

PRECO[™]
ELECTRONICS



PreView Side Defender II
SDR8503 & SDL8503
SDR8504 & SDL8504
System Operating Manual



FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference.

INDUSTRY CANADA STATEMENT

Per RSS-Gen, Section 8.4 This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Par RSS - Gen, Section 8.4 Cet appareil est conforme à Industrie Canada exempts de licence standards RSS. Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence , y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

REGULATORY COMPLIANCE

The PreView® Side Defender® is compliant with the following countries/regions and their regulations as of the published date of this manual. The sensor may be compliant in other countries/regions. Please check your local regulations or contact PRECO Electronics® for support.

- **United States** - FCC- Part 15.249
- **FCC ID:** OXZJCKP2016
- **Canada** - RSS-210 Radio Standards Specification
- **IC ID:**
- **European Union** - ETSI EN300 440-1 Electromagnetic Compatibility and Radio Spectrum Matters (ERM)
- **Australia/New Zealand** - AS/NZ 4268 Radio Equipment and Services – Short Range Devices

Patent pending

This document may be amended, corrected, and enhanced in keeping with the sensor development progress. The most recent version can be found at www.preco.com

TRADEMARKS

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Product Description

The PreView® Side Defender® is an FMCW radar object detection system designed to alert operators of medium and heavy-duty over-the-road vehicles of obstacles in their side blind zones. The Side Defender® has intelligent modes of operation that help minimize false alerts due to fixed objects such as guardrails, while still providing reliable side object detection.



Figure 1. PreView® Side Defender™ Radar Sensor

The Side Defender is configured in four different ways:

Position	Slow Speed OFF	Slow Speed ON
Right Side	SDR8503	SDR8504
Left Side	SDL8503	SDL8504

Each configuration comes with an in-cab display and a body harness cable.

Sensor Description

The PreView® Side Defender® is a small, rugged short range radar sensor designed and made by PRECO Electronics® in the USA for use in heavy-duty applications such as trucks/busses, waste vehicles and other applications requiring a robust, high-performance side blind-zone radar. The sensor transmits and receives low power narrow band 24 GHz radar signals. It then processes the returned signals to determine if an object has reflected any energy back to the sensor. If an object presents a collision threat, it is reported to the operator display. The sensor is designed to process and report detections within 300 ms allowing the operator to quickly respond to any object within the detection zone. **The frequency band used is legal throughout most of the world, but check with PRECO Electronics® or your country's regulations before purchasing.**



The PreView® sensor has a continuous Built-In-Self-Test (BIST) that notifies the operator via the in-cab display of sensor failure within a fraction of a second. This test functions by monitoring the transmit and receive performance as well as other internal operations. The BIST reporting functionality is a critical feature for fail-safe operation.

Using frequency modulated transmit waveform (FMCW) technology, the Side Defender® radar measures radial range, speed, angle, reflectivity, and other parameters of multiple stationary and moving targets simultaneously. This radar sensor has a wide horizontal field of view up to +/-75°, optimized for side object detection in large trucks and busses. When traveling above 10 mph (16 kph) the horizontal field-of-view for all models is approximately 40 feet along the side and 10 feet wide. When traveling at slower speeds, models with Slow Speed ON, have a horizontal field of view of approximately 12 feet along the sides and 10 feet wide. See Figure 2.

