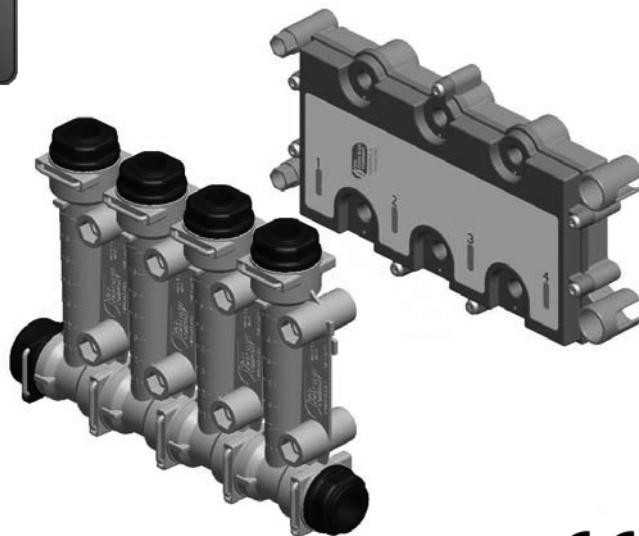




BMi-08 PREMIUM LIQUID BLOCKAGE MONITOR SYSTEM

PARTS AND INSTALLATION MANUAL



U.S. Patent #8,839,681



CDS-JOHN BLUE COMPANY

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TABLE OF CONTENTS

Safety Precautions	2
System Description	3
How to Order	4
Installation	5
Operation	8
Troubleshooting	11
Parts List	12
Device Notes	13
Warranty	14

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SAFETY PRECAUTIONS

- Equipment should be operated only by responsible people.
- A careful operator is the best insurance against an accident.

WARNING: USE OF THIS PRODUCT FOR ANY PURPOSES OTHER THAN ITS ORIGINAL INTENT, ABUSE OF THE PRODUCT, AND/OR MODIFICATION TO THE ORIGINAL PRODUCT IS STRICTLY PROHIBITED BY CDS-JOHN BLUE COMPANY. CDS-JOHN BLUE COMPANY RESERVES THE RIGHT TO DENY WARRANTY OR LIABILITY CLAIMS IN ANY/ALL SITUATIONS INVOLVING MISUSE, ABUSE OR MODIFICATION.

THE ORIGINAL INTENT OF THIS PRODUCT DOES NOT INCLUDE USE WHERE THE MAXIMUM ALLOWED SPEED, PRESSURE, OR TEMPERATURE IS EXCEEDED, AND IT DOES NOT INCLUDE APPLICATIONS UTILIZING FLUIDS THAT ARE NOT COMPATIBLE WITH THE PRODUCT'S COMPONENT MATERIALS. DO NOT USE THIS PRODUCT WITH FLAMMABLE OR COMBUSTIBLE FLUIDS SUCH AS GASOLINE, KEROSENE, DIESEL, ETC..., AND DO NOT USE IN EXPLOSIVE ATMOSPHERES. FAILURE TO FOLLOW THIS NOTICE MAY RESULT IN SERIOUS INJURY AND/OR PROPERTY DAMAGE AND WILL VOID THE PRODUCT WARRANTY. IF IN DOUBT ABOUT YOUR APPLICATION, CONTACT YOUR STOCKING DEALER OR THE CDS-JOHN BLUE TECHNICAL STAFF AT 1-800-253-2583.

