AGTRON
ENTERPRISES • INC

ART 100

Advanced Blockage Monitor

Operator's Manual MNART1003 for Software Revision 5.03

Follow safety Instructions

- *Be sure to follow all safety instructions in your air seeder operator's manual.*

Read and Understand This Manual Before Operating This Machine.

- Learn how to operate and service the machine correctly. Failure to do so could result in personal injury or equipment damage. Agtron Enterprises Inc. will not accept any responsibility for any damage or malfunctions resulting from failure to comply with the operator's manual.
- If you do not understand the information in this manual, or if you have any questions, contact Agtron Enterprises Inc. Customer Service.
- This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.
- Agtron Enterprises Inc. reserves the right to alter illustrations and technical data contained in this manual.
- The contents of this manual are the intellectual property Agtron Enterprises Inc. All use and/or reproduction not specifically authorized by Agtron Enterprises Inc. is prohibited.
- All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. Agtron Enterprises Inc. reserves the right to make changes at any time without notice.
- ATTENTION! Low battery or alternator voltage can cause system errors.

Quick Start Guide

To turn on, press the POWER button. To turn the system off, press and hold the POWER button for five (5) seconds.

Set Sensitivity

The Sensitivity value must be set for Block mode to function. Follow this procedure to change the Sensitivity value:

1. Press the Sens button.
2. Use the arrow buttons to set the Sensitivity value; See **Appendix A** for sensitivity values.
3. Press any mode button to complete the change.

Follow one of these two procedures to set the Sensitivity value for the Seed Sensors.

Method 1:

1. Manually check for any blockages.
2. Begin seeding.
3. Press the Block button.
4. Press the SENS button. If blockage alarms are not issued, use the UP arrow button to increase the sensitivity value by 10 until blockage alarms occur; repeating Step 2 to 4.
5. Use the DOWN arrow button to decrease the sensitivity value by three until blockage alarms are no longer issued.

Method 2:

1. Calculate the ground speed in feet or meters per second. Ex: *The ground speed is 8 Km/h. (8 Km/h X 1000 m) ÷ 3600 s = 2.22 m/s.*

2. Calculate the area coverage per second. The width of the implement is required. **Ex:** *The implement width is 12 m. (2.22 m/s X 12 m) ÷ 10,000 m^2 = 0.002664 hectares/s.*

3. Using the average of the number of seeds per pound or kilogram from **Appendix B**, calculate the application rate. **Ex:** *Two row barley has an average of 22,046 seeds/Kg. 35 Kg/Ha X 22,046 seeds/Kg = 771,610 seeds/ Ha.*

4. To calculate the application rate in seeds per second, multiply the area coverage calculated in Step 2 by the application rate calculated in Step 3. **Ex:** *0.002664 hectares/s X 771,610 seeds/Ha = 2056 seeds/s*

5. To calculate the Sensitivity value, divide the application rate calculated in step 4 by twice the number of openers. Record the product name and sensitivity value in **Appendix A**. **Ex:** *The implement has 50 openers, 2056 seeds/s / 100 = 21 seeds/s. The sensitivity value is 18*

Tips:

The goal is to have the Sensitivity value as high as possible without giving constant alarms. If a seed sensor measures fewer seeds per second than the Blockage Sensitivity value indicates, a blockage alarm is occurs.

A Sensitivity value of zero (0) will disable the power and alarms to the Seed Sensor Loop. The default value is 15.

Table of Contents

Introduction

Congratulations on your purchase of an ART 100 Advanced Blockage Monitor! With this state-of-the-art monitor you can detect blockages in up to 120 seed or 120 fertilizer runs.

How Your Blockage Monitor Works

ART 100 Advanced Blockage Monitors use infrared seed sensors to measure seed rate and check for blockages. The sensors operate on a similar principle to that of a motion detector in a security system. Sensors are connected in a loop, each communicating in turn, and each including build-in diagnostics. The system determines the number of sensors in a loop automatically. A maximum of 120 sensors can be connected in a loop.

