



MICRO-TRAK[®]
SYSTEMS, INC.



SafeGuard[™]

Blockage Monitor

System Manual

SafeGuard™

Blockage Monitor

System Manual

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SafeGuard™ is an electronic blockage monitor that will help you achieve maximum yields and operate more cost-effectively by providing the information you need to maintain proper application rates of liquid chemicals and fertilizer. SafeGuard™ has been designed for easy installation and operation.

If you do encounter a problem that cannot be corrected by reviewing this manual, consult your dealer or distributor, or contact Micro-Trak® for assistance.

Toll Free in U.S. or Canada: (800) 328-9613 or (507) 257-3600

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Console

This is the main unit of the SafeGuard™ system. The console continually scans for a blocked indication. It consists of a display, power button, and volume buttons.



Console

Sensor

The sensor assembly is a liquid flow chamber surrounded by a blockage detection shroud. The bottom openings of the sensor assembly accommodate a variety of plugs (male) and caps (female). The sensors may be mated with other sensors in a manifold or used individually. The chamber contains a detection cartridge which rises with flow. Sensors models are marked with an imprint in the clear ring at the top of the sensor body; standard sensors are marked "P2" and sensors designed for use with fumigants are marked "T1".



Sensor

Fittings

Micro-Trak offers a wide variety of O-ring seal fittings to connect SafeGuard™ sensors to your plumbing system. The use of non-Micro-Trak fittings with SafeGuard is strongly discouraged and voids the warranty in the event of damage caused by leakage.

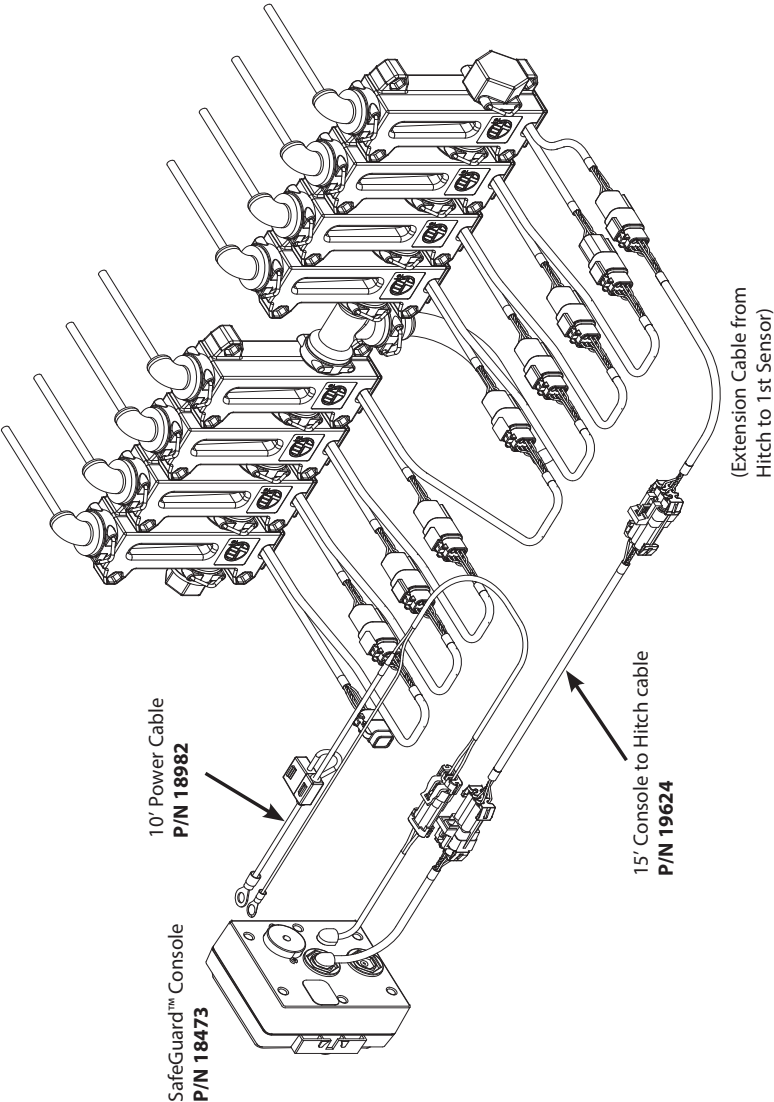
Implement Switch & Module

SafeGuard can accept an optional Implement Switch and corresponding Module. This option silences the audible alarm on the SafeGuard when the implement is not in use. The Module provides the interface between an implement switch and SafeGuard wiring and can be placed at any point in the chained sensor connections.



Implement Switch (optional)

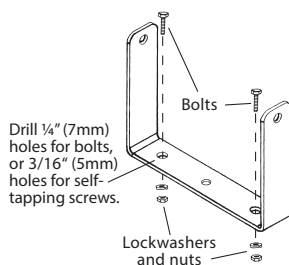
System Layout



Installation

1. Place the mounting bracket in selected location, mark holes, drill 1/4" (7mm) holes and mount bracket with hardware provided.

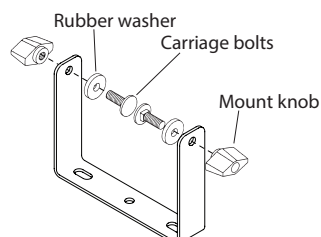
2. Put rubber washers on carriage bolts and put the bolts through the bracket holes from the inside out. Loosely attach the mount knobs onto the bolts. Place console over carriage bolt heads and tighten knobs to secure the console.