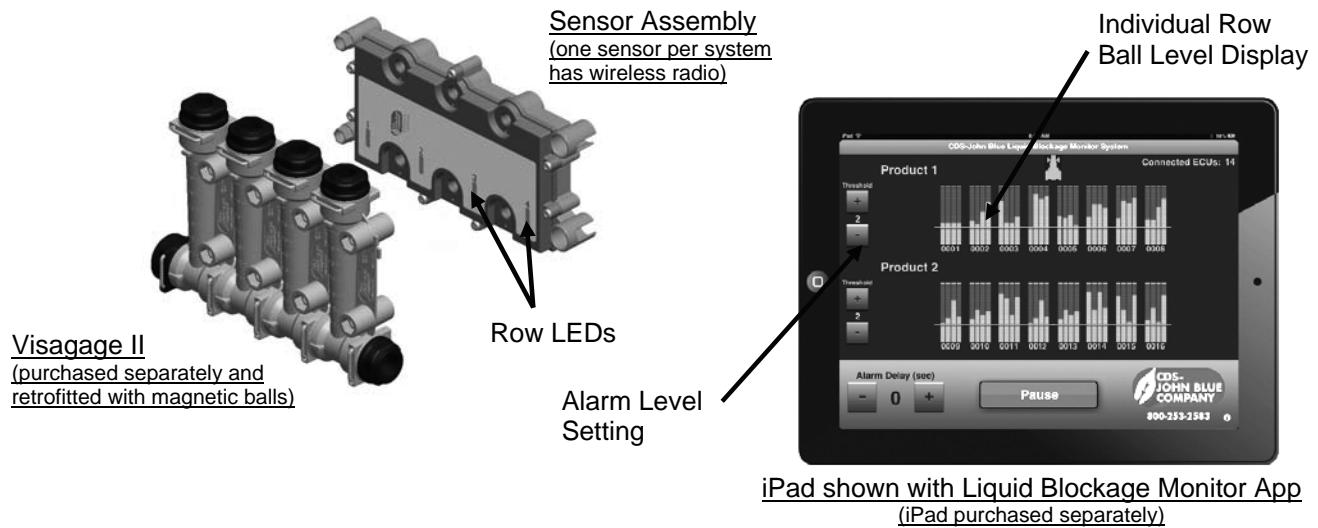
To The Owner

This manual has been prepared and illustrated to assist you in the maintenance of your CDS – JOHN BLUE product. Enter your serial number and the date of the purchase in the space provided below for future reference in service information or for ordering parts. Because our engineering department is constantly improving products, we reserve the right to make design and specification changes without notice.

Model Number: _____ Serial Number: _____ Purchase Date: _____

SYSTEM DESCRIPTION

The CDS-John Blue Premium Liquid Blockage Monitor System is an automatic warning system that lets the operator know when the ball (and flow) in an individual row has dropped below a selected level in a CDS-John Blue Visagage II flow monitor. The system also gives real-time ball level updates for each row as it is running using an Apple iPad or Android tablet display.



The premium system uses sensor assemblies mounted behind the Visagage flow monitors to sense where magnetic balls are floating in each row during liquid application. One of the sensor assemblies contains a wireless radio which communicates with the tablet (used as the control panel) in the cab. The tablet allows the user to select at which level on the Visagage the alarm will sound when a ball drops to or below that level.

When a low ball position has been detected, visual and audible alarms will alert the user. Additionally, each row that had a low ball will be highlighted by a flashing LED located in the sensor assemblies behind the Visagage columns to help with troubleshooting the blockages. When the blockage has been corrected and the ball again goes above the alarm level, the alarm will reset automatically.

The user must supply either an iPad 2 or newer display running the latest iOS, or a quality 7" or larger Android tablet running at least Android 4.0. A RAM mounting bracket is supplied to rigidly mount the iPad in the cab, which is customizable through many online retailers. An Android tablet may or may not fit the bracket supplied. The Liquid Blockage Monitor App is free and available in the App Store and in the Google Play Store. It is also recommended that the user get a charging adapter suitable for their tractor's power outlets.

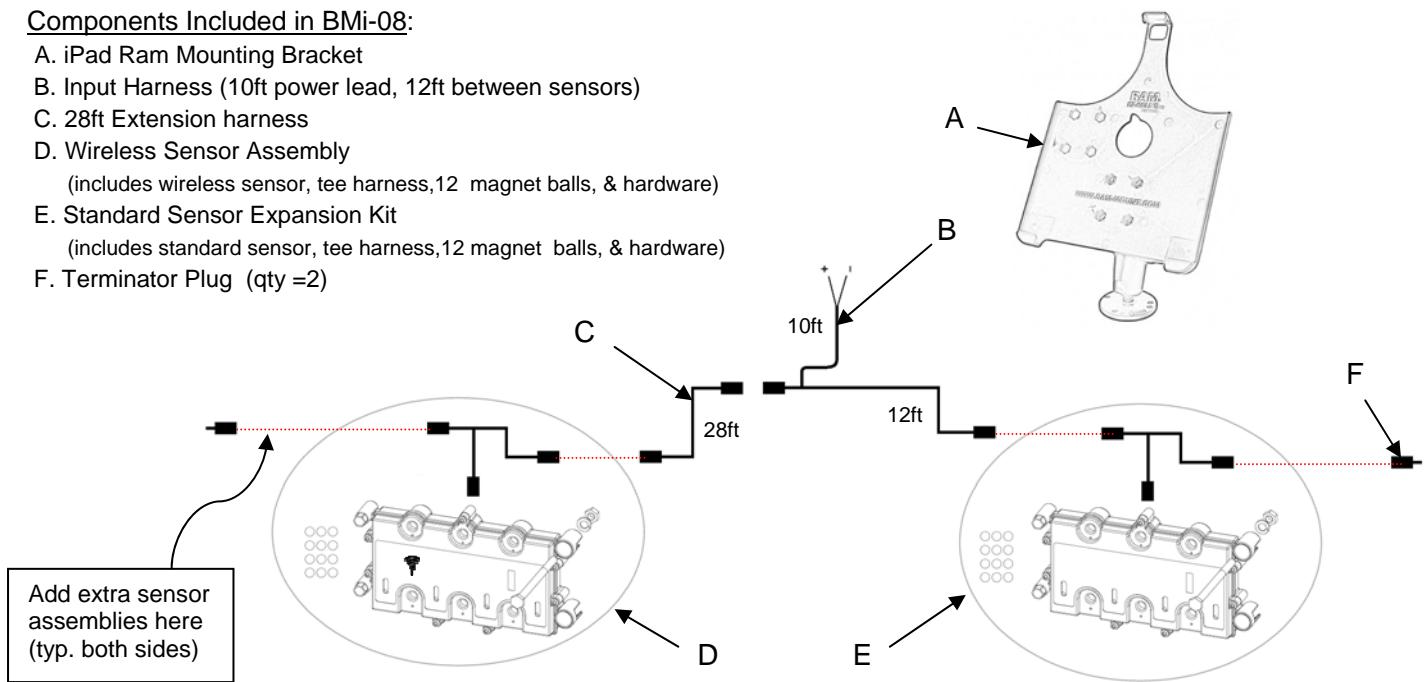
The base system is sold with enough components to monitor an 8-row system. To size it for larger machines, 4-row Sensor Expansion Kits (part #BMPT-001) are added as needed. Note that while the sensor assemblies are sized to monitor 4-rows at a time, it is ok to leave rows empty if the machine has an odd number of rows. The harness lengths are sized for normal size machines, but if longer lengths are needed extension cables are available - measure the machine first.