The User Interface

The User Interface for the ART 100 has a display and 6 membrane pushbuttons or keys (Block, Sens, Rate, Power, ⇧ ⇩)

The display, which is backlit whenever the monitor is on, will show status and alarms of sensors in Blockage mode, Sensitivity value is shown in Sensitivity mode and Seeds per minute in Rate mode.

Abbreviations Used on the Display:

Abbreviation	Meaning
END	Complete Loop of seed sensors detected
ERR	Communication Error
CLN	Clean Error
---	Blocked Sensor
OFL	Seed Rate above 99.99 millions of seeds per minute

Membrane Keys:

Key	Function
Block	Cycles through all installed sensors
Sens	Allows adjustment of sensitivity value
Rate	Shows an average seed rate in thousands of seeds per minute
⇧ ⇩	Used to enter sensitivity value

Installation

Monitor Head Installation

Mount the Monitor Head in a location where the display can be easily seen, and all the buttons are accessible.

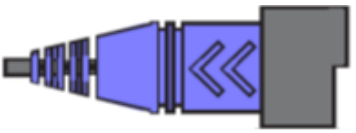
1. Screw the RAM Mount to the back of the monitor head with supplied M5 hex screws (Agtron Part# 450014004).
2. Attach base of RAM Mount to preferred location.

The tools required to install the Monitor Head are:

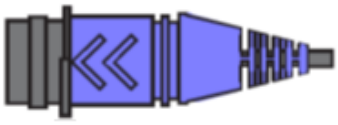
- Wire strippers
- Wire cutters
- Crimp tool

Route the power cable to a switched 12 volt source in the accessory panel. Cut off any excess cable. Secure the power cable to the equipment with cable ties.

Route the Extension cable from the Monitor Head towards the tractor hitch. Secure the Extension cable to the equipment with cable ties.



Monitor head female



Extension Cable male

Cable Connections

Tips:

Do NOT connect the black wire to the negative terminal of the tractor battery.

If the Power button is used to turn off the Monitor Head there is a small current draw; less than 0.002 Amps.

Connect the *red* power wire to a switched 12 volt source; the Monitor Head is off when the ignition is off. A fuse is not required.
Connect the ***black*** power cable wire to a ground source. Not all tractor cabs are properly grounded; it is recommended to use a ground source in the fuse panel.

Tip:

When making Extension cable connections, make sure you align the molded arrows. If they are difficult to push together, check the condition of the pins. To help avoid electrical interference problems, create a figure eight shape with excess cable before securing.

Seed Sensor Installation

1. Select a mounting location near the distributor. The Sensor Loop Cables should not be stretched tight when connected.
2. Mount the Seed Sensors in the hose above the implement chassis to protect the Seed Sensors and cables from field debris damage.
3. Secure the Seed Sensors in the hose using metal hose clamps.

Tips:

If necessary apply heat to the hose ends in order to fit the hose over the sensor.

To keep plugs clean, always connect unused Seed flow sensor cables together.

Y-Cables and Sensor Loop Cables

Y-Cable Installation (less than 60 sensors)

1. Select a mounting location for the Y-Cable in the center of the implement.
2. Secure the ring terminal of the Y-Cable to the chassis of the implement.
3. Connect the Y-Cable's male Sensor Loop Cable to Seed Sensor 1 (located on the far left side of the implement) using Sensor Loop Cables as needed.
4. Connect the Y-Cable's female Sensor Loop Cable to the last Seed Sensor using Sensor Loop Cables as needed.

Y-Cable Installation (more than 60 sensors)

On systems with more than 60 Seed Sensors, an additional Y-Cable must be installed in the middle of the loop to improve power distribution.

1. Connect the blue male end of the second Y-Cable to the blue female end of the first Y-Cable.
2. Connect the first Y-Cable's male Sensor Loop Cable to Seed Sensor 1 (located on the far left side of the implement) using Sensor Loop Cables as needed.
3. Connect the first Y-Cable's female Sensor Loop Cable to the last Seed Sensor using Sensor Loop Cables as needed.
4. Connect the second Y-Cable's male and female Sensor Loop Cable into the middle of the Seed Sensor Loop.