3. Connect the power cable to a 12 VDC source. This can be connected to the battery or other power source.

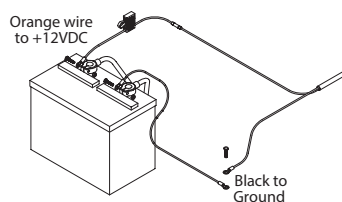
- ORANGE wire (from fuse) to +12 VDC
- BLACK wire to Ground

Note: the power cable is equipped with a 5 Amp fuse. This rating is critical - using a fuse with a different rating can lead to console damage and voids the warranty.



4. Connect power cable connector to the console power connector.

- Route the 15' Console to Hitch cable from the console to the tractor hitch.
- Route data extension cables as needed from the hitch cable to the location of the first sensor.



ORANGE wire (from fuse) to +12 VDC
BLACK wire to Ground

Sensor Mounting

- Mount the sensors vertically with the outlet at the top. See sensor measurements pages for spacing. Sensors need to be mounted plumb for correct operation.
- Sensor leads are daisy-chained together directly or with the use of extension cables.
- The last sensor will have an unused connector. There is a termination cap shipped with the console kit. Install this cap on the last sensor's unused connector.
- Implement switch modules can be installed at any point in the sensor daisy chain.
- In rare cases, heavy-gauge ferrous metal contacting the back of the sensor can cause magnetic interference resulting in false blockage readings. Use a 1" spacer behind the sensor to eliminate this problem. Nylon spacers are available from Micro-Trak - P/N 18653.

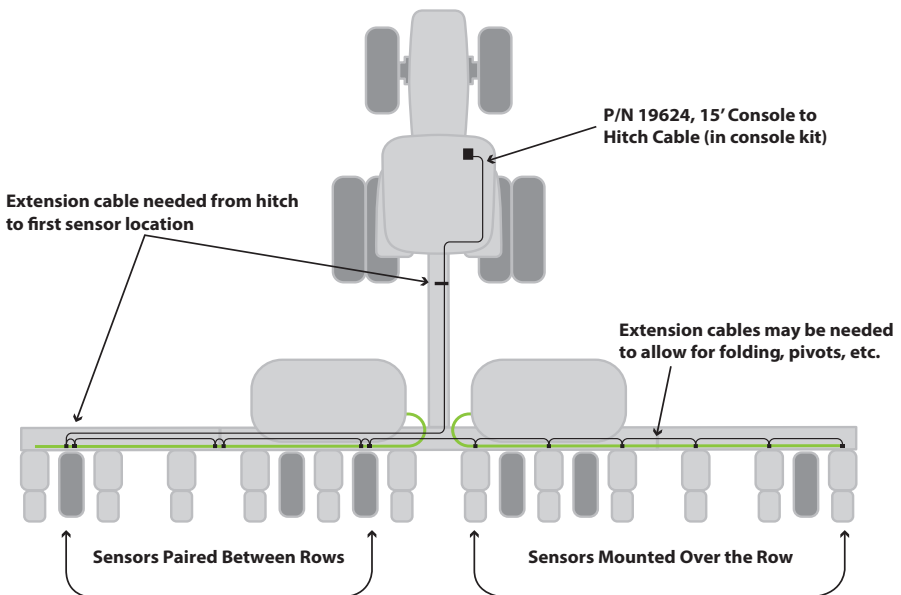
Paired or Over the Row Installation

Paired

Sensors are paired between rows.

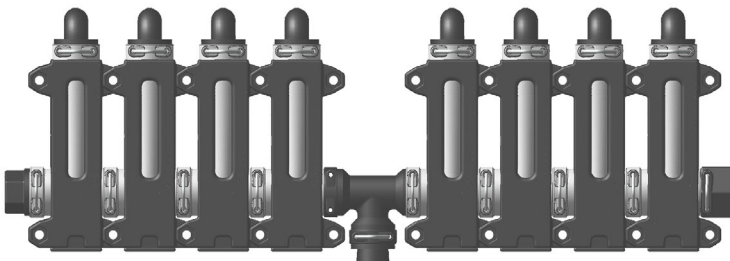
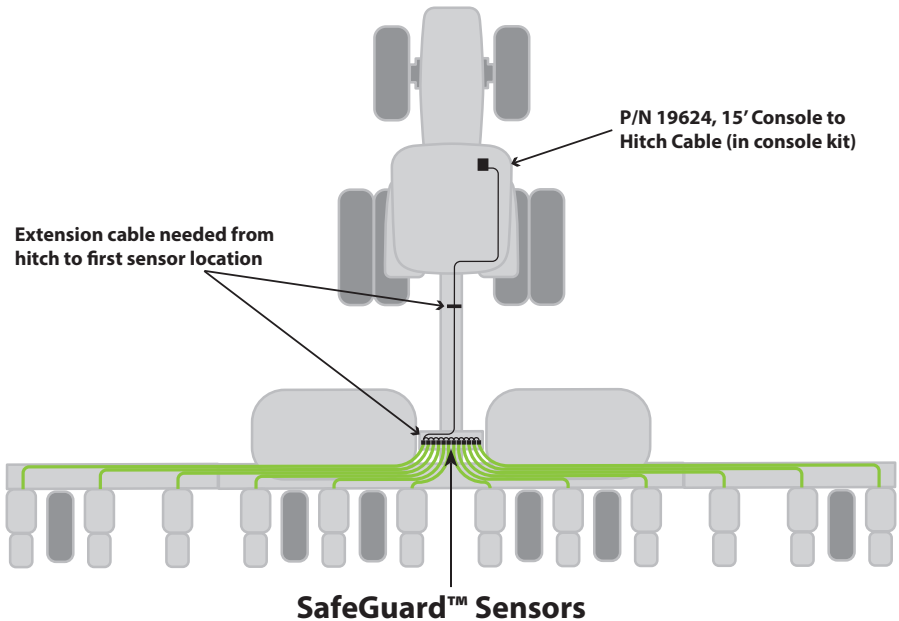
Over the Row

Sensors are placed at each row. Cabling connects to an end sensor and sensors are daisy-chained together. Many fittings are available from Micro-Trak to match a variety of plumbing layouts.



