



# TankChek Wizard

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***User Manual***

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## TankChek Wizard

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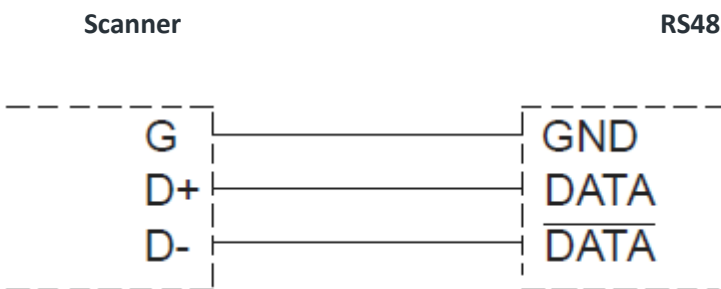
TankChek Wizard is software used to configure the TankChek LCD200 and LCD210 Series Displays (scanners). In this document, TankChek, Scanner and LCD Display are used interchangeably. TankChek Wizard and TankChek Scanners are used with Electrolab's DLS2100 level sensor. While the TankChek scanner offers many features, the scope of this document covers the use of TankChek with Electrolab's Model 2100 DLS.

TankChek LCD200 and LCD210 are devices that enable the display and processing of Modbus RTU register Process Variables (PV's). Both units operate the same with Modbus RTU communications. The differences are in the display method, specifically the display format and scaling parameters. The TankChek LCD200 displays in Feet and Inches with a Tank Scale Indicator. The TankChek LCD210 displays in Decimal format allowing multiple, non-level, process variables to be displayed. Both Scanners poll the Modbus RTU registers one at a time. In the event more than one register is requested, only the first register will be displayed.

### Setup

The Scanner uses 2-wire RS485 communications to connect to external RS485 devices. It requires two twisted pair of high quality cable. One pair for communications and the other for signal ground; this is usually power ground but may be the ground of the SCADA source.

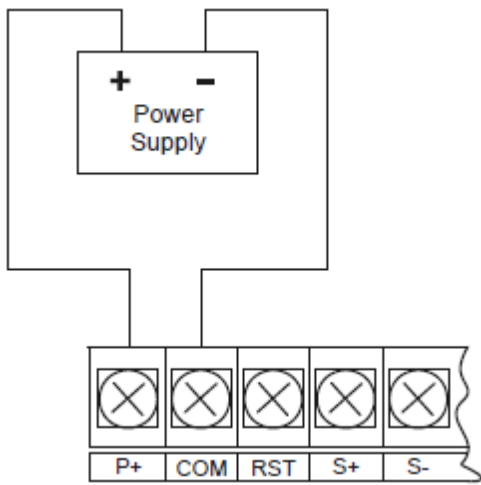
1. Connect a PC to the unit via a USB to RS485 converter (2-wire communications).



2. Prior to connecting sensors to TankChek LCD Displays, the sensors need to be pre-configured to 9600n81 with the proper unit number relating to the Modbus slave ID. Use the HHC1000 Hand Held Communicator for the DLS2100, or a terminal emulation program to configure each of the sensors to a unique slave ID.

## Connecting Power

Connect 12vdc power to the unit, as shown in the following diagram.



## Operation

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Upon launching the TankChek Wizard, the software will attempt to connect to the LCD Display using the last known TankChek scanner ID (default is 240) and read the configuration. When successful, all the data will be available to the user for analysis and reconfiguration, if necessary. The delay in retrieving and programming is due to the TankChek Software slowly reading and programming so as not to seriously impact normal data communications. These communications are logged in the TankChek Wizard directory, under the file name "CommLog mmddyy", where "mmddyy" is the month, day and year.

If the TankChek Software is running and connected to the TankChek Display Scanners, there is a possibility that communications data can be compromised due to the software constantly communicating with the Scanners. This will be evident when the word "**none**" displays instead of the process variable (PV) data. When this occurs, the communications port, parity or scanner ID may need to be configured and communications connection re-attempted.



In the event more than one LCD Display is used on a RS485 communications line, each will need a unique scanner ID for the TankChek Wizard to communicate with it; this will need to be **configured manually via the push buttons**.

