

# Installation and Use of Single Line Remote Display

**NOTE** The FMU Satellite I/O Control Board PULSE FILTERING must be turned off for all hose positions connected to a Single Line Remote Display.

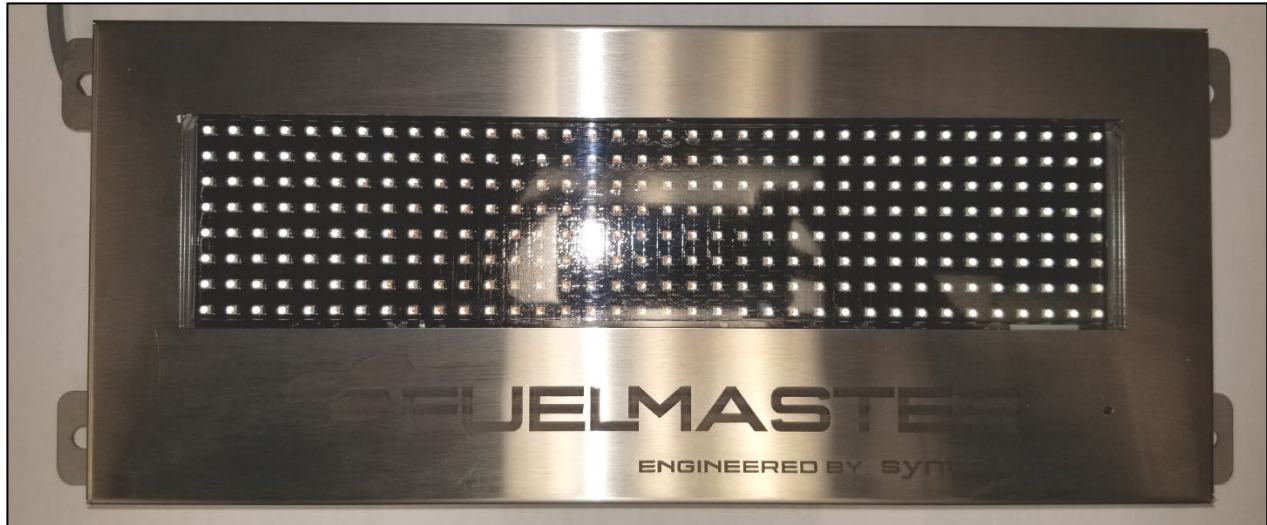


Figure 1. Single Line Remote Display

## Description

Syntech offers an optional Single Line Remote Display Kit (941B0281) for monitoring fuel quantity as it is being pumped. Long fueling hoses such as at small airports, marinas, or on mobile fueling trucks place the operator too far from the dispensing equipment to read the quantity displayed.

The Single Line Remote Display (see Figure 1) has six 3-inch red numbers on a black background visible at distances up to 120 feet away. The pulser divide ratio and decimal placement may be set in the field using the provided, Eagleview software program. The display will show the quantity from the last transaction until it resets for a new transaction.

## Parts Included

The 941B0281 Single Line Display Kit includes the following:

- 263954 - Single Line Display w/ attached Interface Cable
- 264694 - Breakout Board (preferred)
- 237116 - Power Supply
- 182834 - Strain Relief

## Mounting

Use the Mounting holes located at the four corners of the device to secure the display to the desired surface.

## Wiring

A six-conductor interfacing cable (see Figure 2) with a weatherproof connector is attached to the display. The loose wire end of the cable is run to the FMU. Reference NFPA 70 (National Electric Code) for guidance on the use of conduit. If the cable passes through a hazardous location, conduit requirements can change.



Figure 2. Interface Cable attached to back of Single Line Display

A strain relief (see Figure 3) is provided for a weatherproof connection into the FMU.



### Figure 3. Strain Relief

Make a 7/8-inch entry hole into the underside of the FMU upper cabinet for installation of the strain relief. The locknut is the only piece of the assembly installed inside the cabinet. Run the loose wire end of the Figure 2. interface display cable through the strain relief into the FMU. The cable has a multicolored cable that attaches to a TK-14002 Breakout Board. Two different revision levels have been delivered with past displays. Wiring diagrams for both revisions are shown in Figures 5 and 6. Wire nuts may be used with fixed site FMUs. More positive (i.e., crimped) wire connections should be used for mobile applications. Two pieces of Velcro are provided with the installation kit to mount the breakout board to a sidewall in the FMU upper cabinet.

