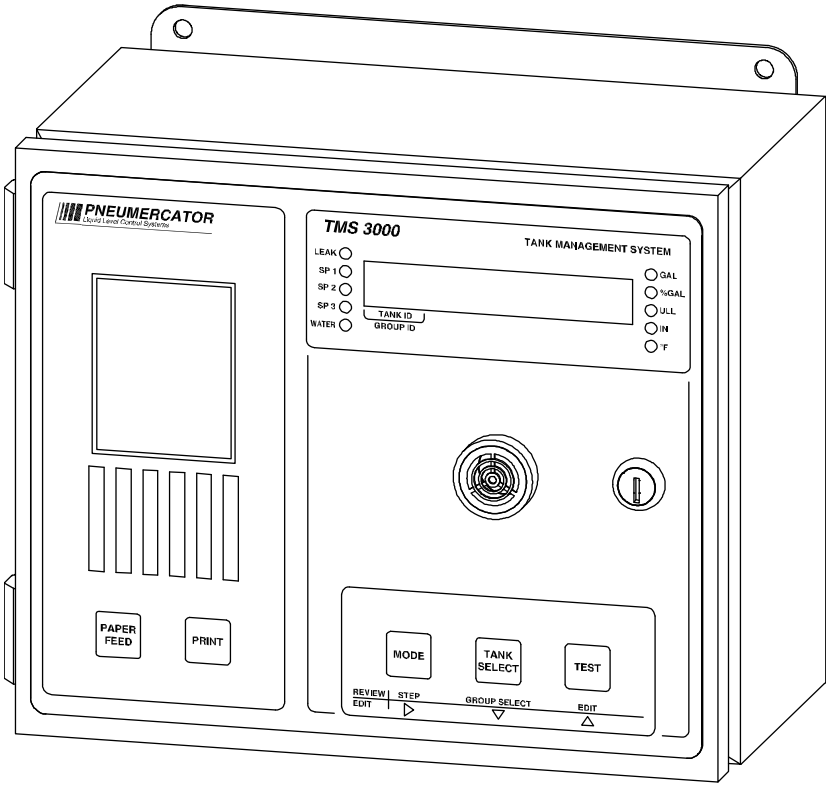
PNEUMERCATOR
Liquid Level Control Systems

TMS Quick Start-up Guide



DRAWING NO. 20001 REV. A

For Use With

Factory Preprogrammed TMS Systems

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Note: Separate manuals are available for System Operation and Installation.

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INTRODUCTION

This guide is intended for use as a field help guide for factory-trained technicians when performing a start-up on the Pneumercator TMS Series tank gauging system. This guide may be used for any TMS console. The first part of this guide shows what is needed to perform a start-up on a FACTORY PREPROGRAMMED TMS Series console. The second part has the basic wiring needed for the TMS systems. For detailed installation instructions please refer to the model-specific TMS Installation Manual. For systems NOT factory preprogrammed, please refer to the standard TMS Operations Manual for programming instructions. Please make sure that the Warranty Start-up paperwork is completely filled out by a factory authorized technician and returned to Pneumercator in a timely fashion to qualify the system for warranty consideration.

For information on becoming a factory authorized service/start-up technician, please contact Pneumercator below, or e-mail at training@pneumercator.com. Your local Pneumercator sales representatives may also be of assistance.

This guide is for reference purposes only. Complete installation guidelines are contained in the TMS model-specific Installation manuals.

IT IS THE RESPONSIBILITY OF THE START-UP TECHNICIAN TO VERIFY THE INFORMATION PROGRAMMED INTO THE TMS SYSTEM MATCHES THE SITE REQUIREMENTS. ALL EQUIPMENT MUST MATCH WHAT IS LISTED ON THE PACKING SLIP AND TAGGED FOR THE SPECIFIC SITE. IF ANY INFORMATION IS NOT CORRECT, THEY SHOULD CORRECT THE PROGRAMMING PER THE OPERATIONS MANUAL OR CONTACT THE FACTORY FOR PROGRAMMING ASSISTANCE.

For more information, please contact:

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SECTION 1 – SYSTEM STARTUP

1.1 GENERAL OVERVIEW

The goal of the startup process is to ensure that the TMS has been installed in accordance with all applicable regulations and Pneumercator requirements. This is important to provide both a safe and reliable TMS system.

The startup process must begin PRIOR TO powering on the TMS and any external devices with wiring connected to the TMS for the first time. If the installer is NOT the person performing the startup, be sure to instruct them to NOT apply power to the system. It is the responsibility of the startup technician to confirm that the TMS can be powered on without causing any safety issues or damage to the equipment.

The topics that follow are divided into the steps to be followed PRIOR to powering on the TMS and AFTER the TMS is powered on. A startup form is provided with the TMS to document all points have been reviewed and verified to be correct.

1.2 STARTUP CHECKLIST PRIOR TO POWERING ON TMS

- Locate the Enclosure Rating written on the foil label on the left-hand side of the TMS. Confirm the TMS is installed in a location supported by the Enclosure Rating as per the below table.
  Note: level-gauging probes, leak/point level sensors, and the WiDAM may be installed in a hazardous area.

Enclosure Rating	Indoor	Outdoor	Outdoor (Corrosive Environment)	Hazardous Location
12	X			
4	X	X		
4X	X	X	X	
7	X	X	X	X

- Inspect all wiring to verify proper separation of intrinsically safe and non-intrinsically safe wiring, both in and out of the TMS.
  Note: Separation requirements detailed in Article 504 of the National Electric Code

- Inspect the TMS to verify that it has not been modified from the original factory design.
  - No holes have been drilled in the enclosure including both the exterior walls and the intrinsically safe partition wall.
  - No unapproved hardware is installed in the TMS.
  - No unnecessary wiring is entering the TMS.

- The TMS is on a Dedicated Circuit Breaker. The TMS MAY share a breaker with Pneumercator Remote Alarms and/or Displays controlled by the TMS.

- Confirm that the TMS has the proper grounds all returning to the ground buss bar in the service panel. A total of 3 independent ground wires (1 system and 2 intrinsically safe) are required.
  Note: For non-hazardous applications, 1 intrinsically safe ground wire may be eliminated.

- Verify all wires are properly terminated in the appropriate terminal blocks as indicated both by the device and TMS configuration. Any damage to the system caused by miswiring will NOT be covered in warranty.

- Confirm the specified cable or approved electrical equivalent has been used for each device. Complete cable details can be found in the respective installation documentation. Select cable part numbers are listed below:
    - MP4xx: Belden 8441
    - MP5xx: Belden 6501FE
    - 2-wire sensors: Belden 8442
    - 3-wire sensors: Belden 8443
    - Modbus RTU, ETD1000, RA400, MPX200: Belden 9841
    - TMS to MWR200: Belden 6501FE and Belden 9844

1.3 STARTUP CHECKLIST AFTER POWERING ON TMS

- Validate any Alarms/Events and troubleshoot any unexpected conditions.
  Example: an empty tank is expected to have a Low Level Alarm but not a High Level Alarm.
  Note: The TMS will display a Power Fail, Warning 21 message on first powerup. This is expected and may be acknowledged by waiting for the message to be displayed, then holding MODE until the TMS beeps once.

- If the probe is easy to remove and handle, manipulate any floats on the stem to simulate a change in Product and/or Bottom Water levels. Various aspects of the TMS may be tested including:
    - Product and Water SetPoint alarms are activating at the expected threshold.
    - Remote Alarms and Displays are functioning and alarming as expected
    - Analog Outputs: The receiving equipment shows the proper data and is consistent with the data shown on the TMS display.
    - Relay Outputs: Verify the correct signals are being received and/or external equipment is being controlled, as expected.
    - Modbus Registers: Confirm the Modbus Master in the Automation system is configured properly to provide proper values and representation of alarm conditions.

- Test each leak/point level sensor to confirm that it is operating properly.
  Note: Testing is not recommended for HS100, HS100D, and HS100ND Leak Sensors.
    - Remote Alarms and Displays are alarming as expected.
      Note: The ETD1000 will only alarm for Leak Sensors that are Associated with a specific Tank Channel.
    - Relay Outputs: Verify the correct signals are being received and/or external equipment is being controlled, as expected.
    - Modbus Registers: Confirm the Modbus Master in the Automation system is configured properly to provide proper representation of sensor statuses.

- Test any features that have not been tested as part of the above steps. These features may include the optional internal printer or communications interfaces (RS-232, Modem, Network, etc.):

- All electrical splices have been properly sealed using the supplied splice kits or other splice kits approved by Pneumercator.

Once the hardware review and functionality testing has been completed as described above, the TMS is ready to be calibrated. Note that there must be adequate product in the tank to all the Product Float to rise on the probe stem. See the next Section for details on performing the calibration.

SECTION 2 – FLOAT OFFSET ADJUSTMENTS

2.1 PRELIMINARY STEPS

All systems are supplied with factory configuration sheets showing what was programmed into the TMS system. Please review these sheets prior to continuing.

1. Record probe serial number(s), model number(s), calibration factor(s) (Probe C.F.), and length(s) on the worksheet on the next page. This information must match the factory programming printout provided with the console to avoid reprogramming the console.
   Note: The Probe CF does not apply to MP5xx probes.

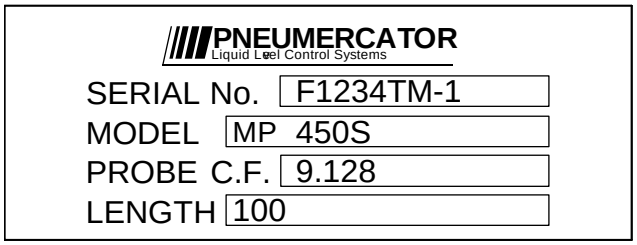

Figure 1 – MP45xS Label

Figure 2 – MP46xS Label

2. Stick tanks for product level & water level and record on the worksheet on the next page. Note: Stick readings should be taken in the same opening the **TMS** probe is installed for greater accuracy. The Product Float must be floating in the product in order to calibrate the TMS.
3. Record the Product and Water level readings (inches or millimeters) displayed on the TMS on the worksheet on the next page. To access the product level readings on the TMS, hold the MODE button until the TMS beeps. Repeat until the level unit LED (IN/mm) is lit. Hold the MODE button until the TMS beeps to access the water level. A "ب" (w) will be displayed to the left of the reading.
4. For multi-tank systems, hit the TANK SELECT button and repeat steps 3 & 4 for each tank.
5. Calculate float height offsets using the worksheet on the following page.
6. Configure the TMS with the calculated float height offsets. Go to the Section Number, listed below, that reflects the programming method of choice.

   - Section 2.2: Programming the TMS using the TMS Communicator software.
   - Section 2.3: Front Panel Programming for TMS Models with LED Display. This includes:
     - TMS1000
     - TMS2000
     - TMS3000
   - Section 2.4: Front Panel Programming for TMS4000 Models using an LCD Touchscreen.

Probe Worksheet

	Ex: F1	Probe 1	Probe 2	Probe 3	Probe 4	Probe 5	Probe 6
Probe Information							
Serial #	R1234-1						
Model #	MP450S						
C.F.	9.128						
Length	100”						
Product Level Information							
Stick	42.5”						
TMS	43.7”						
Prod HO	-1.2”						
Water Level Information							
Stick	0.0”						
TMS	1.7”						
H2O HO*	-1.5”						

	Ex: F2	Probe 7	Probe 8	Probe 9	Probe 10	Probe 11	Probe 12
Probe Information							
Serial #	R1234-2						
Model #	MP463SA						
C.F.	9.104						
Length	446”						
Product Level Information							
Stick	242.5”						
TMS	224.7”						
Prod HO	+17.8”						
Water Level Information							
Stick	0.0”						
TMS	5.5”						
H2O HO*	-5.0”						

***Note:** The final bottom water level should be set to at least 0.2” for MPx5xS, 0.5” for MPx6xSC, or 1.0” for MPx6xS to allow for thermal expansion and/or contraction of the system. It is recommended to allow the MPx6xS Series probes to settle for a couple of days before performing the float offset adjustments. If the TMS has a negative water level calculation, the Water alarm will immediately activate.

The expected value for the offset should not exceed the combination of the float height with the distance between the bottom of the probe and the tank floor. If the calculated value exceeds expectations, check that the float travel is not restricted on the probe stem. Also confirm the TMS has been properly configured.

2.2 ENTERING FLOAT OFFSETS USING TMSCOMM

TMSComm (TMS Communicator) is a Windows-based software program that can be used to reconfigure any supported TMS System using the RS-232 port or optional modem or network interfaces (Standard on TMS4000).
Note: If TMSComm is not yet installed, refer to the TMSComm Installation Manual for guidance through the installation process.

1) Launch TMSComm. This is located in the Start menu in the Programs or All Programs section. Locate the Pneumercator group and click on TMSComm.