Tips:

When making connections, align the molded arrows, push together, and secure the latch. If the connectors are difficult to push together, check the condition of the pins.

To prevent cable damage, have cables follow hydraulic hoses.

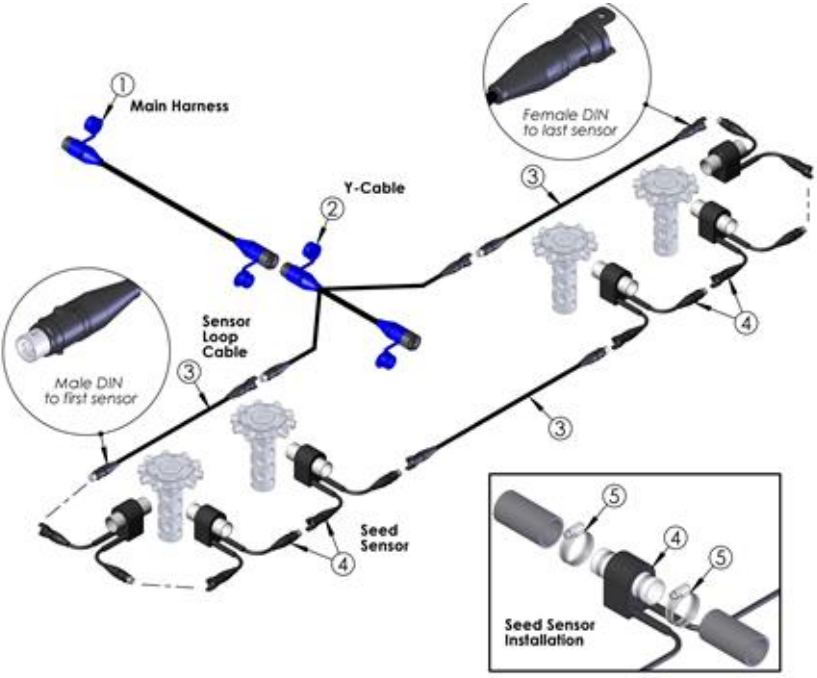
Sensor Loop Cables

1. Select a Seed Sensor on the first distributor or tower on the driver's left as Seed Sensor 1.
2. Connect the male plug of the first Seed Sensor to the female plug of the next closest Seed Sensor. (This will be Seed Sensor 2).
3. Continue connecting the remaining Seed Sensors on each tower or distributor in this fashion.
4. Using 10-foot Sensor Loop Cables, connect the towers or distributors together.

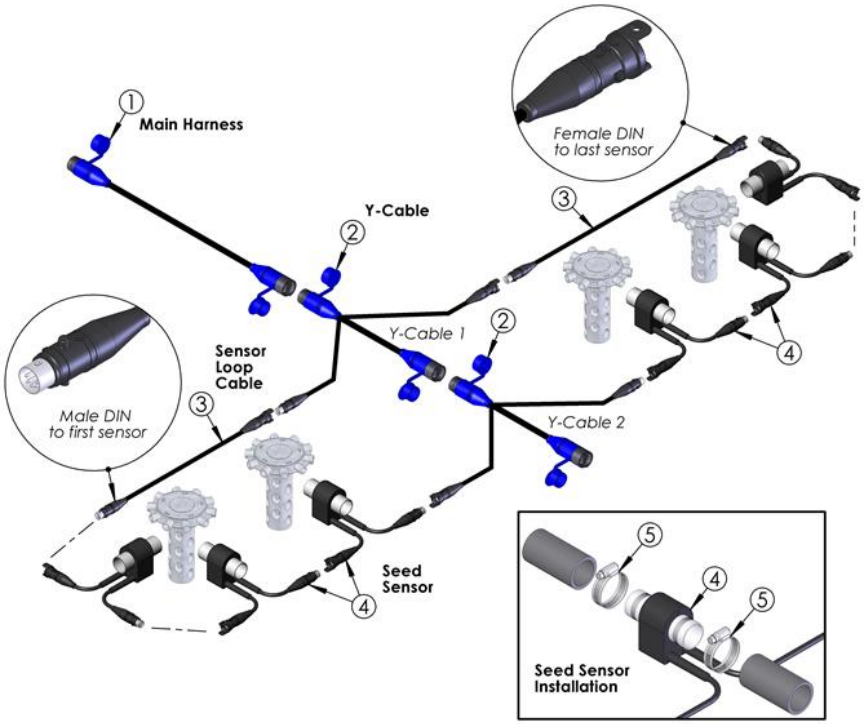
Tip:

