WILGER

Electronic Flow Monitoring System

Installation and Operation Manual
V1.2 (Revised Feb 22, 2021)
Featuring App version 2.6.3

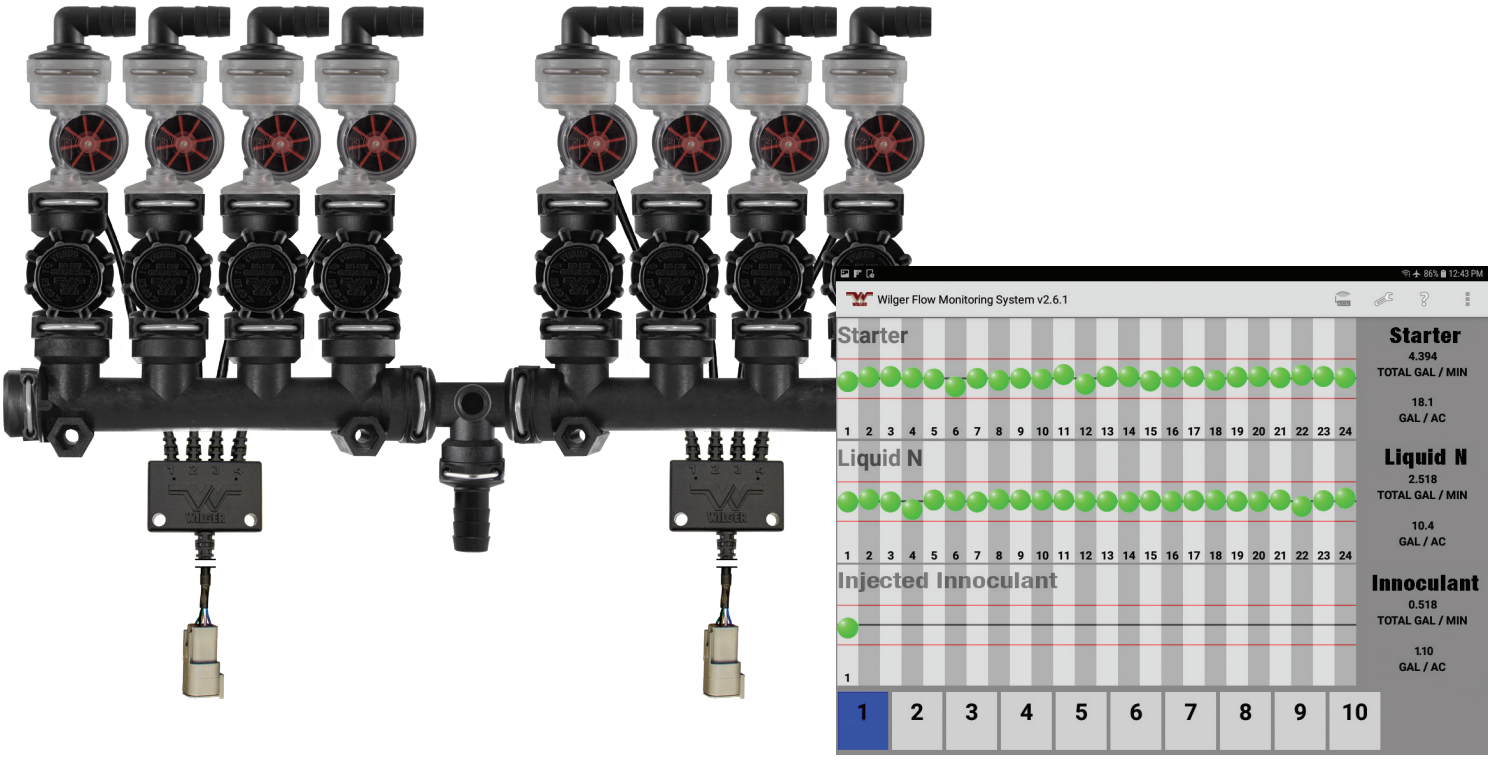


Table of Contents

MY ECU
SERIAL NUMBER:
— — — — — — —

Important Information

- Be sure to follow all safety instructions in your application equipment operator's manual.
- Wilger Industries Ltd. (Canadian Head Office & Factory) and Wilger Inc. (US Office & Factory) will furthermore be referred to as 'Wilger'.
- Learn how to operate and service the application equipment correctly. Failure to do so could result in personal injury or equipment damage. Wilger does not accept any liability or responsibility for personal, equipment or other damage or malfunctions arising from failure to comply with the equipment's operation manual.
- If you do not understand the information in this manual, or if you have any questions, contact Wilger Customer Service. (USA: M-F 9-5; 1 877 968-7695 // CANADA: M-F 9-5; 1 833 242-4121)
- This manual should be considered a permanent part of your machine and should remain with the machine when you sell it.
- Wilger reserves the right to alter illustrations and technical data contained in this manual without notice of changes. Technical data and illustrations are provided for visual aids, and may differ from your current system. Contact Wilger Support if any verification is needed.
- The contents of this manual are the intellectual property of Wilger. All use and/or reproduction not specifically authorized by Wilger is prohibited. Send all requests for reproduction or modification to: info@wilger.net
- All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. Wilger reserves the right to make changes at any time without notice.

Introduction

The Wilger Electronic Flow Monitoring System (EFMS) is a compact flowmeter that can be used row-by-row on liquid fertilizer or chemical application equipment. The flow meter is paired with a tablet, or manufacturer's monitor to provide accurate monitoring for both blockage and flow rate irregularity.

Similar to visual ball flow indicators, the Wilger Electronic Flow Monitoring System shows variations in flow caused by blocked lines, incorrect orifices, or blown product hoses. However, the Wilger EFM System provides the added benefit of indicating the actual flow (not just relative flow) for each row. This information is conveniently displayed on a screen in your cab.

The EFM system utilizes a paddle-wheel flowmeter, with patented stabilizing flow jets, that maintains accuracy across the flow range of 0.04 US GPM to 1.5 US GPM (0.15L/min to 5.6L/min), without significant pressure drops. The EFM system accurately monitors flow on each outlet or product run, which ensures the operator has complete and comprehensive flow information. The flowmeter can provide a 40:1 flow range, pairing stabilizing flow jets appropriate for the users' operational flow range.

The Electronic Flow Monitoring app (Android OS) receives sensor information from the flowmeters via an Electronic Control Unit (ECU). The ECU establishes a local WiFi connection with the tablet, so there are no communication harnesses needed between the implement and the cab.

EFM System Components

Plumbing Components

The Electronic Flow Monitoring system uses O-ring Seal (ORS) plumbing, which is ultimately adaptable to any application equipment. However, the system typically requires:

- Plumbing manifolds, which split the flow to each flow run
- EFM flowmeters, each of which is equipped with:
- A flow jet, selected for the anticipated flow range
- An orifice, which determines the application flow rate
- Check valves (recommended) that allow flow to be manually shut off
- [OPTIONAL] Ball Flow Indicators, which can be installed to add visual indication of flow in addition to the digital display.

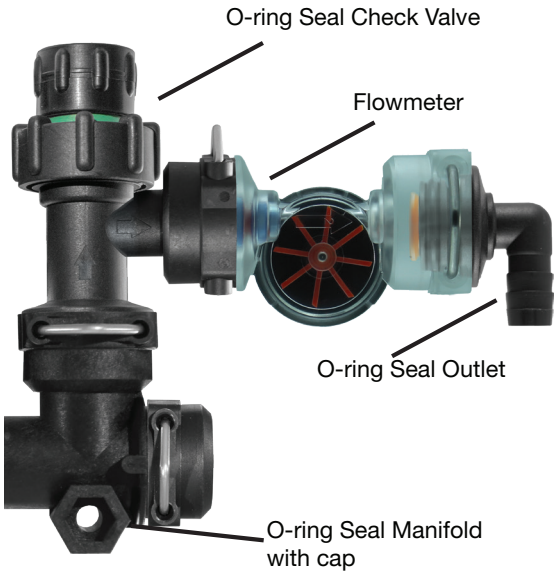


Figure 1. Manifolds with flowmeter and check valve

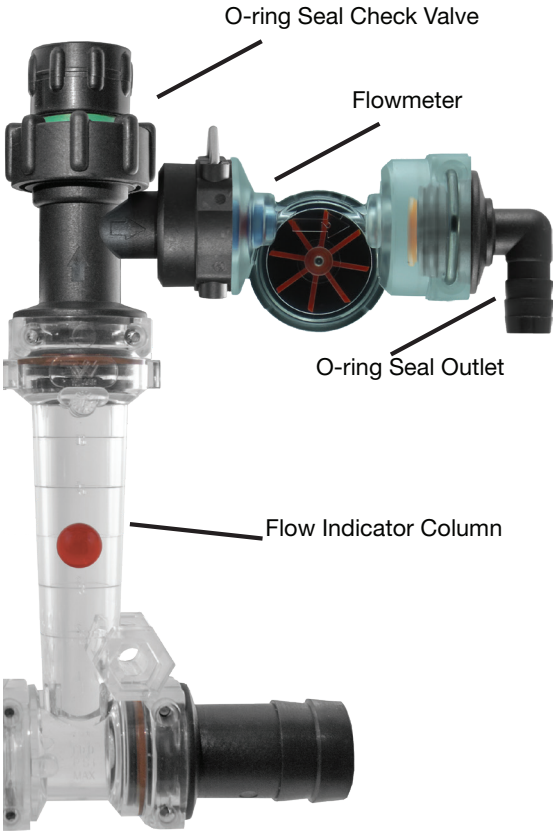


Figure 2. Ball Flow Indicator with flowmeter

Figure 3. O-ring Seal Orifice for Various Flow rates

Green Jet:	Red Jet:	Lt Blue Jet:	Black Jet:
0.04-0.12 us gpm	0.1-0.31 us gpm	0.18-0.98 us gpm	0.57-1.53 us gpm
0.15-0.45 L/min	0.378-1.17 L/min	0.68-3.71 L/min	2.16-5.79 L/min

Figure 4. Flow Stabilizing Jets for measuring flow ranges

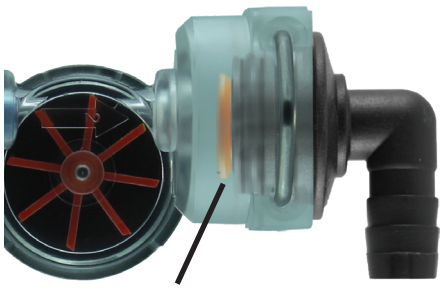


Figure 5. Orifice & Outlet in flowmeter

EFM System Components - cont'd

Electronics and Cabling Components

The EFM system operates from 12 VDC power (10.8-13.8v). Sensors, nodes and the ECU are interconnected using multiconductor cables with weather-tight Deutsch connectors.

Electronic control unit (ECU) – Creates a local WiFi network signal that allows the EFM system to communicate with an app running on an Android tablet in the tractor cab. The Android app is provided free as a download.

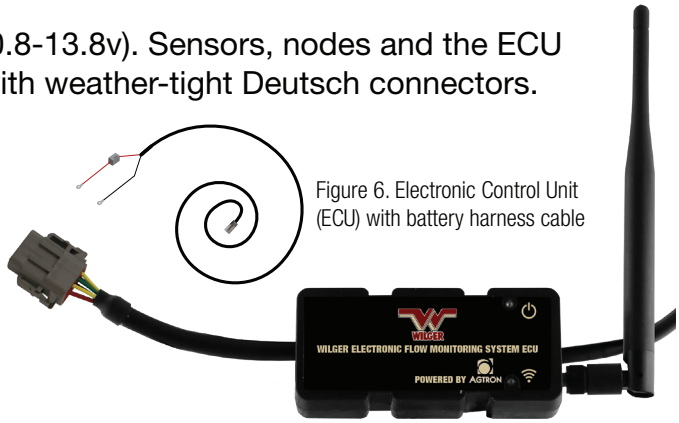


Figure 6. Electronic Control Unit (ECU) with battery harness cable

#20603-00 KIT - includes Terminator (#20604-00), Antenna (20603-03), Battery Harness (#20603-02), ECU (#20603-01)

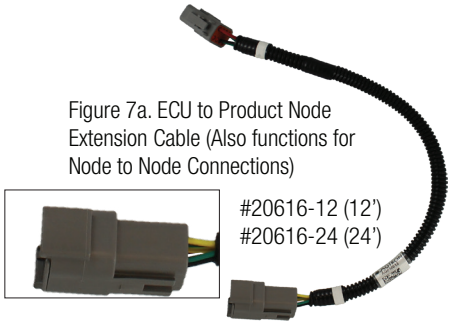


Figure 7a. ECU to Product Node Extension Cable (Also functions for Node to Node Connections)

#20616-12 (12')
#20616-24 (24')

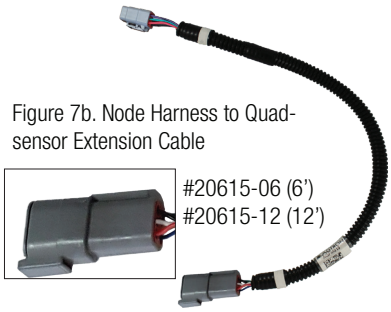


Figure 7b. Node Harness to Quad-sensor Extension Cable

#20615-06 (6')
#20615-12 (12')

[Optional] Extension cables – Two extension cables are available

ECU/Node to Node (8-pin)
Connects the ECU to the first product node in a chain of multiple product nodes if a span greater than ~18" is required.
Available in 12' or 24' length.

Node Harness to Quad-Sensor Cable (6-pin)
Connects a Node Harness Divider Cable (A/B/C/D) to a quad-sensor cable, giving extra length if required.
Available in 6' or 12' length.

4-Channel (4CH) Node, 4CH Node Harness, and Single Sensor cable – The 4CH node brings together signals from up to four flow sensors and sends the signal to the ECU. A 4CH harness connects the node to four single-sensor cables. Each 4CH node has six connectors: four 3-pin female Deutsch connectors (for sensor cables), one 8-pin female Deutsch connector (for connecting to the next node in the chain, or to a terminator), and one 8-pin male Deutsch connector (for connecting to the previous node in the chain, or the ECU)

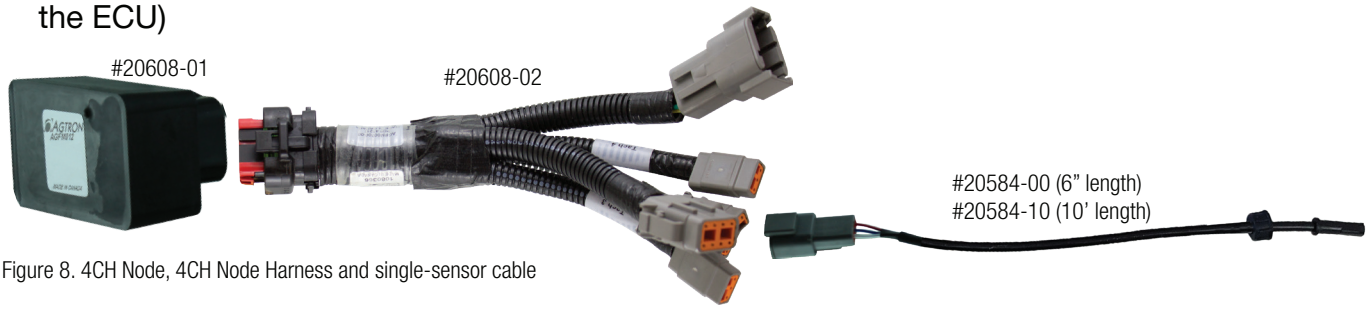


Figure 8. 4CH Node, 4CH Node Harness and single-sensor cable

EFM System Components - cont'd

Electronics and Cabling Components

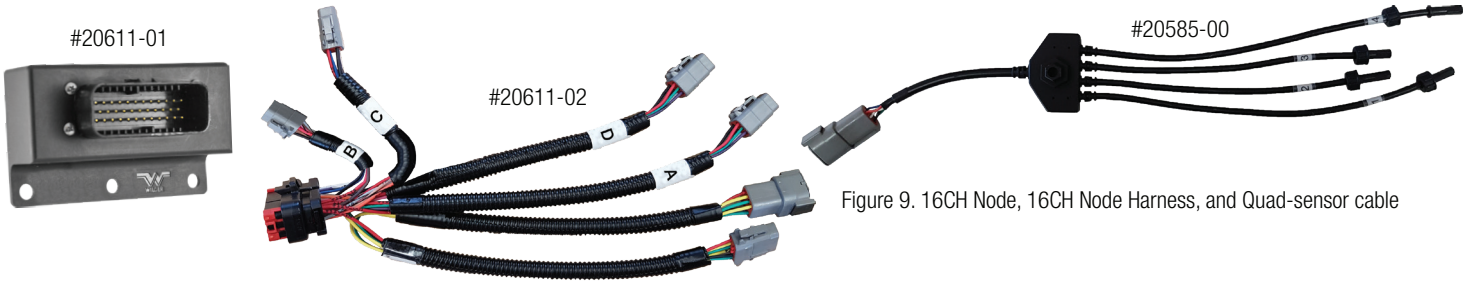


Figure 9. 16CH Node, 16CH Node Harness, and Quad-sensor cable

16-channel (16CH) node, 16CH node harness and quad-sensor cable – Enables the 16CH node harness to connect to four quad-sensor cables (allowing up to 16 sensors per 16CH product node) to be connected and communicate with the system. Each 16CH node has six connectors: four 6-pin female Deutsch connectors (for quad-sensor cables), one 8-pin female Deutsch connector (for connecting to the next node in the chain, or to a terminator), and one 8-pin male Deutsch connector (for connecting to the previous node in the chain, or the ECU).

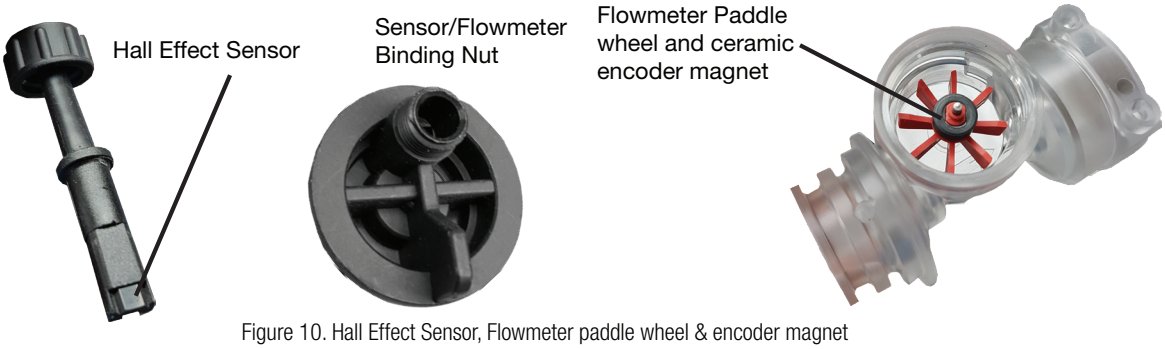


Figure 10. Hall Effect Sensor, Flowmeter paddle wheel & encoder magnet

Sensor and Encoder – Hall effect sensor detects rotation of the encoder magnet on the wheel, producing pulses at a rate representative of flow.