A single display may be used with multiple pulsers if; the pulsers have the same divide ratio, and pulses from only one pulser are being sent at any given time. Some pulsers can stop at the end of a transaction with their pulse output active and continue to send a 12VDC signal after the transaction is complete. See 'Wiring Multiple Pulsers into a Single Display' for more information.

## Breakout Boards

There are 2 versions of the Breakout Board used with the TK-14002 Single Line Display Kit

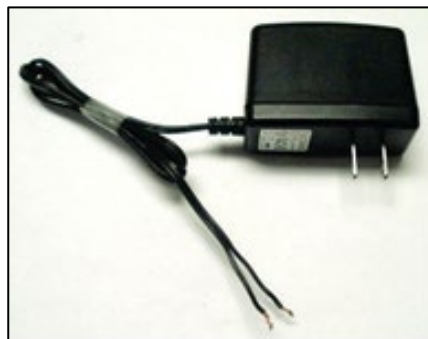
- Rev 1.1
- Rev 2.1

### TK-14002 Rev 1.1

The Rev 1.1 breakout board is red and has a small wire terminal with six receptacles labeled 1- 6. Looking at the wire receptacles, there is a small slot just over each wire receptacle.

Insert a jeweler's screwdriver into the slot and pry up on the back of the screwdriver. It will open the receptacle so you can insert a wire into it. After the wire is inserted, remove the screwdriver and check the security of the wire connection. The wire should be captured in the receptacle.

A 12VDC power supply (see Figure 4) is also provided with the display with positive/negative ground wires.



**Figure 4. Power Supply**

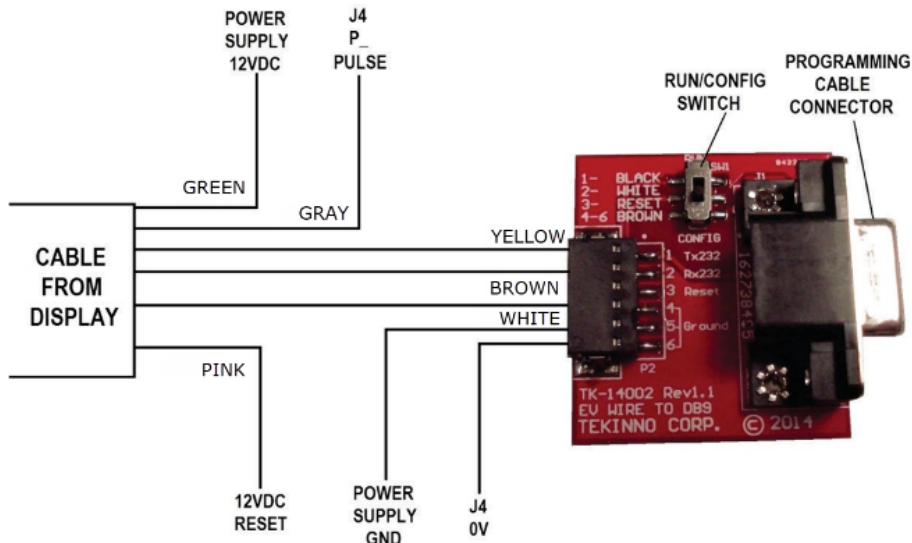
If the FMU does not have an AC power outlet from the factory, one will have to be installed. The positive output wire has a grey stripe.

Connect the positive wire to the display cable BLUE wire. Connect the negative/ground wire to one of the three Ground positions (4, 5, or 6) on the breakout board.

Run a wire from the FMU pulser connector P\_ position to the display cable GREY wire. It should be the same P\_ position the pulser is connected to.

Connect the display cable BLACK wire to position 1 on the breakout board. Connect the display cable WHITE wire to position 2 on the breakout board.

From the two remaining unused Ground positions on the breakout board, connect the display cable BROWN wire to one position. From the remaining Ground position, run a wire to a pulser connector (J4, J5, J6, or J7) 0V position. Any 0V position may be used. This connection is providing a common ground reference between the display and FMU.