## Programming a TankChek Scanner ID

To program a new TankChek Scanner ID, use the push buttons on the face of the Scanner and follow the steps below:

1. Select **MENU**.
2. Select **PREV** twice. The display will show "**Advance**" then "**Comm**".
3. Select **SCAN** and "**SCAN ID**" will be displayed.
4. Select **SCAN** again and the scanner ID will be displayed, (Default **240**).
5. Select **PREV** to select the digit, as indicated by the flashing digit.
6. Select **NEXT** to increment the digit value.
7. Select **SCAN** to complete the process.
8. Select **MENU** three times to exit and return to scan mode.

**Save and document all Scanner ID's for future use. The TankChek Wizard can only communicate with the scanner whose ID is selected.**

The scanners will default to scanner ID 240. When establishing a connection with a unique Scanner ID, first "disconnect" communications, then select **CONNECTION > EDIT** and select a new "Scanner ID" from the drop down menu. Select **OK** and then select **CONNECT**.



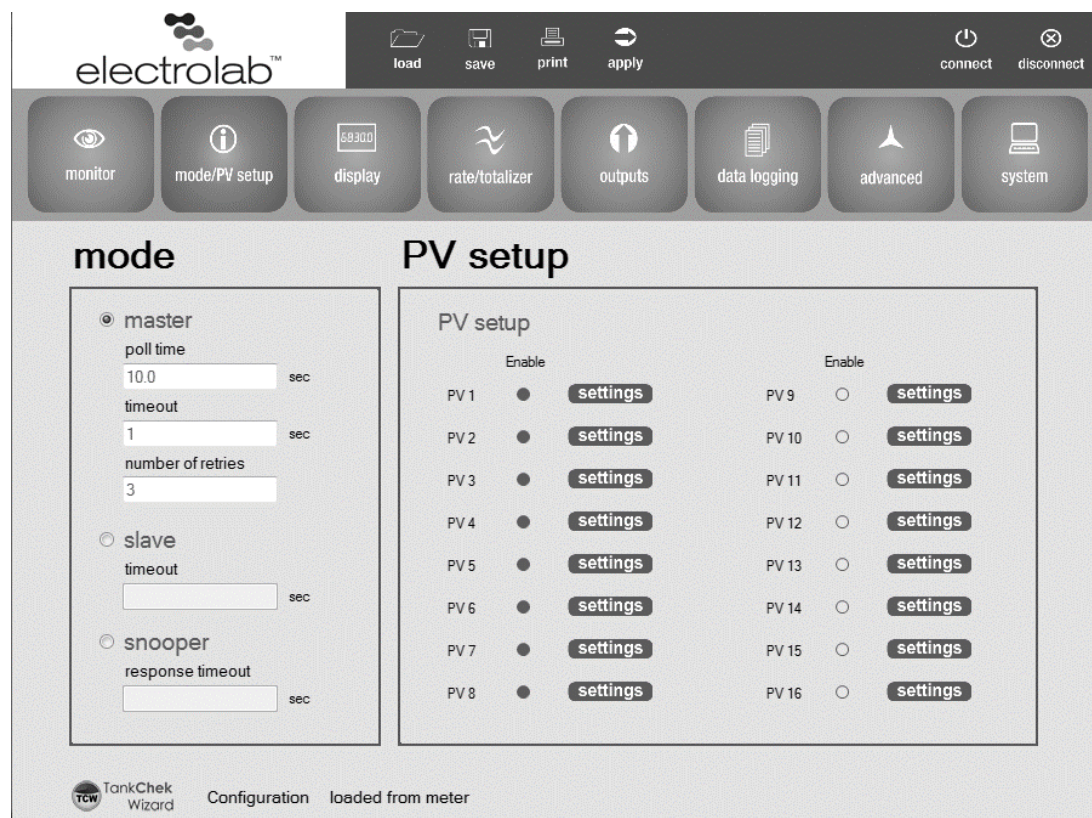
## Master Mode

The TankChek LCD Display arrives pre-configured as a Master to display 16 total process variables (PV's) from eight Model 2100 Digital Level Sensors. These are set up as DLS 2100 level sensor unit #1 through #8 with each sensor providing 2 levels (total product at Modbus register 43991 and water interface at register 43992).

**Note:** Only the first 8 PV's will be enabled, in order to speed up set up time. This will enable reading and displaying 2 process variables from four sensors with dual level.