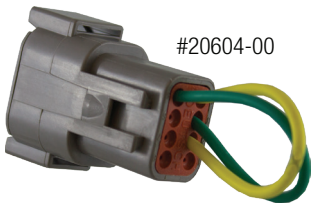


Figure 11. ECU Harness Terminator

8-pin node harness terminator – Terminates the series (chain) of product node harnesses that originate at the ECU. The terminator will always be plugged into the last product node(s) of the chain.
(**Advanced:** If an ECU to Node Y-adapter is used at the ECU, two terminators are required – one on each end of the chain.)

Figure 12. 4CH Node Sensor connector cap (3-pin) [left]
16CH Node harness (A/B/C/D) connector cap (6-pin) [middle]
Hall Effect Sensor Rubber Cap [right]

4CH, 16CH node harness & sensor caps –
Protect unused sensor connectors from corrosion. Used for any unused sensors or harness connections

EFM System Components - cont'd

Electronics and Cabling Components

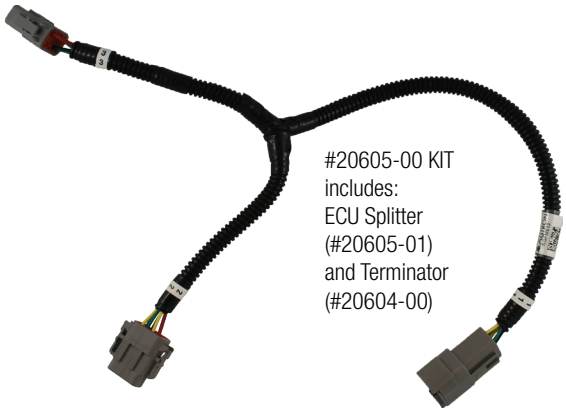


Figure 13. ECU Splitter - Used to split ECU Node Connection into Right/Left Nodes [Advanced]

ECU Splitter Cable - The ECU to Node Splitter cable is used only when plumbing manifolds and EFM components cannot be centrally located on the application equipment.
In situations that dictate the EFM components and plumbing manifolds must be located alongside the application equipment's length, the splitter can be used to minimize the amount of extra wiring and/or extension harnessing required.
For proper use and labeling of a ECU splitter, reference Appendix 1.

Tablet and EFM App

NOTE: EFM App can be available from www.wilger.net/efm.apk It may also be available from the GooglePlay App store.

WWW.WILGER.NET

ANDROID APP ON Google play

Android App requires Android 8.0 or greater

The Electronic Flow Monitoring (EFM) System includes an Android app that runs on an Android tablet computer located in the the tractor cab.

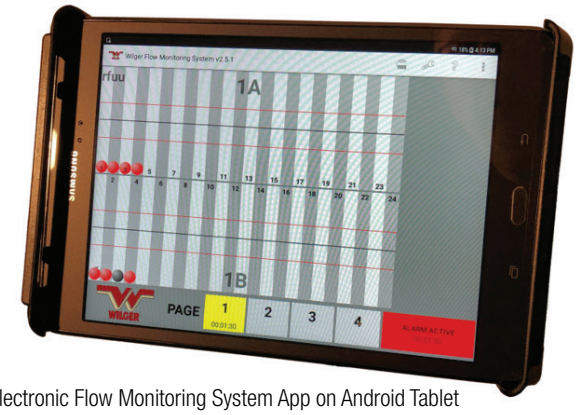


Figure 14. Electronic Flow Monitoring System App on Android Tablet

The EFM app (downloadable from www.wilger.net, GooglePlay Appstore) is relatively simple to operate and interpret. It provides a highly customizable visual indication of flow rates for each sensor. Up to three different products can be shown at a time. Up to 196 sensors (shared across the three products) can be monitored.

Flow alarm thresholds are easily changed for any of the three products. Green balls indicate a sensor is within the threshold; yellow indicates the flow is approaching, or past the threshold; red indicates a serious flow alarm condition.

App Setup and Operating Screens & Pages

The app provides three main screens for setting up and operating the system:

- Main Overview - up to four pages of information for operating the system
- ECU Settings – for configuring units, values and system options
- EFM Sensor Setup - up to four pages for configuring individual sensors

[Advanced]

- Advanced Settings & Calibration - Advanced Menu and Manual Calibration

The Main Overview screen includes icons at the top, right that provide access to the other screens and additional menu items.

SYSTEM SETUP SCREEN ACCESS CODE

To access the Sensor Settings screen, the operator must enter a four-digit System Setup Access Code.

The factory default code is 1111.

The System Setup Access Code can be changed from within the Setup menu.

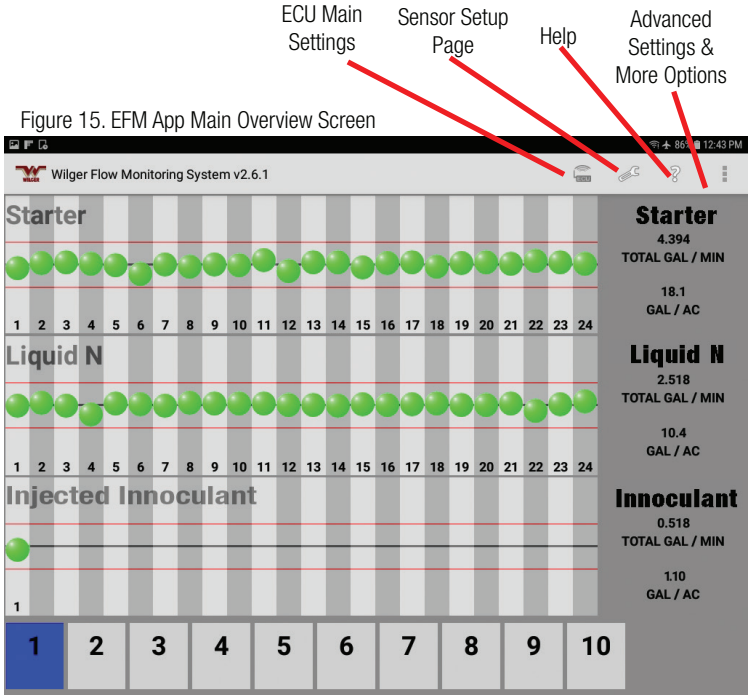


Figure 15. EFM App Main Overview Screen

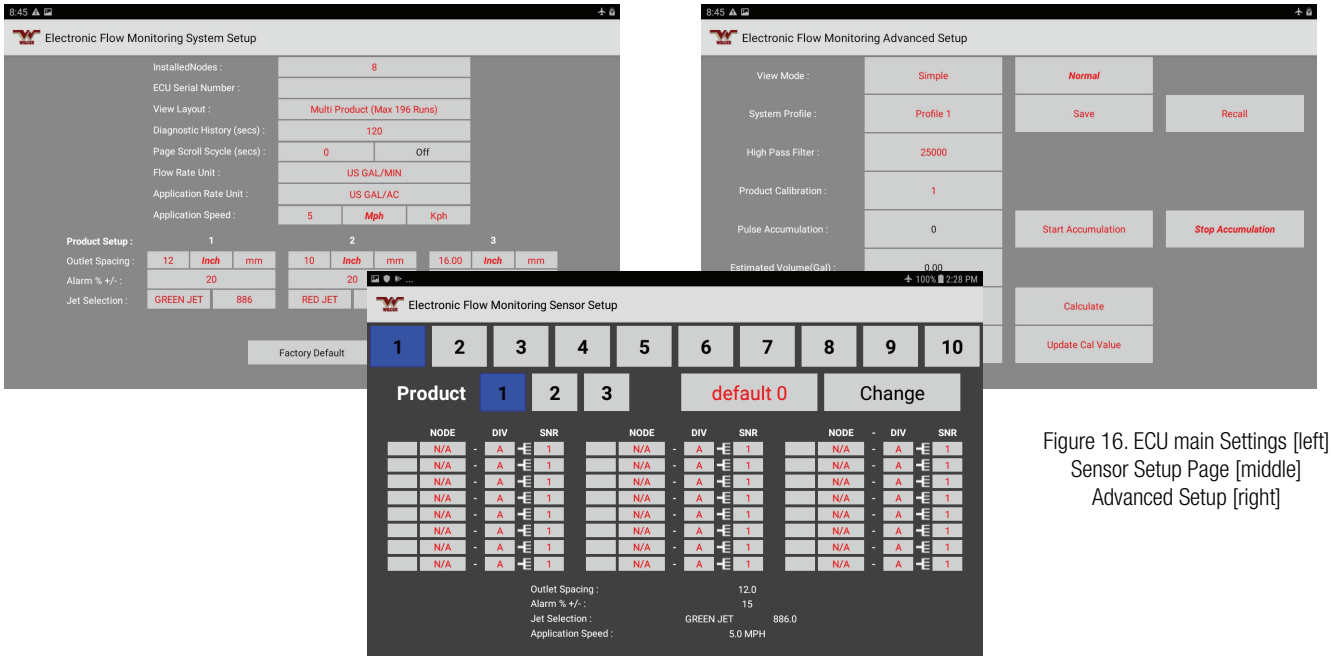


Figure 16. ECU main Settings [left] Sensor Setup Page [middle] Advanced Setup [right]

Help and Options Screens

The following screens provide additional information and options:

- Help - provides access to this manual in electronic format

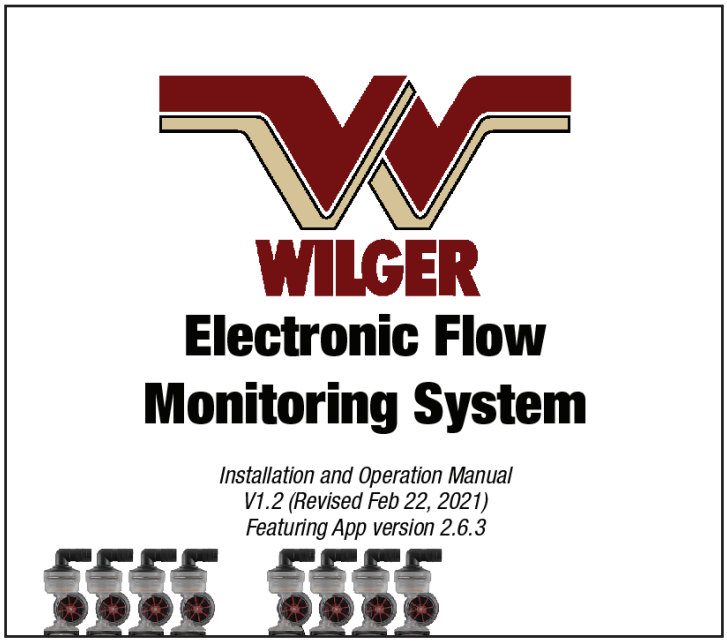


Figure 17. The digital manual PDF which is accessed by clicking the ? HELP button.

- More Options & Advanced Settings

- Status and history messages about wireless status
- Status and history message about loop communications errors
- A log file (.csv) with flow information
- **Advanced Settings screen**, allowing for manual jet calibration using actual flow rates, Saving Sensor setup profiles (and recalling them), or enabling SIMPLE view (showing ONLY balls going up and down)

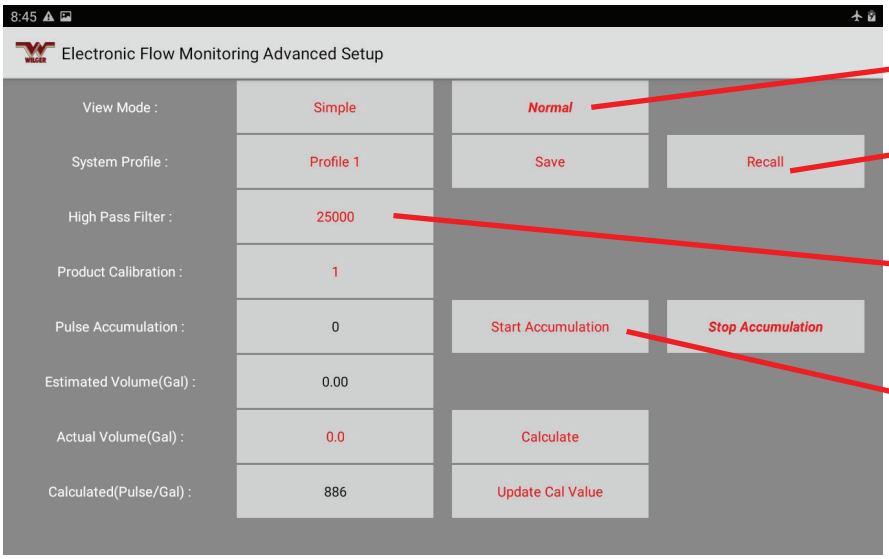


Figure 18. The advanced setup & calibration screen

SIMPLE MODE or NORMAL MODE
Allows selection of Simple mode, which removes all flow rate information, showing only ball height variation.

SAVE/RECALL PROFILE
Allows saving of EFM sensor setup page and ECU settings page information into a profile to allow easy switching between crops. There are 3 profiles that can be used for saving/recalling.

High Pass Filter [BETA FEATURE]
For ease of monitoring flow that is pulsing, a high pass filter can be adjusted to skip frequencies that are too high (or pulses that occur too fast - which are likely caused by the encoder magnet spinning backwards during an 'off' pulse)

CUSTOM CALIBRATION
To allow for greater accuracy, using a flow test, a user can 'start accumulation' as they start collecting a single outlets flow. After 30 seconds of collection (longer will provide more accuracy), the user will press STOP ACCUMULATION, and stop collection of flow.

The user will them input the collected flow (in gallons), and press CALCULATE, to generate a new Calibration Jet number.
By pressing UPDATE CAL NUMBER, it will send that new calibration number to the product's JET selection. This can be ovewritten on the ECU Settings page, if an error is made.

Overview of the EFM System

Basic Structure

Figure 19. 8-pin female connector

Figure 20. 8-pin male connector

The Electronic Flow Monitoring System can be retro-fitted on an existing liquid fertilizer or chemical application kit using O-ring seal (ORS) fittings, or added as a new kit to an existing machine.

- One ECU is required per EFM system (and can accommodate up to 196 product outlets/sensors).
- The 8-pin female Deutsch connector from the ECU plugs into the 8-pin male connector on the harness connected to the first product node (Node 1)
- Additional Product Nodes are daisy-chained (using node-to-node extension cables – if extra harness length is required)
- There are two types of product nodes: 4-channel (4CH) and 16-channel (16CH)

NOTE: Wherever possible, use 16CH nodes. Use 4CH nodes only where four sensors or less are required

- 4CH nodes connect to a harness that allows connection to four single-sensor cables
- 16CH nodes connect to a product node harness that allows connection to four quad-sensor cables, which facilitates the use of up to 16 sensors in total
- Each unused product node connection should be capped to protect connections from possible corrosion.
- Sensors are designated by node, cable, and sensor.

Example: Sensor 2B3 is Node 2, Cable B, Sensor 3 (See Figure 21)

- The last product harness in the chain requires a node harness terminator.

Overview of the EFM System - cont'd

Basic Structure

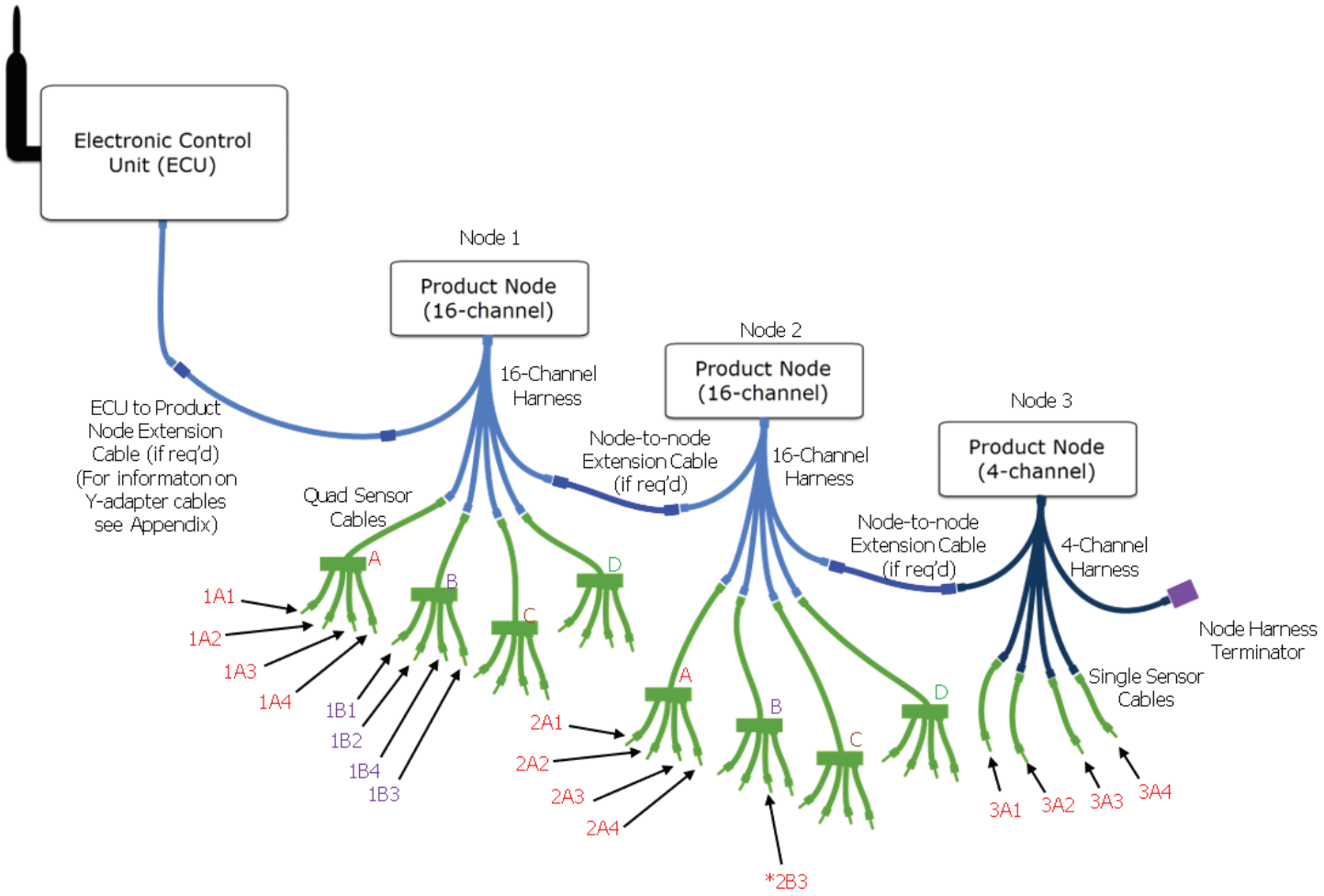


Figure 21. System Structure for EFM system using 3 nodes

ADVANCED:
Using an ECU to Node Y-adapter
If more convenient, an ECU to Product Node Y-adapter cable can be used to split the system into two sections allowing the ECU to be located in the middle of the implement with a series of Product Nodes on each side.