Target: Distance, Angle, Speed, Reflectivity

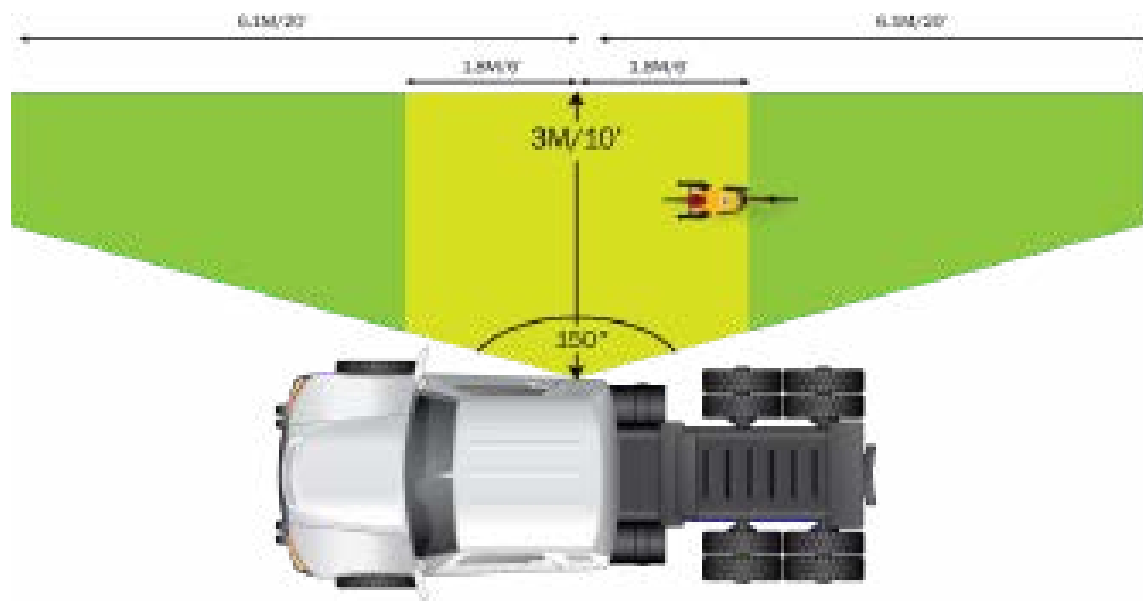


Figure 2. Horizontal Detection Zone

PreView® Side Defender® can detect people, bicycles, motorcycles and other cars/trucks within the detection zone, providing a visual alert on the in-cab LED display, as well as an audible alert if the turn signal is active. Figure 3 shows the in-cab LED display.

The Side Defender® radar performance is not affected by other PreView® Radar or similar sensors operating in close proximity with each other.



PreView® In-cab LED Display Description

The in-cab display provides the vehicle operator with visual and audible alerts when an object is detected. The audible notification is only used when the associated turn signal is active and will only sound upon the first detection of a specific object. The audible alert will not sound again until the turn signal is cycled or a new object enters the detection zone.



Figure 3. In-cab LED Display Unit

Table 1. Operator Display Description

Item	Description
Status LED*	Illuminates green after power is applied to the system. Turns off anytime the detection LED is illuminated.
Detection LED*	Illuminates to alert operator to the presence of an object
Light Sensor*	Measures ambient light conditions allowing for Status and Detection LEDs' brightness to automatically adjust
Display Buzzer*	Sounds an audible tone to alert operator of obstacles

*Locations of LEDs and buzzer are different for left side kit.



Sensor Interfaces and Configuration

DO NOT use your vehicle's CAN-Bus to communicate between the PreView® Side Defender® Radar and the in-cab display

CAN-Bus Speed Message

The Side Defender® supports certain J1939 vehicle speed messages provided by the vehicle's CAN-Bus. Contact PRECO Electronics® for more information about how this can be used.

Turn Signal Input

The Side Defender® requires a turn signal input for proper in-cab display operation. When the turn signal is active, the display's audible alert will sound once when an object is detected. Refer to the Wiring Connections diagram (Figure 4) for more information.

Auxiliary Output

The Side Defender® radar supports an auxiliary output signal that can be used to provide additional operator alerts. This output is an Active Low (switch to ground). One example use of this output is to drive an LED indicator in a side mirror when there is an object in the side blind zone. Contact PRECO Electronics® for more information.

System Connections

Locate the vehicle's ignition power and connect to the red wire on the body harness. If it is necessary to extend the power wire on the supplied harness, use 20 AWG wire as a minimum. Locate the vehicle's turn signal wire associated with the turn signal on the sensor side and connect to the blue wire on the body harness. **(Be sure that the turn signal wire selected activates ONLY when the turn signal is active. On some trucks the daytime running lights and/or air brakes will activate the wires connected to the turn signal lamp).** Connect the black wire of the body harness to vehicle ground.



Figure 4. Wiring Connections



Object Detection Capability

The PreView® Side Defender® radar system is a blind spot collision warning system designed to supplement other safety practices and/or devices. The vehicle operator is always the first line of defense when safely operating a vehicle.

The PreView Side Defender® can detect most objects within the detection zone. However, there are some instances where objects can go undetected. Obstacle size, shape, orientation, relative location, and composition are all factors determining if, when, and where an object is detected. The Side Defender® radar operates by transmitting low power electromagnetic energy. Any energy that strikes an object reflects a certain amount of this energy back to the Side Defender® radar. If the returned energy is of sufficient magnitude, it is used to indicate the presence of an object and determine the object's distance. While PreView® sensors can resolve multiple objects, only the object closest to the vehicle is reported to the operator display since it represents the most significant collision threat.