The Modbus RTU data format is 16-bit unsigned integer (x100). When in Master mode, the TankChek Display will poll for levels every 10 seconds. The levels will display along with the tag and units for a specified period of time. The units can be re-labeled as another tag. The default is 2 seconds for each tag and unit of measure for a total of 4 seconds. The next value displays when the next process variable is present. In the event there is no data the word "none" will display until the next display period occurs. The polling period is adjustable between .1 second and 99.9 seconds. Polling periods below 7 seconds can result in timing issues and data randomly not being displayed, or the word "none" being displayed. Individual PV's are polled every 500ms.





## Snooper Mode

The TankChek LCD Display arrives pre-configured as a Master to display 16 total process variables (PV's) from eight Model 2100 Digital Level Sensors. These are set up as DLS 2100 level sensor unit #1 through #8 with each sensor providing 2 levels (total product at Modbus register 43991 and water interface at register 43992).

**Note:** Only the first 8 PV's will be enabled, in order to speed up set up time. This will enable reading and displaying 2 process variables from four sensors with dual level.

To enable Snooper mode, simply select the "Snooper" radio button and select "apply". The Modbus RTU data format is 16-bit unsigned integer (x100). When the SCADA polls for levels they will be displayed along with the tag and units for a specified period of time. The default is 2 seconds for each tag and unit of measure, for a total of 4 seconds. After 4 seconds, the next value is displayed. By default the PV's will be displayed every 4 seconds, one PV at a time.

The data will only be displayed if the Snooper recognizes the Modbus data on the line and the message is present in the Response time. Scanners set up for Snoopers must have the response timeout set greater than the Master poll time. If unknown, set the response timeout to maximum (99.9 seconds).

In all cases, the TankChek will scan through the pre-programmed PV's and display the value stored in the Modbus address/register if it is available, otherwise "none" will be displayed.

The screenshot shows the 'mode/PV setup' screen of the TankChek Wizard. The top navigation bar includes icons for load, save, print, apply, connect, and disconnect. Below this is a row of icons for monitor, mode/PV setup, display, rate/totalizer, outputs, data logging, advanced, and system. The main content area is divided into two sections: 'mode' and 'PV setup'.

**mode section:**

- master:** poll time (input field), timeout (input field), number of retries (input field).
- slave:** timeout (input field).
- snooper:** response timeout (input field, value 99.9).

**PV setup section:**

PV	Enable	settings
PV 1	<input checked="" type="radio"/>	settings
PV 2	<input checked="" type="radio"/>	settings
PV 3	<input checked="" type="radio"/>	settings
PV 4	<input checked="" type="radio"/>	settings
PV 5	<input checked="" type="radio"/>	settings
PV 6	<input checked="" type="radio"/>	settings
PV 7	<input checked="" type="radio"/>	settings
PV 8	<input checked="" type="radio"/>	settings
PV 9	<input type="radio"/>	settings
PV 10	<input type="radio"/>	settings
PV 11	<input type="radio"/>	settings
PV 12	<input type="radio"/>	settings
PV 13	<input type="radio"/>	settings
PV 14	<input type="radio"/>	settings
PV 15	<input type="radio"/>	settings
PV 16	<input type="radio"/>	settings

At the bottom, the status bar shows 'TankChek Wizard Configuration loaded from meter'.

## Modifying PV Configurations

After reading the scanner configuration, use the Mode/PV Setup screen to access the individual PV configurations. Select the PV to modify from the list of 16 PV's by selecting **SETTINGS**. The radio button to the right of the PV indicates whether the PV is enabled or not. The following screen is where the Modbus registers, Device ID, and Data type and byte format are selected. The data type for the DLS2100 sensor should use the following settings.

PVSetup

### PV 1 setup

slave ID	1
function code	3
slave register	3991
Offset: 40000	6 digit <input type="checkbox"/>

data type	short
binary	<input checked="" type="radio"/> BCD <input type="radio"/>
signed	<input type="radio"/> unsigned <input checked="" type="radio"/>
byte format	1234

save cancel

16 bit configuration settings

PVSetup

### PV 1 setup

slave ID	1
function code	3
slave register	3991
Offset: 40000	6 digit <input type="checkbox"/>

data type	float
binary	<input checked="" type="radio"/> BCD <input type="radio"/>
signed	<input type="radio"/> unsigned <input checked="" type="radio"/>
byte format	1234

save cancel

32 bit floating point configuration settings

## Disabling PV's

PV's can be selected or disabled via the **Slave ID** drop down menu. Select a **SLAVE ID** to enable the PV or select **DISABLE** to disable the PV.