For more information on the use of the ECU to Product Node Y-adapter cable, see **Appendix 1**.

Installing your EFM System

Planning your Installation

Using a whole host of available Wilger O-ring sealed (ORS) fittings, manifolds, or flow indicator columns, a flow monitoring system can be built to fit a vast majority of application equipment. Based on the application equipment, and your preferences:

1. Determine the number products/rates that will be monitored simultaneously.

Each sensor must be correctly grouped with like sensors, monitoring the same product, to ensure all flows will display correctly.

2. Determine the flow rate units that will be used (US GPM, L/min or Oz/min)
3. Determine the application rate units that will be used (US GAL/AC, IMP GAL/AC, L/HA, or US GAL/1000sq ft)
4. Ensure 12 VDC power is available on the application equipment.
5. Determine the size of the feed lines feeding each manifold/section.
6. Determine the hose size required for lines feeding each liquid maifold.

Hose barb options include: 1", ¾", 5/8", ½", 3/8", ¼"

7. Determine how the application equipment's sections are split up (how many outlets per section, and the spacing between each outlet).
8. Estimate the approximate distance between each section feed line.

This is important for optimizing EFM manifold locations and minizing excess harmess extension cables.

9. Determine the number of outlets/runs to be monitored.

E.g. A 48 row air seeder applying liquid fertilizer requires 48 sensors. If the same air seeder applied liquid fertilizer and starter, it would require 96 sensors.

10. Determine how many sections the EFM must be split into.

E.g. 6 sections x 8-rows/section

11. Optimally, feed each EFM pumbling manifold centrally, splitting the manifold with an ORS Tee. (This provides more consistent flow.) In the event of smaller manifolds, a single side-fed manifold is sufficient.
12. IMPORTANT! Locate and name each EFM sensor based on its product node number, divider letter (A-D), and sensor cable number (for 16CH nodes: 1-4; for 4CH nodes, sensor cables are numbered with the product node number plus A1, A2, A3, A4).

e.g. For a 16CH Node: Product Node 1 + Divider A + Sensor 1 = Sensor 1A1
For a 4CH Node: Product Node 1 + A + Sensor 1 = 1A1

Note: Divider letter is always A for 4CH nodes

NOTE: For more assistance in planning your installation, download the EFM System System Kit Builder, Quote Sheet, or for other information from www.wilger.net, OR contact your Wilger dealer, OR contact Wilger directly.

WILGER Industries Ltd.
[Canada]
1 (833) 242-4121 or
info@wilger.net

WILGER Inc.
[USA]
1 (877) 968-7695 or
WilgerEsc@WilgerEsc.com

Installing your EFM System - cont'd

Plumbing Manifolds

Flow Stabilizing Jet Ranges:

Green Jet:
0.04-0.12 us gpm
0.15-0.45 L/min

Red Jet:
0.1-0.31 us gpm
0.378-1.17 L/min

Lt Blue Jet:
0.18-0.98 us gpm
0.68-3.71 L/min

Black Jet:
0.57-1.53 us gpm
2.16-5.79 L/min

1. Use an ORS Tee (#20526-00) to connect the manifolds together and an end cap (#20521-00) at each end.
2. Install the preferred inlet size into the ORS Tee.
3. Determine the EFM jet required for the flow range required by your application.
4. Add the jets into each EFM body. (They only fit into the in-flow side of the EFM body.)
5. Connect an electronic flow meter (EFM) sensor to each check valve outlet.
6. Connect a manual ON/OFF check valve to the top of each EFM sensor. (This allows the run to be shut off for maintenance.)
7. Add the ORS metering orifices to the outlet fittings, sized as required by your application equipment outlets.

Example:

- Six sections of eight runs each, for a total of 48 runs.
- Center-feed each section (with 20526-00 TEE and hose barb inlet) using two 4-outlet EFM manifolds (#20644-00), and an outlet (with an option for a metering orifice) attached to the EFM body, with end caps to close the manifold (#20521-00).

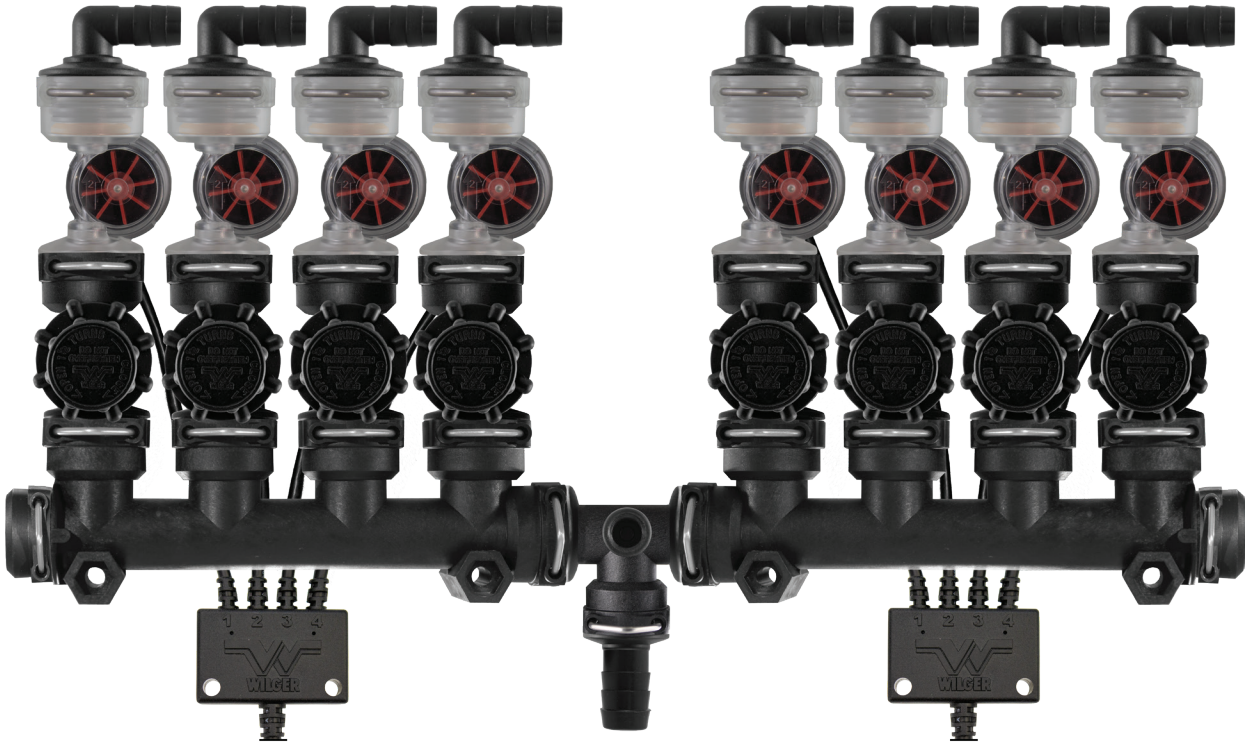


Figure 22. Example Plumbing Manifold

Installing and Connecting Electronics

Installation of the electronics is primarily a matter of plugging connectors together as per the arrangement determined in Planning Your Installation:
NOTE: While connecting ECU, nodes, harnesses and sensors, mark each item to make it easy to identify and configure in the app at a later step.
1. Connect each product node to a product node harness. (Select 16CH or 4CH harnesses based on your original installation plan.)
2. Link the nodes together in a daisy-chain by plugging the female 8-pin Deutsch connector of the first node into the male 8-pin Deutsch connector of the second, etc.
SUGGESTED BEST-PRACTICE: Label each product node with the number of its sequence in the chain (Suggestion: use a mark-all marker).
NOTE: 4CH node harnesses are compatible with 16CH node harnesses (and vice versa).
3. Connect the ECU's 8-pin female Deutsch connector to the 8-pin male Deutsch connector on the harness plugged into the first product node. If necessary, use an ECU to node extension cable. (If using a ECU Y-splitter cable, reference Appendix 1).
4. Connect an 8-pin ECU terminator to the harness on the last node of the chain.[1]
5. Connect sensor cables to node harnesses. (Single sensor cables to 4CH node harnesses; quad sensor cables to 16CH node harnesses.)
6. Cap off any unused node connections to avoid possible corrosion of terminals.

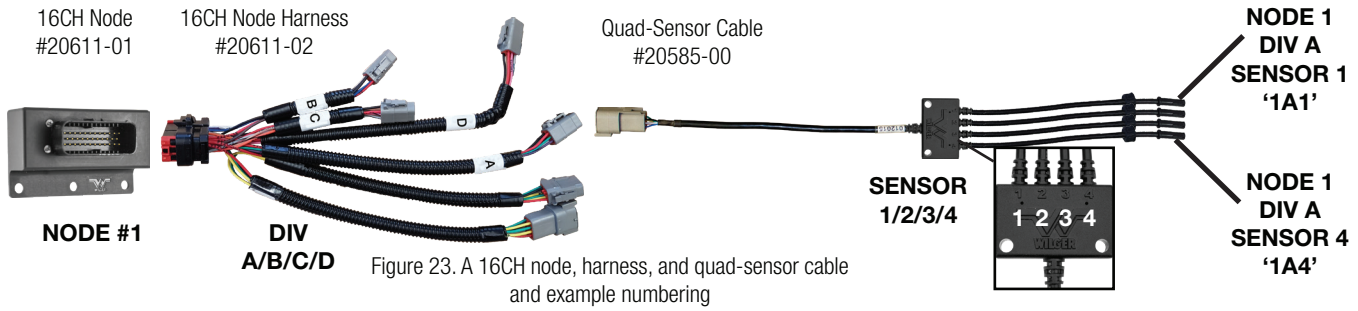


Figure 23. A 16CH node, harness, and quad-sensor cable and example numbering

[1]Correct installation of the terminator is critically required for proper flow readings in the app.

Installing the Wilger Electronic Flow Monitoring System App

NOTE: EFM App can be available from www.wilger.net/efm.apk
It may also be available from the GooglePlay App store.

WWW.WILGER.NET

ANDROID APP ON Google play

Android App requires Android 8.0 or greater

Using the Android tablet:
1. Establish a WiFi connection to the Android tablet.
2. Open a browser and download the EFM app from:
- Wilger's website (http://www.wilger.net/efm.apk)
- Google Play (https://play.google.com/store?hl=en)

NOTE: The tablet may require permissions to install apps from "outside" sources, for downloading the app from the wilger.net website.
3. Install the Wilger Electronic Flow Monitroing System app on the tablet.
4. Launch the app.

TIP: Refer to your android tablet manual for more detailed information on downloading and installing software.

Launching the App

SYSTEM SETUP SCREEN ACCESS CODE

To access the Sensor Settings screen, the operator must enter a four-digit System Setup Access Code.

The factory default code is 1111.

The System Setup Access Code can be changed from within the Setup menu.

1. On the tablet home screen, tap the EFM app icon (named Wilger Flow Monitoring System).

Figure 24. An Android Tablet

The following screen appears, indicating that the ECU is not communicating with the ECU.

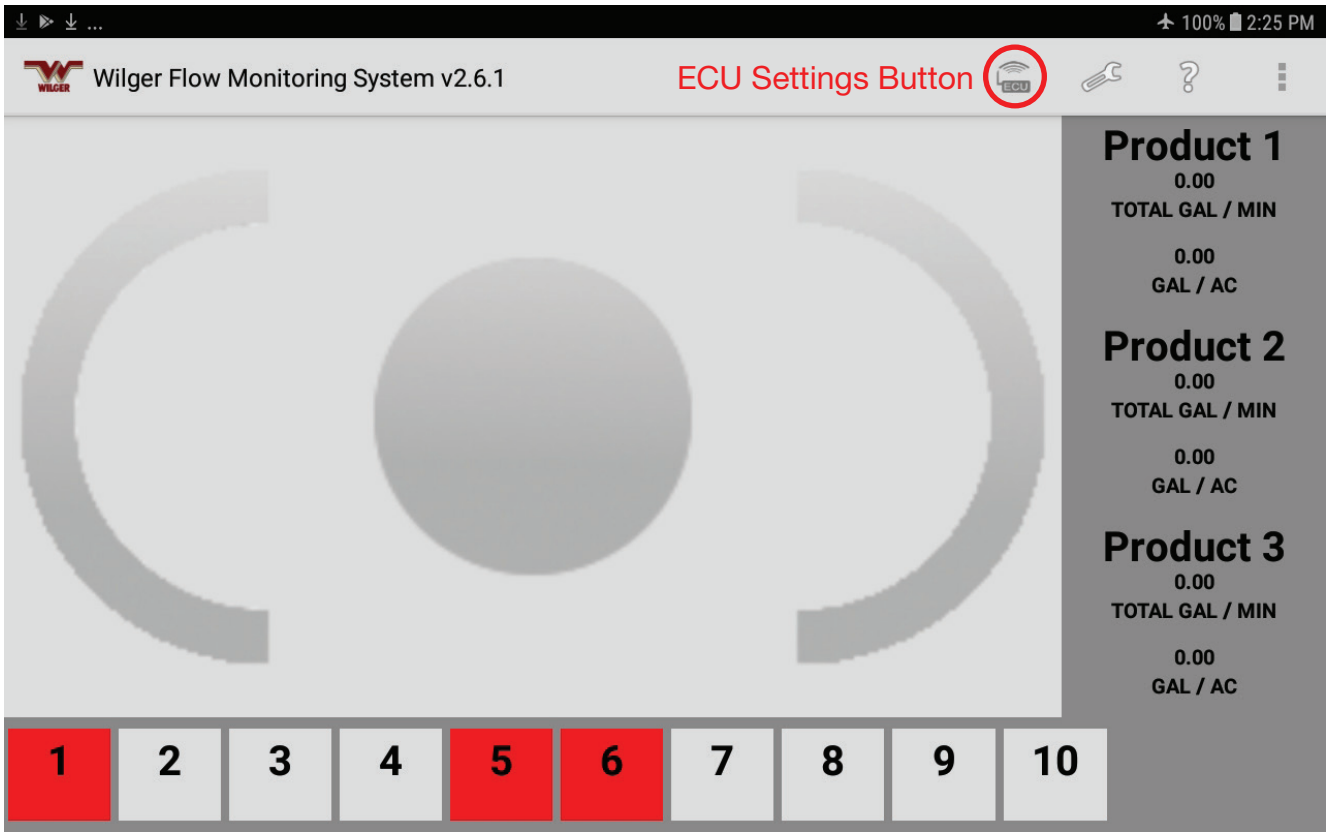


Figure 25. No ECU Connectivity.

Connecting the Tablet to the ECU

MY ECU SERIAL NUMBER:

__ __ __ __ __ __ __

RETAIN SERIAL NUMBER HERE IN CASE ECU STICKER WEARS OFF

IMPORTANT: The app communicates with the ECU using the tablet's WiFi, but you do not connect the tablet to the ECU using the same WiFi menu on the tablet that you would use to connect the tablet to your home WiFi. If you do, you will have to re-configure the tablet to "forget" the ECU before performing the following (correct) connection procedure.

Special steps are required if you are using an ANDROID 10.0+ device with an app software version of 2.6.2 or earlier.

To connect the app to the ECU:

1. Make sure the ECU has power. The red light 1 beside the power icon on ECU will light up. The red light beside WIFI icon 2, will light up and blink steadily.
   - Before first connection to ECU and tablet, the ECU will go through a 10 second power cycle reinitializing the WIFI broadcast until connection.
   - Once ECU has had a successful connection, this power cycle will adjust to a 30 second cycle.
2. Locate and record (for later use) the ECU serial number on the back of the ECU 3
3. On the Main Overview screen, tap the ECU Main Settings icon. (See Figure 25).
4. Type in the default system access code (1111) and press Accept.

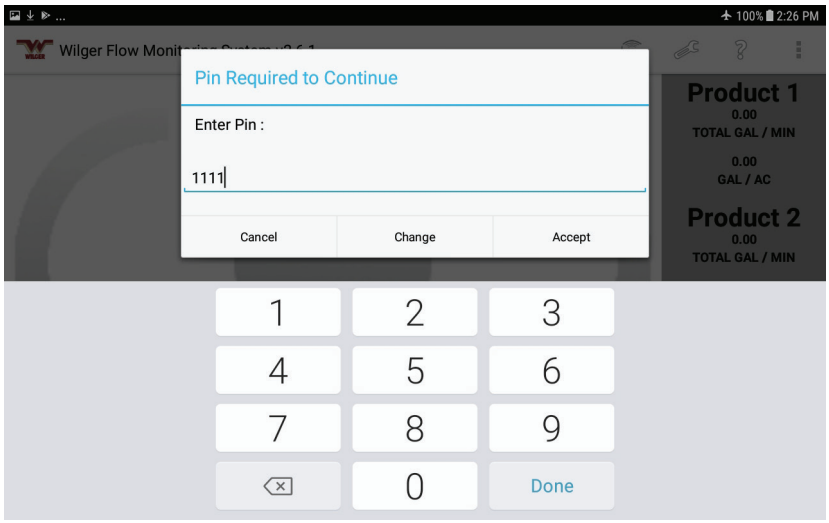


Figure 26. PIN required to enter settings screens

NOTE: You can also change the access code by pressing Change.

The ECU Main Settings page appears.