HOW TO ORDER

Step 1: Purchase a Premium 8 Row Liquid Blockage Monitor Kit, #BMi-08:

Components Included in BMi-08:

- A. iPad Ram Mounting Bracket
- B. Input Harness (10ft power lead, 12ft between sensors)
- C. 28ft Extension harness
- D. Wireless Sensor Assembly
 - (includes wireless sensor, tee harness, 12 magnet balls, & hardware)
- E. Standard Sensor Expansion Kit
 - (includes standard sensor, tee harness, 12 magnet balls, & hardware)
- F. Terminator Plug (qty =2)

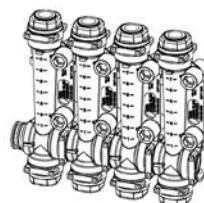


Step 2: If the harness lengths supplied are not long enough for your machine measurements, you can order more of these harnesses and add them anywhere in the circuit:

- BMPT-012 28FT Extension harness
- BMPT-013 15FT Extension harness
- BMPT-014 7FT Extension harness

Step 3: Purchase the required number of 4-Row Sensor Expansion Kits (#BMPT-001, item "E" above) to cover the number of rows on your machine (extra rows are ok). The location of the individual sensors does not matter, and they do not have to be evenly split.

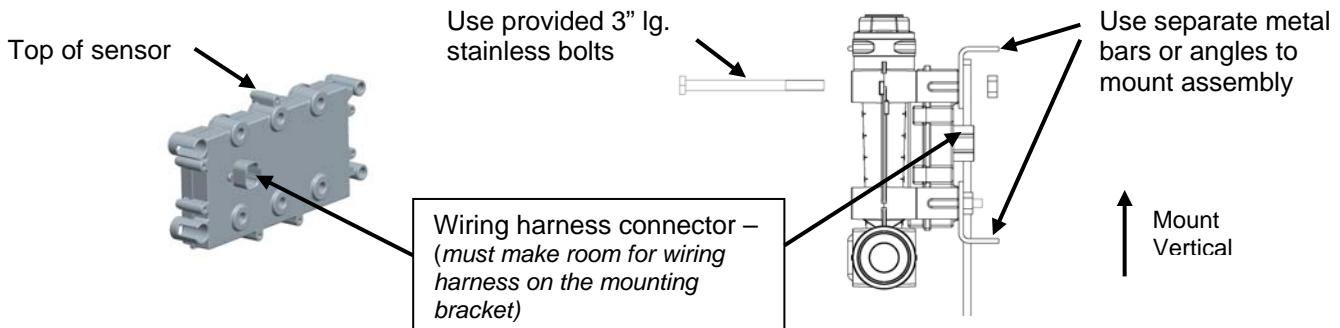
Step 4: Order the required number of Visagage II assemblies for your machine, and at installation you will replace the standard balls with the appropriate magnet ball for your specific row flow rate (see page 6).



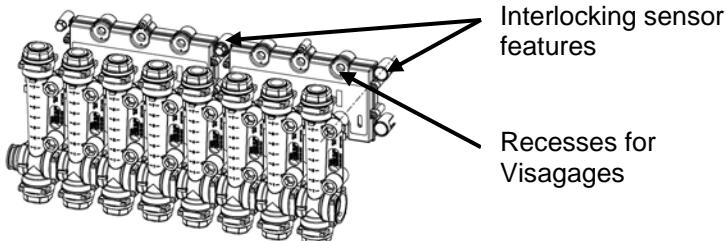
Step 5: Purchase a tablet: iPad 2 or newer Apple tablet (wifi or 3G, any memory size) with the latest iOS, or a quality 7" or larger Android tablet running at least Android 4.0, and purchase a charging adapter that will work best for your tractor.