Manifold style installation

Sensors are joined together using stainless-steel U-clips - the same method as standard visual ball monitors. The sensor with short 3" leads minimizes excess cabling between sensors. Liquid can be fed to sensor groups via fitted caps and plugs featuring threads, integral hosebarbs, or John Guest™ connectors. A Tee fitting for joining sensors together is also available.



Manifold style Installation

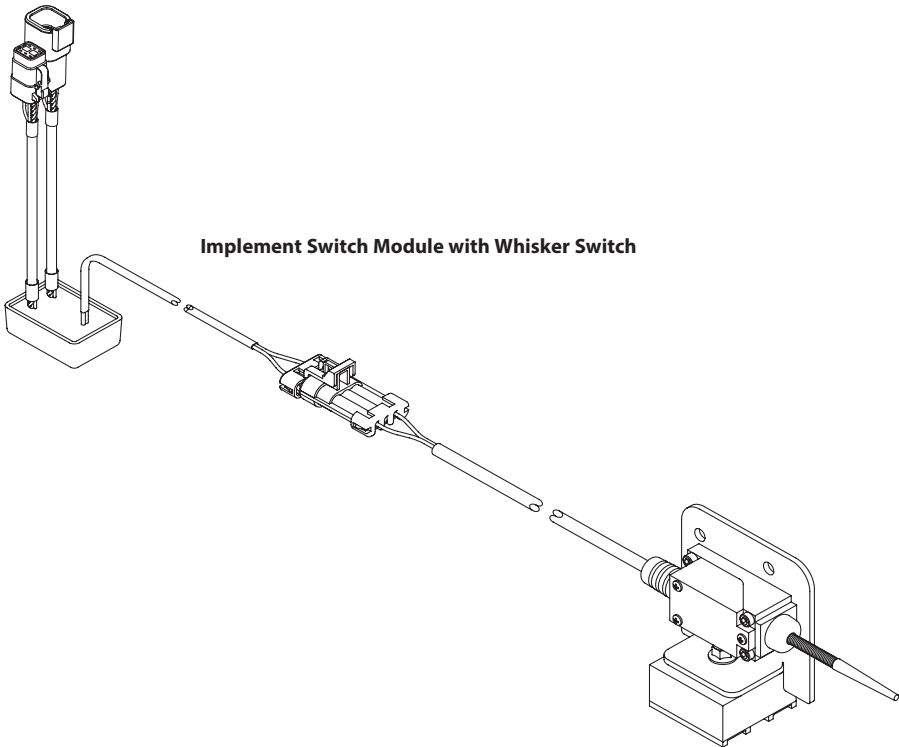
Implement Switch Module

The implement switch module can be installed at any position on the data line. If it is the last item on the data line the termination cap should be installed on the open connector.

The Implement switch has a magnetic base which allows it to be positioned on the implement as needed. The coiled spring actuator will activate when moved in any direction.

There is a three-pin Metri-Pak connector for connecting an implement switch. The switch is connected between pins A & C. When the switch is closed the audible alarm is on. When the switch is open the audible alarm is muted and HOLD is displayed. The display still shows blockage and error indications when HOLD is displayed.

+ 12 VDC on pin A = Audible alarm ON



When the console is turned on it searches for sensors and implement switch modules installed on the data line. During the power up sequence the console displays the number of sensors found, for example: 5 48 indicates 48 sensors were detected during power up. If the number of detected sensors has changed since the last power-up sequence, the console will pause, display the new sensor count, and beep to alert the operator. Operator must acknowledge the new sensor count by pressing either volume button to continue the power-up sequence.

⚠ IMPORTANT!! ⚠

After every start-up, confirm that the displayed number of detected sensors matches the actual number of sensors used on the implement. If it does not match, refer to Troubleshooting section of this manual on p. 12.

- Devices are numbered sequentially based on their position on the data line starting with # 1 being closest to the console end of the cable.
- Sensors and implement switch modules are numbered separately so the first implement switch module on the data line is always module # 1.

The console continually monitors the sensors for a blocked indication. When a blockage is detected the console immediately alerts you by flashing the red warning LED, sounding an audible alarm, and displaying the number of the sensor that is blocked. This alert will remain until the blockage is cleared. With the implement switch activated the display should show that all runs are blocked, and HOLD is displayed (audible alarm muted). This serves as confirmation that the system is working properly.

Power – Turns the system on or off.

Warning Indicator – This flashes to indicate a blockage. The audible alarm will be beeping unless the volume setting is at minimum.

Volume decrease – Pressing this decreases alarm volume. The lowest setting silences the alarm. The alarm will remain muted until the volume setting is increased. Cycling power does not turn the alarm back on!