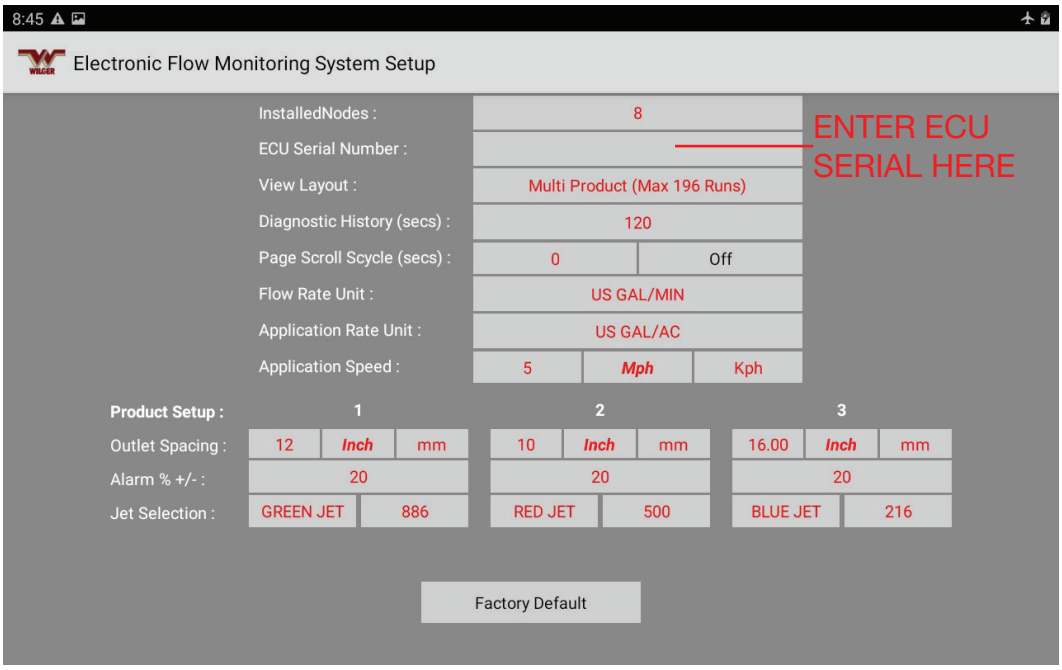


Figure 27. Setting ECU Serial Number in ECU Settings Page

5. Tap the ECU Serial Number field.

The on-screen keyboard appears

6. Type in the ECU serial number you previously recorded from the ECU.
7. Tap Next.

The tablet will automatically connect to the ECU. This process may take a few minutes for an initial connection.

8. Verify that the light ❷ beside the WiFi icon on the ECU lights up solid. This indicates you have successfully connected your ECU to the android tablet.

Tip for Android Tablets Version 9.0.0r65 and earlier and App version 2.6.3 or earlier:
If the tablet is attempting to connect to the ECU WiFi directly through the tablet's setting, the EFM app may not work. It must connect using the "Connecting the Tablet to the ECU" procedure shown above. Before this procedure will work, you must reconfigure the tablet to "forget" the incorrect WiFi connection. To do so:

1. Navigate to the tablet's Connections Settings, WiFi, Manage Networks page
2. Select the Wilger connection listed there
3. Select Forget.

Tips for Android Tablets Version 10.0.0+:
You will have a prompt asking to use a specific WIFI connection with using the app. Accept the connection.

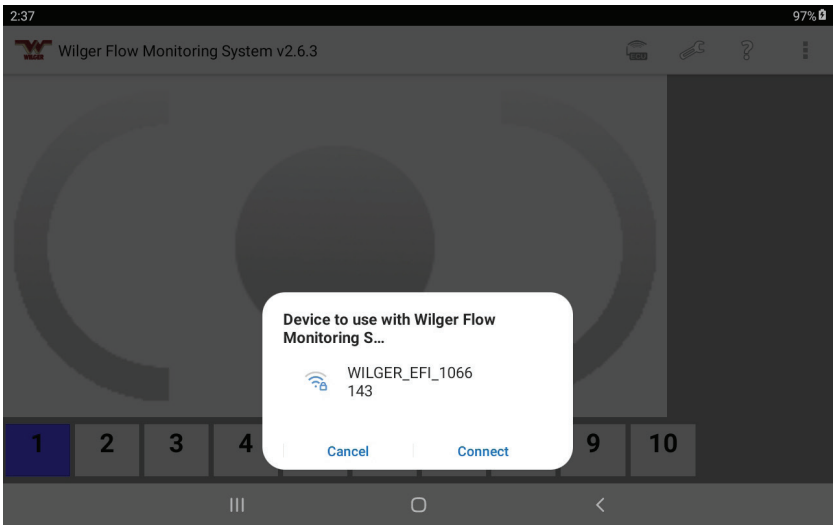


Figure 27b. Connecting to ECU WIFI on Android 10.0+

Configuring the ECU Settings

In addition to connecting the ECU to the tablet, (as described in the previous section), the ECU Main Settings Page allows you to configure many other settings used for accurate flow monitoring and operation of the system.

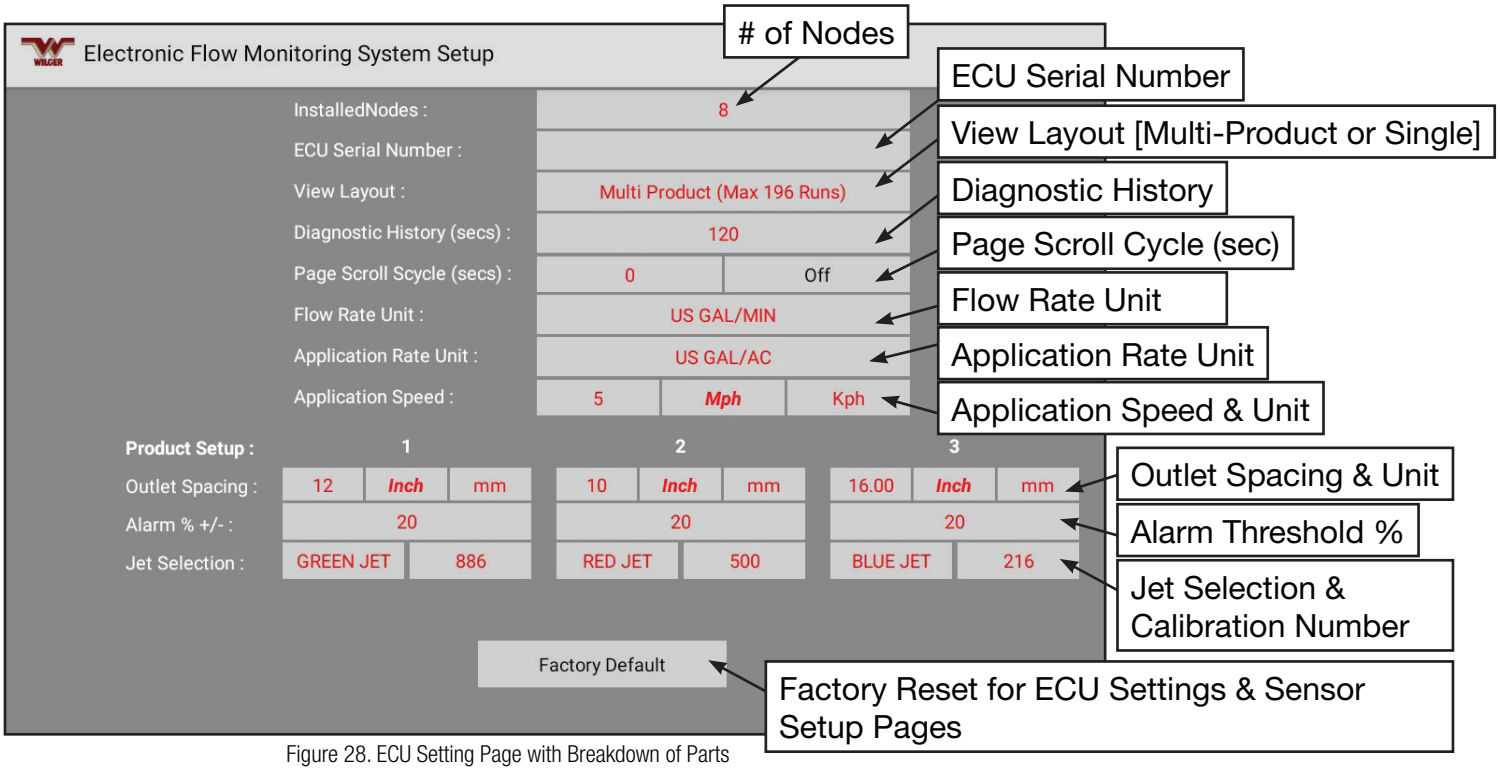


Figure 28. ECU Setting Page with Breakdown of Parts

Installed Nodes (# of Nodes): This field auto-populates if the ECU has power and is properly attached to all product nodes in series, with the terminator attached to the last product node harness. Verify that the number of nodes indicated matches the actual number of nodes in your system. If it does not auto-populate, simply input the correct number of nodes.

ECU Serial Number: As described in "Connecting the Table to the ECU" you must enter the correct ECU serial number in this field to get the tablet to communicate with the ECU over WiFi. The serial number is printed on the back of the ECU. Tap the field to open the numeric keypad popup and enter the desired value.

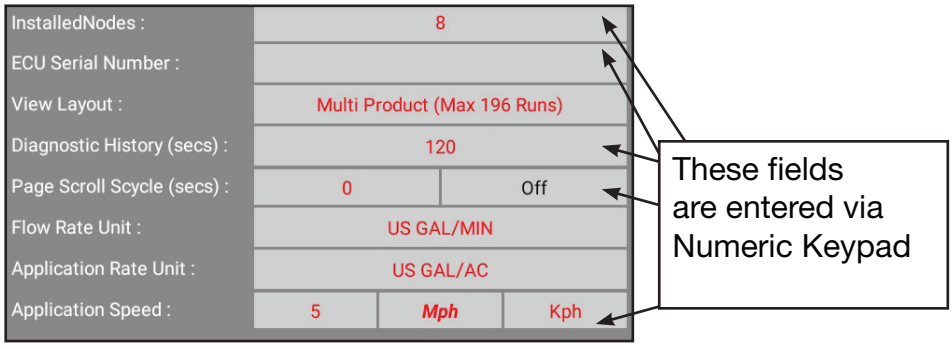


Figure 29. Sections requiring keypad entry

Diagnostic History: This field determines the amount of data held in memory for diagnostic purposes (used during support interactions with the manufacturer). Typically you will leave this value at the default setting of 120 seconds unless notified otherwise by support personnel. Tap the field to open the numeric keypad popup and enter the desired value.

Page Scroll Cycle: If multiple pages are being used to display sensor information, the pages will scroll automatically after the indicated number of seconds. Tap the field to open the numeric keypad popup and enter the desired value.

Flow Rate Unit: This field contains your preferred flow rate units. Tap this field, then select the desired units in the popup menu.

NOTE:
The EFM app does not receive actual travel speed information so an expected travel speed must be entered and then the machine should be operated as close to that speed as possible.

Figure 30. Flow Rate Unit Pop-up

Application Rate Unit: This field contains your preferred application rate units. Tap this field, then select the desired units in the popup menu.

Figure 31. Application Rate Unit Pop-up

Outlet Spacing: This field contains the spacing between the outlets/openers on your application equipment. Tap the field to open the numeric keypad popup and enter the desired value.
Outlet spacing is based on flow rate units;

e.g.
US GAL/MIN = inch
IMP GAL/MIN = inch
OZ/MIN = inch
L/Ha = cm

Alarm Threshold % +/-: This field contains the alarm threshold value for your application rate. Tap the field to open the numeric keypad popup and enter the desired value.

Jet Selection: Select the color of the jet you are using for a specific product type. Tap the field to open a popup menu.

Figure 32. Jet Selection Pop-up Menu

Jet Selection Calibration Number: This field is automatically updated with the calibration factor for the jet color you selected.

NOTE: Advanced operation: You can also fine tune this value manually by entering a your own calibration number. In the Jet Selection popup menu, tap MANUAL CAL to open the numeric keypad popup and enter the desired value.

In app versions 2.6.3, in the ADVANCED SETTINGS menu, you can use the app to improve calibration for a custom MANUAL JET calibration number.

Manual calibrations can be used if your flowmeter's readings progressively get higher/lower than actual (due to paddle wheel wearing out). The manual calibration can be raised (using the selected jet's baseline calibration number) in situations that the flow is showing higher than actual. The manual calibration can be lowered in situations that the flow is showing lower than actual. Alternatively, maintenance or replacement of the Flowmeter inner components (e.g. paddle wheel) can be considered.

Manual Calibration can also be used to adapt to very viscous or thick materials or cold temperatures that greatly effect flow rate.

Configuring the Flow Measurement Sensors

Depending on the ECU Settings screen option '**MULTI-PRODUCT VIEW**' or '**SINGLE PRODUCT VIEW**', this page will have different instructions.

While in MULTI-PRODUCT VIEW (View up to 196 Outlets across 3 products, on 10 sections)

-The setup screen has 3 **PRODUCT** 'pages', which have a subset of 'sections' that relate to sections of that given product.
-Each product can use a Label to differentiate that product name. Simply select a label (Default 0 -> Default 9), and Change the label to a product name or any label you'd like.
-The Sensor Setup screen has ten **SECTIONS** (1-10), which relate to a maximum of 10 virtual 'sections' that show sensor information.

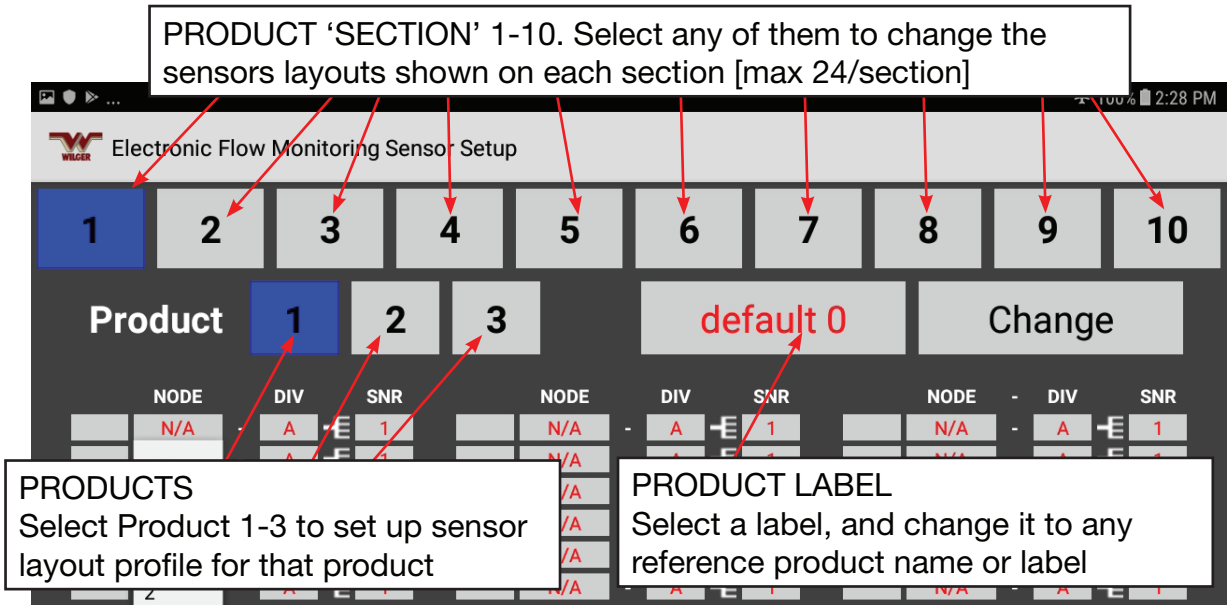


Figure 33. Sensor Setup Screen Navigation

On these pages you can group and list flow sensors so that they display together, the way you want to see them while operating the machine. You can also add page labels to indicate the location or product type. Identify the sensors by their numbers, as connected to their respective product harnesses. When a product type is selected (1-3), the associated outlet spacing, alarm threshold, and jet selection/calibration number are displayed for verification on the Main Overview screen.

NOTE:Before configuring these pages, decide how you want to see the information. For example, do you want information for two different products to appear on the same page? Sensor information is split into two parts on each page. (e.g. 1A and 1B).

While in SINGLE-PRODUCT VIEW (View up to 72 Outlets across 3 product pages)

-The setup screen also has 3 **PRODUCT** 'pages', which have a subset of 'sections' that relate to sections of that given product.

-Each product can use a Label to differentiate that product name. Simply select a label (Default 0 -> Default 9), and Change the label to a product name or any label you'd like.

-The Sensor Setup screen has ten **SECTIONS** (1-3), which relate to a maximum of 3 virtual 'sections' that show sensor information. These SECTIONS will show on the same main running screen, but on seperate levels.

Opening the Sensor Setup Screen

1. On the Main Overview screen, tap the Sensor Settings icon. (See Figure 25) The Sensor Setup page #1 appears.

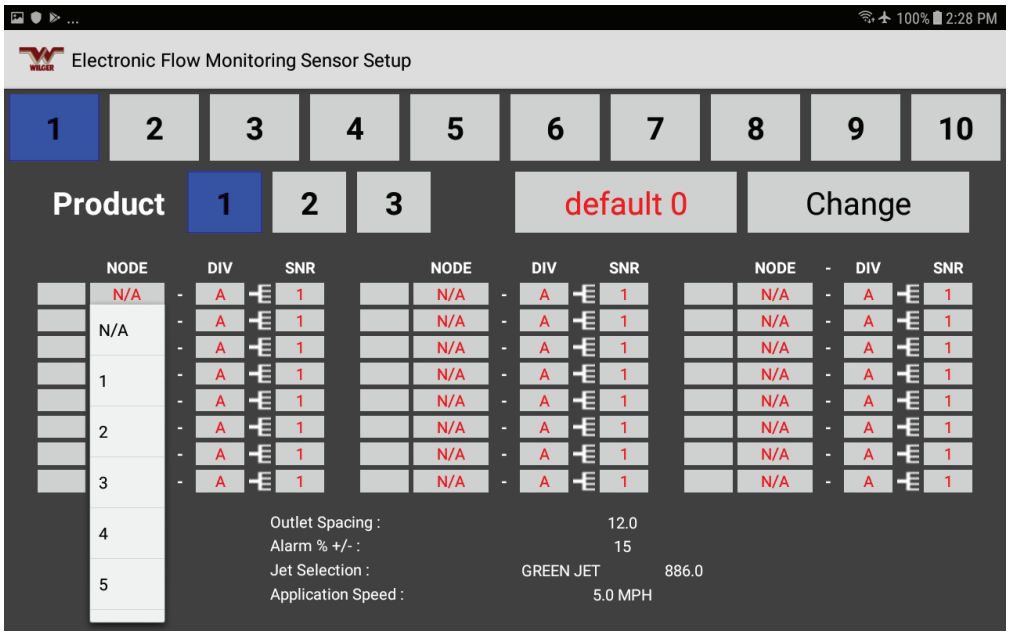


Figure 34a. EFM Sensor Setup Page

Any of the 10 sensor layout SECTIONS (or 3 SECTIONS in SINGLE-PRODUCT VIEW) can be displayed by tapping the number associated with the desired page of the main screen.

