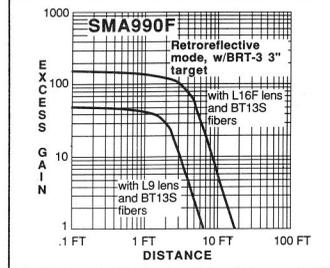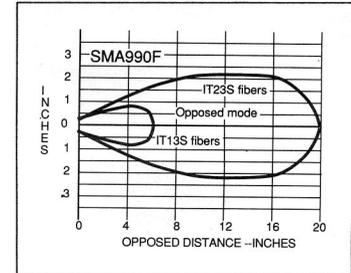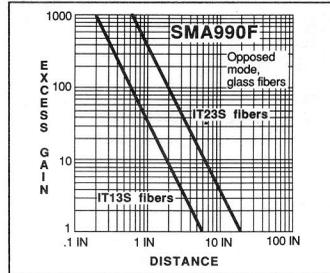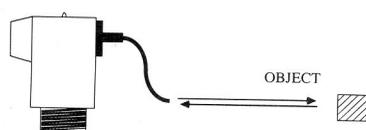
OPTIONS and ACCESSORIES for "990" SERIES SENSORS

"QD" OPTION

The VALU-BEAM "QD" option allows quick and easy removal or replacement of VALU-BEAM sensors in the field. "QD" option VALU-BEAM "990" series sensors have a 3-pin male connector, built into the sensor's base, which mates with the model MBCC-312 3-conductor female SO-type quick-disconnect cable. To specify the "QD" option on a sensor, simply add the letters "QD" to the end of the sensor's model number. (Example: the QD version of the SMA990FMB is "SMA990FMBQD".) Model MBCC-312 SO-type cable (12' length) must be ordered separately.

DIMENSIONS, "QD" SENSORS

1.96" (49,8mm)
1.44" (36,6mm)
1.54" (39,1mm)
.70" (17,8mm)
10 Screw clearance (2)
2.00" (50,8mm)
2.50" (63,5mm)
.22" (5,6mm)
3.00" (76,2mm)
1.00" (25,4mm)
Quick disconnect
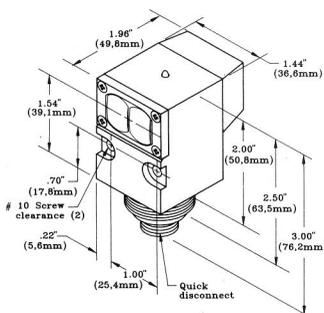
SMB900 ACCESSORY MOUNTING BRACKET

Lens centerline
1.63" (41,4mm)
Internal tooth lockwasher (provided)
2.25" (57,2mm)
Hex nut (provided)
1.00" (25,4mm)
2.00" (50,8mm)
2.25" (57,2mm)
2.75" (69,9mm)
.28" x 90° (2 slots) (7,1mm)

Accessory mounting bracket model SMB900 has curved mounting slots for versatility in mounting and orientation. The sensor mounts to the bracket by its threaded base, using a jam nut and lock-washer (both included). The bracket accommodates both standard and "QD" sensor models. Bracket material is 11-gauge zinc-plated steel. The curved mounting slots have clearance for 1/4" screws.

Other VALU-BEAM accessories are available; see Banner catalog.

3-PIN SENSOR BASE CONFIGURATION

0.5" (13mm)
Sensor Body
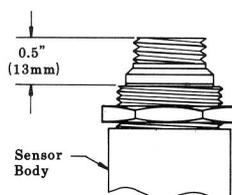
"QD" Receptacle Pin Numbering (Male Pins)
1" Dia. (25mm)
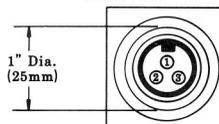
NOTE: Pin #1 is not used.

MBCC-312 CABLE
(end view of connector)

1" Dia. (25mm)
Blue   Brown   Black
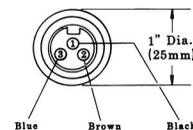
For DC applications:
BROWN (pin #2) connects to +Vdc,
BLUE (pin #3) connects to -Vdc.

Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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