PVSetup

### PV 1 setup

slave ID	disable
function code	2
slave register	4
Offset: 40000	6

data type	11
binary	<input checked="" type="radio"/> 14
signed	<input type="radio"/> 16
byte format	18

save

## Alarm Outputs

There are 2 outputs available for alarms or controls. The outputs are “open collector” and are programmed from the “**Outputs**” screen by selecting **alarm** under **output type**, **PV#** under **alarm function** and inputting a value under **set** for the alarm point limit to exceed, and a value under **reset** at which the alarm will clear (input the value in Feet for TankChek LCD200 and input the value in Inches for TankChek LCD210).

When in alarm condition the word “HI” will be flashing on the display above the Tank scale indicator (TankChek LCD200) or at the bottom right hand of the display (TankChek LCD210). The alarm condition and indicator will remain until the level has dropped below the reset level. The example below shows the configuration for the TankChek LCD210 with an alarm point, “set”, of 84.00” for PV1 and a “reset” point of 75.00”. The equivalent configuration for the TankChek LCD200 would be a “set” point of 7.0’ and a “reset” point of 6.25’.

**Note:** The alarm set point values for TankChek LCD210 directly correlate to the scaling of the display settings. If the display scaling is set for inches, the alarm points should be set in inches. If the display scaling is set for feet, the alarm points should be set in feet.

The screenshot shows the 'pulse output' configuration screen in the TankChek Wizard. The interface includes a top navigation bar with icons for load, save, print, apply, connect, and disconnect. Below this is a row of menu buttons: monitor, mode/PV setup, display, rate/totalizer, outputs (selected), data logging, advanced, and system.

The main configuration area is titled 'pulse output' and contains three panels:

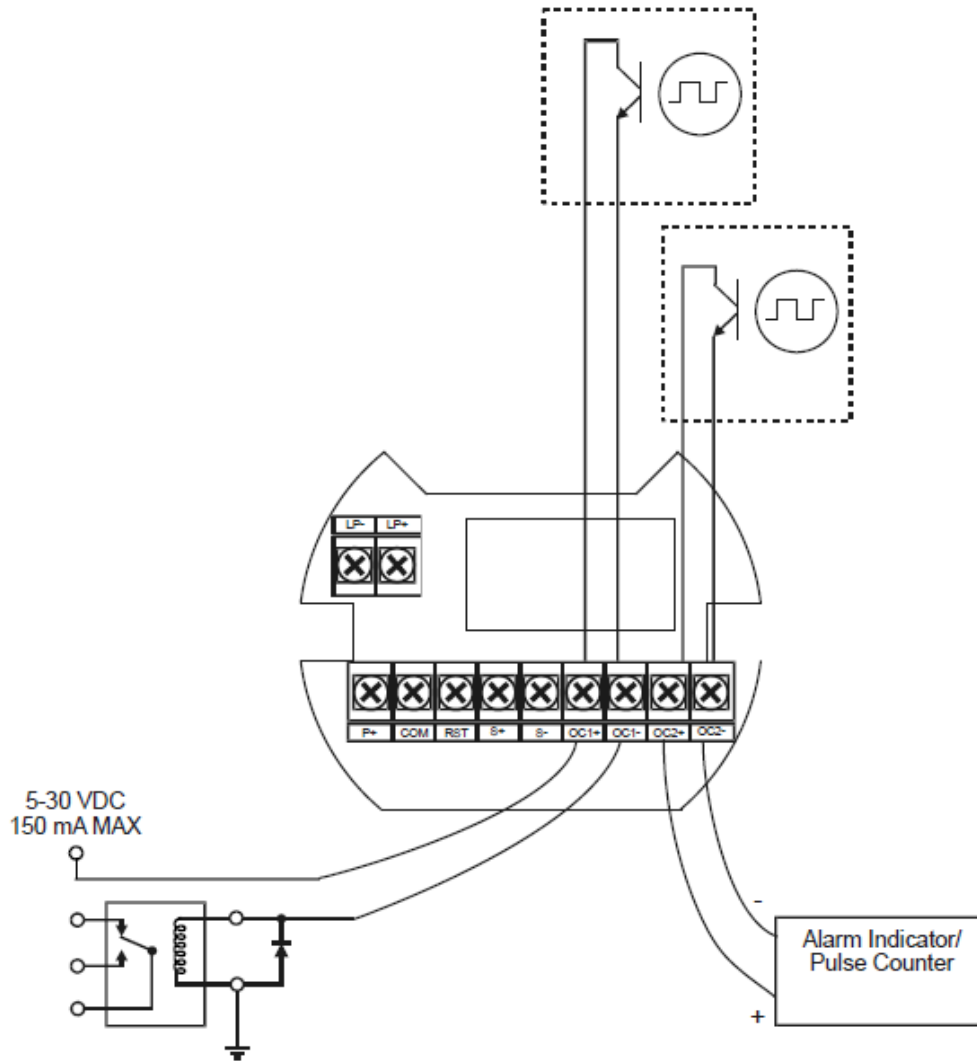
- output 1:**
  - output type: alarm
  - alarm function: PV 1
  - pulse function: rate
  - rate count: 1
  - total count: 1
  - grand total count: 1
  - test: 500.0
  - timer period: 1000.0 sec
  - timer on time: 1.00 sec
  - set: 84.00
  - reset: 75.00
  - set total: [empty]
  - set grand total: [empty]
  - timer start button
- output 2:**
  - output type: off
  - alarm function: rate
  - pulse function: rate
  - rate count: 1
  - total count: 1
  - grand total count: 1
  - test: 500.0
  - timer period: 1000.0 sec
  - timer on time: 1.00 sec
  - set: 99999
  - reset: 0
  - set total: [empty]
  - set grand total: [empty]
  - timer start button
- analog output:**
  - disable
  - display 1: [empty]
  - output 1: [empty]
  - display 2: [empty]
  - output 2: [empty]