2) The TMSComm installation will need to have adequate privileges to "Allow Configuration Write". If this computer has already had the privileges defined, skip to the next Step. Otherwise, sign into the TMSComm Administrator account to become fully authorized for all actions.
   a. Click on the Options menu and click on the Security tab.
   b. Click the "Login…" button and enter the User Name and Password.
      User Name: ADMIN Password: ROBUST
      Note: the password for TMSComm before version 94 is JONESTOWN.

3) Review the Connection Settings for an existing TMSComm Site or Create a new set of Connection Settings as follows:
   a. Click on the Sites menu and choose Select Sites.
   b. Review the Site Name column for any defined Sites and proceed as follows:
      i. No Sites listed: Continue with Step 3c.
      ii. Desired Site is listed: Review the settings then proceed with Step 3e.
      iii. One or more Sites are listed but prefer to use new Site record: Click the New Record button then continue with Step 3c.
   c. Enter a Site Name. This Name identifies the connection settings and any historical Logs/Reports retrieved when connected using that Site.
   d. For RS-232 connections, verify the settings below Site Name match Figure 3.
      Note: 9600 and N,8,1 represent the TMS defaults.
      Note: COM Port must be set according to your computer's hardware settings.
   e. Click the Close button.

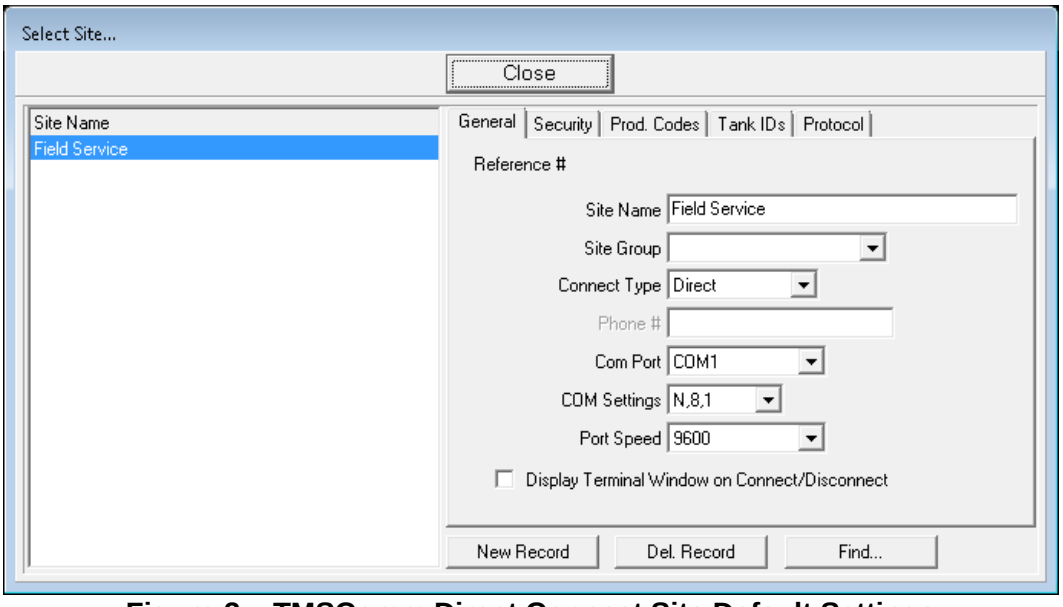

Figure 3 – TMSComm Direct Connect Site Default Settings

4) Connect to the Site by clicking “Connect To Device” in the Sites menu.

5) Read the configuration from the TMS.
   a. Click on the Configurations menu. Click “Yes” when prompted whether to Read the Configuration from the Connected Device.
   Note: If the prompt is not shown, click on the File menu in the Configurations window and choose “Read Configuration From Connected Device”.

6) Click on the Tanks tab and select the desired Tank Channel.

7) Click on the Probe button.
Note: The details shown in the Probe window must match the information recorded on the worksheet. If not, either correct the Worksheet using the data from the corresponding probes or reconfigure the TMS to match the information on the new probes.

8) Enter the Height Float Offset (HO) information from the worksheet as shown in Figure 4 below for both the Product and Water floats.

9) Click the close button.

10) If there is more than one tank enabled, click on the next enabled tank tab and return to Step 7.

11) Click on the File menu and select the Write configuration to Connected Device option.

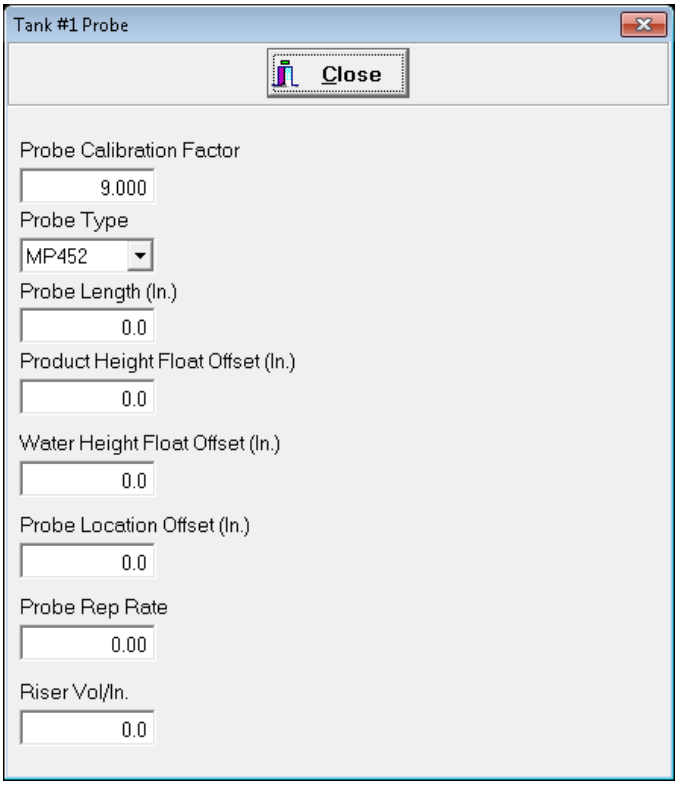

Figure 4 - TMSComm Probe Configuration Window

2.3 ENTERING FLOAT OFFSETS USING FRONT PANEL OF TMS WITH LED DISPLAY

Note: Includes all TMS1000, TMS2000, and TMS3000 models.

Refer to the Figure 5 below for the relative locations of the buttons. Note that each button has three labels depending upon your display status. Without entering programming mode, the main labels printed on the buttons are used. Once in programming mode, a nonflashing display represents Review Mode where a flashing display represents Edit Mode. Note that this represents the latest front panel button configuration available. Earlier systems maintained the same labeling system but had physically different buttons.

Note: See Figure 7 at the end of this Section for a TMS Navigation Flowchart

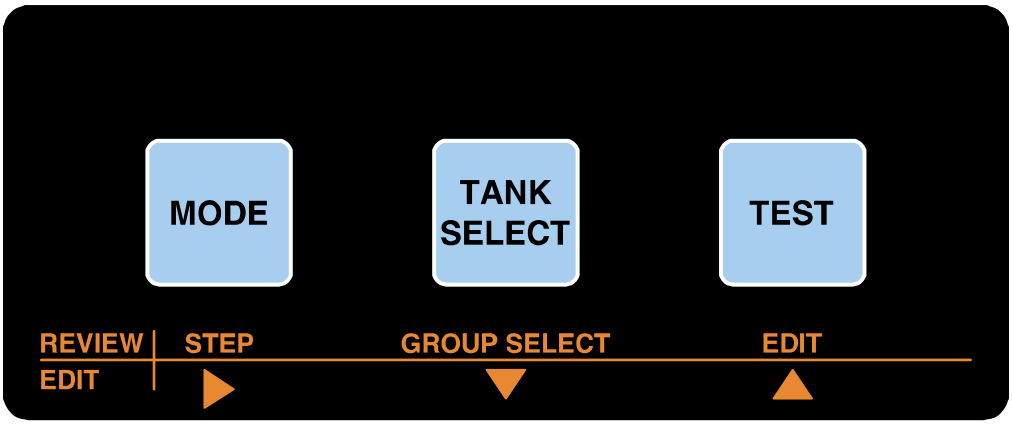

Figure 5 - TMS Front Panel Keys Layout (TMS3000 colors shown)

1) Enter programming Mode by pressing and holding the TEST button and then pressing the MODE button at the same time until LoG (Log) appears. Release both buttons.

2) Press the EDIT (TEST) button repeatedly until ConF iG (Config) appears flashing.

3) Press the ► (MODE) button one time. HEAdEr (Header) appears.

4) Press the EDIT (TEST) button repeatedly until ProbE (Probe) appears flashing.

5) Press the ► (MODE) button one time. The first setting for the Probe for Tank Channel 1 is displayed.

6) Press the GROUP SELECT (TANK SELECT) button until the desired Tank Channel number is displayed over the TANK ID label on the display.

7) Press and hold the STEP (MODE) button until the TMS beeps ONE TIME and immediately release the button. Repeat this until Prod HO (Prod HO) appears briefly. The current value for the Product Float Height Offset will appear. Note that this number will start with a 1 (+) or a - (-) sign indicating a positive or negative number.

8) Press the EDIT ENABLE/THEFT ALARM ACKNOWLEDGE button on the inside of the front door up one time. This will NOT cause the display to change but will authorize you to make programming changes to the TMS for the duration of the programming session.
TMS1000 Note: DIP Switch 1 on the Main Board must be OPEN to enable editing.

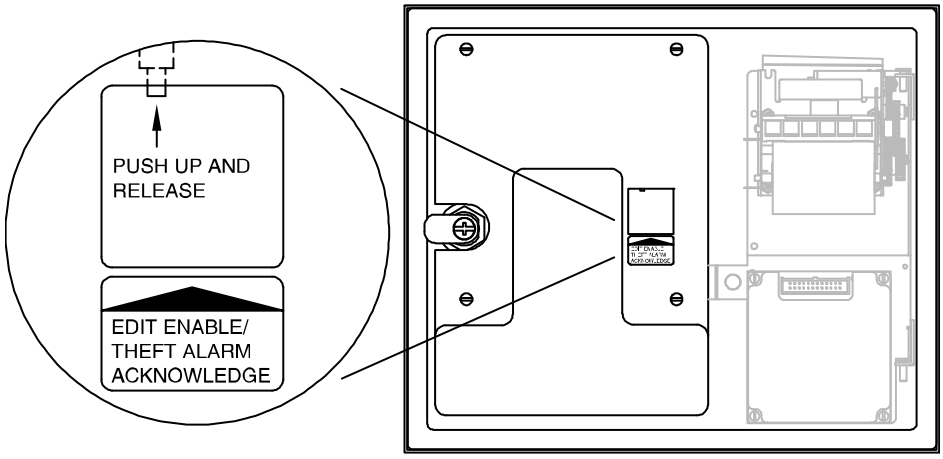

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Figure 6 - Edit Enable Button

9) Press the EDIT (TEST) button one time and the first digit (cursor) will start flashing. This digit indicates a positive or negative number. Use the ▼ (GROUP SELECT) and/or ▲ (TEST) buttons to change the value of what's flashing. Use the ► (MODE) button to move the cursor to the right. Once the last digit is flashing the correct value, enter by pressing the ► (MODE) button. It will stop flashing and show you the current value for the Product Float Height Offset.

10) Press and hold the STEP (MODE) button until the TMS beeps ONE TIME and immediately release the button. h2o HO (H_2O HO) will appear briefly then the current value for the Water Float Height Offset will appear. Note that this number will start with a + (+) or a - (-) sign indicating a positive or negative number.

11) Press the EDIT (TEST) button one time and the first digit (cursor) will start flashing. This digit indicates a positive or negative number. Use the ▼ (GROUP SELECT) and/or ▲ (TEST) buttons to change the value of what's flashing. Use the ► (MODE) button to move the cursor to the right. Once the last digit is flashing the correct value, enter by pressing the ► (MODE) button. It will stop flashing and show you the current value for the Water Float Height Offset.

12) If there is more than one tank enabled, go to Step 6 to calibrate the next tank.

13) Press and hold the STEP (MODE) button until the TMS beeps TWO TIMES and immediately release the button. rEturn (Return) appears.

14) Press the EDIT (TEST) button two times. ProbE (Probe) will appear flashing on the display.

15) Press the GROUP SELECT (TANK SELECT) button until rEturn (Return) appears flashing.

16) Press the ► (MODE) button one time. ConF ig (Config) appears.

17) Press the EDIT (TEST) button until rEturn (Return) appears flashing.

18) Press the ► (MODE) button one time. The system returns to normal operating mode.