Each sensor layout section has 24 locations that can be used to populate the main screen.

A sensor that has been entered with a NODE, DIV (or Divider Harness letter from A/B/C/D), and SNR (or sensor # from 1-4). Any slots with 'N/A' in the NODE will remain blank on the main screen, and will not be monitored.

2. Tap the desired PRODUCT (1-3), and desired sensor layout SECTION to edit that view.

Sample Layout Example between MULTI-PRODUCT and SINGLE-PRODUCT views

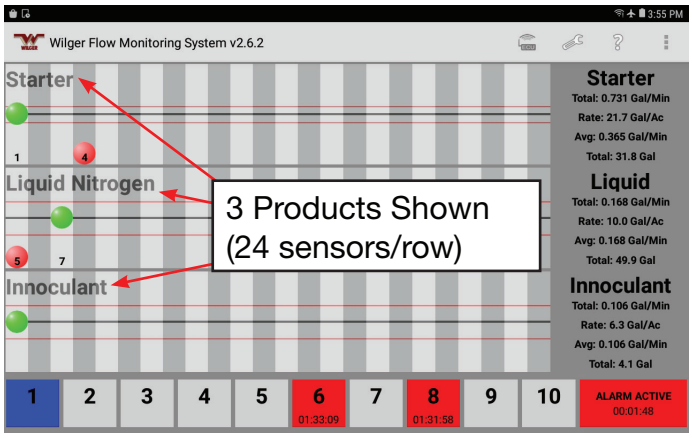


Figure 34b. Main Screen on MULTI-PRODUCT View

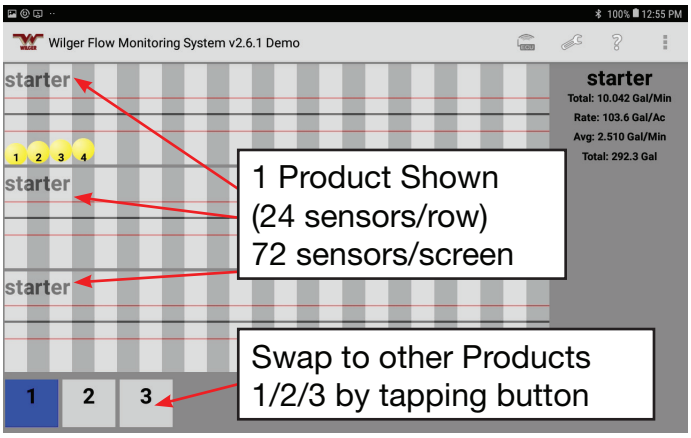


Figure 34c. Main Screen on SINGLE-PRODUCT View

Setting up a Label for a Product

1. Tap the field below beside PRODUCT 1/2/3.
The label popup menu (containing 10 labels) appears. Select a DEFAULT label placeholder, and select CHANGE to edit the label title.

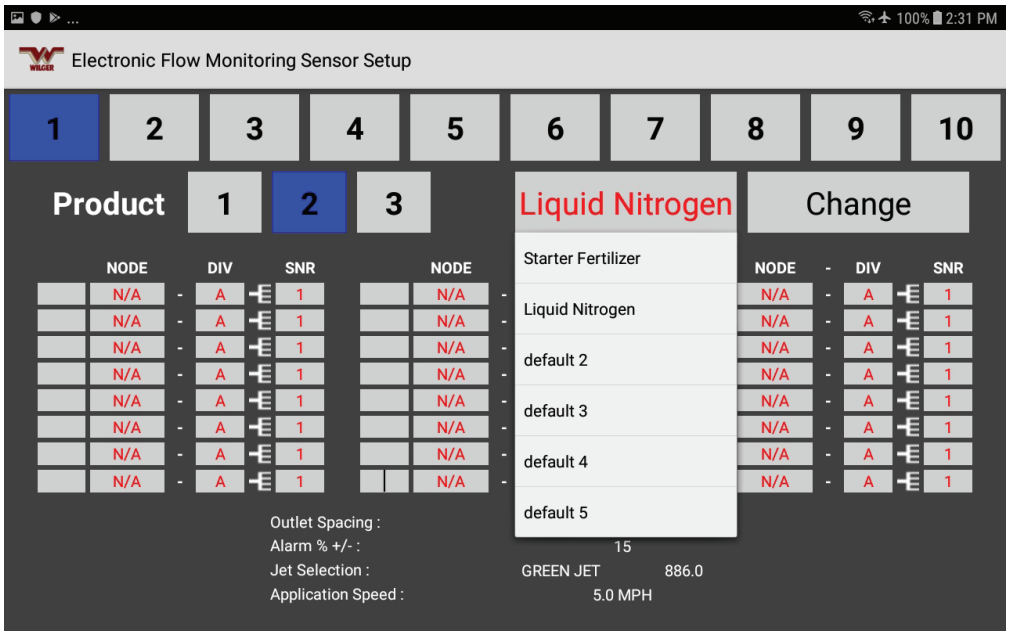


Figure 35. Product Label Change

2. If the list contains the label you need, select it from the list.

3. If you need a new label, select a new DEFAULT that has not yet been used, and tap CHANGE.

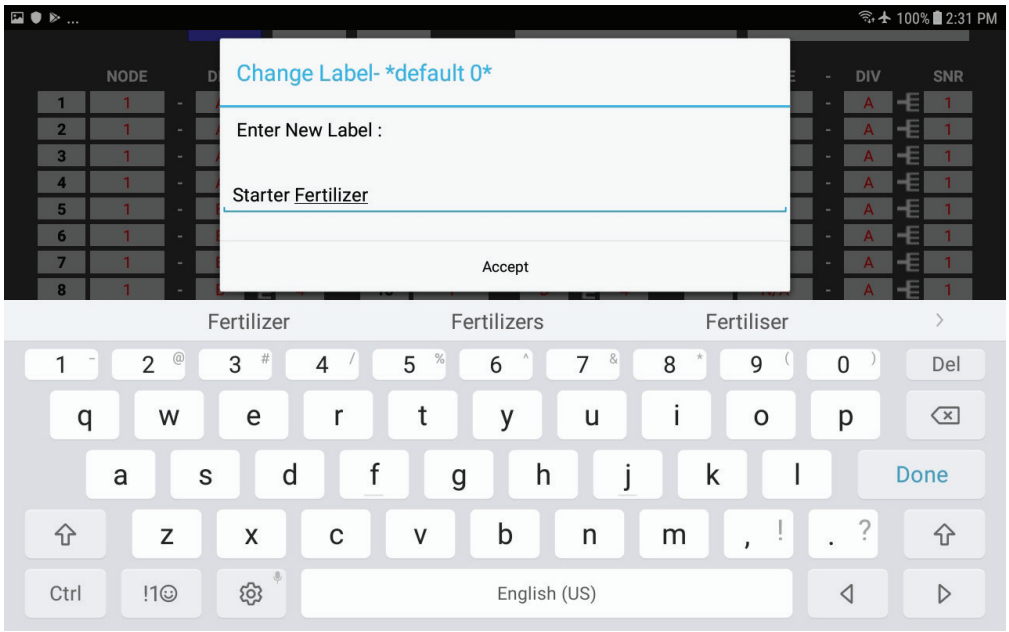


Figure 36. Product Label Change Pop-up

4. Enter a new label via pop-up keyboard, and tap Accept. The new label will appear in the field position where the original label was located.

Verify Monitoring Product & Specifications

1. Once a product has been selected, the PRODUCT specifications (outlet spacing, alarm threshold %, Jet Selection, and Inputted Application Speed). Verify these are correct to your product.
2. If information is not accurate to the product selected, proceed to the ECU SETTINGS screen, to change the specifications at the bottom of the screen.

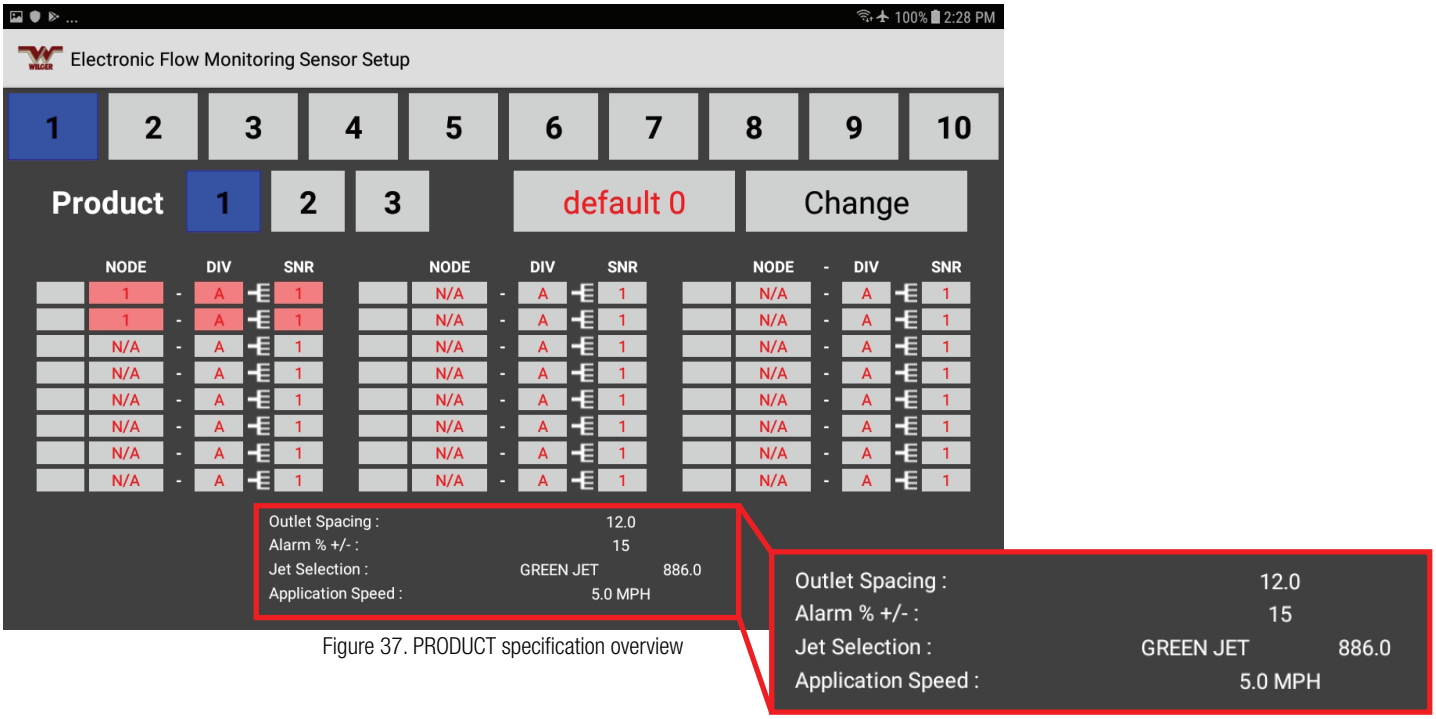


Figure 37. PRODUCT specification overview

Identify the Sensors

For each sensor, enter the sensor number as follows:

1. Tap the NODE box.

The Node number selection popup list appears.

2. Select the node number for the sensor.
3. Tap the DIV box.

The DIV letter selection popup list appears.

4. Select the divider cable letter (A-D) for the sensor.
5. Tap the SNR box.

The SNR number selection popup list appears.

6. Select the sensor number.
7. Tap the BLANK box (this is the LABEL, to the left of the NODE field)
8. Type in an OUTLET label. This is limited to 3 characters, so permissible labels might be: e.g. '1' (for row 1), '1a' (for row 1, left side), '1b' (for row 1, right side), 1a3 (for Implement tower 1, outlet A3)

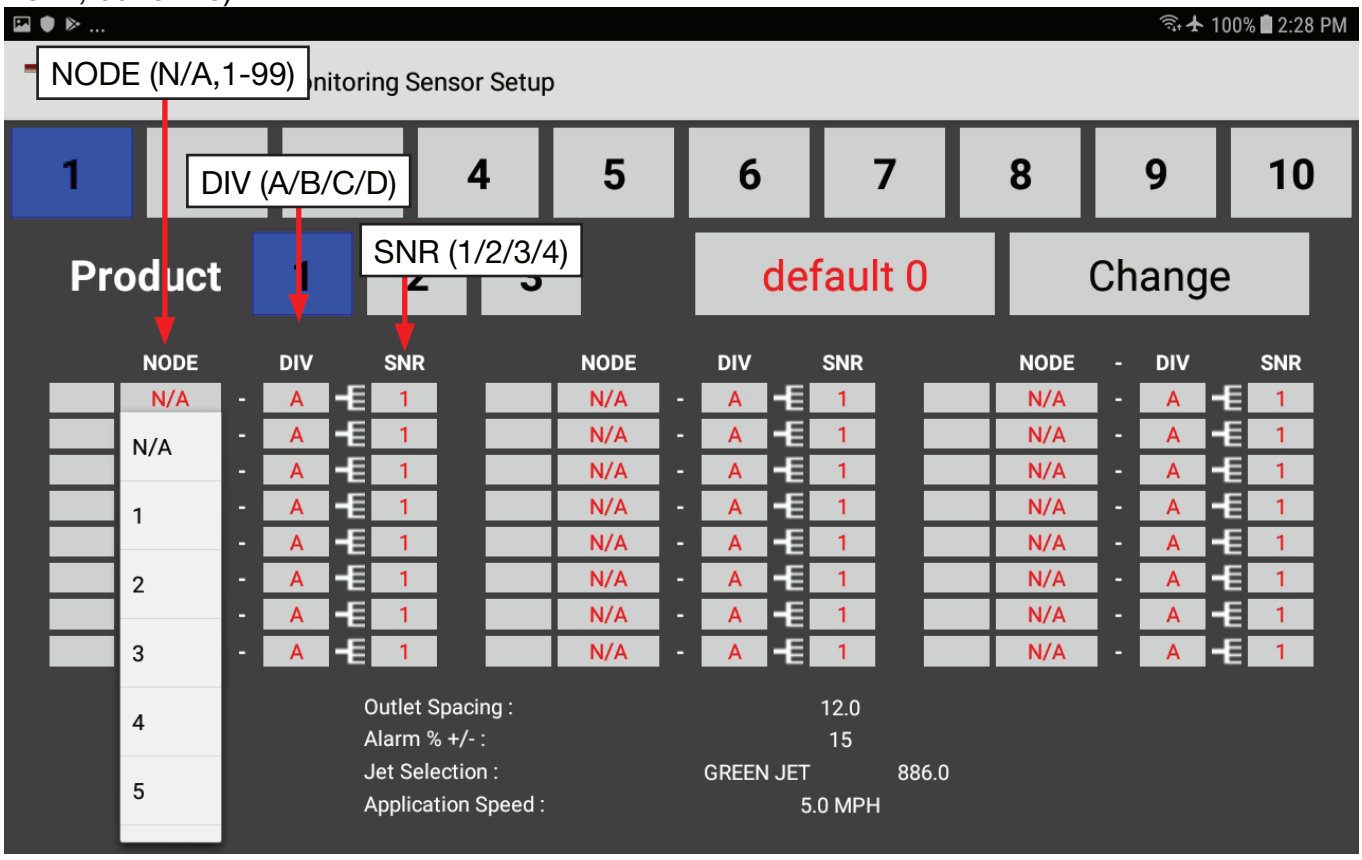


Figure 38. Sensor Numbering

NOTE: Skip any unused sensor or product node locations when entering the NODE/DIV/SNR values. Ball indicators for skipped sensors do not appear on the Main Screen, and will maintain a 'blank' column in its spot.

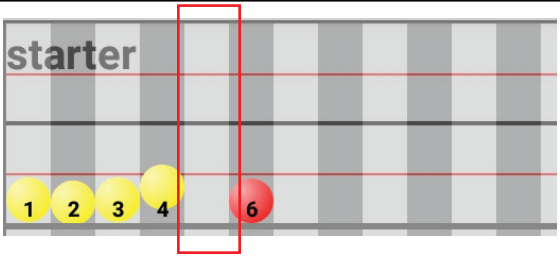


Figure 39. Sensor ball indicators with skipped sensor (5), leaving an intentional gap between other sensors

Sensor Box Color & Diagnostics

If sensor numbers are entered correctly, the NODE, DIV, and SNR boxes display as red print on a gray background.

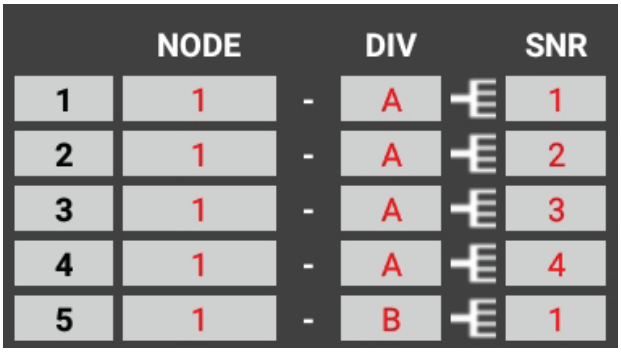


Figure 40. Sensor entry, indicating sensor entered normally

If nodes are disconnected, or entered incorrectly, the ECU cannot find the product node or sensor(s). The NODE, DIV, and SNR boxes display as red print on a yellow background.