At the bottom left, there is a logo for 'TCW TankChek Wizard' and the text 'Configuration loaded from meter'.



## Output Wiring

To wire up an open collector output, connect power to OC1+ and connect OC1- to the positive of the load. The negative from the load will connect to ground.



## TankChek Reset

As with all electronics, there may be times when the processor must be reset, due to corrupt memory or being unsure of what the processor is doing after programming. TankChek allows for a “Factory Reset”. When “Reset”, the TankChek will revert back to 9600Baud with 8 bits, no parity and a Scanner ID of 240.

To reprogram the scanner:

1. Select **DISCONNECT** from the menu bar.
2. Select **EDIT** from the TankChek Wizard main window and the “**Connection**” window will appear.
3. To reprogram the scanner using TankChek Wizard, the Scanner ID of 240 must be selected.
4. Select **TEST CONNECTION** and verify the “Meter Connection” indicator turns Green.

The screenshot displays the 'system' configuration window of the TankChek Wizard software. The interface includes a top menu bar with icons for load, save, print, apply, connect, and disconnect. Below the menu bar is a row of buttons: monitor, mode/PV setup, display, rate/totalizer, outputs, data logging, advanced, and system. The 'system' window is titled 'system' and contains several sections:

- backlight**: A checkbox is checked, and a brightness icon is visible.
- battery symbol**: A checkbox is checked, and a 'BAT' icon is visible.
- factory defaults**: A 'reset' button is present.
- save to backup**: A 'save' button is present.
- load from backup**: A 'load' button is present.
- factory use only**: A button is present.
- password status**: Three fields are shown, all set to 'unlocked': programming menu, total reset, and grand total reset.
- serial settings**: Fields for scanner ID (240), baud rate (9600), transmit delay (50 msec), and parity (none, 1 stop).
- SFT / firmware version**: Fields for SFT number (SFT093) and firmware version (1200).

At the bottom of the window, the status bar shows 'TankChek Wizard Configuration loaded from meter'.

The screenshot shows a 'Connection' dialog box with the title 'edit connection parameters'. It is divided into two main sections. The top section has 'available COM ports' with a dropdown menu showing 'MOXA UPort COM Port 1' and a 'Refresh COM ports' button. Next to it is 'meter connection' with a dropdown menu showing 'RS-485'. The bottom section has 'scanner ID' with a dropdown menu showing '240' and a note: 'Note: scanner ID is not written to the meter.' Below this is 'parity' with a dropdown menu showing 'none, 1 stop bit'. To the right is 'transmit delay' with a text box containing '50'. There are buttons for 'Send to meter' and 'Test connection'. At the bottom, there is a 'Meter Connected' indicator (a small black box with white text) and 'Cancel' and 'OK' buttons.