TMS NAVIGATION FLOWCHART

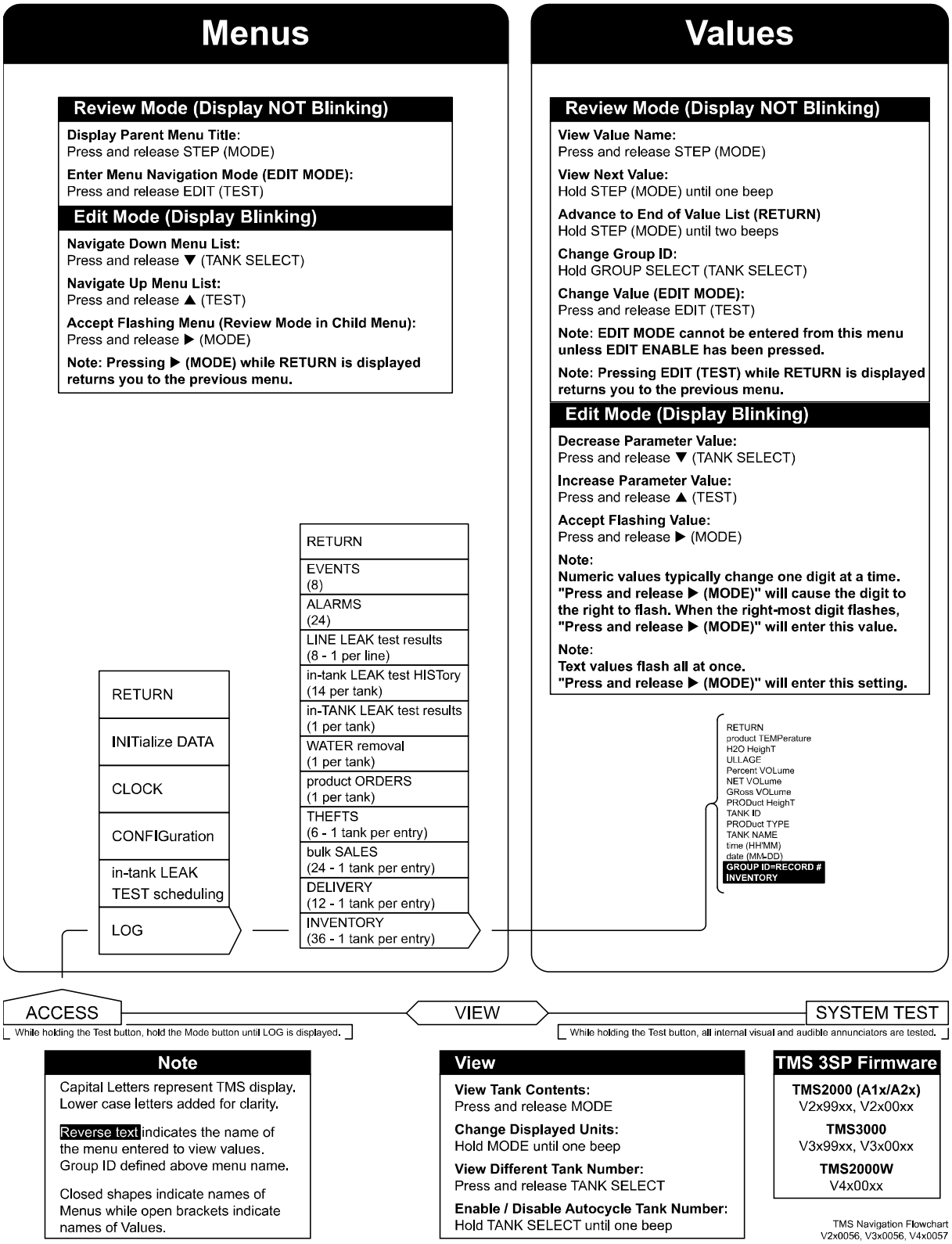


Figure 7A - TMS Front Panel Navigation Chart - Legend

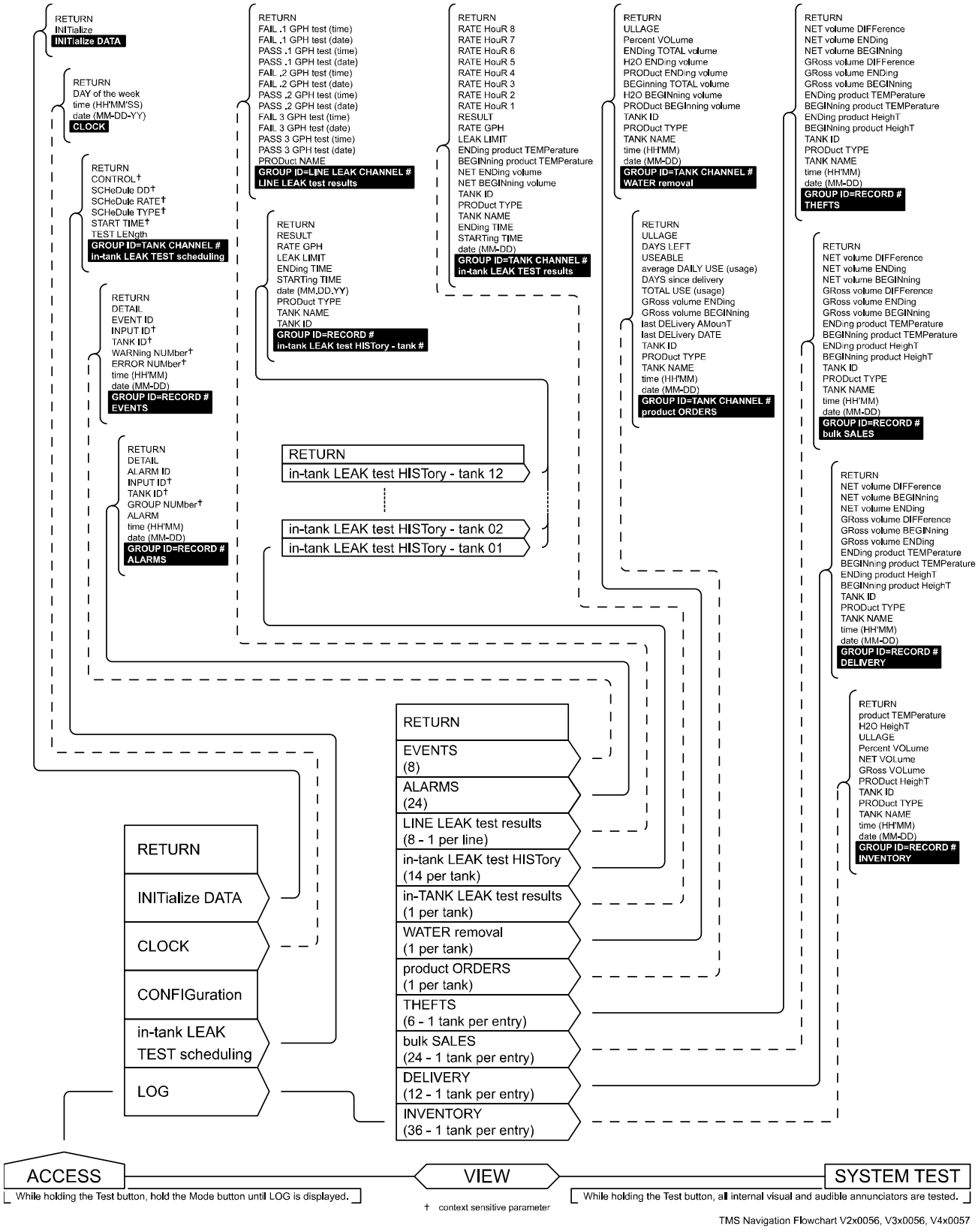


Figure 7B - TMS Front Panel Navigation Chart - All menus except Configuration

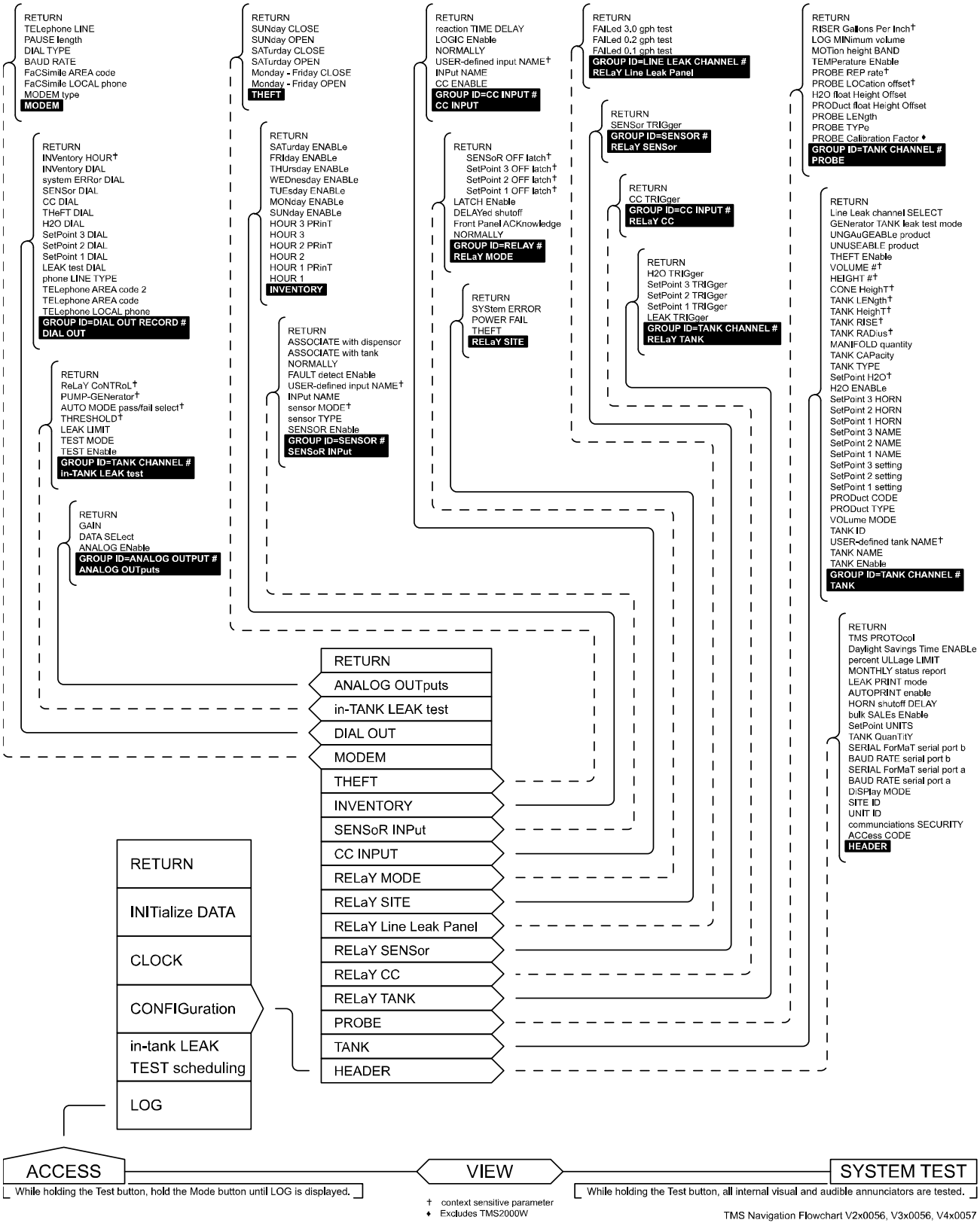
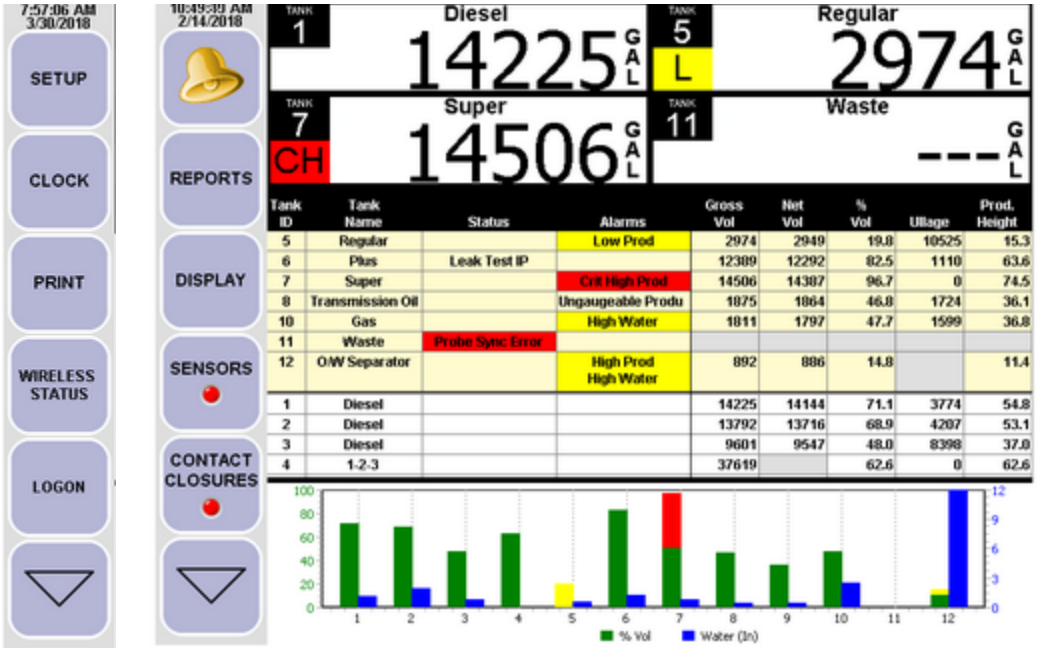