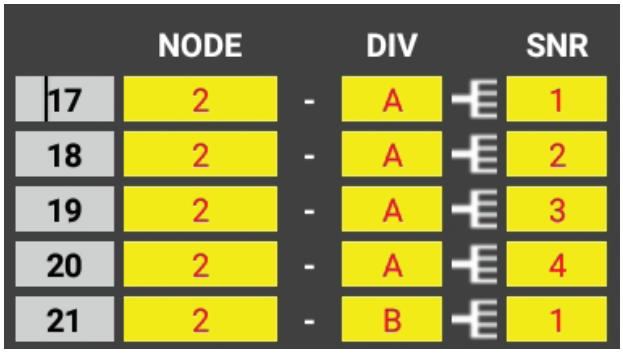


Figure 41. Sensor entry, indicating sensor is not connected, non-existant, or entered incorrectly

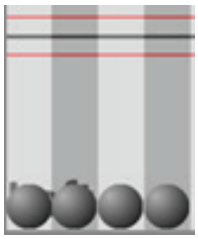


Figure 42. Gray Ball on Main Screen indicates sensor disconnected or entered incorrectly

NOTE: On the Main Overview screen, if the ECU cannot find the a sensor, its indicator ball will be located at the bottom of the screen and displayed as gray.

If you enter the same sensor number twice or more (on the same, or on another page), the NODE, DIV, and SNR boxes display as red print on a red background. Ensure only one reference to each sensor is made in the entire app. If sensors are recalled multiple times across products/sections, they will show red as well.

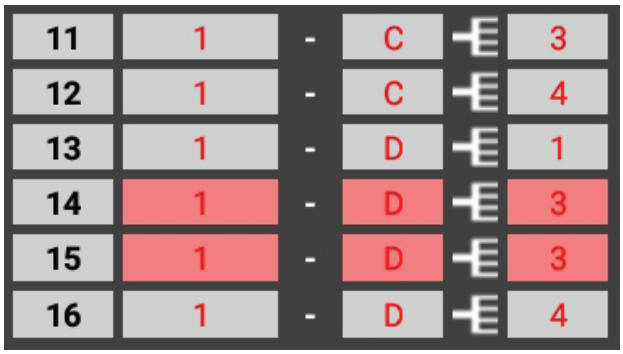


Figure 43. Sensor entry, indicating the sensor has been entered or recalled duplicate times.

TIP: You can segregate sensors in the list by leaving a blank slot between groups. Simply leave the node as N/A (default) in a slot on screen.
Leaving blank slots (balls) between sensors does not impede the function of the flow monitoring system; it only provides more customization options for leaving spaces between sections, etc.

Operating the Electronic Flow Monitoring System

Main Screen Overview

The Main Overview Screen (actually one screen with four selectable pages) provides status information on all sensors in each loop. The Main Overview is used during operation of your application system to monitor the status of all sensors, and provide alarms (audible and visual) if a flow rate exceeds the thresholds you have programmed into the system.

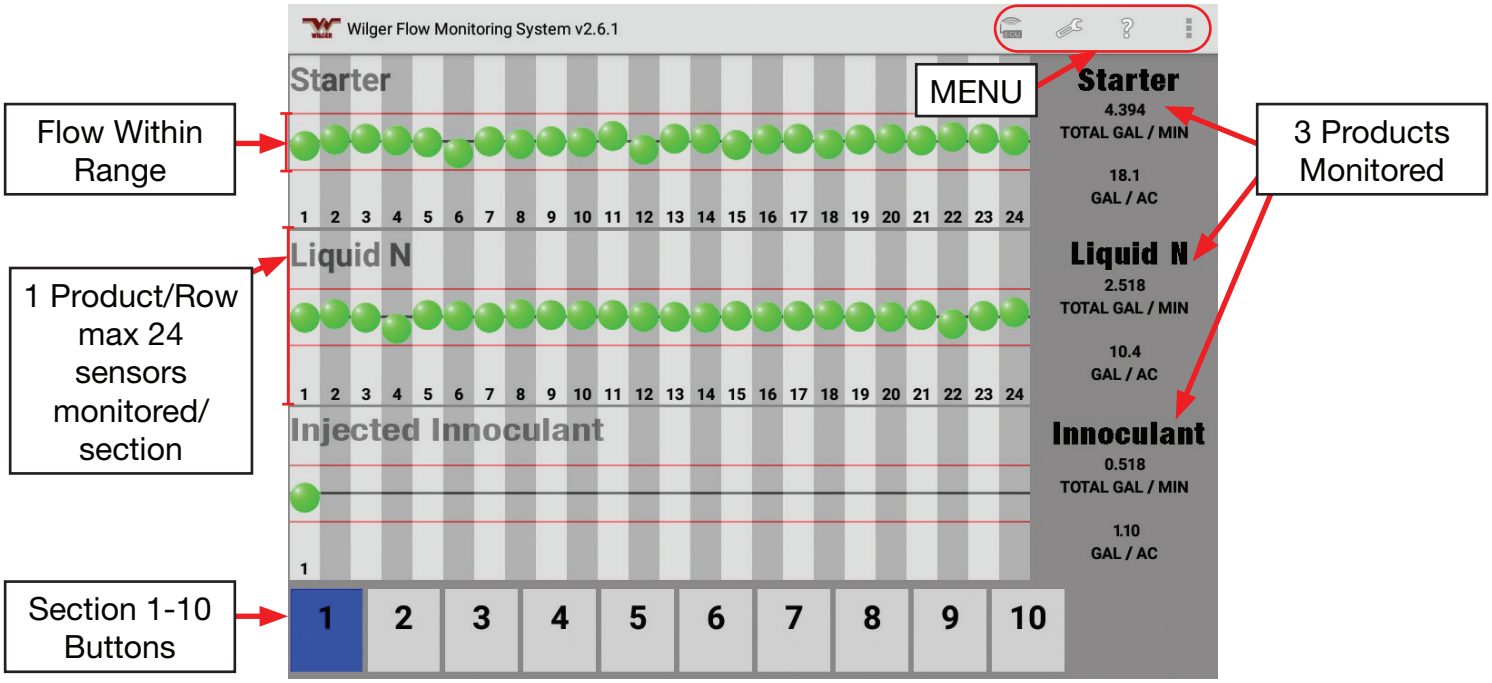


Figure 44a. The Main Overview Screen in **MULTI-PRODUCT View**

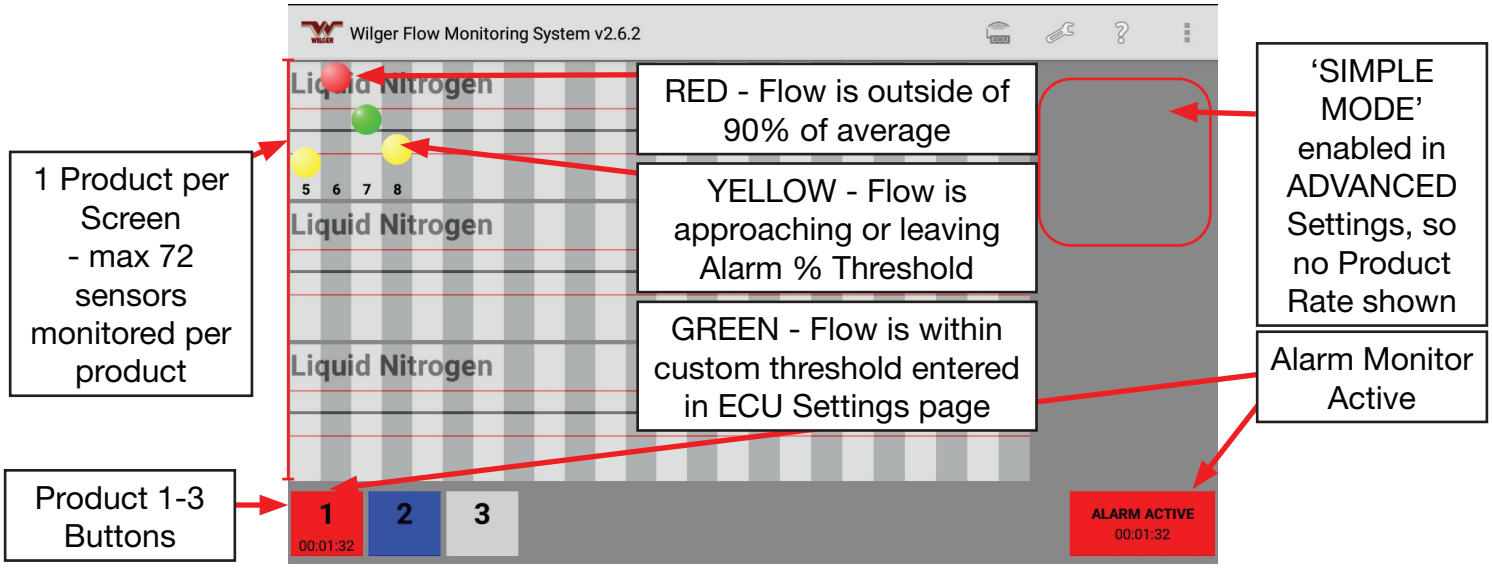


Figure 44b. The Main Overview Screen in **SINGLE-PRODUCT View** with SIMPLE mode enabled (only showing ball indicators)

Operating the Electronic Flow Monitoring System - cont'd

Snapshot Screen

By tapping in the row of any shown row of product, it will start a pop-up that shows more detail about those rows in that section/product, with flow rates provided in number form. (rather than relative ball height)

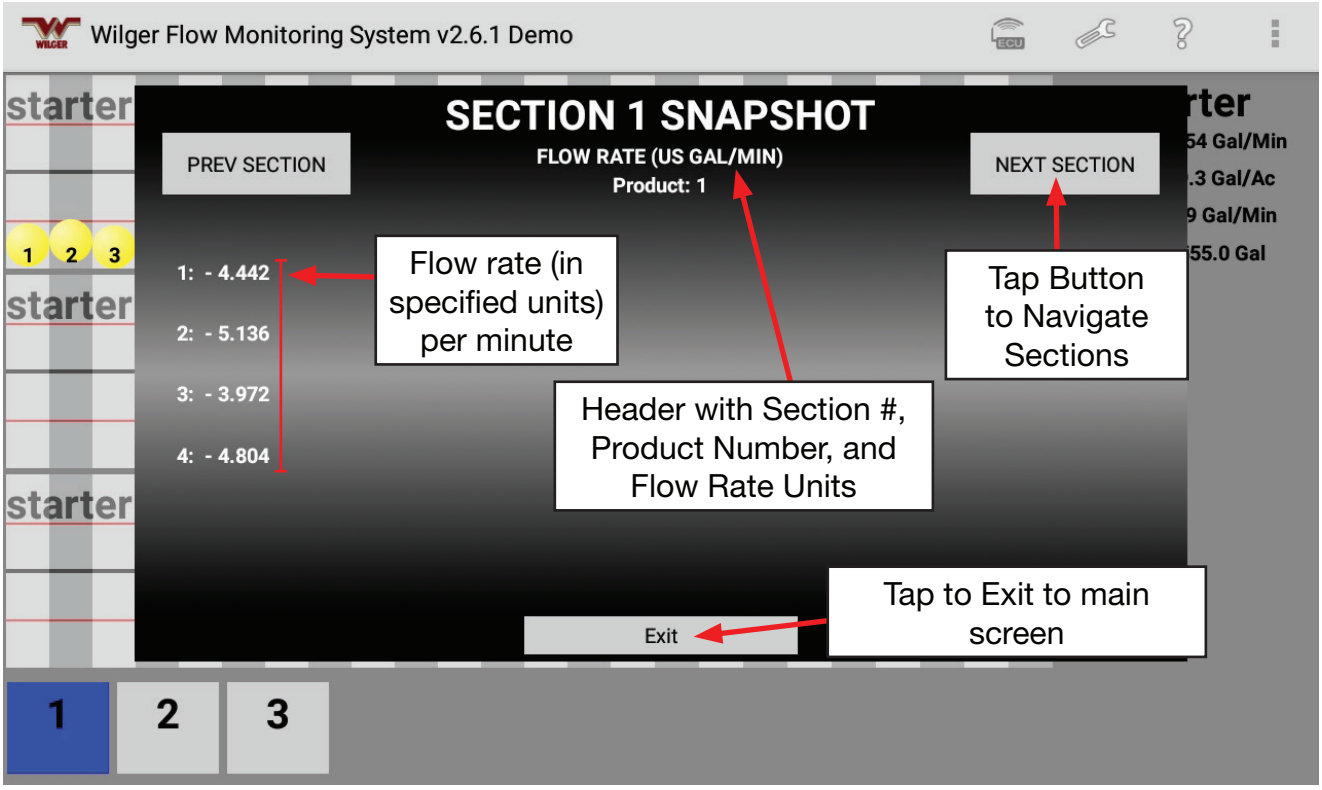


Figure 44c. SNAPSHOT view of a Section or Product

Troubleshooting & Frequently Asked Questions

Frequently Asked Questions

"I'm setting up a new system and don't know how many product nodes I need."

Two factors determine how many nodes you need for a system:

1. The location of liquid manifolds/plumbing. If each section's liquid manifolds are spread out from each other, less efficient use of nodes may occur.
2. In ideal setups, you would:

a. Determine the required number of outlets (including multiple products)
b. Divide by 16.
c. If the remainder is greater than 4, use a 16-channel node for the remaining outlets (some lines will be unused)
d. If the remainder is less than 4, use a 4-channel node.

NOTE: Using 16-channel nodes is more cost effective per channel than using multiple 4-channel nodes.

Example 1:
A 24-row corn planter would use two 16-channel nodes (one fully utilized and one with half the inputs utilized).

Example 2:
A 72 row air drill with dual applicators for starter and liquid fertilizer would have a total of 144 outlets. This would require nine 16-channel nodes, as nodes can be shared between products.

"I have my nodes hooked up to my ECU. What is next?"

Once the product nodes are connected to the ECU, make sure you have the correct product node terminator connected to the last product node in the chain. This is important so that the electronics recognize how many nodes are actually connected in the chain.

NOTE: If an ECU splitter cable is used (to connect the ECU to product node chains in two different directions), ensure that the splitter is only used between the ECU and the nodes, NOT from a node to other nodes. This can cause problems in how the system communicates, and recognizes product nodes.

"What do I do with my unused product node connections?"

Use a cap to seal off all unused product node connections (located on the product node harnesses). Even though the connections are weather-tight, corrosive fertilizers can degrade connections and cause issues. Replace, and do not use, any connections that seem to be affected by corrosion.

"I have my system components set up and plugged in, but my WiFi on the tablet isn't connecting."

The wireless connection between the app running on tablet and the ECU is set up in the app NOT using the typical WiFi settings on the tablet.

If you mistakenly tried to set up a WiFi connection between the tablet and the ECU, you will have to go back into the tablet's Connection Settings, WiFi, Manage Networks page and have the tablet "Forget" that network. Then open the EFM app and re-configure the app to connect to the ECU. For ANDROID 10+ users, ensure you are using the latest version of the app, then consult figure 27b.

“The application rate (e.g. US gallons/acre) is not showing correctly.”

If the information configured in the ECU Setting page is missing, or incorrectly entered, OR if incorrect units, or average speed, have been entered, the application rate will not indicate correctly. Make sure all settings have been configured correctly and then check the application rate again.

Troubleshooting

Many of the potential troubleshooting issues might arise from three main functions: ECU connectivity, Node & Sensor Connectivity, and System Setup and App.

ECU Connectivity Troubleshooting

No Power/Lights on ECU - Low (<10.8v) or High (>13.8v) Power

With the ECU, it requires a 12V power supply, with the correct connection for Positive/Ground wire connection. The tolerance for voltage is 10.8-13.8V. Any voltage lower than the minimum will often cause the ECU to not complete the power/connection cycle. Voltage over 13.8v can also conflict with proper set up.

No Power/Lights on ECU - Fuse

If there was a situation where the in-cable fuse has been flipped unknowingly, the fuse box must be opened and reset. The fuse box is located on the battery harness cable that is supplied with the ECU kit (20603-00 kit).

ECU not powering up - Sensor/Electrical Short or Fault

In a situation where a sensor cable, or harness connection wire has been damaged, there may be power/electricity running through the sensor feedback cables, causing a fault. Often this can still result in the ECU powering up properly, but the sensor feedback not showing properly and having multiple dead sensors on screen (or all sensors).

If this is suspected, a simple test is to unplug the ECU at the 8-pin connection that would go to the nodes. If the ECU condition is restored to working functionally, it can be surmised there is a short down the length of the nodes.

Proper steps to isolate shorts:

Unplug ECU from all NODES. (Remove 8-pin connection. Leaving the POWER/Battery cable attached to the ECU). Check ECU operation on both POWER/WIFI light, as well as in android app if connectivity has been restored.
Plug in 1st node to ECU. Disconnect 1st node from the next node. Check ECU/App operation. If all balls/sensors in app show properly. Carry on to next node.
Plug in next node in series, disconnecting the next node in series. Check ECU/app operation. If all balls/sensors in app show properly. Repeat step 3 until you find a node that causes the ECU/app operation to fail.
Failure of the app would typically mean previously red balls/sensors in the app would turn GREY in color, signifying they are offline.
Once a node is found to be a culprit with potential short, unplug all quad-sensor cables from the node divider harnesses (labeled A/B/C/D), and verify if ECU/app operation improves. Expect that the

ECU not powering up - Sensor/Electrical Short or Fault - continued

quad-sensor cables on that node will be grey, as they are offline.
If app operation is functional without the quad-sensor cables connected, the node should be OK.
Connect each quad-sensor cable divider (A/B/C/D) one at a time, ensuring that the previously grey sensors are now powered up and RED.
Continue to connect quad-sensor cables until one is found to cause functional issue in the system.
Once the quad-sensor cable is isolated as damaged, it should be checked or replaced if the damage is found.
If the sensor connection has been compromised or damaged, it may require replacement and cleaning inside the flowmeter body to ensure future damage is avoided.

Observation: Power Light SOLID; Wifi Light Blinking. Restart Cycle on 10 second interval [NORMAL]

With the initial powerup of an ECU that has not yet had any connection to an Android tablet application, the ECU will cycle on 10 second intervals. It is NORMAL and functioning if the ECU power light stays solid for 10 seconds, with WIFI light blinking consistently, followed by both POWER/WIFI light turning off, and restarting the cycle.

POWER: SOLID RED // WIFI: BLINKING RED
30 Seconds, restart cycle until connection is verified.

Once an ECU has connected to a tablet app,
it will shift this cycle to 30 seconds.
(Power solid for 30 seconds. WIFI blinking for 30 seconds. Reset cycle)

Observation: Power Light SOLID; Wifi Light Blinking. Restart Cycle on 30 second interval [NORMAL]

With the initial powerup of an ECU that has not yet had any connection to an Android tablet application, the ECU will cycle on 30 second intervals. It is NORMAL and functioning if the ECU power light stays solid for 30 seconds, with WIFI light blinking consistently, followed by both POWER/WIFI light turning off, and restarting the cycle.