5. If the Scanner is to remain at Scanner ID 240, continue with programming.  
If the Scanner ID needs to be changed, follow the procedures in **Programming Scanner ID** then, select the new **SCANNER ID** from the drop down list and select **TEST CONNECTION**.
6. Verify the “**Meter Connected**” indicator turns Green. Once meter connection is established, programming can continue.

## Scaling Display Outputs

The TankChek LCD200 and LCD210 display data in different formats and use the data in different ways to program the digital outputs. The TankChek LCD200 is a feet and inches display that takes the raw Modbus RTU data and multiplies a K-factor to get the feet and inches or uses the scale to scale the output display.

### **Factor**

#### *TankChek LCD200*

Each PV needs to have a K-factor assigned. This is done in the display screen by selecting the PV display setup to get to the factor/scale setup screen. Since the raw data is multiplied by 100, it must now be divided by 100, or  $1/100 = .01$ . The K-factor for the DLS2100 is then calculated to be  $.01/12" = 0.000833$ . The scanner now uses the k-factor and multiplies it by the raw data to get the data that will be displayed. The TankChek LDC200 has an additional display item, the “tank size indicator” bar graph. When using the factor for displaying the level, all tanks will use the same tank height input in the “tank size indicator” input window.

PV 1 display setup

top or bottom display: top 1/8

tag: PV 1

units: FEET

float decimal point: [dropdown]

display decimal point: [dropdown]

factor: [radio button selected] scale: [radio button]

factor: 0.000833

save cancel import export

### *TankChek LCD 210*

The TankChek LCD210 is a Decimal display. It displays the raw Modbus RTU data divided by 100 to get the inches and fractions of an inch. The division is accomplished by multiplying the raw Modbus RTU data by .01.

PV 1 display setup

top or bottom display: top

tag: TOTAL 1

units: INCHES

float decimal point: dddddd

display decimal point: dddd.dd

factor: [radio button selected] scale: [radio button]

factor: 0.01

save cancel import export

For 32 bit modbus, the TankChek LCD210 reads the raw Modbus RTU data and uses a factor of 1, (float). In this case, the data is simply formatted to the proper display with the use of the “display decimal point” selection of “dddd.dd”.



PVDisplay

### PV 7 display setup

top or bottom display top

tag TOTAL 4

units INCHES

float decimal point dddddd

display decimal point dddd.dd

factor ☒ scale ☐

factor 1.

save cancel import export

## Scale

An alternate method of formatting and displaying the data is with the “scale” function. This function is used in the cases where not all tanks being monitored are of the same height and you are using the “tank size indicator” (TankChek LCD200). The scale uses the raw Modbus RTU data as the “Input value” and the scaling is done in the “Display value”. “Float decimal point” is directly related to the “Input value” for the placement of the decimal in the raw Modbus RTU data. In the example below, the Input value of Pt 1 represents the input value of 0” to be displayed as 0.00’ and Pt2 Input value of 12000” (input value x100) to be displayed as 10.0’. In this example, 12000 = 10.00’ or 120.00 will be displayed as 10’, both on the display and on the “tank size indicator”.