The amount of energy returned is based on a few factors:

Size – a larger object usually reflects more energy than a smaller object.

Composition – a metal object typically reflects more energy than a non-metallic object.

Scattering – a solid object reflects more energy than a non-solid object such as tree branches, gravel, bushes, etc.

Shape – complex shapes cause energy to be returned in a very non-uniform way. Very small variations or movement can change detection status.

Angle – an object flat side perpendicular to the sensor will reflect more energy than an object at an angle. See Figure 5 for an example of how angle can affect return energy.

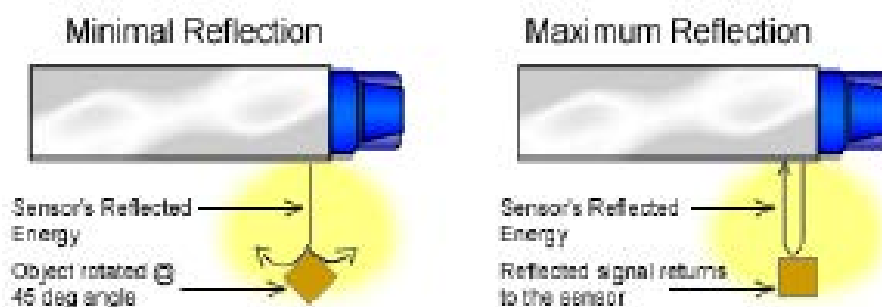


Figure 5. Object Reflection



System Operation

The Side Defender® system has two different modes of operation depending on the vehicle speed.

Slow Speed ON/OFF

Models SDR8504 and SDL8504 have Slow Speed set to ON: if vehicle speed is below 10 mph (16 kph), the Side Defender® will detect and report all objects in the sensor's Slow Speed field of view (6' fore and 6' aft of sensor).
Models SDR8503 and SDL8503 have Slow Speed set to OFF: if vehicle speed is below 10 mph (16 kph), the Side Defender® will not report objects.

At Speed Operation

If vehicle speed is above 10 mph (16 kph), all models ignore stationary objects such as guardrails or concrete barriers, while alerting the operator of moving objects in the blind zone 20' fore and 20' aft of the sensor. This feature minimizes 'nuisance alerts' due to stationary objects in the detection zone, e.g. guardrails, signs, etc. This mode is optimized for on-highway blind zone collision mitigation due to lane change or merging.



System Installation

The Side Defender® system has two different modes of operation depending on the vehicle speed.

Before you Start

Models SDR8504 and SDL8504 have Slow Speed set to ON: if vehicle speed is below 10 mph (16 kph), the Side Defender® will detect and report all objects in the sensor's Slow Speed field of view (6' fore and 6' aft of sensor).

Models SDR8503 and SDL8503 have Slow Speed set to OFF: if vehicle speed is below 10 mph (16 kph), the Side Defender® will not report objects.

Sensor Location

The Side Defender® mounting location is important for proper system operation. The sensor should be mounted on the side of the vehicle with the bottom of the radar between 18" (45 cm) and 24" (61 cm) above the ground. The sensor face should be perpendicular to the ground with Side Defender® text up and V logo pointing down. Select a location that will provide some protection from impact and debris while allowing an unobstructed view of the target hazard area. Refer to the Keep Out/Interference Zones in Figure 8.



Figure 6. Sensor Position on Vehicle

Sensor Mounting

1. Select the appropriate location to mount the sensor in Figure 6.
2. The standard mounting configuration is with 'Side Defender®' text, as shown in Figure 1.
3. Using the drill template, scribe position marks through the holes. Drill 1/4" (6 mm) holes centered on the marks.
4. For the pigtail, drill a 1 1/2" (38 mm) hole for the sensor connector and mating connector.
5. Secure the sensor to the equipment using the supplied hardware, with a maximum 22 in-lbs torque.



Mounting Tolerances

For optimal performance, the vertical angle (up/down) tolerances are +5° (up) and -2° (down). The horizontal angle (side/side) tolerance is +/- 5°.