If the cables of the Seed Sensors appear to swing or shake excessively, secure them by entwining the Sensor Loop Cables with rope; tighten the rope only enough to stop the swinging motion.

Installation Diagram (Less than 60 Sensors)



Installation Diagram (More than 60 Sensors)



Operation

The monitor head turns on automatically when power is applied

When turned on, the Monitor Head sounds the audible alarm three times, turns on the display and button backlights, and then displays **100**. When Seed Sensors are connected to the Y-Cable, the Monitor Head counts each Seed Sensor this indicates a complete loop of Seed Sensors was detected. Block mode is then selected; the light above the **Block** button turns on.

If a complete loop of Seed Sensors is not detected, an error message occurs. An error message displays followed by the Seed Sensor number that is not reporting to the Monitor Head; the audible alarm will sound. None of the buttons function, and the error message remains until a complete loop of Seed Sensors is established. For more information, see the ***Troubleshooting*** section.

Arrows are molded on the Sensor Loop and Extension cables. The arrows on the Sensor Loop Cables indicate the counting direction, and are used to identify the number of a Seed Sensor; the male Sensor Loop Cable of the Y-Cable connects to the first Seed Sensor. The arrows on the Extension Cables point towards the Monitor Head; located in the cab of the tractor.

The Power button is used to turn the Monitor Head ON and OFF. To turn off the ART 100 Blockage monitor, press and hold the Power button for half a second. To turn the Monitor Head on, press the Power button.

The Sens button is used to adjust the Sensitivity value. The UP and DOWN buttons are used to adjust the Sensitivity value. The DOWN button is used to acknowledge audible alarms.

Block Mode

Block mode monitors the Seed Sensors for blockages. Block mode cycles through all the installed Seed Sensors in numerical order regardless of whether a Seed Sensor reports a blockage or not.

A blockage alarm is issued when a reported Seed Rate, in seeds per second, is below the Sensitivity value. For more information, see the **Quick Start** section. When a Seed Sensor reports a blockage, the audible alarm sounds instantly for five (5) seconds. The visual blockage alarm does not occur until the Seed Sensor scan arrives at the Seed Sensor number reporting the blockage. When the visual blockage alarm occurs, **---** followed by the blocked Seed Sensor number is displayed three times. When a blockage alarm occurs, look for a complete or partial blockage at the opener and distributor of the identified Seed Sensor.

If the hose is entirely blocked or excessive buildup on the eyes is detected for an extended period of time (approx. 1 min.) the monitor will display, ***CLN*** followed by the Seed Sensor number is displayed three times; the audible alarm will sound. When a Seed Sensor clean (***CLN)*** alarm occurs look for a complete blockage at the opener of the identified Seed Sensor, or the sensor requires cleaning.

Pressing the DOWN arrow button disables the audible alarm for every Seed Sensor for 20 seconds. When every Seed Sensor reports a blockage, pressing the DOWN arrow button disables the audible alarm. No further audible alarms will occur until a Seed Sensor reports normal operation. A Sensitivity value of zero disables Block mode; no blockage alarms occur. For more information, see the **Quick Start** section.

Tip:

Blockage alarms will not occur when Sens button is selected.
The Sensitivity value is product specific. Change the Sensitivity value when changing the applied product.

Rate Mode

Rate mode displays an average seed rate for the entire machine; in thousands of seeds per minute. The seed rate displays a hundredths place up to 99.9; 99,900 seeds per minute. Above 9999, the seed rate is displayed in millions of seeds per minute; the decimal point flashes. If Rate mode detects a seed rate above 99.99 millions of seeds per minute, ***OFL*** is displayed.