POWER: SOLID RED // WIFI: BLINKING RED
30 Seconds, restart cycle until connection is verified.

If an ECU has not been connected to a tablet app, it will start this cycle to 10 seconds.
(Power solid for 10 seconds. WIFI blinking for 10 seconds. Reset cycle)

ECU WIFI not Maintaining Connectivity to App - WIFI Channel Interference

With the ECU, it generates a WIFI signal, the broadcasts on a WIFI channel. The WIFI channel used to broadcast on is hardcoded to the ECU, and is identified easily by the LAST NUMBER ON THE ECU SERIAL NUMBER.

For example: ECU Serial Number 1124674 would operate on WIFI CHANNEL 4.

If you are in the situation that you have been able to connect to the ECU during normal function, but it drops connection, you may need to verify if there is any conflicting communication hardware in the tractor/cab/implement that may be operating on the same WIFI channel.

ECU WIFI not Maintaining Connectivity to App - WIFI Channel Interference - continued

With multiple signals on the same channel, it can cause interference causing dropping of signal.

Some example of other systems that might cause interference via WIFI channel:

-Tractor Monitor with WIFI signal through Router
-Seed blockage monitoring systems
-Auxiliary Systems that create a WIFI network for IoT (internet of things) connections

Some of these systems will have means to change WIFI channel from within their interfaces. If this is not the case, replacement of the equipment broadcasting hardware (e.g. EFM ECU) might be required.

If you are aware of existing WIFI equipment on the implement, ensure to specify a WIFI channel (or serial number digit) that will ensure clear communication.

For example, on the parts order from factory, specify: “ECU must NOT have serial number ending in ‘5’ ” if there was existing equipment operating on Channel 5.

ECU/System not operating Consistently - Required Amperage & Power

The Wilger Electronic Flow Monitoring System has relatively low power requirement, but it must be met and accounted for on an implement to ensure proper operating.

Each system will require 1 AMP (ECU) + 0.25 AMP per node.

Example: For a system with 10 nodes, available power requirement would be 3.5 AMPs @ 12v. (1amp + 2.5amp)

System Battery Drain

The ECU is relatively simple in that it will always be searching out a WIFI connection, and despite going into a low draw mode, it will consistently draw electricity.

If the implement is not disconnected from battery during storage, it is recommended to have power linked through a keyswitch to ensure ECU is only receiving power when intended.

Abnormal ECU Power due to Electrical Wiring

Since the EFM system requires power on the implement, there have been situations that the implement (e.g. planter, air drill) route power in strange ways, causing loss of power to the ECU. One example of this that was difficult to troubleshoot:

Tractor seemed to have proper application when standing still or sometimes in field application, but it would cut out without notice.

Result: Power to implement that was drawn to EFM system ECU was run through the brake light series, so it had power cut off whenever the brake lights were not active.

Ensure to check existing power and use a voltmeter that can determine that the required voltage is available to the ECU before suspecting a faulty ECU.

WIFI Broadcasting, but no connection to app - Incorrect Serial # in app

Within the flow monitoring system app, the app verifies proper connection to the ECU by means of matching the ECU serial number listed in the ECU settings page of the app.

If the ECU serial number in the app does not match, the ECU cannot connect to the app, and the system will not function.

Ensure all numbers are typed in properly, and there are no spaces or letters in the ECU serial number space (in the app).

NOTE: FOR ANDROID TABLETS USING ANDROID 10.0 OR NEWER:
There is a new software function that is making itself available with authentication of connection to WIFI. The new update (as of Feb 2021) will not allow the EFM app authenticate with the WIFI signal from the ECU without the tablet first trusting the WIFI connection.

Having a WIFI connection to be trusted can be done by going into the SYSTEM APP on the android device.

Simply go to: SYSTEM -> CONNECTIONS -> WIFI – > Select the WIFI that is being broadcast by the ECU
ECU wifi will follow the following naming mechanism: WILGER_EFI_#######, with the ####### pertaining to the ECU serial number.
For example, for ECU serial # 1124674, the WIFI broadcast would be WILGER_EFI_1124674.

Whatever is listed as the trailing numbers following the WILGER_EFI_ would be the password for the WIFI signal.

WIFI Broadcasting, but no connection to app - Incorrect Serial # in app for Android 10.0+

Within the flow monitoring system app, the app verifies proper connection to the ECU by means of matching the ECU serial number listed in the ECU settings page of the app. With Android 10.0 versions and newer, it changes how the initial connection to the ECU must be made.

To Determine your android device, enter the SETTINGS app -> ABOUT -> About Software. From there, you should see an Android Software version. Higher numbers are newer versions. The minimum android version for the EFM system is Android 8.0

NOTE: FOR ANDROID TABLETS USING ANDROID 10.0 OR NEWER:
There is a new software function that is making itself available with authentication of connection to WIFI. The new update (as of Feb 2021) will not allow the EFM app authenticate with the WIFI signal from the ECU without the tablet first trusting the WIFI connection.

Having a WIFI connection to be trusted can be done by going into the SYSTEM APP on the android device.

EFM System Notification on Android 10+, asking for WIFI to be accepted and used for the EFM system app

WIFI Broadcasting, but no connection to app - Incorrect Serial # in app for Android 10.0+ - cont'd

Simply go to: SYSTEM -> CONNECTIONS -> WIFI – > Select the WIFI that is being broadcast by the ECU
ECU wifi will follow the following naming mechanism: WILGER_EFI_#######, with the ####### pertaining to the ECU serial number.
For example, for ECU serial # 1124674, the WIFI broadcast would be WILGER_EFI_1124674.

Whatever is listed as the trailing numbers following the WILGER_EFI_ would be the password for the WIFI signal.

NOTE: FOR ANDROID TABLETS USING ANDROID 10.0 OR NEWER AND WILGER EFM APP VERSION 2.6.3 OR GREATER.
With a new update of the Wilger WIFI Electronic Flow Monitoring System app (v2.6.3, released on Feb 22, 2021), a new prompt will start during setup, asking for permission to use the WILGER_EFI_####### wifi signal. This permission should be accepted for proper operation.

Alarm not sounding, or too loud

On the tablet, the app will alarm when there is a full blockage, or based on alarm threshold entered in app.

If the alarm is NOT sounding, it is common that the tablets volume has been muted. The alarm uses the devices volume setting, so it can be turned up or down to suit the operator.

If the alarm is sounding and is too loud, adjust the tablet volume. Alternatively, each SECTION on the main page can be muted individually (Sections 1-10) by pressing on the section button and HOLDING for 3 seconds. After 3 seconds, a prompt will pop up, giving option to mute the alarm for that section for a given time. (several minutes to half an hour).

Alternatively, the entire system can be muted by long-pressing the ALARM button in the bottom right of the screen when it appears, and selecting a mute length.

EFM Sensor Use - How to use Sensors [General Use]

The sensors used in the Electronic Flow Monitoring Systems are hall-effect sensors, detecting changes in magnetic polarity. The hall-effect sensor mounted in the flowmeter body detects the polarity shift of the multi-pole ceramic magnet within the flowmeter body.
The hall-effect sensor transmits an analog pulse (ON/OFF) signal, or RPM that will be used to calculate the actual flow, using the appropriate color-coded JET. The color coded jets have a default calibration factor that is used to interpret the number of 'pulses' to the calibration factor, resulting in flow rate.

These sensors are located by the app based on the NODE # location (1-99), Divider letter on the node harness (A/B/C/D), and the molded-in Sensor number (1-4). From this location, the application will visually show that row where it would be on the implement, as well as the relative flow rate (based on average flow for the product).

So, a common situation on the first installation of a system is misunderstanding the sensor location relative to the ECU, which would result in the application showing feedback on the incorrect actual rows.

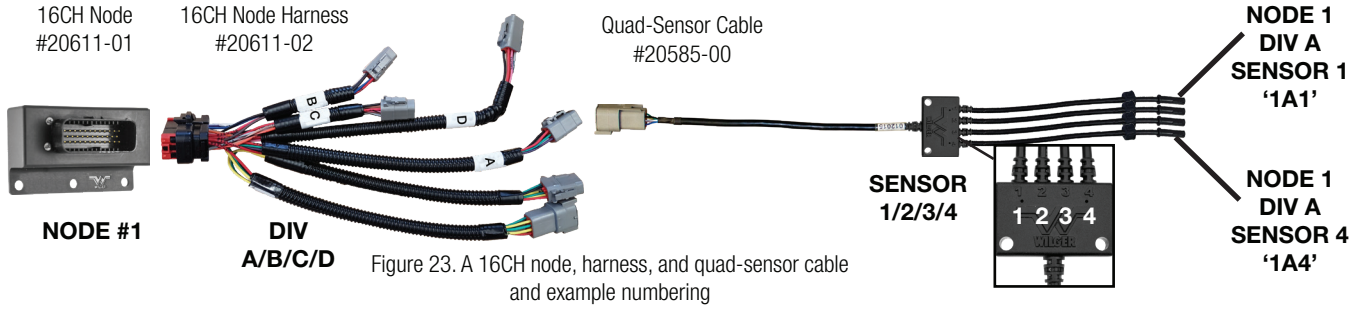
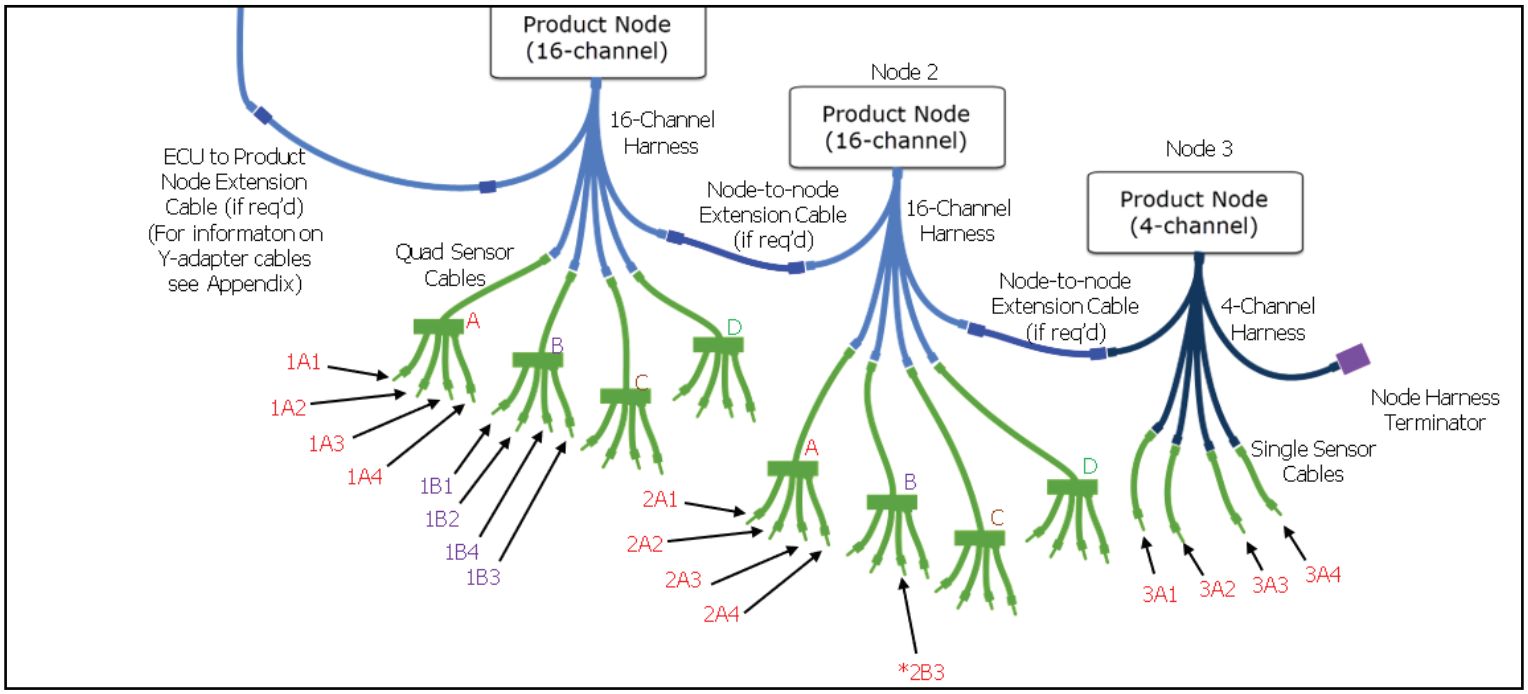


Figure 23. A 16CH node, harness, and quad-sensor cable and example numbering



ECU Splitter Use [General Use]

The ECU splitter cable can be used when it is required that the EFM system's nodes are split across the wings of am implement, and not able to be centralized in manifold banks.

In this situation, the ECU dictates the label of a node (e.g. Node 1) by the FIRST connected node to the ECU Splitters label '2' connector. The ECU will continue labeling nodes down the length of the daisy-chain until it reaches a terminator. After the terminator, the ECU will continue labeling nodes down the length of the daisy-chain until it reaches the terminator on the opposite side of the implement, starting with the ECU splitter label '3' connector.

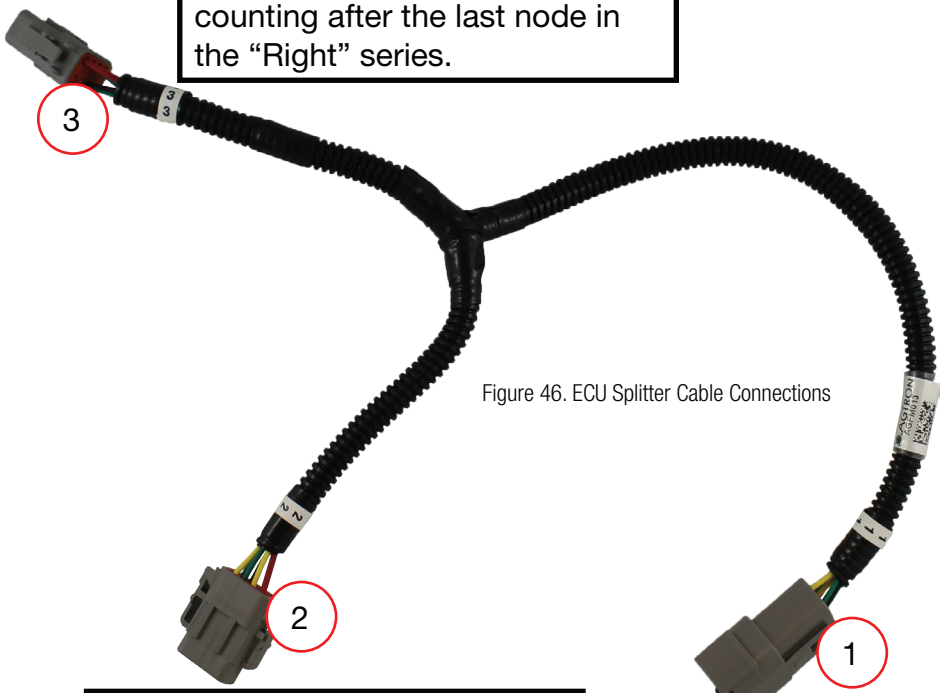


Figure 46. ECU Splitter Cable Connections

1 8-pin Male connector to ECU

2 8-pin Female connector to First Node [always NODE 1]

3 8-pin Female connector to second series of nodes. Node # is defined by the 'next node' after the last in line connected to (2)

When using a Y-adapter cable, numbering of the product nodes and sensors starts at 1 with the first node on the right-hand side (#2 connector on the Y-adapter) and increments until the right-hand terminator is reached.
Numbering continues from the first node connected to the left-hand side (#3 connector on the Y-adapter) and proceeds to the left-hand terminator.

Using 4 Channel (4CH) Nodes & sensors [General Use]

With the Electronic Flow Monitoring System, there is a 4 channel node available. It is available for when only 1-4 extra sensors are required. If there are 5 or more sensors required on an implement, it is typically cost effective to use 16-channel nodes instead.

Using 4 channel nodes is nearly identical to 16 channel nodes, and they can be freely mixed in with 16 channel nodes.

The main difference is that 4 channel nodes DO NOT have a DIVIDER Harness. So, when entering sensors within the application itself, and you are asked specify a DIV letter (A/B/C/D), if a 4CH node is used, it is always using DIV A. The only available options for a 4 Channel node are DIV A, and sensors 1-4 (based on labeled single sensor cables, which might also be labeled as TACH 1/TACH2/ TACH 3/TACH 4 corresponding to their sensor #)

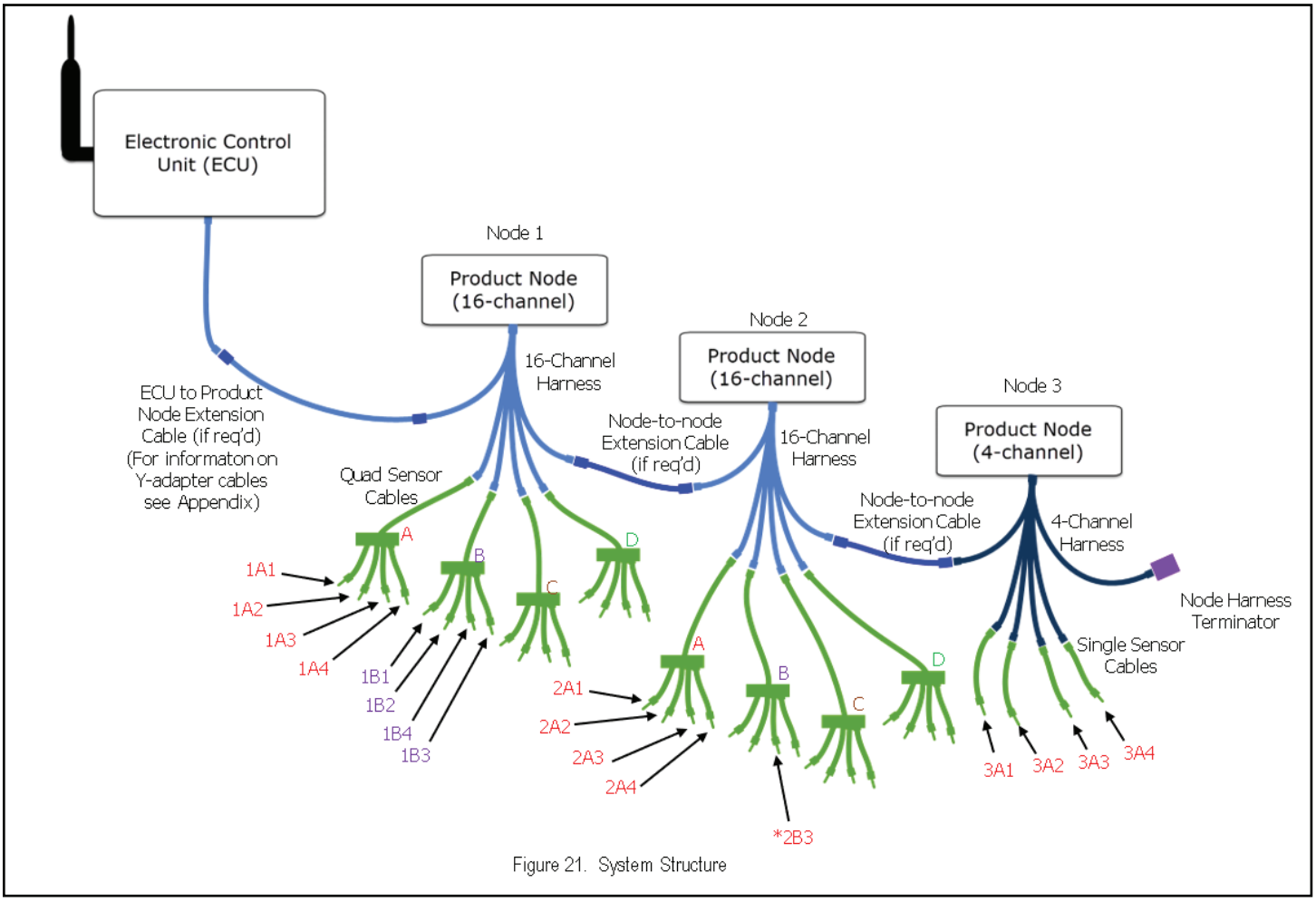


Figure 21. System Structure

EFM Sensor Location & Labeling - How to enter sensor locations [General Use]

The labeling scheme of sensors in an assemble EFM system is relatively straightforward, and it has been mentioned in some other of the FAQ articles.