Volume increase – Pressing this button increases alarm volume.



Power Up Sequence

SafeGuard™ sequences through information screens during the power-up routine. They're displayed in this sequence:

- **Elapsed Time** - Total cumulative time the console has been turned on.



- **Software part number** - The part number of the SafeGuard™ software.



- **Software Revision** - Revision designator for the SafeGuard™ software.



- **Number of sensors detected** - The system counts the blockage sensors it sees on the data line upon power up. If the number of detected sensors changes during operation an ERROR is generated. This example shows 48 sensors detected.



- **Implement Switch Module Status** - The system indicates if an implement switch module is detected. The total number of modules detected will be displayed. This example shows 1 implement switch module detected.



Normal Operation

System Status – Not Applying Liquid

Typically the system is turned on before liquid application begins so the system detects blockage (no flow) after initial start-up. The system will display ALL BLOCKED, or ALL BLOCKED HOLD if an implement switch is being used and is open. If the HOLD indicator is lit the audible alarm is silenced.



System Status – Normal Operation

While applying, the display shows ALL GOOD.



System Status – Blockage Detected

When a blockage is detected the display shows the number of the sensor which is reading blocked. If there are multiple sensors blocked, the display will scroll through all blocked sensor numbers, i.e. # 7... # 12... # 28. Sensors are numbered starting at the first sensor on the data line.



The warning LED flashes red and the alarm sounds once every three seconds. The audible alarm is muted if an implement switch is holding the system in standby mode (HOLD), or if the volume is set to the minimum setting.

Troubleshooting

Console won't turn on

Is there power on the console power cable? Pin A is +12 VDC, Pin B is ground.

- **NO** Troubleshoot for possible blown fuse, broken wiring or bad connections on power cable. Verify there's power at cable connection point.
- **YES** Disconnect data cable and try to turn on the console. If it turns on with data cable disconnected troubleshoot damaged cable or sensor assembly. If it does not turn on with data cable disconnected, replace console.

Sensors Not Detected

Several sensors in a row missing - Check connection between last good sensor and first bad sensor. Bypass first bad sensor in string with extension cable or adjacent sensor leads.

Single sensors not detected - Isolate or verify bad sensor by bypassing suspect sensor with extension cable or sensor leads. Cycle power on console to re-scan for sensors.

Implement Switch Not Working

HOLD indication on display won't go out

Using a jumper wire short pin A to pin C on three-pin implement switch module connector. If the HOLD indicator goes away, replace implement switch (not module). If it does not go away, replace implement switch module.

HOLD indication won't turn on

Disconnect implement switch from module. Does HOLD indication turn on?

- NO Replace implement Switch Module
- YES Verify implement switch operation / replace implement switch.

Sensor not detecting blockage or Showing blockage when not present

Doesn't read BLOCKED

If the cartridge is at the bottom of the sensor assembly and the sensor does not indicate BLOCKED, verify cartridge is in sensor tube with tail on top/ball on bottom. If this is correct, replace sensor.

Doesn't read GOOD

Remove cartridge from sensor chamber. Sensor should read GOOD. If it doesn't read GOOD with cartridge removed, replace sensor.

Error Messages

HOLD

This is not an error. This indicates that the implement switch module has placed the system in “hold”, or standby. The audible alarm is muted but blockages are still displayed.



BLOCKED

This indicates a blockage is detected. The sensor (or sensors) which are blocked are displayed.



OPEN

No sensors detected during power-up. Check connection and cables between console and first sensor.



NET

Displayed when operating and communication with all sensors is lost.