**Figure 5. Wiring Display Cable to Rev 1.1 Breakout Board**

The remaining connection to the display cable PINK wire is a 12VDC reset connection. The display needs a 12VDC input to reset the display to 0 (zero) when a new transaction is started. There are two easy ways to attain the 12VDC reset. See Wiring Reset.

The RUN/CONFIG switch is set to RUN for normal operation, and CONFIG for programming with the software as explained elsewhere in this bulletin.

### TK-14002 REV 2.1

The Rev 2.1 breakout board is green. On one side is a small wire terminal with six receptacles labeled according to the wire colors in the display cable. Figure 6 shows which color connects to each terminal on the right. Only four terminals are used on the left. The supplied power supply connects into the 12VDC and GND&0V terminals. The 12VDC hot wire from the power supply has a grey stripe to identify it. The ground wire from the power supply, and a field installed wire both connect into GND&0V. The field installed wire needs to run to 0V on the J4 (or J5, J6, J7) pulser connector to provide a common ground between the FMU and display.

The 12V RESET wire is another field installed wire. This wire resets the display back to 0 (zero) for each new transaction. See the section Wiring Reset on page 3 for wiring instructions.

The PULSE wire is run from the same P\_ terminal on J4 (or J5, J6, or J7) that receives the pulse input from the pulser. There will be a double wire connection to the FMU terminal, one for FMU pulse inputs, and one for display pulse inputs.

The SW1 RUN/CONFIG switch has to be in the RUN position for normal operation, and in the CONFIG position for programming with the software. The SW2 ON/OFF switch is not used and must be in the OFF position.

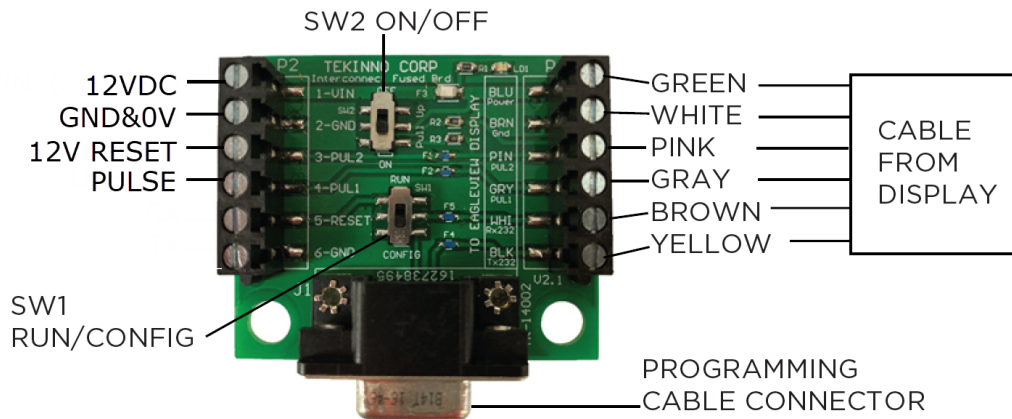


Figure 6. Wiring Display Cable to Rev 2.1 Breakout Board

### Wiring Reset

Reference Figure 7 for using a Dual Control Relay Assembly (DCRA) with unused secondary contacts (positions 1A thru 4B on the terminal strip). The secondary contacts on the face of the DCRA switch power from an A position to a B position. The A and B positions (1,2,3,4) used must correspond to the LD positions activated. (Example: if LD3 is being activated to authorize hose 3, the 3A and 3B secondary contacts must be used to switch the reset power). Run a wire from any +12V position on the Pedestal I/O Board J4, J5, J6, or J7 to the unused A position on the DCRA. Run another wire from the B position on the DCRA to the PINK wire in the display cable, or to PUL1 on the rev 2.0 breakout board (see Figure 7).

If any questions arise, contact Syntech’s Customer Satisfaction Center (CSC) at 1-800-888-9136, ext. 2, or email at support@myfuelmaster.com.

Reference Figure 8 for using a Solid State Relay Assembly (SSRA), or a Dual Control Relay Assembly (DCRA) with no unused secondary contacts. A Single Pole Single Throw (SPST) relay must be installed to control the 12VDC reset signal. 12VDC power from a +12V position is wired to the input side of the relay. The switched output side of the relay is wired to the PINK wire when using the rev 1.1 breakout board, or PUL2 when using the rev 2.0 breakout board.