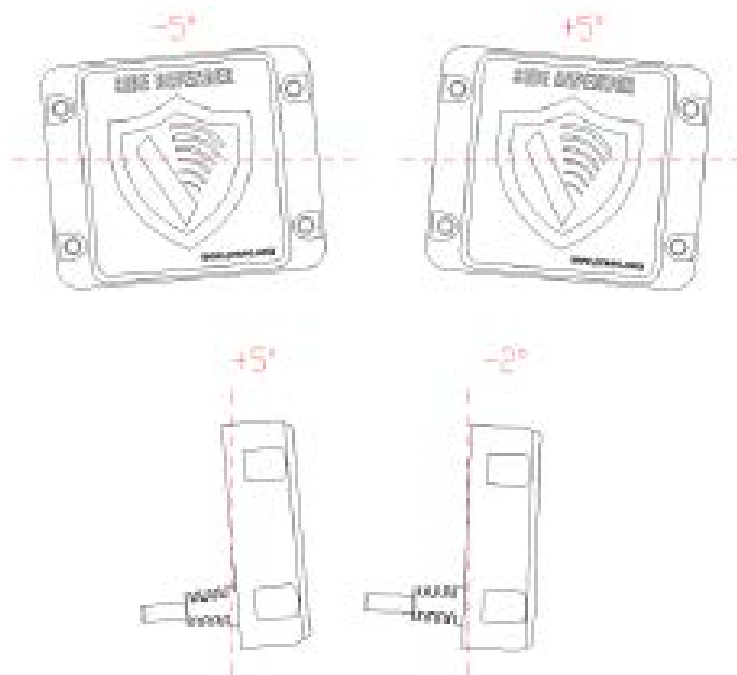


Figure 7. Vertical and Horizontal Angle Mounting Tolerances

The performance of the sensor can be negatively impacted if the sensor is angled down, causing ground and curb detections. Any time the sensor is not perpendicular to the ground, the performance should be tested.

The sensor’s horizontal field of view is +/- 75° and the vertical field of view is +/- 10°. For optimal performance, the sensor should protrude beyond any other portion of the vehicle.



Keep Out/Interference Zones

Metallic and other strong radar reflecting objects must remain outside of the Keep Out Zones defined in Figure 8. Radar reflecting objects within these areas may affect operation. If those objects cannot be removed, testing must be performed to determine the influence on the system's performance.

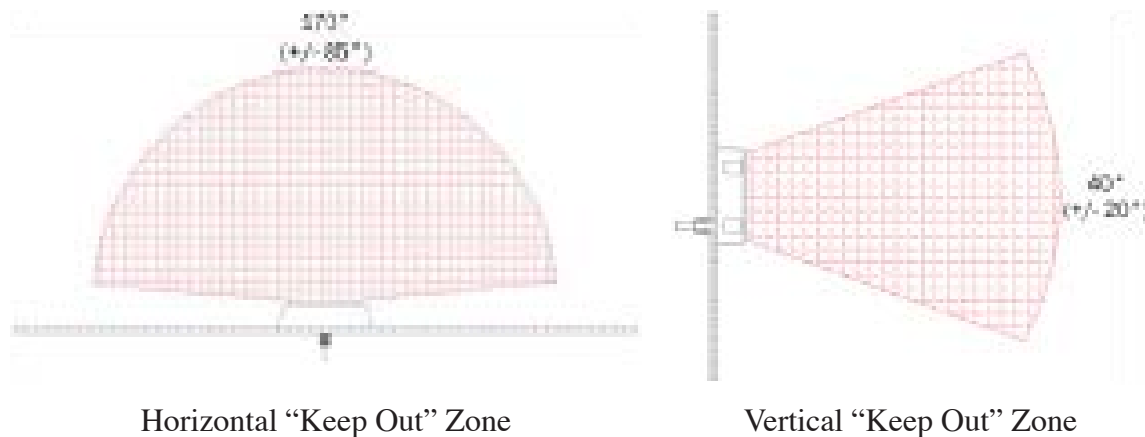


Figure 8. Keep Out Zones

Important!

Before permanently installing the PreView® Side Defender® on the vehicle, verify that the selected sensor mounting location provides a clear detection zone. Take the vehicle to a clear area, temporarily attach the sensor in the proposed mounting location, apply power to the system, and verify that nothing is being detected.



PreView Daily Maintenance

Safety Message to Vehicle Operators with PreView Radar Systems

1. Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death. It is necessary to read, understand and follow all instructions shipped with the product.
2. Systems on operating equipment must be tested each day prior to the equipment operation. The equipment operator must check for proper operation at the beginning of every shift or safety inspection period.
3. The PreView® system is intended as an Object Detection System and should not be relied upon as your first line of defense for the safe operation of the equipment. It should be used in conjunction with established safety programs and procedures to augment the safe operation of the equipment, ground personnel, and adjacent property.
4. People's lives depend on the proper installation of this product in conformance with these instructions. Should the system become inoperative, it could jeopardize the safety or lives of those who depend on the system.
5. The PreView® Object Detection System is intended for commercial use. Proper installation of the object detection system requires a good understanding of equipment electrical systems and procedures, along with proficiency in the installation.
6. Store these instructions in a safe place and refer to them when maintaining and/or reinstalling the system.