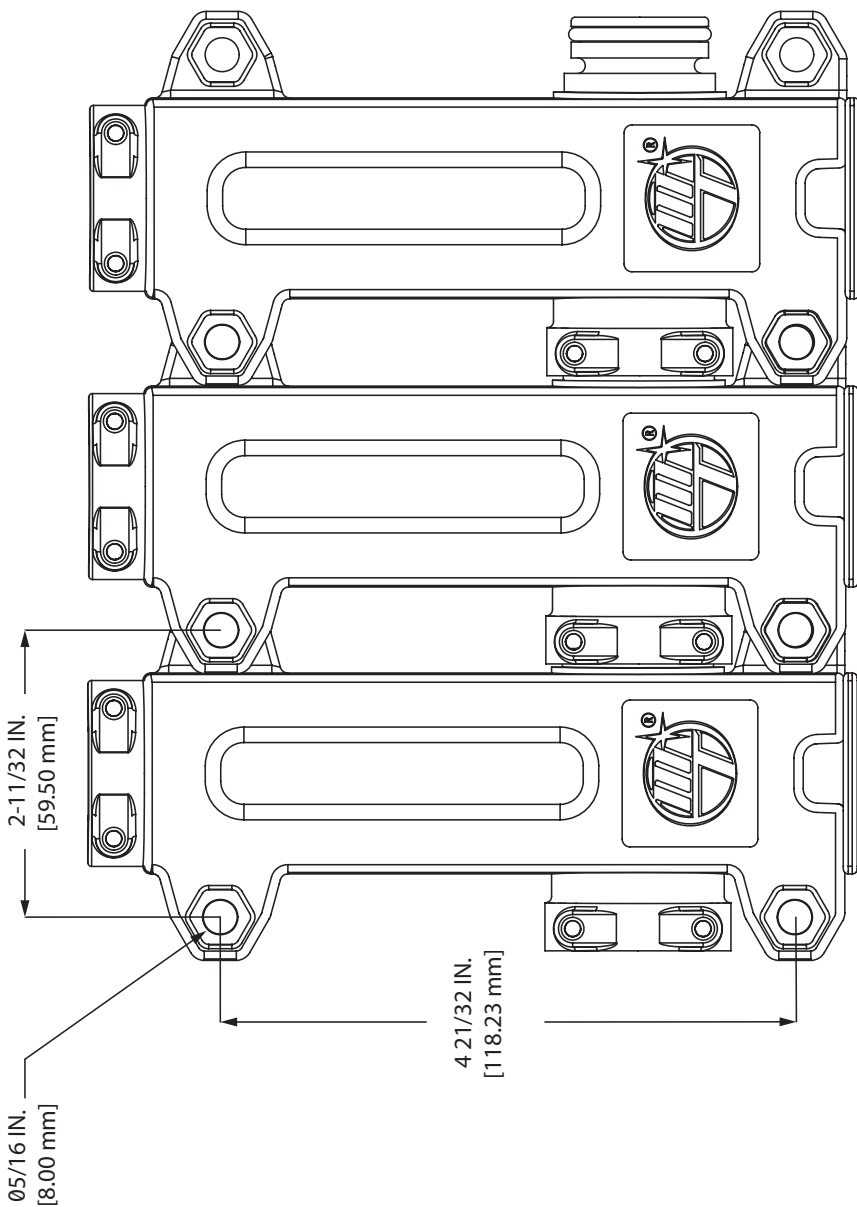


ERROR

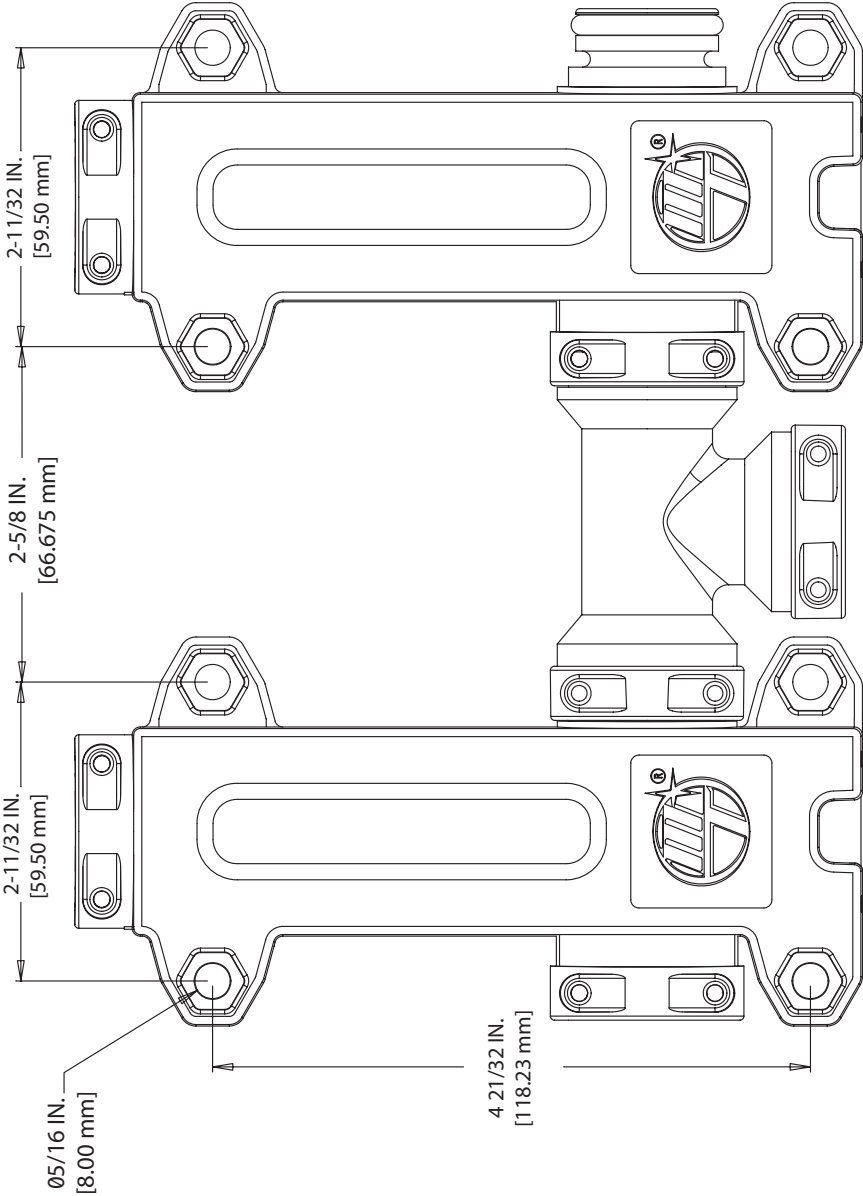
Sensor was present at power-up, and is now not talking to console. The sensor number will be displayed. If an H is displayed, the error is originating from an implement switch module. The number of the module will be displayed.



Sensor Measurements



Sensor Measurements with Tee fitting

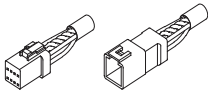


Sensor Parts

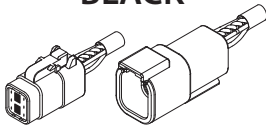
Important Note:

Effective Jan.1 2017,
SafeGuard™ sensor plugs
changed from gray JWPF to
black Amphenol. Be certain
to check vintage prior to
ordering repl. parts.