INSTALLATION

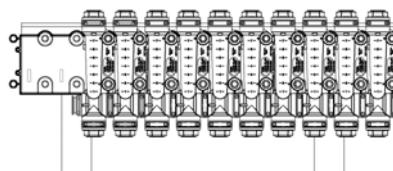
1.) Mounting the Liquid Blockage Monitor Sensors: The sensors mount behind the Visagage II columns using the provided hardware. The assembly must be mounted vertically as shown, and lengthwise it should be horizontal. Clearance must be given around the wiring connector on the back of the sensor, so a good choice for mounting bracket material would be two strips of angle or bar.



- The sensors interlock with each other, and the Visagages fit into the sensor recesses.



- Note that it is ok to leave rows open on the ends.

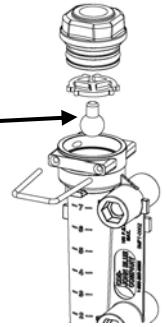


- Note that one sensor has the wireless radio inside of it. The label on the front has a wireless symbol (Wi-Fi icon) and the part number is BMPT-003. While it does not matter where it is located in the system, the Wi-Fi maximum range (without obstructions) is approximately 75 feet so place it in the location closest to the cab with the least amount of obstructions.
- If you are applying two separate products, all of the sensors still connect to each other with only one wireless sensor in the system. If the Visagages are spaced apart you will need purchase an extension harness – see page 4. Note that currently a **maximum of 48 rows** may be displayed on each line.
- Be sure to write down the **serial numbers** of the sensors from left to right as you sit in the tractor - it will help you when placing the sensors in the Blockage Monitor App on the tablet:

INSTALLATION (continued):

2.) Install the Magnet Balls: Use the following table to select which magnet ball is to be used. Note that if needed the magnet balls can be easily lifted out of the Visagages by using a steel screwdriver or rod to attract them. Install the balls with the "tail" up.

- Notes: a.) The maximum flow allowed through each column is 3.8 GPM (water). An optional high flow ball (#SMPT-0079) is available to attain that flow level.
 b.) For solutions other than water, apply the appropriate conversion factor to the flow table values
 c.) The balls are made from polypropylene or acetal with stainless steel weights.



FLOW RATE TABLE FOR WATER (IN GPM) (WATER = 8.34 LBS/GAL)					
	SMPT-0060 BALL SET			SMPT-0085	SMPT-0079
LEVEL	ORANGE MAGNET BALL	YELLOW MAGNET BALL	GREEN MAGNET BALL	OPTIONAL GRAY MAGNET BALL	OPTIONAL BLUE MAGNET BALL
7	0.55	1.20	2.50	0.75	3.80
6	0.40	0.85	2.25	0.55	3.50
5	0.28	0.62	1.75	0.35	2.65
4	0.18	0.50	1.30	0.27	2.10
3	0.10	0.35	0.95	0.21	1.60
2	0.05	0.25	0.70	0.10	1.05
1	0.00	0.15	0.55	0.00	0.70

SOLUTION WEIGHT (LBS/GAL)	CONVERSION FACTOR
9.0	0.96
10.0	0.91
11.0	0.87
12.0	0.83
14.0	0.77
16.0	0.72

** If you encounter a situation where the orange or yellow magnet ball is too heavy, you can install a non-magnet green or black ball from your Visagage set under the magnet ball to help it float higher. Also note that an optional gray ball is available with flow values between the orange and yellow balls. **

3.) Place a cow magnet in fertilizer strainer: It is recommended that a cow magnet (or similar) be placed in the fertilizer strainer to prevent metal particles from building up on the magnet balls.

4.) Connect the Harnesses: Install them in this order:

a.) Input Harness:

- The input power should be connected to a switched 12V DC power source on the implement, or run wires from the tractor.

b.) 28ft Extension Harness

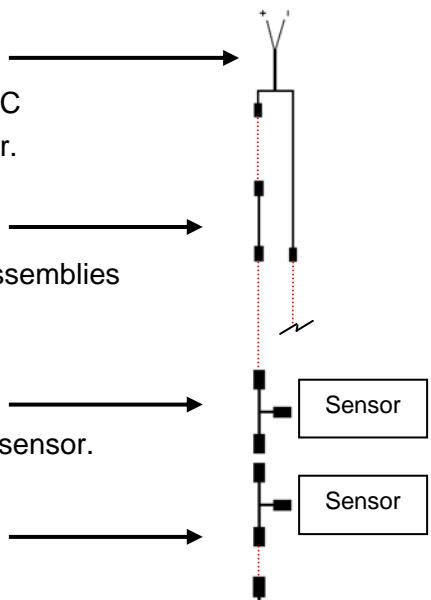
- Connect to the input harness and run toward the sensor assemblies on the far side of the implement.

c.) Tee Harness at each sensor:

- Connect to the preceding harness, and to the neighboring sensor.

d.) Terminator Plug:

- At the last sensor, place on open connector.