Blockage messages are not displayed in Rate mode. If a blockage occurs, the audible alarm will sound and the light above the Block button will flash. Select Block mode to identify the blocked Seed Sensor.

Additional Operational Modes

Monitor Head Software Mode

The Monitor Head Software Version identifies the software in the Monitor Head. To display the software version number, simultaneously press the Block and UP arrow buttons. Once selected, all the button lights turn on, and **X.YY** is continually displayed; where **X** represents the hardware version and **YY** represents the software version. Press any mode button to exit.

Seed Sensor Software Mode

The Seed Sensor Software Version identifies the hardware and software version of each Seed Sensor. Simultaneously press the Block and DOWN arrow buttons to display the hardware and software version number of the first Seed Sensor. Once selected, all the button lights turn on, and **X.YY** followed by **1** continually cycles on the display; where **X** represents the hardware version, **YY** represents the software version, and **1** represents the first Seed Sensor. Use the UP and DOWN arrow buttons to scroll through each Seed Sensor. Press any mode button to exit.

Diagnostics and Troubleshooting

CLN message (clean)

When a Seed Sensor can't count the seeds properly, ***CLN*** followed by the Seed Sensor number is displayed three times; the audible alarm will sound. When a ***CLN*** alarm occurs, look for a complete blockage at the opener of the identified Seed Sensor or buildup on the indicated Seed Sensor eyes.

Err message (error)

If a complete loop of Seed Sensors is not reported to the Monitor Head, ***ERR*** followed by the Seed Sensor number not reporting to the Monitor Head is displayed; the audible alarm will sound. The ***ERR*** message remains until a complete loop of Seed Sensors is established. When an ***ERR*** message occurs, look for a disconnected Sensor Loop Cable, Seed Sensor or Extension cable at the identified Seed Sensor location.

Situations and solutions

To effectively troubleshoot the ART 100 Blockage Monitor, start with a known "good" or working system. There are five areas of possible failure; the Monitor Head, Seed Sensors, Y-Cable, Extension cables, and Sensor Loop Cables.

Listed below are situations that could occur with the various parts of the ART 100 Blockage Monitor.

Tips:

When bypassing a sensor the sensor count will be one less than before.

Sensitivity set to zero will disable the loop and alarms.

Troubleshooting Table

Type of Problem	Symptom/Diagnostic Step	Action/Information
Alarms	To acknowledge alarms…	…temporarily, push the DOWN arrow key to disable audible alarm for 20 seconds.
Monitor Displays ERR 1	The monitor is not detecting any sensors.	Check all the cables and connections from monitor head to sensor 1. Bypass Sensor 1 by connecting Sensor 2 to the Sensor Loop Cable from the Y-Cable.
	If the message is no longer displayed…	…replace Sensor 1.
	If the problem persists…	…connect a Seed Sensor directly to the Y-Cable male Sensor Loop Cable.
	If you get a SNR 2 ERR…	…replace the Sensor Loop extension cable between the Y-Cable and Seed Sensor 1.
	If the problem persists…	…connect the Y-Cable and a sensor directly to the monitor head.
	If you get a SNR 2 ERR…	…replace the Main Extension Cable.
	If you get a SNR 1 ERR…	…replace the Y-Cable.
	If problem persists…	…contact Agtron Service.
Monitor displays ERR one number above total sensors installed	The monitor is reading an incorrect number of sensors.	Check all the cables and connections from the last sensor to the monitor head. Bypass the last sensor by connecting the second last sensor to The sensor loop cable to the Y-Cable.