Pre-2017
GRAY



2017-after
BLACK



SafeGuard Sensor Kit:

Includes sensor body, green cartridge,
cartridge clip, O-ring, and 2 U-clips.

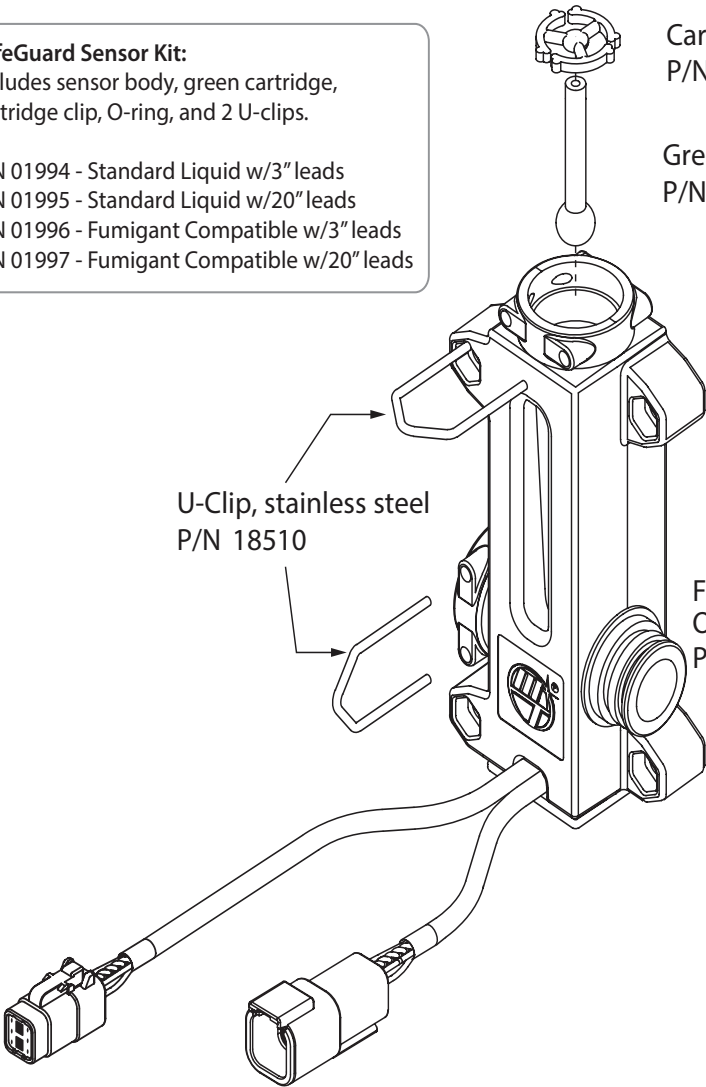
- P/N 01994 - Standard Liquid w/3" leads
- P/N 01995 - Standard Liquid w/20" leads
- P/N 01996 - Fumigant Compatible w/3" leads
- P/N 01997 - Fumigant Compatible w/20" leads

Cartridge clip
P/N 18514

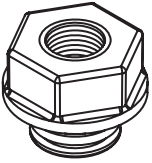
Green Cartridge
P/N 18511

U-Clip, stainless steel
P/N 18510

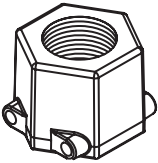
FKM (Viton® type)
O-Ring
P/N 18521



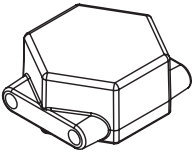
Optional Fittings



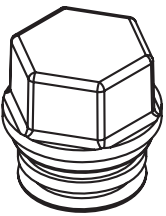
Plug with FKM (viton® type) O-ring
1/4" FPT P/N 18515
3/8" FPT P/N 18516
3/4" FPT P/N 18517



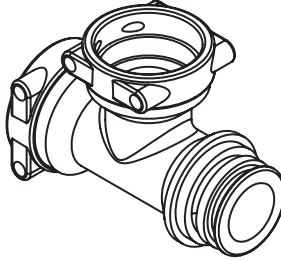
Cap with stainless steel U-clip
3/4" FPT P/N 18524



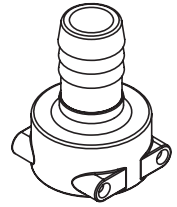
Cap with stainless steel U-clip
No threads P/N 18488



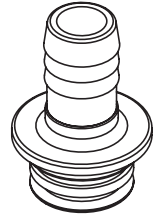
Plug with FKM (viton® type) O-ring
No threads P/N 18489



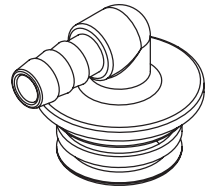
Tee Fitting with FKM (viton® type) O-ring and stainless steel U-clips
P/N 18493



Cap - straight hosebarb
with stainless steel U-clip
3/4" P/N 18620
1" P/N 18621



Plug - straight hosebarb
with FKM (viton® type) O-ring
3/4" P/N 18622
1" P/N 18623



Plug - elbow hosebarb with
FKM (viton® type) O-ring
3/8" P/N 18624
1/2" P/N 18625



Plug - John Guest® elbow
with FKM (viton® type) O-ring
1/4" P/N 18626
5/16" P/N 18670
3/8" P/N 18627