Notes:

- The harnesses can be connected in any order, and harnesses can be eliminated if needed but the terminator plug needs to be installed on the last open connector.
- Use wire ties to restrain the harnesses to the machine – take care to avoid sharp edges and pinch points when folding the machine.

INSTALLATION (continued):

5.) Mount the Tablet: Using the supplied Ram (or other) mounting bracket, mount the bracket base in the tractor cab. Other styles of Ram fittings and brackets are available from online retailers if desired. Install the customer-supplied tablet charging adapter at this time. If an iPad Air is used, place the supplied 2" rubber spacers on the bracket side rails to take up the side gaps.

6.) Install the App: With your tablet connected to the internet:

- 1.) Create an iTunes or Google Play account (if you do not have one)
- 2.) Go to the App / Play Store, and search for "CDS-John Blue". The Liquid Blockage Monitor app should be shown in the search results and select "install".

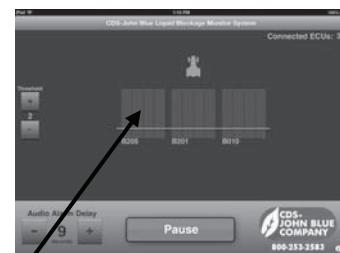
7.) Connect to the sensor wifi network:

- 1.) Turn on the sensors by applying power to the input harness of the blockage monitor system, which will activate the wireless radio in the sensor within 10 seconds.
- 2.) Select the "**Settings**" icon on the tablet, then select "**Wi-Fi**" near the top. You will see a network named "CDSJB_xxxx" (the "xxxx" will be replaced by the sensor serial number). Select it and a checkmark should appear by the name when you are connected.

8.) Setup the App:

Open the Blockage Monitor App and you will see the sensors that are connected to the "network". **Select "OK"** when prompted about the app allowing you to use your current location. The row graphs will initialize and then reset to zero as shown on the right.

**** Note that a "firmware update" box may appear if new software is being loaded onto the sensors. It will be necessary to cycle power if an update occurs. See page 10.*



There are a few items that need to be configured before you start using the system:

1.) The sensors can be arranged in order from left to right by using the list of serial numbers you noted on page 5. To move a sensor, touch and hold it, and when it changes size you may drag it to the location it needs to be.



2.) If you are running more than one product, tap a sensor serial number and a window will open to allow you to change which **product** it is assigned to. If you have more than 12 sensors, the app will automatically assume that you have 2 products and you can change it to one if you wish. (a maximum of 12 sensors (48 rows) can be shown on one product / line) In this screen, you can also ignore individual rows if desired by turning them off.



3.) If you have section control on your machine, you may **define sensors as being in certain sections** while in this window. This will keep the system from activating the blockage alarm when a whole section (or sections) have been shut off. A maximum of 8 sections may be defined.

INSTALLATION (continued):

4.) If you wish to change the name given to "Product 1" and "Product 2", you may change them by **tapping on the name** of either product and modifying them in the window that appears.

5.) Also in this window you can change **the way the rows are numbered**. There are four choices displayed in the window, and the products can be numbered differently if desired.



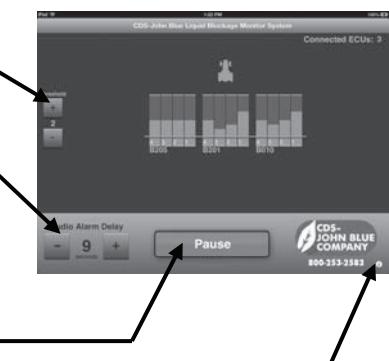
OPERATION

The following sections describe the components and functions of the Liquid Blockage Monitor:

Tablet App Controls:

- The app allows you adjust the following system functions:
 - o Ball level where the alarm will sound
 - o Delay in seconds before the audible alarm will sound
 - o Silence the alarm when a blockage happens
 - o Set two different product types and define sections and row numbers (see page 7)
 - o Pausing of the system to hold the current state
 - o See the system information and product manual

Using the "info" button at the bottom right



- The **ball level alarm setting** indicates the position on the Visagage flow monitor the ball must stay above. The **visual and audible alarms** will occur when a ball is sensed at or below the set level. It is recommended that you set your alarm setting at least 2 steps below where the ball is running the Visagages.
- The app is able to **run in the background** of the tablet, however the user must note that if too many other apps (or a very processor intensive app) are opened while it is running, the tablet's operating system may shut down the LBMS app. It is strongly recommended that you open the app periodically to ensure it is still "open" and functioning, especially when you trying to run in the background for the first time. No guarantees are made with regard to the ability to run in the background behind specific apps. You must enable push notifications and allow the use of your location for the app to run in the background.