Figure 7C - TMS Front Panel Navigation Chart - Configuration menu only

2.4 ENTERING FLOAT OFFSETS USING FRONT PANEL OF TMS WITH LCD DISPLAY

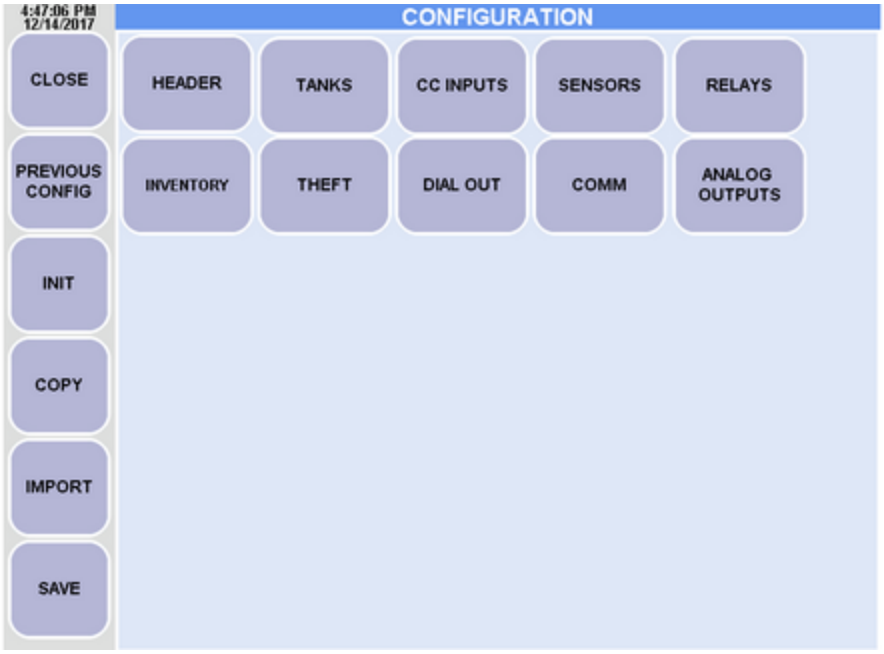
Note: Includes all TMS4000 models.



Note: Tap the Down Arrow in the bottom left corner to access the additional buttons shown to the left of the LCD Screen.

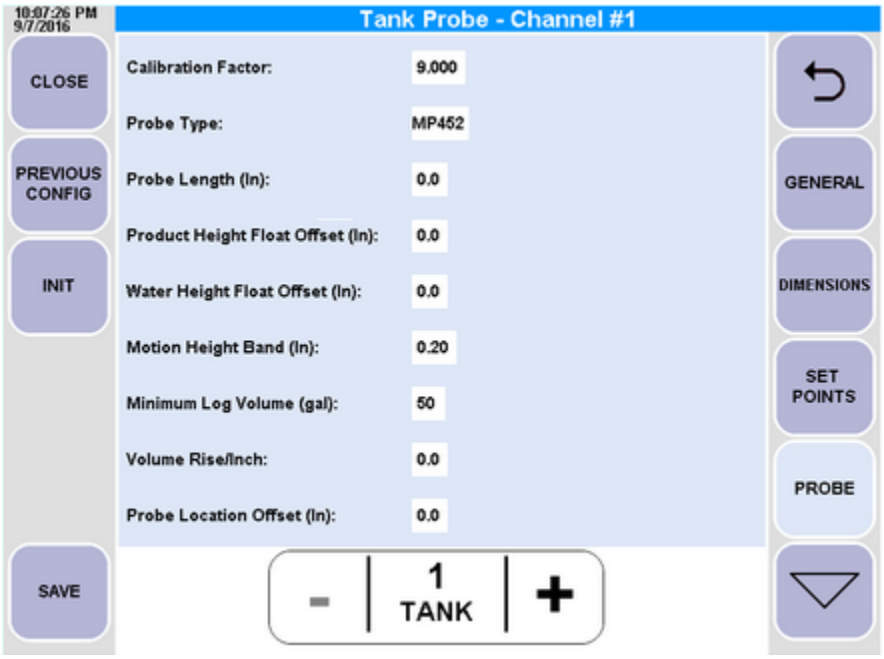
1) Tap the Setup button in the top left corner of the screen.

2) Tap Config to the right of the Setup button as shown below.



3) Tap the Tanks button.

4) Tap the Probe button on the right edge of the screen as shown below.



5) Press + or – at the bottom of the screen until the desired Tank Channel number is displayed.

6) Enter the Float Offsets one at a time by tapping the Offset value and using the displayed keypad.

7) If there is more than one tank enabled, go to Step 5 to calibrate the next tank.

8) Tap the Save button in the bottom left corner to save the changes.