An authorization signal from LD activates the coil of the relay and closes the contacts sending the 12VDC reset signal to the display.

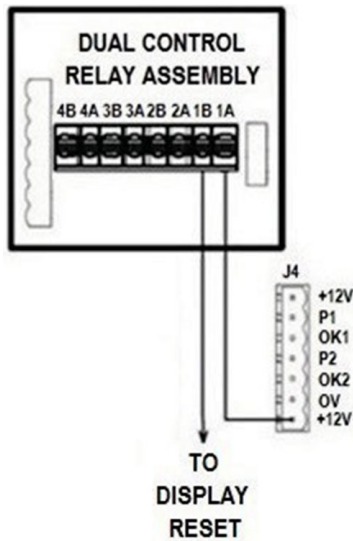


Figure 7. Wiring Reset Option 1

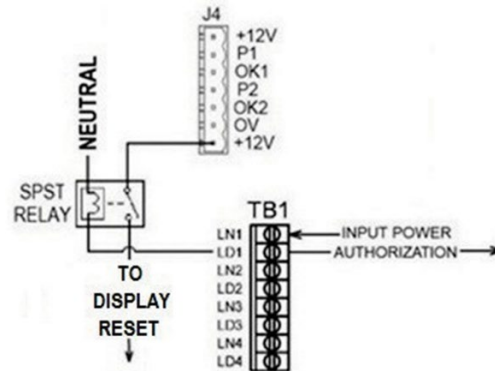


Figure 8. Wiring Reset Option 2

### Wiring Multiple Pulsers into a Single Display

There are three known situations where multiple pulsers have problems when wired to a single display: Veeder Root 1871 10:1 pulsers, open-collector pulsers with pullup resistors connected between +12V and P1, and Integrated Control Systems SP1 12VDC pulsers. There may be other unknown situations with the same problem. If this occurs while attempting this procedure, use the wiring solution shown in Figure 9.

The relays used for this application need to be “normally open off delay” relays with an AC coil rating, and a DC contact rating. If using socketed relays, be sure to purchase a compatible socket for each relay. High volume hoses delivering 100 pulses/gallon, or more,

may not finish sending all the pulses to the FMU before power is removed from the relay. A normally open off delay relay with an off delay of 10 seconds (minimum) will assure all pulses are received at the end of each transaction.



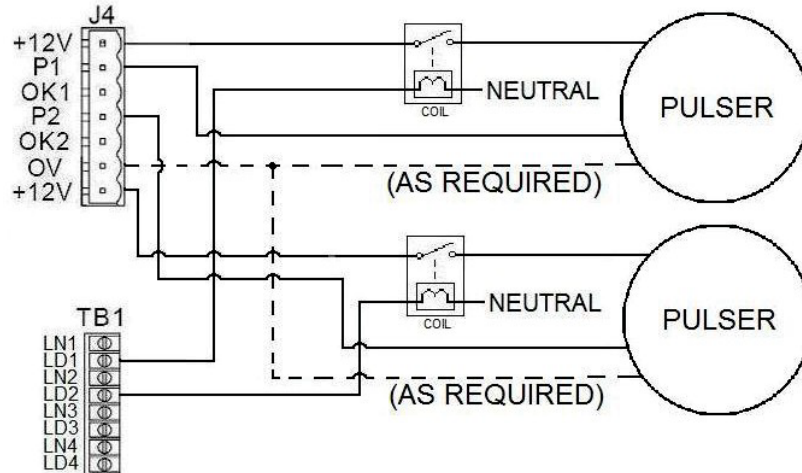


Figure 9. Pulser Wiring Solution

Multiple pulsers may be wired as inputs for a single display if 1) they have the same divide ratio, and 2) only one pulser is providing an input. Figures 5 and 6 illustrate the wiring of the two different breakout boards. Adding pulsers can be as simple as running additional pulse wires to the PULSE wire, or terminal. Additional 12VDC reset wires must also be created for each additional pulser application.

If two or more pulse inputs are wired into the breakout board, and voltage greater than 1VDC is present on the wire or terminal before a transaction is started, the solution shown in Figure 9 must be used to isolate pulser inputs. When isolated, pulse outputs only occur with selected hoses. Figure 9 shows the application for two pulsers. Similar wiring must be used for three or more pulsers. Once this has been accomplished, the display inputs may be wired into the pulser connectors as shown in Figures 5 and 6.