Sensor Assembly:

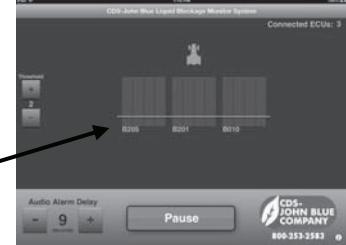
- The sensor assembly has 4 LEDs located in the slots on the lower front of the enclosure. The LEDs have the following functions:
 - o In normal operation the LEDs are solidly lit
 - o If a blockage has been sensed (or when at start-up), the LEDs of the specific rows will flash
 - o If there is an error detected, the LEDs will flash in a specific pattern (see Troubleshooting section)



OPERATION (continued):

Power Up:

- When the system is first powered up, the sensor assemblies will conduct a self-test (all LEDs will illuminate solid for a short time) and then they will start flashing (see next topic). The Wi-Fi sensor will be ready to connect with the tablet within 10 seconds.
- **Please see page 7** for setup information if this is the first time you have powered the system on. For all subsequent power-ups the app will remember the last configuration.
- After the tablet is able to connect to the Wi-Fi sensor, the display will initialize and then reset to zero as shown on the right.



Prior to Pump Start:

- Before the pump starts running, the system will assume that every row is blocked and all of the LEDs on the sensors will be flashing - including those that may not have a Visagage installed over them.

Pump Running (first time):

- After the pump has been running a short time, the system will determine which rows do not have a Visagage (and consequently no magnetic ball) over them. At that time the LED for these empty rows will turn off to show they have been deactivated.
- For the rows that do have Visagages, the LED will change to be on solid when the ball rises above the alarm level setting.

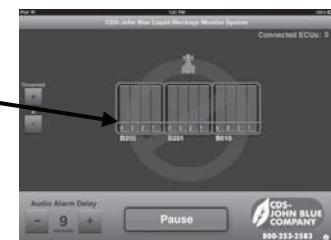
Blocked Row:

- During operation if any of the balls fall below the alarm setting, the blocked row alarm will sound on the app and the alarm will sound.
- You may silence the alarm with the icon at the bottom of the screen.
- On the sensor assemblies, the specific row(s) that caused the alarm will have a flashing LED.



Pump Stop to Investigate a Blocked Row:

- When the pump has been stopped to work on the blockage problem, the system will realize that all of the other balls have dropped at the same time (within a few seconds). A short beep will sound and the app will appear as shown on the right.
- The system will not report them all as blocked. Instead it will remember which ones were blocked before stopping (and keeps them flashing on the sensors). The other LEDs will be on solid.
- This allows you to go back to the row units and easily identify the problem row(s).
- Afterwards when a blockage has been corrected and the pump restarted, the alarm will reset itself after the ball rises again above the level setting.



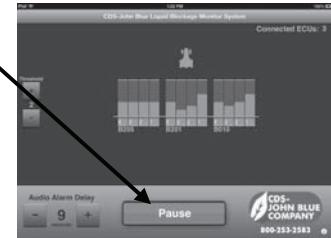
OPERATION (continued):

Headlands Pump Stop:

- At the end of a row when the pump is stopped, the system will note that all of the balls have dropped at the same time and the app will again give a short beep and display the screen shown above.
- The LEDs will all be on solid (provided that there were no blockages sensed at that time).

Pause Mode:

- At any time, the PAUSE button may be pressed to enter Pause Mode. This will hold the current state of the system indefinitely so that work may be performed on the distribution system.
- This is useful if the blockage is intermittent and hard to catch while stopping, especially if the balls drop too slowly.
- Pause Mode may be engaged while running in the field so that you may stop later at a convenient time to troubleshoot the line problem.
- To exit Pause Mode, push the RESUME button (in same location).



Sensor Calibration:

- If the reported ball levels do not appear to be correct, or if when the balls are at the bottom (after pump flow shutoff) but the tablet reports them to be up, a recalibration should be executed. Recalibration sets the “zero” point for each of the sensors used to detect ball position on each row.
- Choose the “**i**” button at the bottom right of the screen. Then choose “**Config**” at the bottom of the next screen.
- You **must remove the magnetic balls** before choosing “**Start Calibration**” at the top of the final screen. Failure to do this will affect system operation and you will have to repeat the process correctly.