There is also a video walkthrough for the EFM app setup. While some features of the app may have been added or changed, it is correct in process: https://www.wilger.net/video_efm_app/

Simply enough the EFM system app interprets PULSE signal from the sensors, tied to a specific location based on which node, divider harness, and sensor it used. So, if the 10th row on an implement is plugged into a sensor that is located on sensor 2, Divider C, and Node 1, when entering the location of that 10th outlet on the implement would be entered in the app as such:

NODE 1, DIV C, Sensor 2. It can then be labeled within the app as well, so the label of the outlet corresponds to the implements outlet.

Multiple Products with Shared Nodes [General Use]

The EFM system is completely able to monitor up to 3 products simultaneously, with shared electronic harnessing.

Exactly the same as how labeling sensors have locations based on the connection of the NODE/ DIVIDER HARNESS/SENSOR, such do situations when multiple products are being monitored at the same time.

Simply enough, the products must only be seperated in PRODUCTS 1/2/3 within the app, with the sensors relating to those products entered accordingly.

So, if the 10th outlet for Product 1 (Liquid Starter Fertilizer) is plugged into one sensor, and the next sensor to it is the 10th outlet for Product 2 (28-0-0 fertilizer) as a seperate product, they might look like as follows:

Outlet 10 (PRODUCT 1): Node 1 DIV C Sensor 2
Outlet 10 (PRODUCT 2): Node 1 DIV C Sensor 3

Simply enough, those locations are still valid, and there will just have to be care to enter the two within the apps seperate product pages.

Sensor Setup Screen with RED/YELLOW sensor names - Duplicate Entries & Non-Existent Nodes

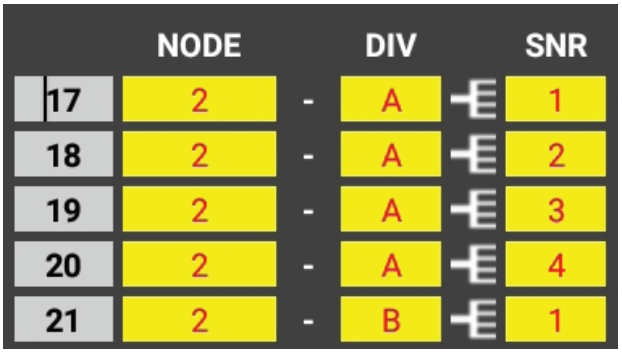
When entering sensor information within the app, using the Sensor Setup Page (wrench tool in upper right of the app), you might encounter two color diagnostics:

If a sensor outlet is highlighted RED; This indicates that sensor location has already been named, and is duplicated.
The duplicated entry must be found and removed. Ensure to check ALL products on ALL sections to find the duplicated entry.

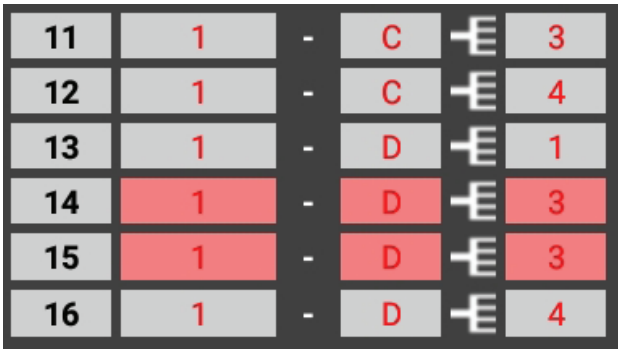
Sensor Setup Screen with YELLOW sensor names - Duplicate Entries & Non-Existent Nodes cont'd

If a sensor outlet is highlighted YELLOW; This indicates that sensor location has named a NODE number that does not exist.

To fix this, enter the ECU Settings Page, and ensure the # of nodes is accurate to the implements layout. Also, ensure the Node is plugged into the EFM system communication harness daisy-chain, with a terminator at the last node in series.



Non-Existent Nodes on EFM system, showing a yellow highlight. This signifies that it is calling upon a Node (Eg. Node 3) which is either not plugged into the systems communication harnesses, nor entered in the ECU settings page in # of Nodes.



This shows the diagnostic shown with red highlight over sensor input. If there is a red highlight, that means the system app already has a reference to this sensor, and requires the duplicate to be changed or removed.

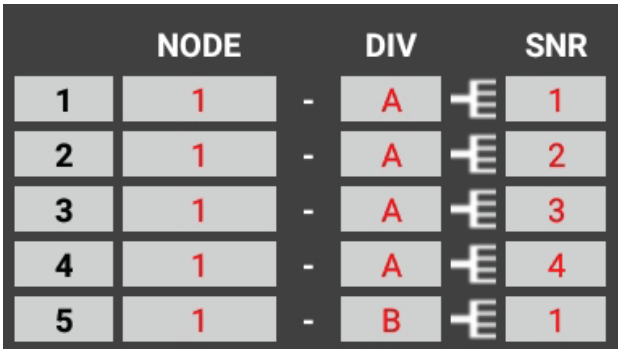


Figure 40. Sensor entry, indicating sensor entered normally

Grey Ball/Sensor on Main Screen - Troubleshooting Quad-sensor Cables

In the event that upon setup of a system a ball/sensor on the main screen is showing as GREY, and located at the bottom of the product/section area, it indicates there is a communication fault with that sensor. This can be caused by a few things. While sensor failure is not common, it can be worth troubleshooting through the following checks:

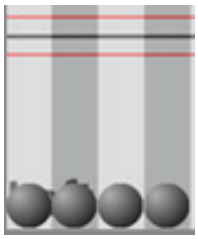


Figure 42. Gray Ball on Main Screen indicates sensor disconnected or entered incorrectly

If ONE sensor is grey, but sensors on the same quad-sensor cable seem to be working fine:

1. Unplug the troubled sensor and ensure no other sensors in the app go offline (or red). If another sensor went red, it was likely misslabeled within the app, and the troublesome sensor was located elsewhere.

Grey Ball/Sensor on Main Screen - Troubleshooting Quad-sensor Cables - continued

2. Unplug the troubled one into the next flowmeter assembly and swap the sensors. Ensure both sensors are inserted in the correct orientation and threaded on fully, and cables are clear of any damage or pinching.

2a. If the problem follows the sensor, it can be determined something might be wrong with the sensor, or that the previous installation did not have the sensor in the correct keyed orientation or inserted deep enough.
2b. If the problem follows the EFM body, it could be missing the encoder magnet, or have debris within the sensor port that is causing interference.
If problem resolves itself and both are operating, ensure extra care that the both sensors are put in their correct flowmeters again, and install the sensors in proper orientation again.

If more than ONE sensor is grey, but some sensors on the same quad-sensor cable seem to be working fine:

1. Unplug the grey sensors on the implement. Ensure that no other sensors went RED or offline. Unplug the troubled one into the next flowmeter assembly and swap the sensor with one that was working properly. Ensure both sensors are inserted in the correct orientation and threaded on fully, and cables are clear of any damage or pinching.

1a. If the problem follows the sensor, it can be determined something might be wrong with the sensor, or that the previous installation did not have the sensor in the correct keyed orientation or inserted deep enough.
1b. If the problem follows the EFM body, it could be missing the encoder magnet, or have debris within the sensor port that is causing interference.
If problem resolves itself and both are operating, ensure extra care that the both sensors are put in their correct flowmeters again, and install the sensors in proper orientation again.

Grey Ball/Sensor on Main Screen - Node Harness & Communications

In the event that upon setup of a system a ball/sensor on the main screen is showing as GREY, and located at the bottom of the product/section area, it indicates there is a communication fault with that sensor. This can be caused by a few things. While sensor failure is not common, it can be worth troubleshooting through the following check:

If all sensors used on a quad-sensor cable are grey:

1. Unplug the grey sensors on the implement. If any other sensors on the app go RED, those sensors may have been mis-labeled, and the troubled quad-sensor cable or sensors are located elsewhere.

2. Take the troublesome quad-sensor cable and swap it with one on the implement that seems to be performing properly.
2a. If the troublesome quad-sensor cable does not work in the new position, inspect the quad-sensor cables for tears, breakage, pinched wires or other damage.
2b. If the troublesome quad-sensor cable DOES work in the new position, inspect the NODE harness that the troublesome quad-sensor cable was previously connected to.

-Use the good quad-sensor cable previously removed to verify if that was not just an insecure connection, by attaching it to the node and flowmeters and check if operation is restored.
-If operation was restored when a new quad-sensor cable was installed, try the troublesome one again, making special attention to the connections being secure and clear of liquids or dust, and ensuring pins on the connectors are straight and in good condition.

3. If it has been determined there may be a fault within the NODE harness, replace the node harness with a replacement, or simply replace it with a working node harness from another node. Verifying that the new harness fixes the error.
– NOTE: Any disconnected node harnesses should result in those node/sensor communications to go offline, so it is expected that those sensors are grey.

7. Appendix

Appendix A: Using an ECU to Product Node Y-Adapter Cable

An ECU to Product Node Y-adapter cable allows you to locate the ECU in the middle of your implement, and run wiring to product nodes on both sides. One advantage is to ensure the best reception of the Wi-Fi signal by the tablet computer.

The Y-adapter cable has three connectors labelled 1, 2 and 3. Connector 1 plugs into the connector from the ECU. Connector 2 is typically connected to nodes on the right-hand side of the implement; Connector 3 is typically connected to nodes on the left-hand side of the implement.

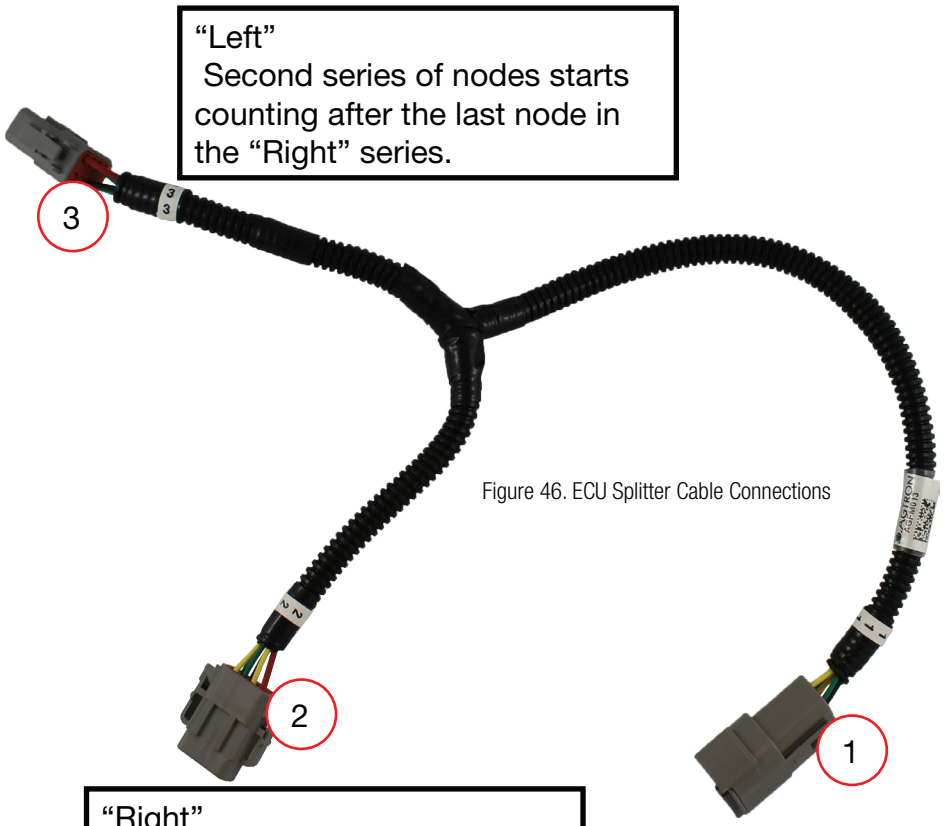


Figure 46. ECU Splitter Cable Connections

1. 8-pin Male connector to ECU
2. 8-pin Female connector to First Node [always NODE 1]
3. 8-pin Female connector to second series of nodes. Node # is defined by the 'next node' after the last in line connected to (2)

When using a Y-adapter cable, numbering of the product nodes and sensors starts at 1 with the first node on the right-hand side (#2 connector on the Y-adapter) and increments until the right-hand terminator is reached.
Numbering continues from the first node connected to the left-hand side (#3 connector on the Y-adapter) and proceeds to the left-hand terminator.

Appendix A: Using an ECU to Product Node Y-Adapter Cable - cont'd

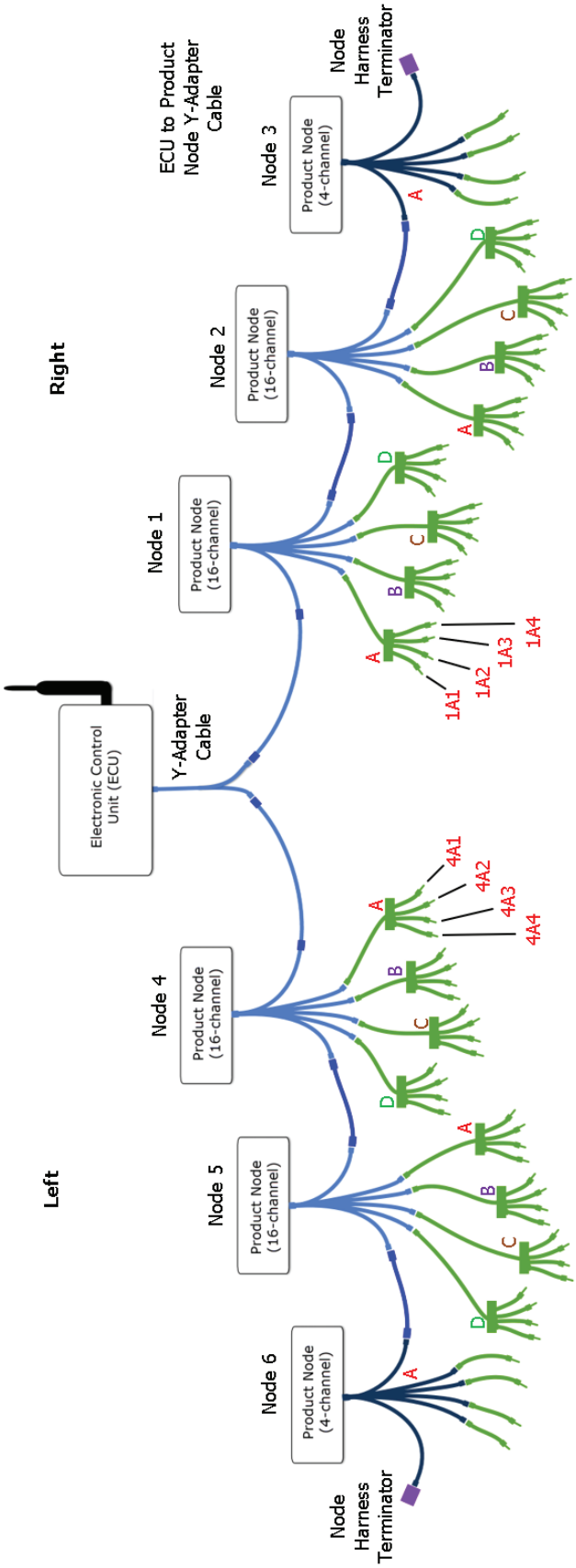


Figure 47. EFM System using an ECU Splitter to Product Nodes

Appendix B: Parts Lists

For current parts lists, descriptions and pricing, go to: http://www.wilger.net/

8. Warranty & Terms of Sale

Warranty covers all defects in workmanship or materials in your Wilger 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 Wilger for a return authorization number and supply the replacement warranty parts.
3. If replacement parts are sent by Wilger Industries Ltd., 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 Wilger. Contact Wilger for shipping details.
4. Any product failures during the warranty period may be repaired or replaced with new or rebuilt product by Wilger's discretion.

5. Troubleshooting, removal, installation labor and shipping to Wilger 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.

2. Any product returned after 30 days must be in new condition and in original packaging to be eligible for a refund. Product returned after 30 days will be charged a 15% restocking fee.

3. No refund is available on product returned 52 weeks after the date of purchase. Go to www.wilger.net for shipping details.

All shipping charges for product returns are the responsibility of the customer, including duty and/or customs charges for international shipments. Product shipped collect will be rejected and returned to the customer.
A return to manufacturer authorization number (RMA) must be obtained before any product is returned.
Please contact Wilger for instructions and shipping information www.wilger.net, or call:
[CANADA] 1 833-242-4121 [USA] 1 877-968-7695

Conditions of Use

1. Wilger 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 Wilger 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.