PVDisplay

### PV 1 display setup

top or bottom display top 1/8

tag TOTAL 1

units FEET

float decimal point

display decimal point dddd.dd

factor ☐ scale ☒

# of points 2

Pt	Input value	Display value
1	0	0.00
2	24000	20.00

save cancel import export

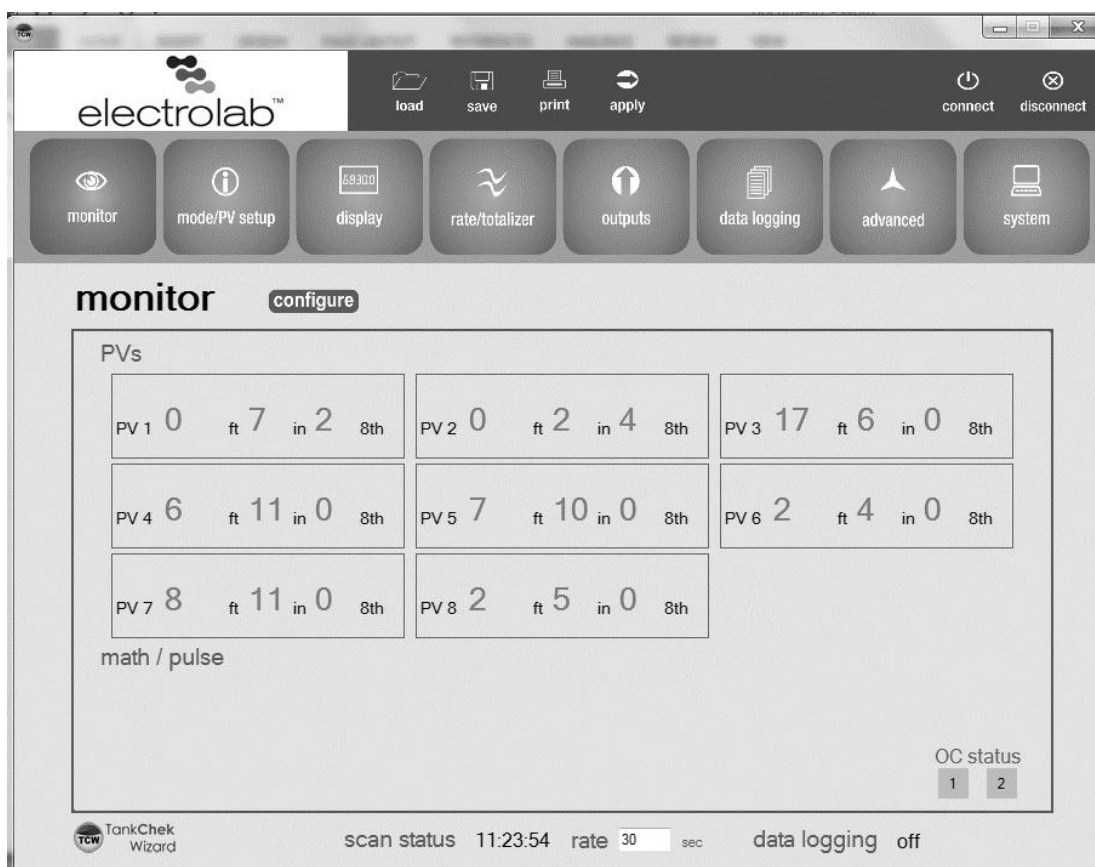
By default for TankChek LCD200 and LCD210, all PV's are scaled to 240.00" or 20'. This is where any scaling will be programmed for varying lengths of sensors. Select "2" for the # of points. PV1 can be programmed for up to 32 points (useful for tank strapping), all other PV's are limited to 2 points. Enter "0.0" for the Pt 1 (this is the value that 00000 will represent on the display), Input value and Display value. For Pt 2, input the raw value (in inches x 100) of the height of the tank associated with the PV#, and input a value in "Display value" representative of the tank height.

**Note:** In order to be displayed correctly/accurately, the tank height "Input value" entered must be a multiple of 12 (for 12") and the Display value must be a quotient of 12. For example, the window above indicates, 120.00" = 10.00', where  $120.00 \times 100 = 12000$ .

TankChek LCD210 scaling is similar, with the exception that units displayed will now be in feet so the PV Display "units" must be changed accordingly. A Display value of 120.00 will scale in inches for the example above.

## Monitoring of Configured PV's

Not only is the data displayed, the status of the Open Collector Outputs are also displayed in the lower right hand corner, boxes labeled 1 and 2. The TankChek Scanners internal data logging status, on or off, will be displayed as well.