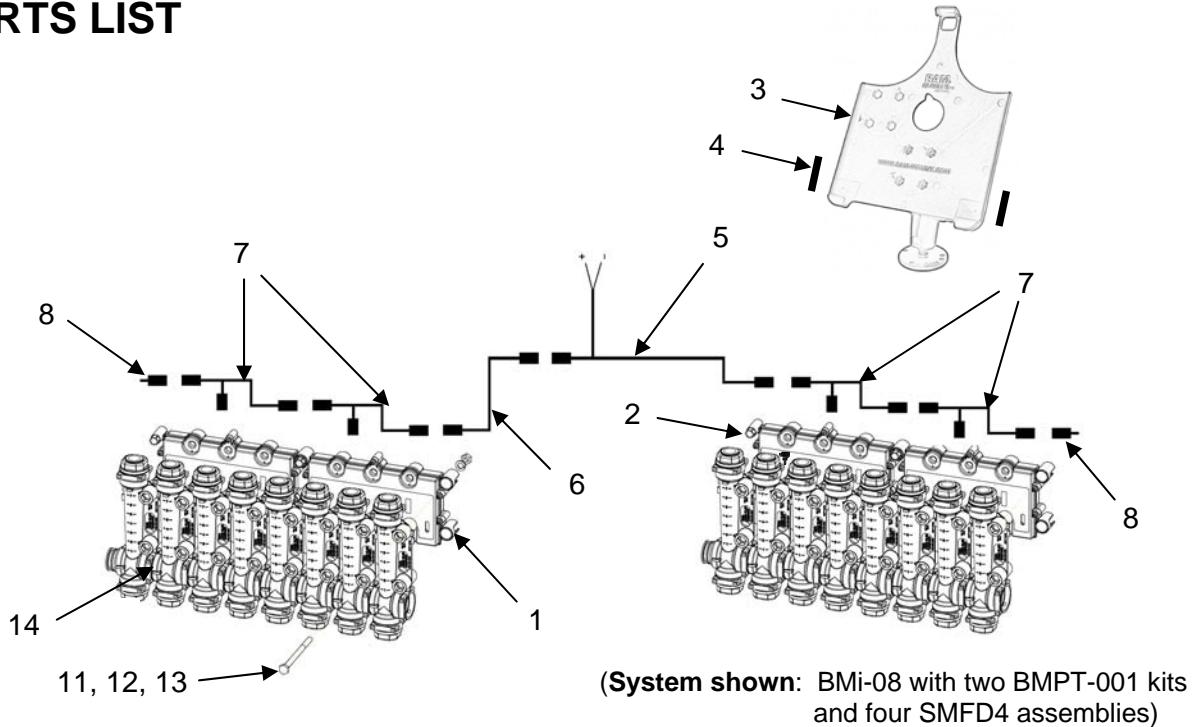
Firmware Updates:

- Firmware updates may occur after app updates to add features or correct product issues. The update will start automatically, and at its conclusion it will give either an update confirmation or report errors. Please do not interrupt the update, and do not turn off the power. If errors are encountered, please try again and follow these tips:
 - Temporarily shorten the physical distance between the tablet and wireless sensor during the update.
 - Don't close the app or otherwise interfere with the tablet WiFi connection
 - Avoid performing the update in an area with heavy WiFi usage (multiple WiFi networks/routers/devices in use)

TROUBLE SHOOTING

ISSUE	POSSIBLE CAUSES
No LEDs are lit on sensor(s) or power loss	If you are sharing power connections with 12v pumps or air compressors, they may pull the voltage down at start-up momentarily and affect the LBMS system. 4 pin connectors are not fully engaged. Pinched or damaged wiring – check all pinch points. Bad ground or power connections.
System does not remember which rows were blocked correctly after the pump has been stopped	The fluid flow must be stopped quickly this function to work correctly or the system will detect that many rows are blocked. Start the pump again and then stop the fluid flow within 5 seconds or less. Alternatively, use the “Pause” feature to capture blocked rows before stopping.
Frequent false alarms	The alarm level setting may need to be set lower, or you may need to set the alarm delay to a higher number. If a ball is pegged to the top of a Visagage column, the signal may be lost – try lowering the level by changing to another ball or ball combination. If a ball is not moving off of the bottom , the system may not turn on the row. Change to another ball or use a light non-magnet ball to lift the orange or yellow ball.
LEDs on control panel or sensor assemblies are flashing rapidly	There is a communication error, most likely caused by a wiring problem between sensors. Check for wiring damage and check connections, then turn sensor power off and on.
No connection to wireless sensor or zero ECUs connected	Check to see if the Wi-Fi signal has been lost in “Settings”, “Wi-Fi” on the tablet and verify the sensors have power and their leds are lit. If you are having trouble connecting to the wifi sensor under “settings” on the tablet, temporarily turn off other wireless devices (like cameras) in the area to help the tablet connect. You may also try turning off cellular data. If your screen is blank and “0” ECU’s are connected, you need to close the app out of memory and reopen. On an iPad, do this by double clicking the home button and closing our app’s “window” by swiping it upward.
System inaccuracy problems	If the reported ball levels do not appear to be correct, or if when the balls are at the bottom but the tablet reports them to be up, a recalibration should be executed. See page 10.
App does not continue to operate while in “background”	When prompted by the tablet, you must choose to allow the app to always use your location and allow notifications.
Metal particles are sticking to magnet balls	It is recommended that strong cow magnets (non-cage style) be placed in your strainer to catch metal particles.