Parts List

Part #	Description
18687	Pink Cartridge
18723	Pink Cartridge - bulk pack 25
18724	Pink Cartridge - bulk pack 50
18688	Orange Cartridge
18725	Orange Cartridge - bulk pack 25
18726	Orange Cartridge - bulk pack 50
18511	Green Cartridge
18546	Green Cartridge - bulk pack 25
18547	Green Cartridge - bulk pack 50
18689	Yellow Cartridge
18727	Yellow Cartridge - bulk pack 25
18728	Yellow Cartridge - bulk pack 50
18691	Blue Cartridge
18731	Blue Cartridge - bulk pack 25
18732	Blue Cartridge - bulk pack 50
18692	Red Cartridge
18733	Red Cartridge - bulk pack 25
18734	Red Cartridge - bulk pack 50
18693	Brown Cartridge
18735	Brown Cartridge - bulk pack 25
18736	Brown Cartridge - bulk pack 50
18694	Gray Cartridge
18737	Gray Cartridge - bulk pack 25
18738	Gray Cartridge - bulk pack 50
18695	White Cartridge
18739	White Cartridge - bulk pack 25
18740	White Cartridge - bulk pack 50
19060	Black Cartridge (for fumigant)
18946	Black Cartridge (for fumigant) - bulk pack 25
18947	Black Cartridge (for fumigant)- bulk pack 50
18514	Cartridge Retainer Clip
18544	Cartridge Retainer Clip - bulk pack 25
18545	Cartridge Retainer Clip - bulk pack 50
18473	SafeGuard™ Console
13304	Console Mount Bracket
13181	Console Mount Kit
12888	Console Mount Knob
12889	Console Mount Washer
18529	Implement Whisker Switch w/cable
18530	Magnet Mount for Implement Whisker Switch
18541	Implement Whisker Switch Kit w/cable and magnetic mount
19625	SafeGuard™ Implement Switch Module
19681	6-pin Amphenol Terminator Tower
19682	6-pin Amphenol Terminator Shroud
19688	6-pin Amphenol Dust Cover Tower

Part #	Description
19689	6-pin Amphenol Dust Cover Shroud
19693	6-pin Amphenol Connector Replacement Kit
18982	Power Cable w/5A fuse
19694	6-pin Amphenol 2.5' Twisted Pair Extension Cable
19616	6-pin Amphenol 5' Twisted Pair Extension Cable
19617	6-pin Amphenol 10' Twisted Pair Extension Cable
19618	6-pin Amphenol 15' Twisted Pair Extension Cable
19619	6-pin Amphenol 20' Twisted Pair Extension Cable
19620	6-pin Amphenol 25' Twisted Pair Extension Cable
19621	6-pin Amphenol 30' Twisted Pair Extension Cable
19624	6-pin 15' M/P150 to Amphenol Twisted Pair adapter
19676	6-pin 25' M/P150 to Amphenol Twisted Pair adapter
18510	U-clip, stainless steel
18542	U-clip, stainless steel - bulk pack 25
18543	U-clip, stainless steel - bulk pack 50
18521	O-ring, FKM (viton®) type
18490	O-ring, FKM (viton®) type - bulk pack 25
18491	O-ring, FKM (viton®) type - bulk pack 50
18493	Tee, w/FKM (viton® type) O-ring & stainless steel U-clips
18558	Tee, w/FKM (viton® type) O-ring & stainless steel U-clips - bulk pack 25
18559	Tee, w/FKM (viton® type) O-ring & stainless steel U-clips - bulk pack 50
18524	Cap, 3/4" FPT w/stainless steel U-clip
18556	Cap, 3/4" FPT w/stainless steel U-clip - bulk pack 25
18557	Cap, 3/4" FPT w/stainless steel U-clip - bulk pack 50
18620	Cap, 3/4" straight hosebarb w/stainless steel U-clip
18633	Cap, 3/4" straight hosebarb w/stainless steel U-clip - bulk pack 25
18634	Cap, 3/4" straight hosebarb w/stainless steel U-clip - bulk pack 50
18621	Cap, 1" straight hosebarb w/stainless steel U-clip
18635	Cap, 1" straight hosebarb w/stainless steel U-clip - bulk pack 25
18636	Cap, 1" straight hosebarb w/stainless steel U-clip - bulk pack 50
18488	Cap, no threads w/stainless steel U-clip
18551	Cap, no threads w/stainless steel U-clip - bulk pack 25
18552	Cap, no threads w/stainless steel U-clip - bulk pack 50
18515	Plug, 1/4" FPT w/FKM (viton® type) O-ring
18518	Plug, 1/4" FPT w/FKM (viton® type) O-ring - bulk pack 25
18548	Plug, 1/4" FPT w/FKM (viton® type) O-ring - bulk pack 50
18625	Plug, 1/4" elbow hosebarb w/FKM (viton® type) O-ring
18643	Plug, 1/4" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 25
18644	Plug, 1/4" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 50
18516	Plug, 3/8" FPT w/FKM (viton® type) O-ring
18519	Plug, 3/8" FPT w/FKM (viton® type) O-ring - bulk pack 25
18549	Plug, 3/8" FPT w/FKM (viton® type) O-ring - bulk pack 50
18624	Plug, 3/8" elbow hosebarb w/FKM (viton® type) O-ring
18641	Plug, 3/8" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 25
18642	Plug, 3/8" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 50

Parts List cont.