## Programming

A zipped copy of the software and this product bulletin are provided on a FuelMaster flash drive (thumb drive). The software is easy to load. Open the software zip file to see the files that were zipped; then click on the setup.exe file. The program will load.

Programming is accomplished with a serial cable connected between a laptop/PC and the PROGRAMMING CABLE CONNECTOR on the breakout board. In most cases it will be necessary to use a USB/Serial Converter to attach the serial cable to a laptop. Set your com port to 9600 baud, 8, N, 1. On the breakout board, set the RUN/CONFIG switch to CONFIG, and plug the power supply into an AC power outlet in the FMU. The display will initialize with a countdown sequence (example: 999999, 888888, 777777, etc.). When the countdown completes, the firmware version loaded in the display will be shown (example: EVT1.10). When the firmware version clears, the address of the display will be shown (example: FT L1). Before firmware version EVT 1.51, the address will clear and display all zeros (0000.00). Beginning with firmware

version EVT 1.51, the address will clear and display the default scrolling message “WAIT FOR DELIVERY”.

See Figure 10. To connect to the display through the software, click on File. From the dropdown menu, click on Auto Connect. If a connection is established, a “Link: Connected to COM1 (or other com port)” will appear. If Auto Connect doesn’t connect, click on Connect and select one of the com port choices. One of the choices should connect.

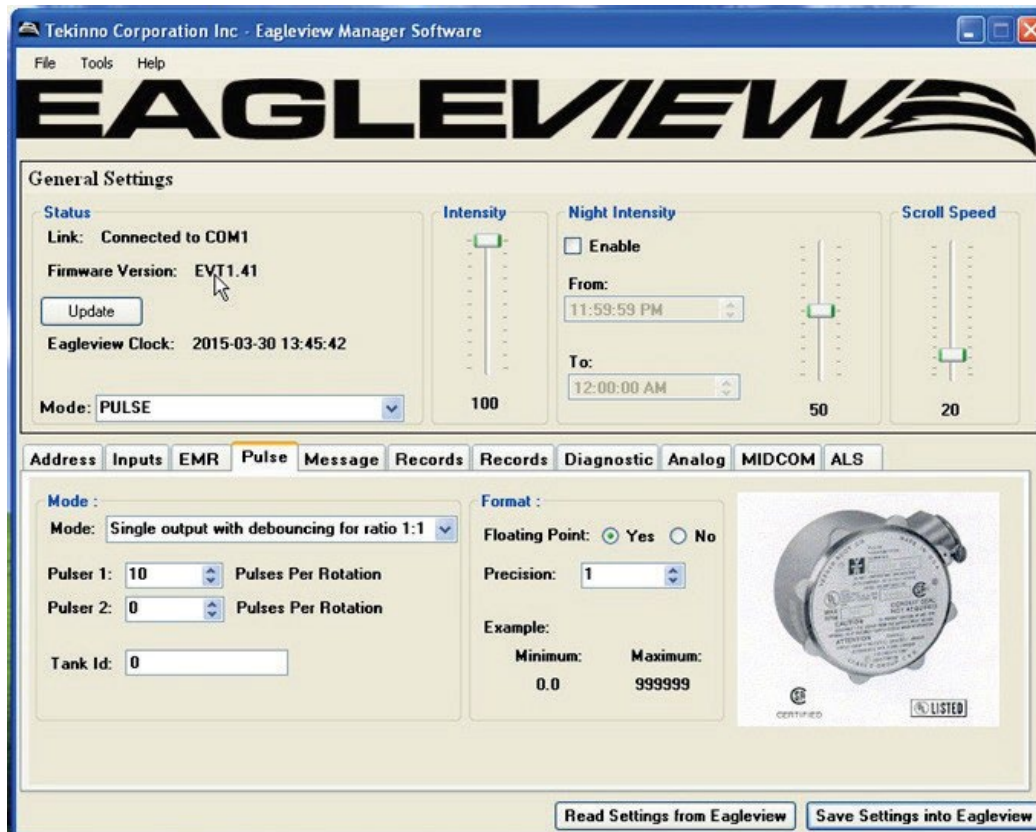


Figure 10. Eagleview Software Main Window

Figure 10 shows the General Settings plus the pulser settings. The intensity (brightness of the display numbers) is set to 100. That is the recommended setting for daylight hours. If it is used at night, you can Enable Night Intensity and lower the intensity by moving the slider to the right of the From and To times. Scroll Speed doesn’t apply to the Single Line Remote Display.