SECTION 3 – TMS WIRING DIAGRAMS

3.1 AC POWER WIRING

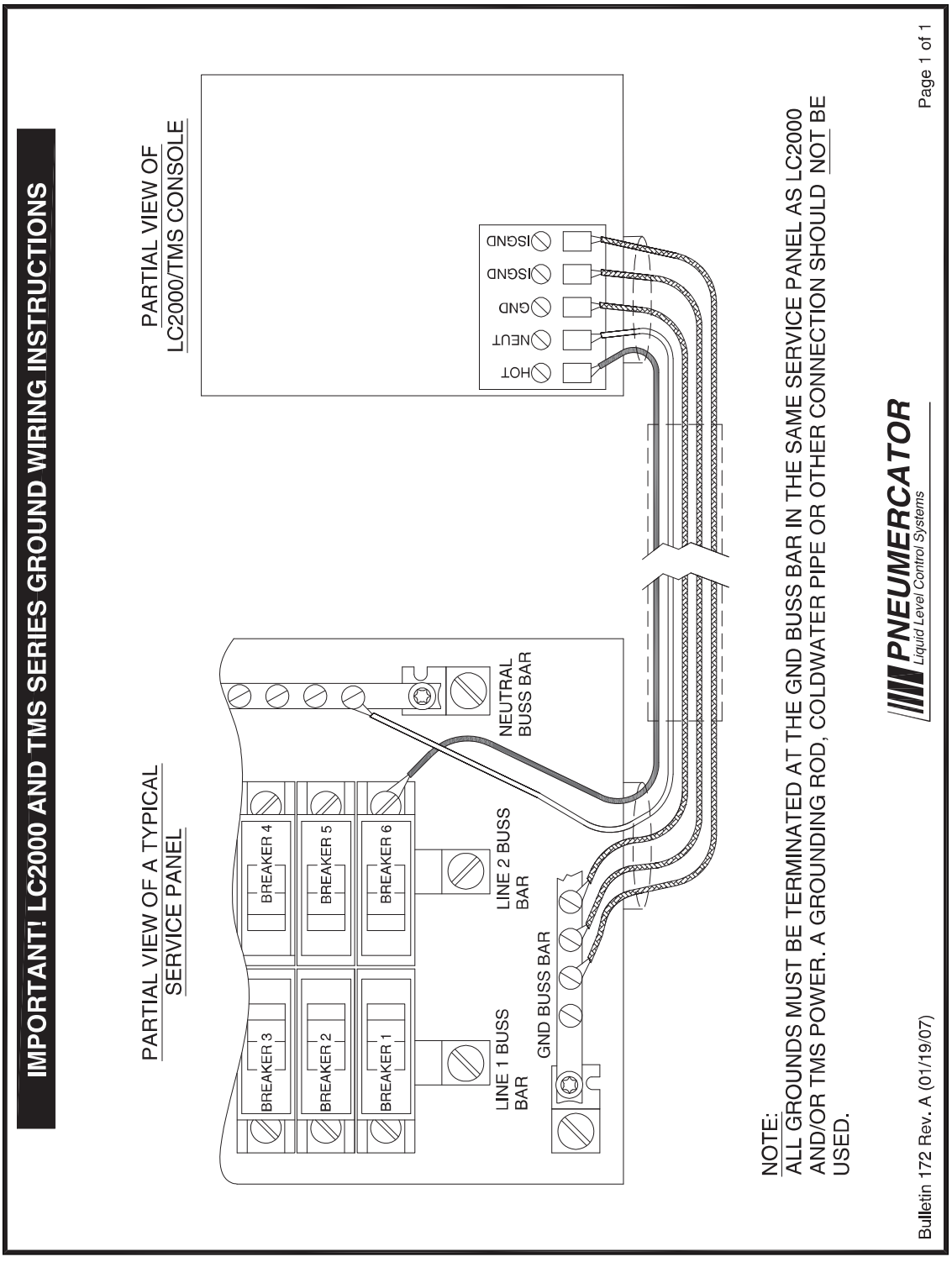


Figure 8 - TMS AC Power Wiring

3.2 PROBE/SENSOR WIRING

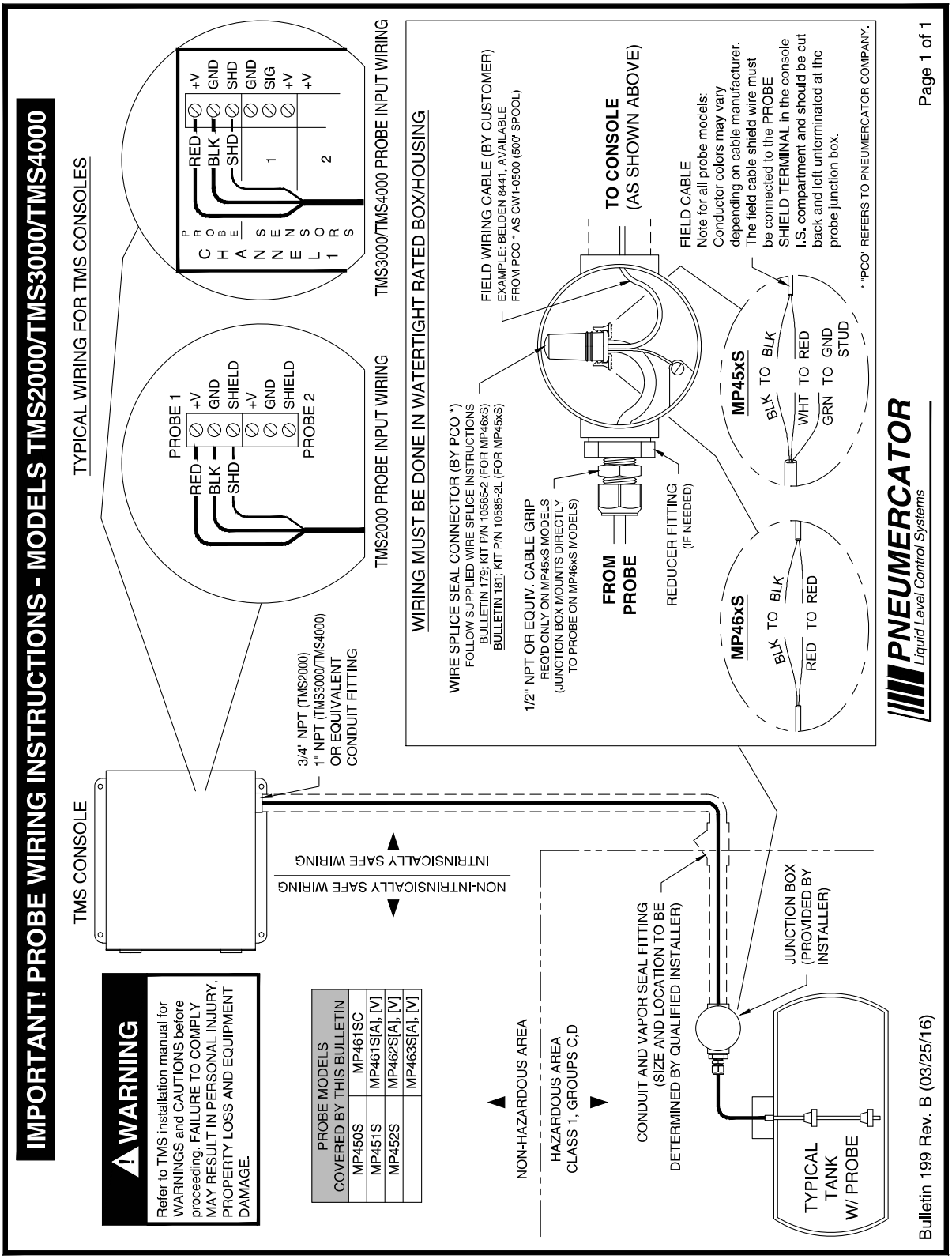


Figure 9 – TMS2000/TMS3000/TMS4000 MP4xxS Probe Wiring

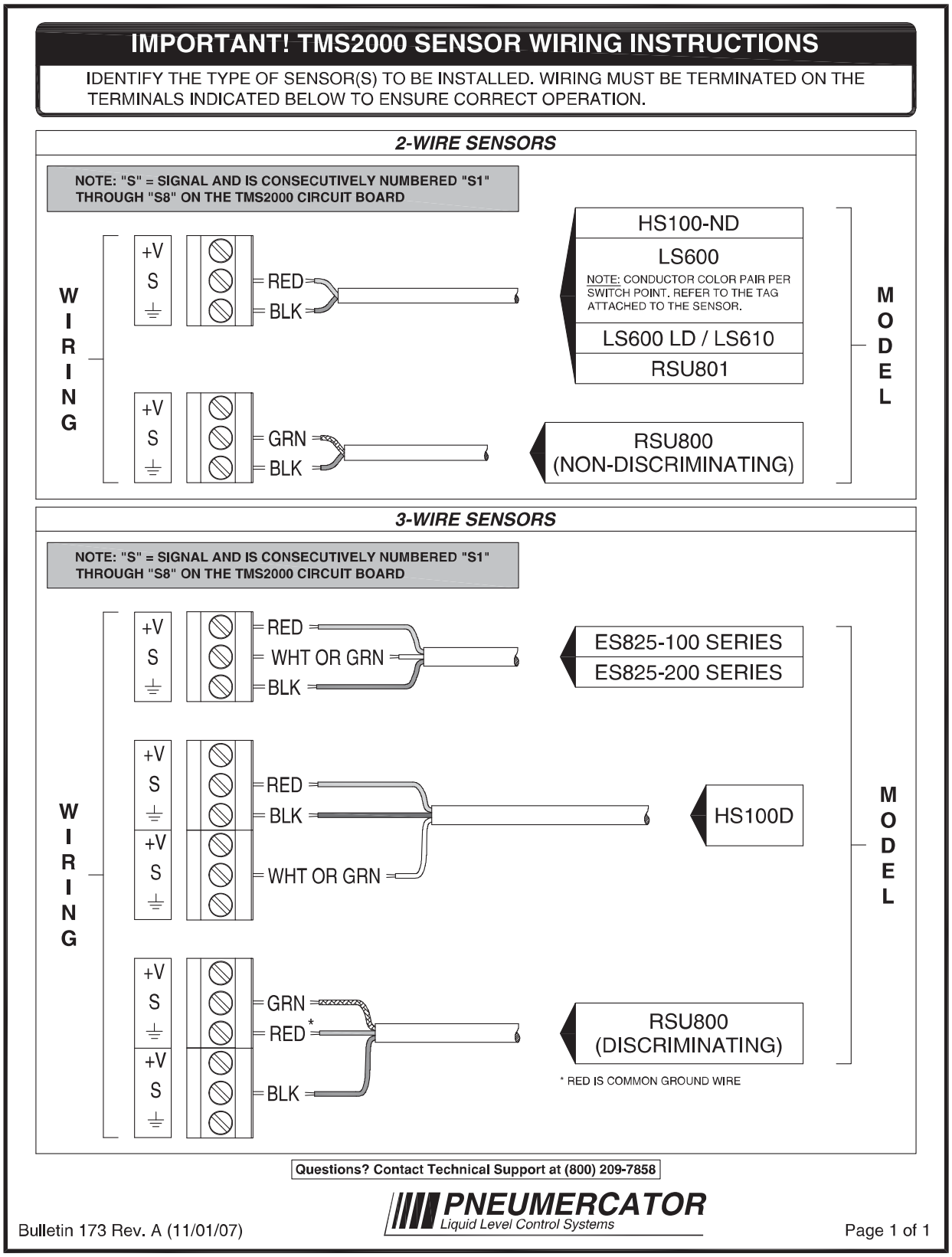


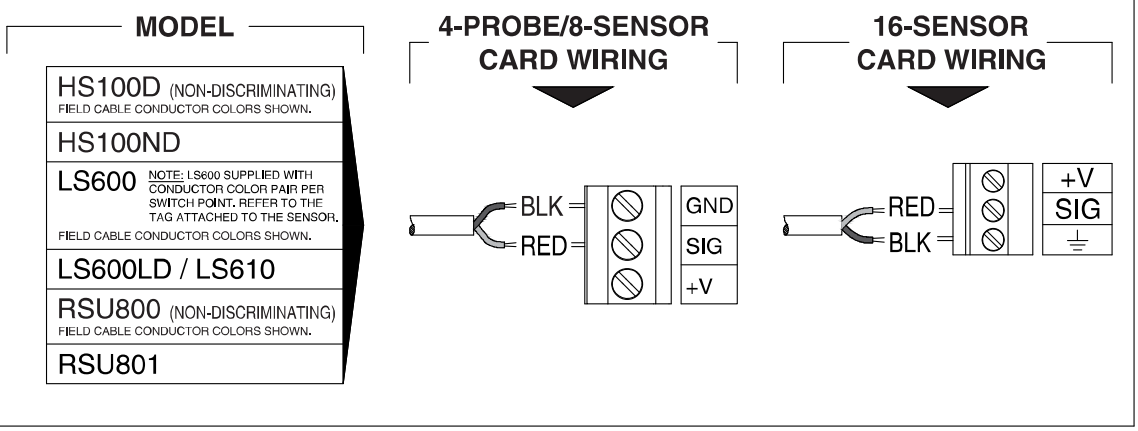
Figure 10 - TMS2000 Sensor Wiring

IMPORTANT! TMS3000/TMS4000 SENSOR WIRING INSTRUCTIONS

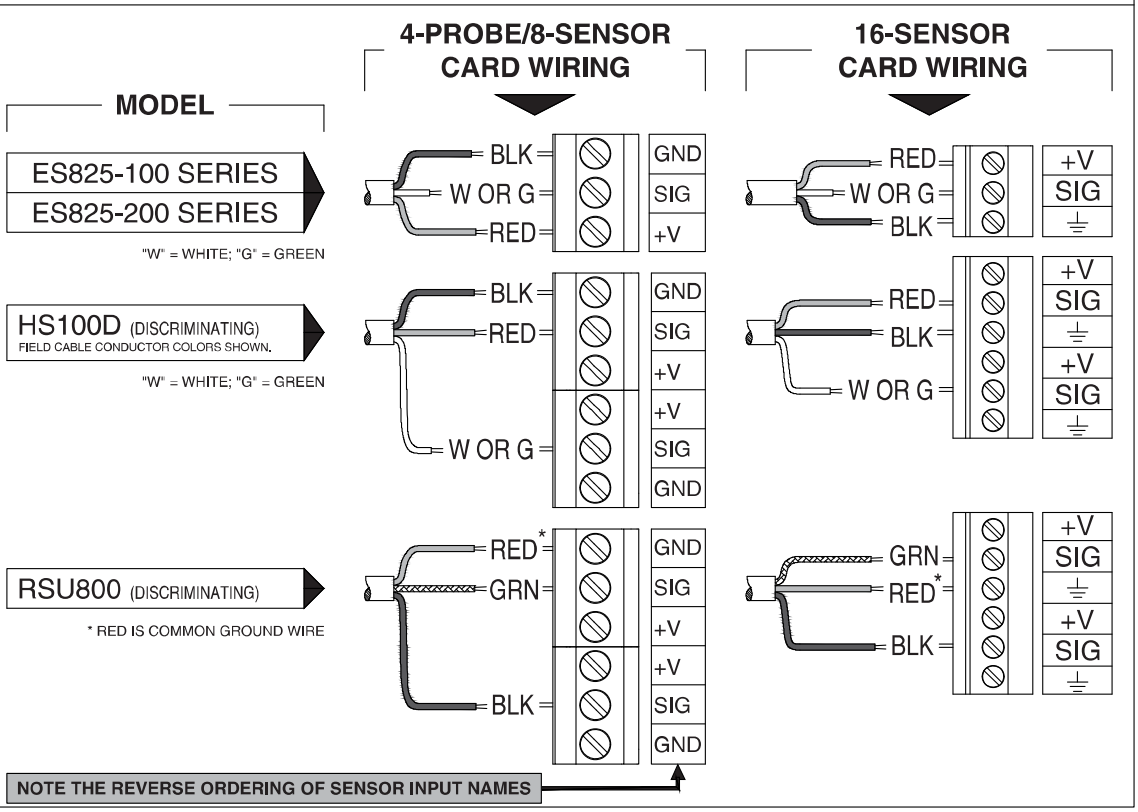
IDENTIFY THE TYPE OF SENSOR(S) TO BE INSTALLED. WIRING MUST BE TERMINATED ON THE TERMINALS INDICATED BELOW TO ENSURE CORRECT OPERATION.

SEE PAGE 2 FOR TMS3000 SENSOR NUMBERING SEQUENCE

2-WIRE SENSORS



3-WIRE SENSORS



Questions? Contact Technical Support at (800) 209-7858

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Figure 11A - TMS3000/TMS4000 Sensor Wiring

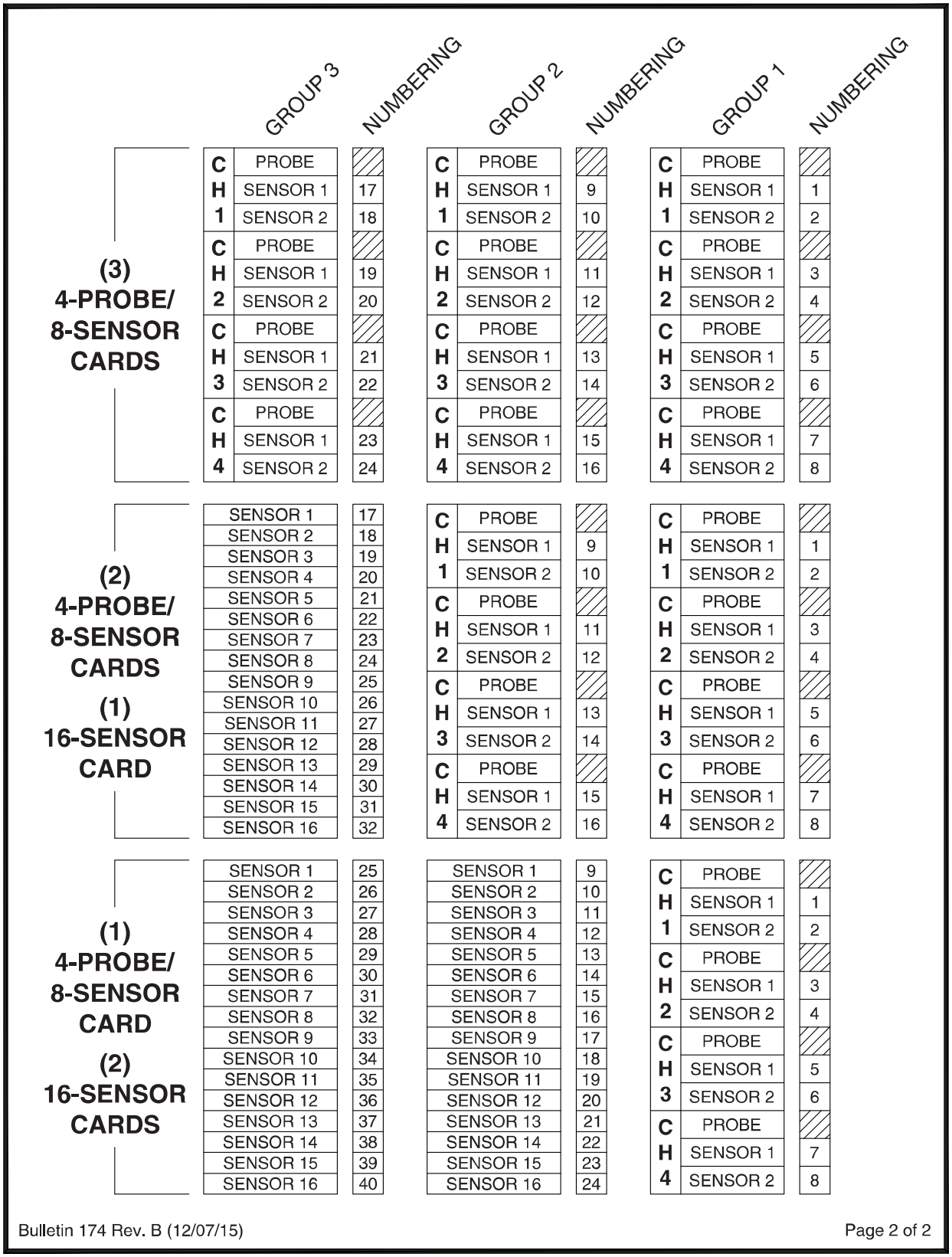


Figure 11B - TMS3000/TMS4000 Sensor Wiring

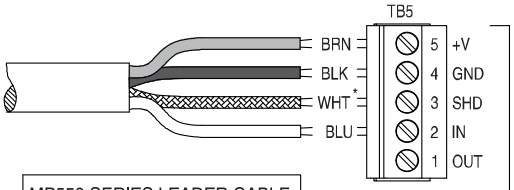
IMPORTANT! TMS1000 SERIES PROBE AND SENSOR WIRING INSTRUCTIONS

IDENTIFY THE TYPE OF PROBE AND/OR SENSOR(S) TO BE INSTALLED. WIRING MUST BE TERMINATED ON THE TERMINALS INDICATED BELOW TO ENSURE CORRECT OPERATION.