Type of Problem	Symptom/Diagnostic Step	Action/Information
	If the message is no longer displayed…	…replace the last sensor in the loop.
	If the problem persists…	…connect a Seed Sensor directly to the Y-Cable.
	If you get a SNR 2 ERR…	…replace the Y-Cable.
	If you get a SNR 1 ERR…	…replace the Sensor Loop Cable between the Y-Cable and the last Seed Sensor.
Monitor displays ERR #	The monitor is detecting an error on the indicated sensor #.	Take note of the indicated sensor number. Inspect the Sensor Loop Cables in the indicated Seed Sensor number location for damage. Replace or bypass any damaged cables.
	If the problem persists…	Bypass the indicated Seed Sensor number. This is done by unplugging the Seed Sensor and plugging in the cables of the Seed Sensor before and after together. The Seed Sensor count will be one less than before.
	If the message is no longer displayed…	…replace the bypassed Seed Sensor.
	If the problem persists…	…bypass the Seed Sensor before the indicated sensor number error
	If the message is no longer displayed…	…replace the bypassed Seed Sensor

Type of Problem	Symptom/Diagnostic Step	Action/Information
	If the problem persists…	…check the Sensor Loop cable connecting the Seed Sensors together, swap the Sensor Loop Cable with another Sensor Loop Cable.
	If the message is no longer displayed…	…replace the Sensor Loop Cable
	If the problem persists…	Bypass everything but one tower and make sure no errors, keep adding piece by piece and bypass sensor or cable when error occurs.
Blocked Sensors	The sensor indicated is blocked.	Clean blockage from indicated run.
	If the indicated run is not blocked…	…verify the Sensitivity is not set too high. Check inside the distribution towers for any foreign material. This may cause blockages to move from sensor to sensor.
	If it is always the same sensor giving the blocked message…	…trade that sensor with one in another position.
	If the blocked message moves with the sensor…	…replace that sensor.
Monitor displays CLN #	This indicates that the optical detectors inside the sensor tube are dirty.	Take note of the indicated Seed Sensor number. Clean the indicated Seed Sensor with warm water and a bristle pipe brush.
	If the message is no longer displayed…	…replace the bypassed Seed Sensor.

Type of Problem	Symptom/Diagnostic Step	Action/Information
Intermittent Communication Errors (Random Communication Errors)	For stationary system testing	Check all cables for stretching or pinching. Clean any connections that may have been left open and re-apply silicone grease (Agtron part number 850039001). Look for damaged cable jackets from over-tightened tie-straps. Spray sensors with water if indication that the system fails after rain. Try to spray the sensor body where the cables join. Disconnect the last Seed Sensor output cable from the extension. Disconnect tower #2 from tower #1 and check the diagnostic message. For example, if there are 10 sensors on tower #1, there should be an error showing no connection to sensor 11. Reconnect tower #2 to tower #1. Disconnect tower #3 from tower #2 and check the diagnostic message. Repeat for all towers. Reconnect the last sensor output cable to

Type of Problem	Symptom/Diagnostic Step	Action/Information
		the extension. The loop should now be complete, with no errors. Set the blockage sensitivity to mid-point. For example, if the range is 1 to 100, set it to 50. Make sure the fan is off. Verify that each sensor reads as blocked on the second cycle.
Intermittent Communication Errors (Random Communication Errors)	Errors occur only when seeding (will need two 20ft extension cables part# 9ARTX20)	Bypass all the towers except tower #1 and check for reliable operation while seeding. Bypass individual Seed Sensors until reliable operation is achieved. Add tower #2 and check for reliable operation. Bypass individual Seed Sensors until reliable operation is achieved. Repeat for all towers. If a reliable loop cannot be made with a single Seed Sensor, replace the main extensions, Y cable and sensor extensions.

Appendix

Appendix A: Seed Sensor Sensitivity Values

The following Sensitivity settings provide a guideline for setting your Seed Rate Monitor Sensitivity:

Sensitivity	Seeds/second
0	Loop is off
1	4
2	5
3	6
5	8
6	9
7	10
10	13
15	18
20	23
25	28
30	36
35	47

Sensitivity	Seeds/second
40	63
45	85
50	116
55	158
60	218
65	300
70	415
75	576
80	801
85	1114
90	1550
95	2157
100	3005