Testing and Maintenance

NOTE: A walk around test shall be performed every day to verify proper function of the system and to familiarize the operator with the zone of detection. More frequent inspections should be performed when:

The equipment is operating in a particularly dirty or harsh environment.
The operator has reason to suspect the system has been damaged.

This test should be performed with two people, the operator who remains in the cab, and the assistant who walks through the sensor field (detection zone).

1. Move the equipment to an open field larger than the detection zone to test.
2. Clean the sensor face of any accumulation of dirt, mud, snow, ice, or debris.
3. Visually inspect the attached wiring and cable and verify that they are properly secured, not chafing or dangling free where they could become snagged and damaged. Inspect the PreView® Sensor and Operator Display and verify that they are securely attached to the equipment.
4. Place the sensor in active mode. Make sure the equipment has been secured and remains stationary.
5. Verify the sensor is operational. Depending on operator notification, this may be: green LED (for display), green icon (in-cab video monitor), or beep (buzzer or SAS).
6. Assure the detection zone has been cleared of all obstacles. Any obstacles in the detection zone will interfere with the test.
7. The assistant should walk across the sensor field while the operator notes when the warning activates, signifying the sensor has detected the assistant and identifying the detection zone limits.
8. Next, the assistant should walk from the center of the sensor field straight back, away from the equipment (the center line of the detection zone) while the operator notes when the warning (notification) stops.
9. The assistant should move to a point near the center of the detection zone and remain still for a few seconds, the warning should continue, demonstrating the system's ability to detect a still object.
10. The assistant should walk the complete sensor field while the operator notes the detection edges of the entire coverage area.
11. Finally, after the test the operator and the assistant need to communicate the details on the detection zone.



Troubleshooting

Display Status LED is not illuminated:

- Verify that DC power (9-33V) is applied to the sensor.
- Verify that the cable between the sensor and display is connected.

Display Status LED and Detection LED are both illuminated:

- There is a system error, contact PRECO Electronics®.

Detection LED is always illuminated when sensor is mounted:

- Verify the sensor is pointing outward from the vehicle in an open area with no obstructions. This may require removing the mounting screws and lifting the sensor out away from the side of the vehicle. If the detection LED is not active when moved away from the vehicle, but is active when mounted, then the sensors' mounting position will have to be moved.

Detection LED is on frequently when driving around and there is nothing in the detection zone:

- The sensor may be detecting a curb. Aim the sensor up about 2° and check again. Do not aim the sensor up more than 5° from perpendicular to ground.

Detection buzzer sounds when turn signal is not active:

- The harness turn signal wire is being set by other electronics, i.e., daytime running lights, air brakes, etc. Check turn signal wire connection.

The system is detecting stationary objects above 10 mph (16 kph):

- The sensor is not receiving speed messages over the CAN bus.