PROBES

MODEL

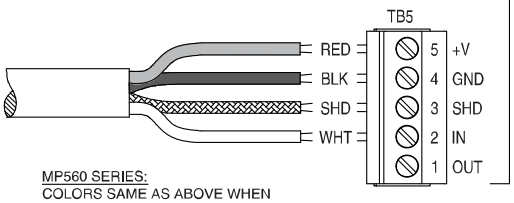
MP550 SERIES



MP550 SERIES LEADER CABLE MAY HAVE ALTERNATE COLORS AS FOLLOWS			
+V	BRN	RED	RED
GND	BLK	BLK	RED/BLK
SHD	WHT*	GRN*	GRN*
IN	BLU	WHT	RED/WHT
OUT	—	—	—

* SHIELD WIRE - WHEN OPTIONAL FIELD CABLE IS USED

MP560 SERIES



MP560 SERIES:
COLORS SAME AS ABOVE WHEN OPTIONAL FIELD CABLE IS USED

⚠ WARNING
MP450/MP460 SERIES ARE NOT COMPATIBLE

WIRING

Questions? Contact Technical Support at (800) 209-7858

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Figure 12A – TMS1000 Probe Wiring

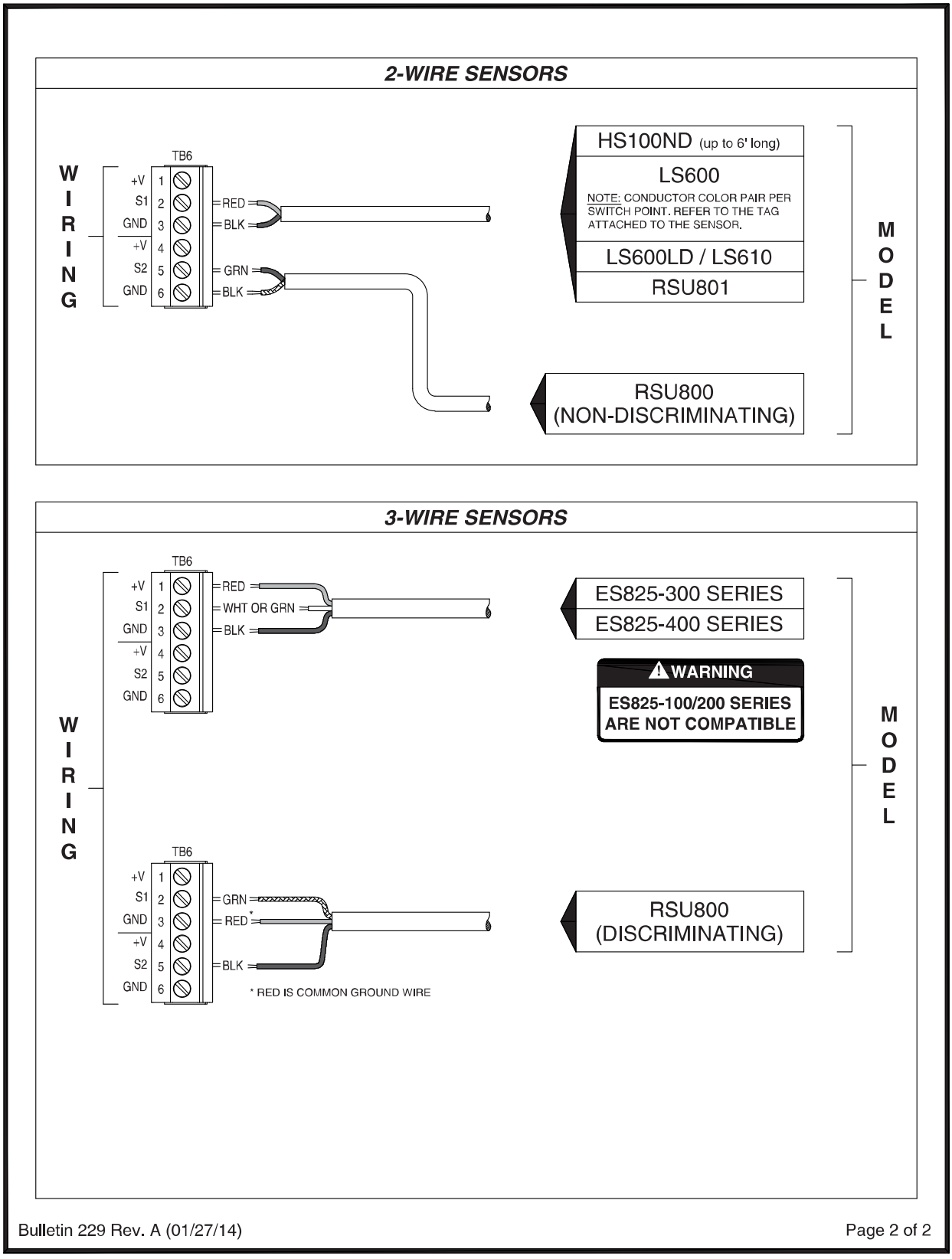


Figure 12B - TMS1000 Sensor Wiring

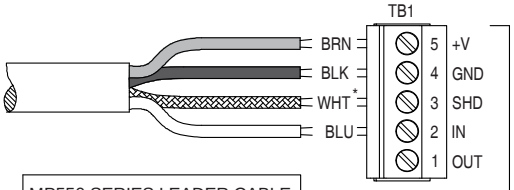
IMPORTANT! WiDAM PROBE AND SENSOR WIRING INSTRUCTIONS

IDENTIFY THE TYPE OF PROBE AND/OR SENSOR(S) TO BE INSTALLED. WIRING MUST BE TERMINATED ON THE TERMINALS INDICATED BELOW TO ENSURE CORRECT OPERATION.

PROBES

MODEL

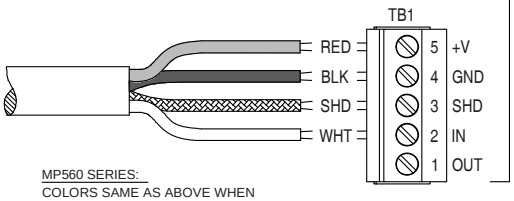
MP550 SERIES



MP550 SERIES LEADER CABLE MAY HAVE ALTERNATE COLORS AS FOLLOWS			
+V	BRN	RED	RED
GND	BLK	BLK	RED/BLK
SHD	WHT*	GRN*	GRN*
IN	BLU	WHT	RED/WHT
OUT	——	——	——

* SHIELD WIRE - WHEN OPTIONAL FIELD CABLE IS USED

MP560 SERIES



MP560 SERIES:
COLORS SAME AS ABOVE WHEN OPTIONAL FIELD CABLE IS USED

⚠WARNING

MP450/MP460 SERIES ARE NOT COMPATIBLE

WIRING

Questions? Contact Technical Support at (800) 209-7858

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Figure 13A – WiDAM (TMS2000W/TMS4000W) Probe Wiring