Part #	Description
18517	Plug, 3/4" FPT w/FKM (viton® type) O-ring
18520	Plug, 3/4" FPT w/FKM (viton® type) O-ring - bulk pack 25
18550	Plug, 3/4" FPT w/FKM (viton® type) O-ring - bulk pack 50
18622	Plug, 3/4" straight hosebarb w/FKM (viton® type) O-ring
18637	Plug, 3/4" straight hosebarb w/FKM (viton® type) O-ring - bulk pack 25
18638	Plug, 3/4" straight hosebarb w/FKM (viton® type) O-ring - bulk pack 50
18623	Plug, 1" straight hosebarb w/FKM (viton® type) O-ring
18639	Plug, 1" straight hosebarb w/FKM (viton® type) O-ring - bulk pack 25
18640	Plug, 1" straight hosebarb w/FKM (viton® type) O-ring - bulk pack 50
18489	Plug, no threads w/FKM (viton® type) O-ring
18553	Plug, no threads w/FKM (viton® type) O-ring - bulk pack 25
18554	Plug, no threads w/FKM (viton® type) O-ring - bulk pack 50
18626	Plug, John Guest®, 1/4" elbow hosebarb w/ FKM (viton® type) O-ring
18645	Plug, John Guest®, 1/4" elbow hosebarb w/ FKM (viton® type) O-ring - bulk pack 25
18646	Plug, John Guest®, 1/4" elbow hosebarb w/ FKM (viton® type) O-ring - bulk pack 50
18627	Plug, John Guest®, 3/8" elbow hosebarb w/FKM (viton® type) O-ring
18647	Plug, John Guest®, 3/8" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 25
18648	Plug, John Guest®, 3/8" elbow hosebarb w/FKM (viton® type) O-ring - bulk pack 50

Pre-2017 Components and Parts

Note: Effective Jan.1 2017, connectors on SafeGuard sensors changed from 6-pin JWPF (gray) to 6-pin Amphenol (black). Check your connector color before ordering replacement parts.

01875	SafeGuard™ ISOmod™ Kit (JWPF)
18525	6-pin 15' M/P150 Extension Cable w/twisted pair (console to hitch)
18526	6-pin 5' M/P150 to JWPF Adapter Cable w/twisted pair (hitch to sensor)
18496	6-pin 2.5' JWPF Extension Cable w/twisted pair
18497	6-pin 5' JWPF Extension Cable w/twisted pair
18498	6-pin 10' JWPF Extension Cable w/twisted pair
18500	6-pin 20' JWPF Extension Cable w/twisted pair
18502	6-pin 30' JWPF Extension Cable w/twisted pair
18531	SafeGuard™ Implement Switch Module w/JWPF plugs
18538	SafeGuard™ Network Terminator Plug (JWPF)

Adapter Cables

19837	JWPF Tower to Amphenol Shroud
19838	JWPF Shroud to Amphenol Tower

Warranty

Micro-Trak Systems, Inc. (herein "Seller") warrants to the original purchaser (herein "Buyer") that, if any product or part of the product (herein "Parts") proves to be defective in material or workmanship, upon inspection and examination by Seller, within three (3) years from the original date-of-purchase, and is returned to Seller with dated proof-of-purchase, transportation prepaid, within sixty (60) days after such defect is discovered, Seller will, at their option and sole discretion, either repair or replace said part, except that the warranty for expendable Parts, including but not limited to, light bulbs and batteries shall be thirty (30) days from the original date-of-purchase; and except that the warranty for Parts manufactured by someone other than the Seller, including but not limited to, shut-off valves, control (servo) valves, flowmeters, pressure sensors, pumps, compressors, tanks and tank accessories, DGPS receivers and related repeater and base stations shall be one (1) year from the original date-of-purchase; and except that the warranty for Parts manufactured by someone other than the Seller, including but not limited to, memory cards and drives, mapping software, terminals, PC's, laptops, tablets and other computer devices shall be thirty (30) days from the original date-of-purchase. Any damage or failure to said part resulting from abuse, misuse, neglect, accidental or improper installation or maintenance, unauthorized modification, use with other parts and/or products, or attributable to acts of God, as determined solely by the Seller, will invalidate the warranty. Said part will not be considered defective if it substantially fulfills the performance specification. Buyer shall be responsible for all maintenance services, if any, all in strict accordance with the procedures outlined in the manual. The warranty does not include labor, installation, replacement parts or repairs, delivery of replacement parts or repairs or time and travel. Said warranty is non-transferable.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. THE SELLER'S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE, SHALL NOT EXCEED THE RETURN OF THE AMOUNT OF THE PURCHASE PRICE PAID, AND UNDER NO CIRCUMSTANCES SHALL THE SELLER BE LIABLE FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES. SELLER NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SAID PART. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS UNDER THIS AGREEMENT MAY BE BROUGHT MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS OCCURRED.

Buyer accepts these warranty terms and limitations unless the part is returned to Seller, via proper distribution channels and approved return authorization, with dated proof-of-purchase, transportation prepaid, within sixty (60) days from the date-of-purchase for refund of the purchase price.

Doc: MTS Warranty Statement_010119a Rev 2_01012019

MAIL and UPS:

Micro-Trak® Systems, Inc.

ATTN: Service Department

P.O. Box 99

111 East LeRay Avenue

Eagle Lake, MN 56024-0099

We thank you for your purchase, and hope that we can be of service to you in the future.

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MICRO-TRAK[®]
SYSTEMS, INC.



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SYSTEMS, INC.

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Printed in U.S.A.

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