Below the general settings are the Pulser settings. We try to know the pulser type and divide ratio before shipment so it can be set here, but it may be set in the field. For a Veeder Root 1871 10:1 pulser, the Mode is set to “Single output with debouncing for ratio 1:1 to 20:1”. Most other pulsers including the Veeder Root 7697 and 7671 should be set to “Single output without debouncing at all”. Set the appropriate number of pulses per revolution for Pulser 1. No setting required for Pulser 2 or Tank Id. For the 1871, set Floating Point to Yes. For all others, set to No. Precision is how many decimal places are desired. For a 10:1 pulser, set to 1. For a 100:1 pulser,



set to 2. If any changes were made to this window, click on Save Settings into Eagleview at the bottom of the window to save the settings into the display.

Disconnect the software from the display by clicking on File, then selecting Disconnect.

## Messages

See Figure 11. Beginning with firmware version EVT 1.51, a scrolling message may be programmed.

Figure 11. Message Tab

### Before Delivery

Before Delivery is for a scrolling message to be displayed as the fueling point is waiting for a fueling customer. The default message is WAIT FOR DELIVERY. This can be edited for any other message up to 100 characters in upper case letters or numbers. The Repeat function to the right is to set the number of times the message is repeated. If it is desired for the message to scroll continuous, set the Repeat setting to 0. Otherwise, any number from 1 to 100 may be set to repeat the scrolling message as many times as the number entered. The Scroll Speed is set at the top under Scroll Speed. Move the slide bar up or down to adjust the speed. The default is 20. A lower number increases the speed. A higher number decreases the speed. After the message is edited to read what you want, click on Save Settings into Display; then remove and reapply power to the display. When display power is restored, the new message will begin scrolling.

### After Delivery

After Delivery is for a scrolling message to be displayed after a transaction is completed. When a transaction is started, the display resets (8.8.8.8.8.8.) and displays 0.00 (or the number of

decimal places set for Pulse). As pulses are sent to the display, it displays the quantity pumped. When the transaction is complete, and the dispenser pump handle is turned off, the top line will display the After Delivery message, if set. The After Delivery message may be up to 100 characters in upper case letters and/or numbers. The custom After Delivery message will precede “- - TOTAL % US GAL” where % is the quantity. The “- - TOTAL % US GAL” portion of the message is fixed and cannot be edited. An example of the custom message is shown at the bottom of the window. Regardless of the number entered in the Repeat function for this message, the After Delivery message times out and reverts to the Before Delivery message after 5 minutes or when a new transaction is started. The “Display total and stop scrolling for TBD second(s)” may be used to stop the scrolling and hold the quantity reading in place for a pre-determined amount of time. The displays are preset from Syntech with “...stop scrolling” set to 5 seconds.

## Operation

The installation is complete. Operation should be automatic whenever a transaction is conducted. The display should reset whenever a new transaction is started and the FMU relay assembly is activated.

### TIP

If any questions arise, contact Syntech Systems, Inc.'s Customer Satisfaction Center (CSC) at 1-800-888-9136, ext. 2, or email [support@myfuelmaster.com](mailto:support@myfuelmaster.com).

## Change Log

5/21/2015	Original release
6/5/2015	Added Messages section
6/15/2015	Added <u>Wiring Multiple Pulsers into a Single Display</u> section
11/18/2015	Added <i>NOTE</i> , page 1
2/3/2016	Added information about “normally open off delay” relays Added Disclaimer to bottom of this page
9/6/2017	Added kit part number
9/12/2017	Corrected Reset wiring info for Rev 2.0 breakout board
10/2/2018	Clarified part numbers for Single Line Display and preferred Breakout Board on page 1
4/9/2019	Clarified that SW2 switch must be in the OFF position on the Rev 2.0 Breakout board
11/8/2019	Updated image of Single Line Display with Mounting bracket Removed information about detachable interface cable Added information for Rev 2.1 Breakout board Restyled and formatted document