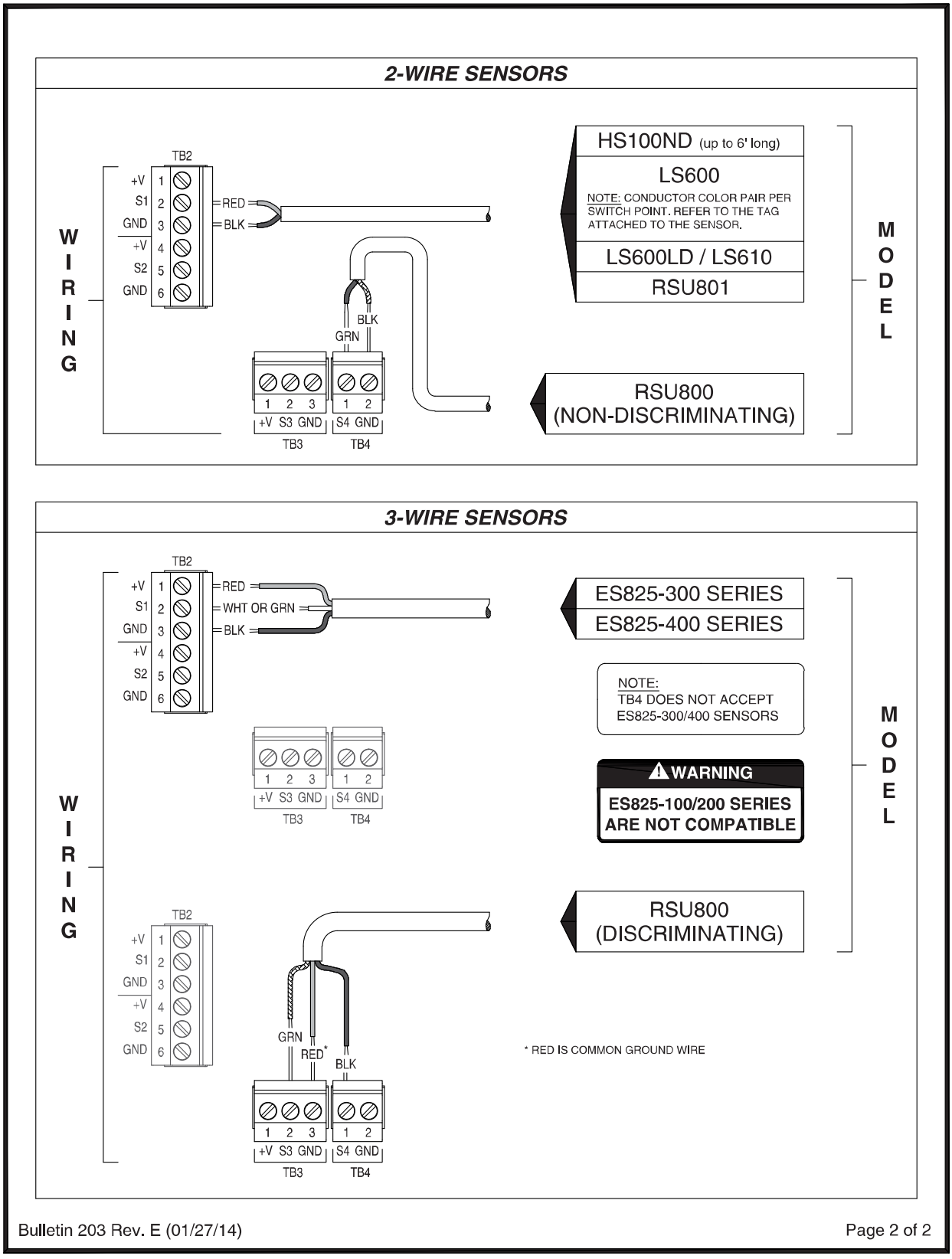


Figure 13B - WiDAM (TMS2000W/TMS4000W) Sensor Wiring

SECTION 4 – RA100R/RA200KR WIRING AND TMS CONFIGURATION

4.1 RA200KR WIRING

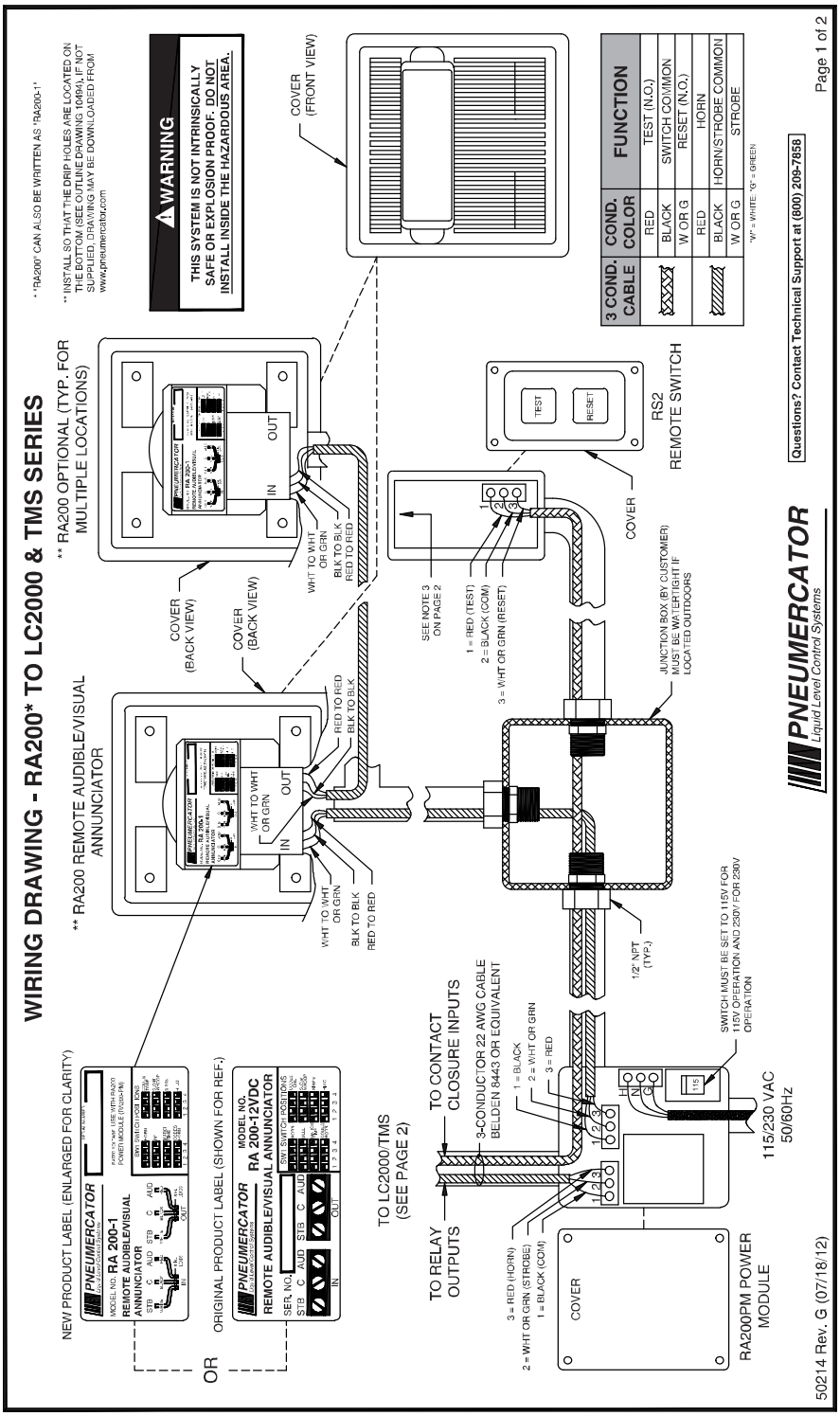


Figure 14A - TMS Series to RA200KR Wiring

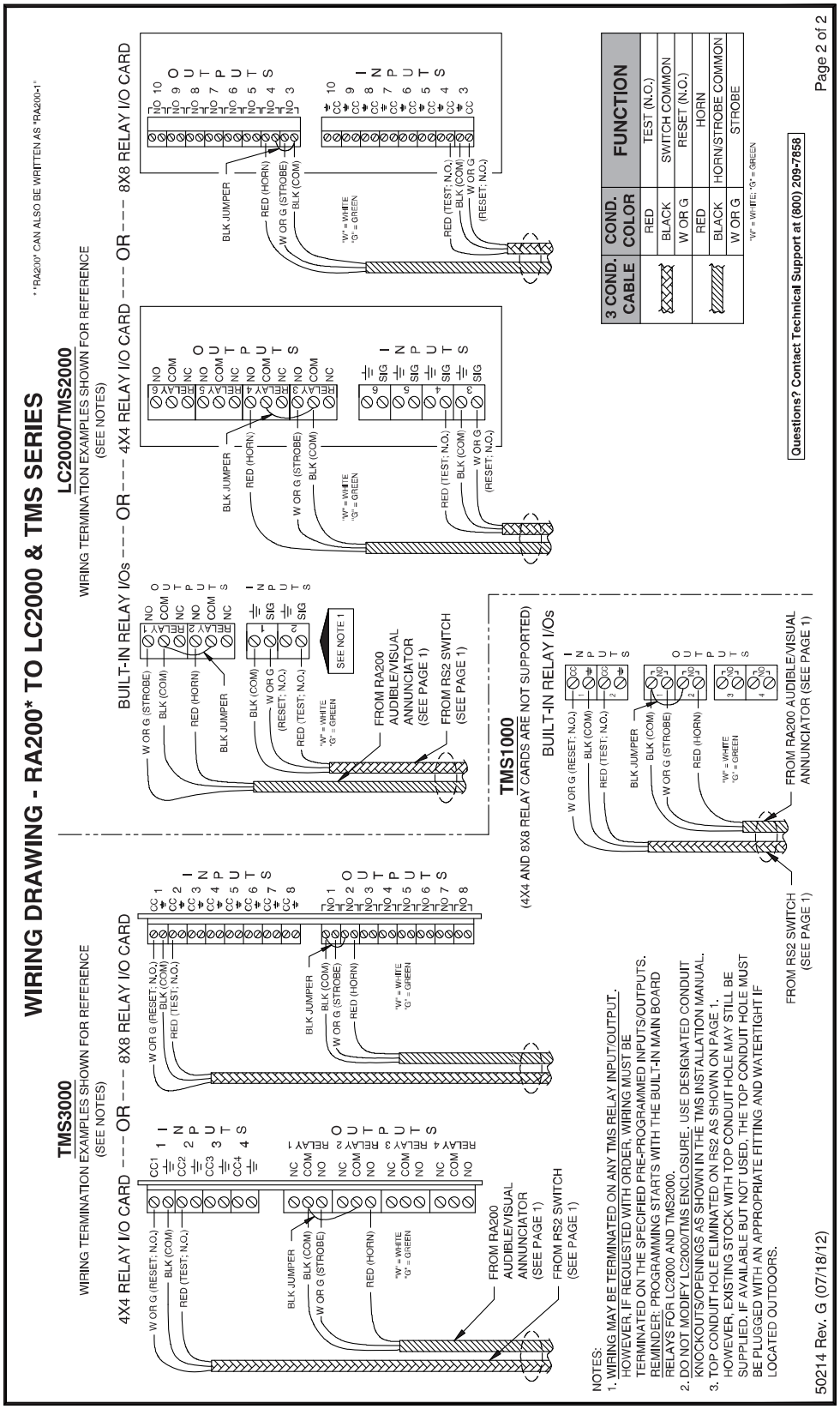


Figure 14B - TMS Series to RA200KR Wiring

4.2 RA100R WIRING

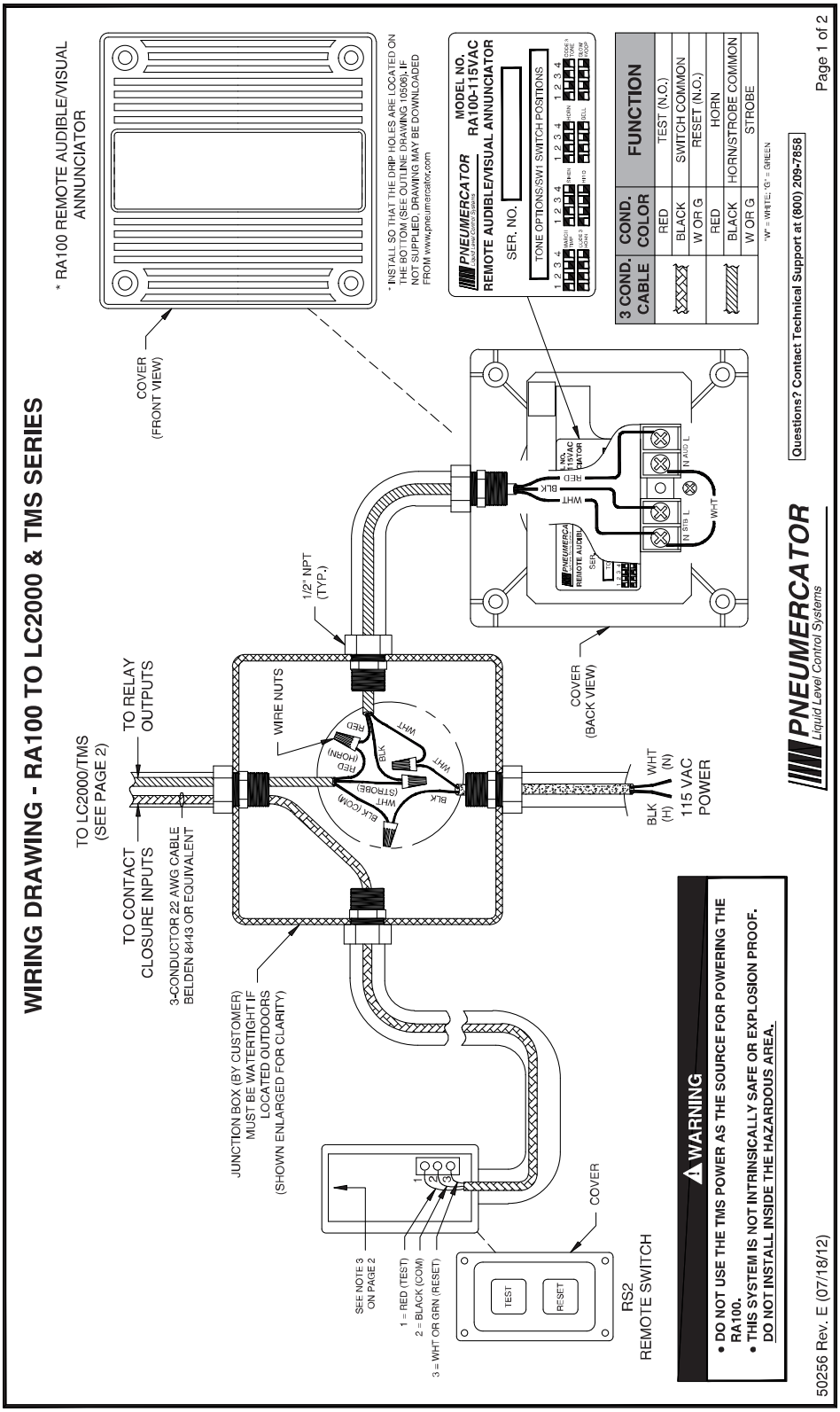


Figure 15A - TMS Series to RA100R Wiring

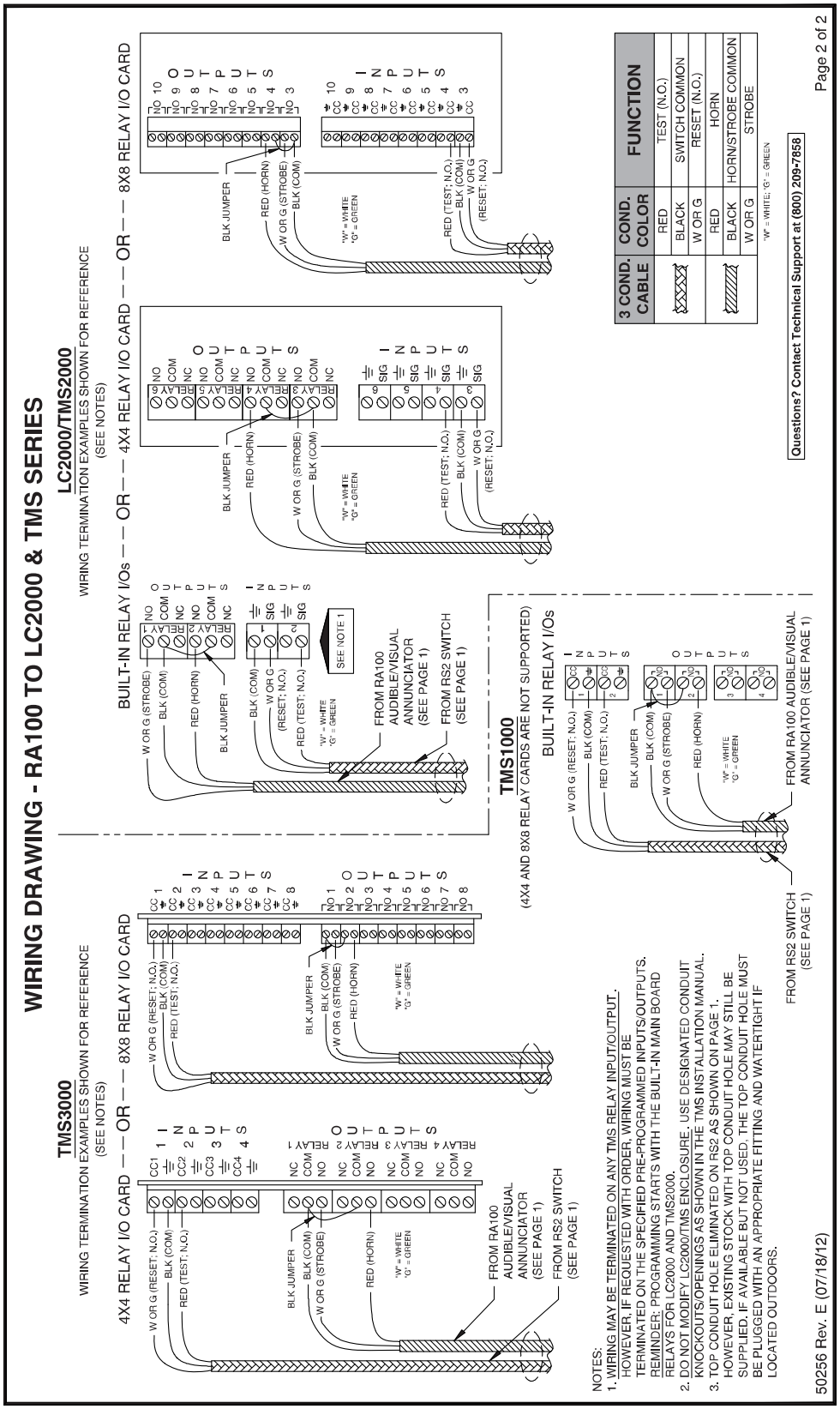


Figure 15B - TMS Series to RA100R Wiring

4.3 TMS CONFIGURATION SUPPORTING RA100R/RA200KR

Contact Closure 1	Reset
Contact Closure 2	Test
Relay 1	Strobe
Relay 2	Horn

Note: For wiring, refer to: Section 4.1, Figure 14 for RA200KR.
Section 4.2, Figure 15 for RA100R

The configuration shown below corresponds to the wiring locations shown on the previous pages. Any changes to be made would need to be reflected in both the TMS wiring and configuration.
Note: The TMS4000 programming details begin on the next page.

Programming:

1. Sets the tank conditions that must occur to activate the relays. Factory default conditions shown below activate for SP1 (95% and higher volume) and SP2 (90% and higher volume).

Front Panel	
Config ⇨ Rely Tank	
	Relays
Leak Trig	no.no.no
SP1 Trig	01.02.no
SP2 Trig	01.02.no
SP3 Trig	no.no.no
H2O Trig	no.no.no

TMS Communicator	
Configuration ⇨ Relays ⇨ Tank Triggers	
	Relays
Leak Trigger	None - None - None
Set Point #1 Trigger	Relay #1 - Relay #2 - None
Set Point #2 Trigger	Relay #1 - Relay #2 - None
Set Point #3 Trigger	None - None - None