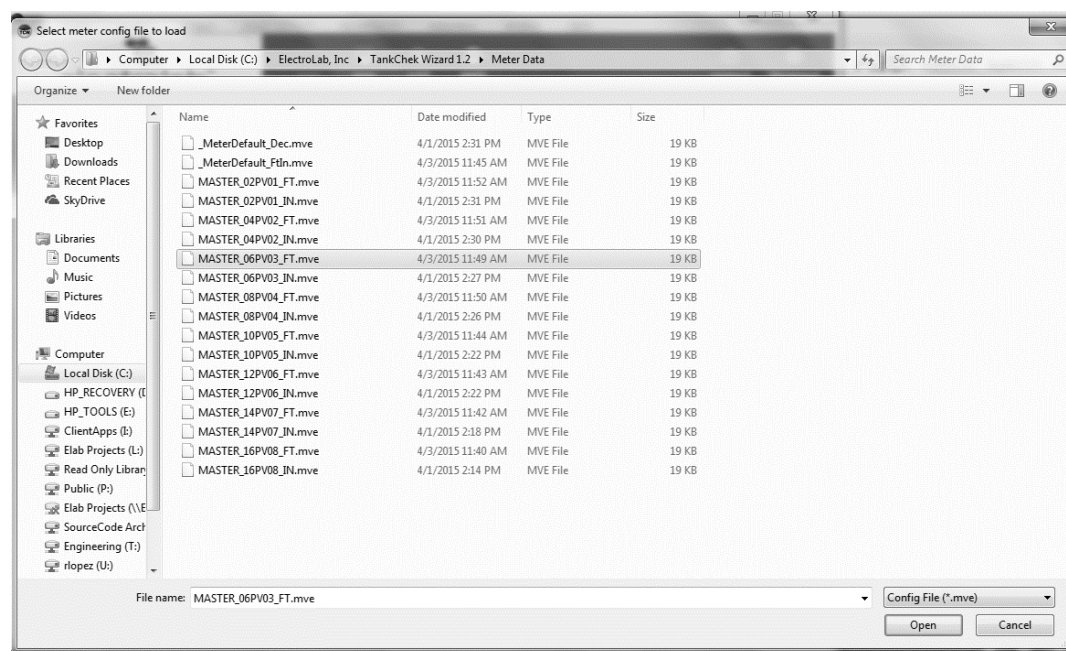
## Configuration

### Loading Configuration Files

In the event there is a need for less than 8 dual float DLS2100 sensors or 16 PV's, files have been created for uploading to the TankChek LCD Display, when used as a Master, in increments of 2PV's at a time. Any updates to the configuration will take approximately 40 seconds to upload.

To load preconfigured settings, select **LOAD** from the top of the TankChek Wizard window and select a file from the list of .mve files in the default Meter Data sub directory, or any other directory that the files have been saved in. The file naming convention is "Mode, # of PV's, number of DLS2100 type sensors, Feet or Inches Display". The file MASTER\_6PV03\_FT.mve is representative of a TankChek LCD200 configured as a Master displaying 6 PV's with 3ea DLS2100 type sensors configured as dual level.

**Note:** DLS sensors are configured as dual float and begin with unit 01 through 03.



### Saving Configuration Files

In the event changes are made to the default configurations, the new configuration can be saved for later use by selecting **SAVE** from the top of the TankChek Wizard window and inputting the new file name in the "File name" input box and selecting **SAVE**. This feature is useful for unique configurations or for identical configurations that are not currently saved.

## Technical Specifications

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### Model

LCD20x, or LCD21x

### Ratings

- FM
- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1; T6
- Class I, Zone 1, AEx d IIC T6 Gb
- Zone 21, AEx tb IIIC T85°C
- Ta = -40°C to +75°C
- Enclosure: Type 4X & IP66
- CSA Ratings and approvals as they appear on the device labeling.

### Warnings

- Never remove the meter cover in explosive environments when the circuit is live.
- Cover must be fully engaged to meet flameproof/explosion-proof requirements.
- Installation and service should be performed only by trained service personnel.
- Service requiring replacement of internal components must be performed at the factory.

### Installation Notes

- Screw Terminals: 12 to 22 AWG wire
- Output: Isolated open collector, 30 VDC @ 150 mA max
- The product must be installed in accordance with the National Electrical Code (NEC) NFPA 70.
- Conduit seals must be installed within 18" (450mm) of the enclosure.
- Use suitably certified and dimensioned cable entry device and/or plug.
- The equipment shall be installed such that the supply cable is protected from mechanical damage.
- The cable shall not be subjected to tension or torque.
- All input circuits must be derived from a CSA Approved Class 2 source.
- Install in accordance with applicable local and national regulations (e.g. NEC).
- Installation and service should be performed only by trained service personnel.
- Service requiring replacement of internal components (not including battery, if equipped) must be performed at the factory.

## Wiring

Definitions of wiring diagram symbols showing connections to the device terminals.

- S+ Signal input positive terminal connection
- S- Signal input negative terminal connection
- COM DC power supply input return/negative, reset contact closure common
- RST Contact closure reset
- P+ DC Power positive terminal connection
- OC1+ Open collector output 1 positive terminal
- OC1- Open collector output 1 negative terminal
- OC2+ Open collector output 2 positive terminals
- OC2- Open collector output 2 negative terminals

## Technical Assistance

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For further information or for assistance, please contact

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