PARTS LIST



Item	Part Number	Description	Qty (variable)
1	BMPT-002	Standard sensor	1 per system
2	BMPT-003	Wi-Fi sensor	1
3	BMPT-023	iPad mount bracket	2
4	BMPT-028	iPad Air side spacer	1
5	BMPT-010	Input harness	1
6	BMPT-012	28ft extension harness	1
7	BMPT-011	Tee harness	(variable)
8	BMPT-015	Terminator plug	2
9	BMPT-013	15ft extension harness (not shown)	optional
10	BMPT-014	7ft extension harness (not shown)	optional
11	90623	1/4"-20 x 3" long SS Hex Bolt	8 per sensor
12	93005	1/4" plated lock washer	8 per sensor
13	92015	1/4"-20 plated nut	8 per sensor
14	SMFD4	Visagage set – sold separately (FD style shown)	~
15	SMPT-0057	Orange low flow magnet ball (not shown)	4 per set (#21)
16	SMPT-0058	Yellow standard magnet ball (not shown)	4 per set (#21)
17	SMPT-0068	Green medium flow magnet ball (not shown)	4 per set (#21)
18	SMPT-0079	OPTIONAL: Blue high flow magnet ball (not shown)	optional each
19	SMPT-0085	OPTIONAL: Grey magnet ball (not shown)	optional each

Kits:		
20	BMPT-001	Sensor Expansion Kit (includes items: 1, 7, 21, and eight each of 11, 12, 13)
21	SMPT-0060	12 Magnet ball kit for one sensor (four each of 15, 16, 17)

DEVICE NOTES

Electrical requirements:	Allowable system input voltage range	8-16 V DC
	Max amp draw for wi-fi sensor	0.31 A (@12V)
	Max amp draw for each standard sensor	0.27 A (@12V)

Changes or modifications 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 for 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 to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna/device.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio technician for help.

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.

Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer le fonctionnement du dispositif.

Notes

Notes

LIMITED WARRANTY

THIS WARRANTY IS IN LIEU OF ALL OTHER WRITTEN OR EXPRESS WARRANTIES AND REPRESENTATIONS. ANY IMPLIED WARRANTIES INCLUDING MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY LIMITED TO THIS WRITTEN WARRANTY. CDS-JOHN BLUE COMPANY SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES.

Use of this product for any purpose other than its original intent, abuse of the product, and/or any modification to the original product is strictly prohibited by the manufacturer, CDS-John Blue Company. Any modification to the product should be approved by CDS-John Blue Company prior to use. CDS-John Blue Company will deny Warranty claims and liability in any situation involving misuse, abuse or modification.

Each new machine or component manufactured by CDS-John Blue Company through original buyer is warranted by CDS-John Blue Company to buyer and to any party or parties to whom buyer may resell, lease or lend the equipment to be free from defects in material and workmanship under normal use and service. This obligation of CDS-John Blue Company under this warranty is limited to the repair or replacement of defective parts or correction of improper workmanship of any parts of such equipment which shall within one year from the date of CDS-John Blue's original delivery thereof, be returned to CDS-John Blue's factory, transportation charges prepaid and which CDS-John Blue Company shall determine to its satisfaction upon examination thereof to have been thus defective. When it is impractical to return the defective parts of such equipment to CDS-John Blue's factory, then CDS-John Blue shall have no liability for the labor cost involved in repairing or replacing any such parts and shall be liable solely for supplying the material necessary to replace or repair the defective parts, provided that prior thereto CDS-John Blue Company shall have determined to its satisfaction that any such parts are thus defective.

This warranty shall not apply to any equipment which shall have been repaired or altered outside CDS-John Blue's factory in any way so as to affect its durability, nor which has been subjected to misuse, abuse, negligence or accident, or operated in any manner other than in accordance with operating instructions provided by CDS-John Blue Company. This warranty does not extend to repairs made necessary by the use of inferior or unsuitable parts or accessories, or parts or accessories not recommended by CDS-John Blue Company.

CDS-John Blue Company makes no warranties in respect to parts, accessories or components not manufactured by CDS-John Blue Company, same ordinarily being warranted separately by their respective manufacturers.

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