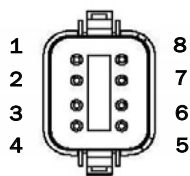
Specifications

Sensor Specifications

Transmitter	FMCW Radar @24 GHz
Connector:	See Figure 9
Protection Rating:	IP69K
Housing Material:	Polycarbonate radome
Dimensions:	4.90" w x 4.06" h x 1.28" d (12.4 cm x 10.3 cm x 3.25 cm)
Weight:	1.0 lb (0.45 kg)
Operating Temperature:	-40°C to +85°C
Storage Temperature:	-55°C to +105°C
Vibration:	25 G, random, all three axis
Shock:	50 G
Mounting:	Four 0.22" (5.6 mm) diameter mounting holes.
Operating Characteristic Range:	Detection Zone Figure 2 – At Speed: 10' (3 m) x 40' (6 m) Slow Speed: 10' (3 m) x 12' (3.6 m)
Range Accuracy:	0.3 m
Azimuth Field of View:	±75° (10 dBsm target)
Elevation Field of View:	±10° (10 dBsm target)
Angle Accuracy:	±2° @ ±10° FoV, ±5° @ ±30° FoV, ±10° @ ±75° FoV
Velocity Range:	± 9 m/sec (± 20 mph)
Velocity Accuracy:	0.2 m/sec (0.5 mph)
Target Resolution:	1.4 m for static targets, nearing 0.3 m for dynamic targets
Cycle Time:	120 ms
Target Detection Time:	300 ms
Power On to Active Time:	300 ms
Electrical Specifications Frequency:	24.00 – 24.25 GHz
Power Supply:	9 – 33 VDC, Reverse polarity and over-voltage protected
Current:	<0.5 A
Communications Interface J1939 CAN Bus:	250 Kbits/sec, not terminated
Alarm Output	Active - Switch to ground, sink up to 1 A, over current protected Inactive – High Impedance
Maintenance	
Daily:	Follow test and maintenance procedure
Display Specifications	
Connector:	See Figure 10
Housing Material:	Polycarbonate/ABS alloy
Dimensions:	1.00" H x 2.25" W x 2.00" D (2.5 cm x 5.7 cm x 5.1 cm)
Weight:	0.25 lb. (0.11 kg)
Regulatory Compliance Compliant with FCC Part 15.249 FCC ID:	OXZJCKP2016
'CE' 'E' mark:	E11 10R-059618

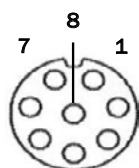


**CONNECTOR END VIEW
DEUTSCH DT06-08SA-E008**



CONNECTOR PIN OUT	
PIN	SIGNAL NAME
1	BATTERY PWR (+)
2	GROUND
3	CAN HIGH
4	CAN LOW
5	DISPLAY PWR (+)
6	DISPLAY GROUND
7	N/C
8	TURN SIGNAL INPUT

Figure 9. Deutsch Connector Pin Out



CONNECTOR PIN OUT	
PIN	SIGNAL NAME
1	CAN HIGH
2	CAN LOW
3	-
4	-
5	POWER
6	GROUND
7	-
8	-

Figure 10. Display Connector Pin Out



Warranty Information

MANUFACTURER STANDARD LIMITED WARRANTY AND LIMITATION OF LIABILITY

Manufacturer warrants that on the Date of Purchase this Product will conform to Manufacturer's published specifications for the product, which are available from Manufacturer on request, and Manufacturer warrants that the product is free from defects in materials and workmanship. This Limited Warranty for the sensor extends for sixty (60) months from the date of shipment. Manufacturer will, at its option, repair or replace any product found by Manufacturer to be defective and subject to this Limited Warranty.

This Limited Warranty does not apply to parts or products that are misused; abused; modified; damaged by accident, fire or other hazard; improperly installed or operated; or not maintained in accordance with the maintenance procedures set forth in Manufacturer's Installation and Operating Instructions.

To obtain warranty service, you must ship the product(s) to the specified Manufacturer location within thirty (30) days from expiration of the warranty period. To obtain warranty service, call Customer Service at +1.866.977.7236 or +1.208.323.1000, or fax your request to +1.208.323.1034. Customer Service will issue warranty authorization and further instructions. You must prepay shipping charges and use the original shipping container or equivalent.

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LIMITATION OF LIABILITY: IN THE EVENT OF LIABILITY FOR DAMAGES ARISING OUT OF THIS LIMITED WARRANTY OR ANY OTHER CLAIM RELATED TO MANUFACTURER'S PRODUCTS, MANUFACTURER'S LIABILITY FOR DAMAGES SHALL BE LIMITED TO THE AMOUNT PAID FOR THE PRODUCT AT THE TIME OF ORIGINAL PURCHASE. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR LOST PROFITS, THE COST OF SUBSTITUTE EQUIPMENT OR LABOR, PROPERTY DAMAGE, OR OTHER SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES BASED UPON ANY CLAIM FOR BREACH OF CONTRACT, NEGLIGENCE OR OTHER CLAIM, EVEN IF MANUFACTURER OR A MANUFACTURER'S REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Manufacturer shall have no further obligation or liability with respect to the product or its sale, operation and use, and Manufacturer neither assumes nor authorizes the assumption of any other obligation or liability in connection with such product.

This Limited Warranty gives you specific legal rights, and you may also have other legal rights, which vary, from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.

Any oral statements or representations about the product, which may have been made by salesmen or Manufacturer representatives, do not constitute warranties. This Limited Warranty may not be amended, modified or enlarged, except by a written agreement signed by an authorized official of Manufacturer that expressly refers to this Limited Warranty.