Product	Sensitivity

Appendix B: Seed Density Values

Seed Type	Seeds/Pound	Seeds/Kilogram
Barley: 2 row	10,000	22,050
Barley: 6 row	12,500	27,563
Bean	1,800	3,969
Buckwheat	15,000	33,075
Canola: Campestris	189,000	416,745
Canola: Napus	132,000	291,060
Canola: Polish	190,000	418,950
Corn	1,200	2,646
Fababean	1,150	2,536
Fall Rye	14,000	30,870
Flax	76,000	167,580
Lentil	10,300	22,712
Mustard	245,000	540,225
Oats	12,500	27,563
Peas	2,550	5,623
Rice	18,500	40,793
Safflower	12,500	27,563
Soybean	3,400	7,497
Sunflower	3,100	6,836
Triticale	10,150	22,381
Wheat: Hard Red	13,300	29,327
Wheat: CPS	11,400	25,137
Wheat: Durum	10,500	23,153
Wheat: Extra Strong	10,500	23,153
Wheat: Soft White	13,400	29,547

Fertilizer		
Ammonium Nitrate	48,400	106,704
Ammonium Phosphate	29,600	65,257
Potash	18,300	40,345
Urea	37,800	83,335

Appendix C: Parts list

Item	Part Number	Description
	AGRTH10	Agtron ART100 Monitor
1	9ARTM10 9ARTM20	Extension Cable 10ft (3m) Extension Cable 20ft (6m)
2	9ARTY10	Y-Cable
3	9ARTX02 9ARTX04 9ARTX10 9ARTX20	Sensor Loop Cable 2ft (0.6m) Sensor Loop Cable 4ft (1.2m) Sensor Loop Cable 10ft (3m) Sensor Loop Cable 20ft (6m)
4	AGSS22 AGSS24 AGSS25 AGSS32	Seed Sensor 7/8” (22mm) Seed Sensor 15/16” (24mm) Seed Sensor 1” (25mm) Seed Sensor 1 1/4” (32mm)
5	400TRHS16	Hose Clamps
	MNART10	ART100 Manual
	850033006	RAM Mount
	450014004	M5 Hex Screws

Notes

Warranty

Warranty Guidelines

Warranty covers all defects in workmanship or materials in your Agtron Enterprises Inc. product under normal use.

1. This warranty coverage applies only to the original owner and is not transferrable.
2. To receive warranty, send the defective part and proof of date of purchase to your local dealer. The dealer will contact Agtron Enterprises Inc. for a return authorization number and supply the replacement warranty parts.
3. If replacement parts are sent by Agtron Enterprises Inc., the customer will have 30 days to return the original defective product. A credit card is required and after 30 days the customer will be charged if the defective product is not received by Agtron Enterprises Inc. Go to www.agtron.com for shipping details.
4. Any product failures during the warranty period may be repaired or replaced with new or rebuilt product by Agtron Enterprises Inc. discretion.
5. Troubleshooting, removal, installation labor and shipping to Agtron are the responsibility of the customer.
6. Damage from neglect, accidents, fire, liquids, chemicals, other substances, flooding, vibrations, excessive heat, power surges, excess supply voltage, incorrect supply voltage, radiation, electrostatic discharges including lightning, other external forces and impacts are not covered under warranty.
7. There are no customer serviceable parts. Removing a security screw will void the warranty.
8. Unauthorized modifications will void the warranty.
9. Any usage outside of the intended use will void the warranty.

Product Returns

1. If unsatisfied, a full refund is offered within 30 days from the date of purchase. To receive the refund, contact Agtron Enterprises Inc. for a return authorization number. Product returned after 30 days will be charged a 15% restocking fee. No refund is available on product returned 52 weeks after the date of purchase. Go to www.agtron.com for shipping details.

Conditions of Use

1. Agtron Enterprises Inc. takes no responsibility for injuries, damages, or losses due to the use, misuse, abuse, or failure of this equipment. It is the responsibility of the customer to understand the operation and to ensure that it is operating properly.
2. All products produced by Agtron Enterprises Inc. are intended for use with agricultural implements. Any other application has not been considered; therefore complying with regulations is the sole responsibility of the customer.