Water Trigger	None - None – None

2. Chooses the CC Inputs (wired to RS2) that the relays will react to.

Front Panel	
Config ⇨ Rely cc	
cc Trig	Relays
1	02.no.no
2	01.02.no

TMS Communicator	
Configuration ⇨ Relays ⇨ Non-Hazardous Contact Closure Inputs	
CC Trigger	Relay Selects
#1	Relay #2 – None – None
#2	Relay #1 – Relay #2 – None

3. Controls the behavior of a relay.

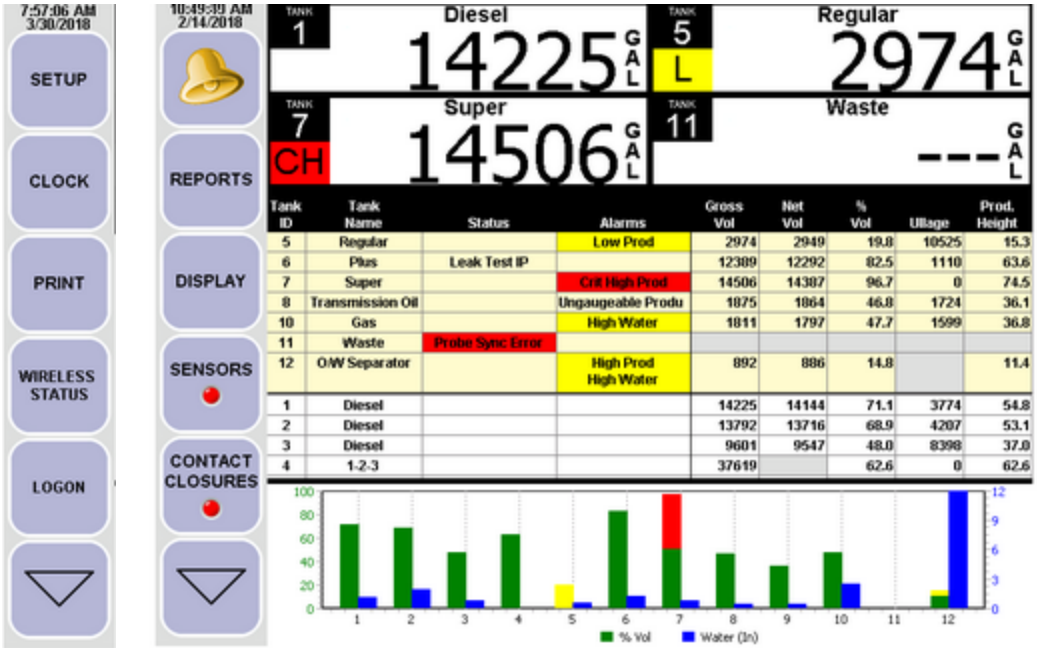
Front Panel				
Config ⇨ Rely Mode				
Relay	Normally	FP Ack	Delay	Latch En
1	Off	No	None	No
2	Off	Yes	None	No

TMS Communicator				
Configuration ⇨ Relays ⇨ Relay Mode				
Relay	Normal Contact State	Allow Front Panel Acknowledgements	Delayed Shutoff	Latch Enable
#1	Off	☐	None	☐
#2	Off	☑	None	☐

4. Controls the behavior of a Contact Closure Input. Note: Only settings used for supporting the RS2 are listed below. Do not change the factory default values for other unlisted settings.

Front Panel		
Config ⇨ cc Input		
CC Input	cc Enable	Normally
1	Ack	Open
2	Relay	Open

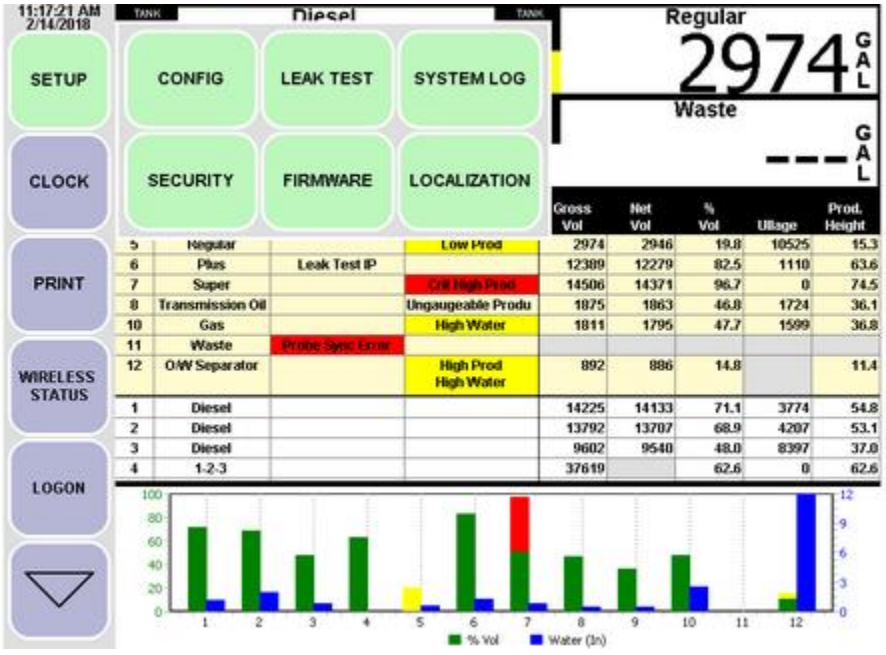
TMS Communicator		
Configuration ⇨ Contact Closure Inputs ⇨ Non-Hazardous Contact Closure Inputs		
CC Input	Contact Closure Enable	Normally
#1	Acknowledge	Open
#2	Relay	Open

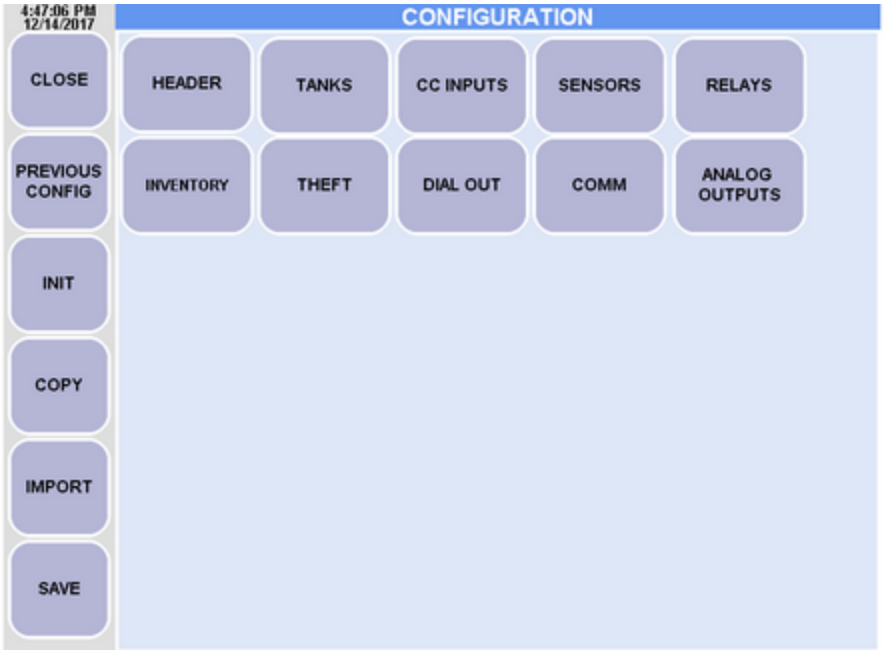


Note: Tap the Down Arrow in the bottom left corner to access the additional buttons shown to the left of the LCD Screen.

1) Tap the Setup button in the top left corner of the screen.

2) Tap Config to the right of the Setup button as shown below.





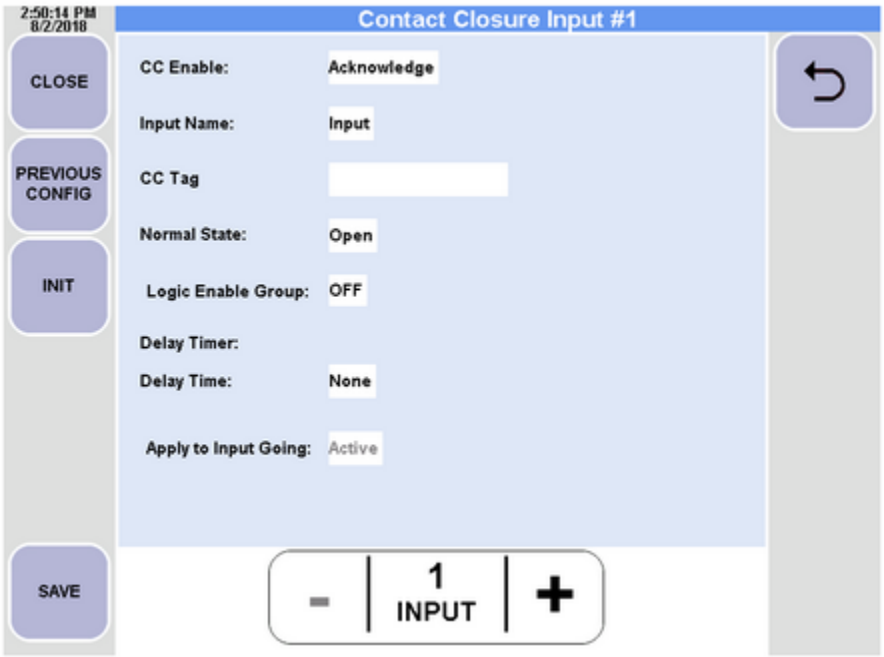
3) Tap the CC Inputs button.

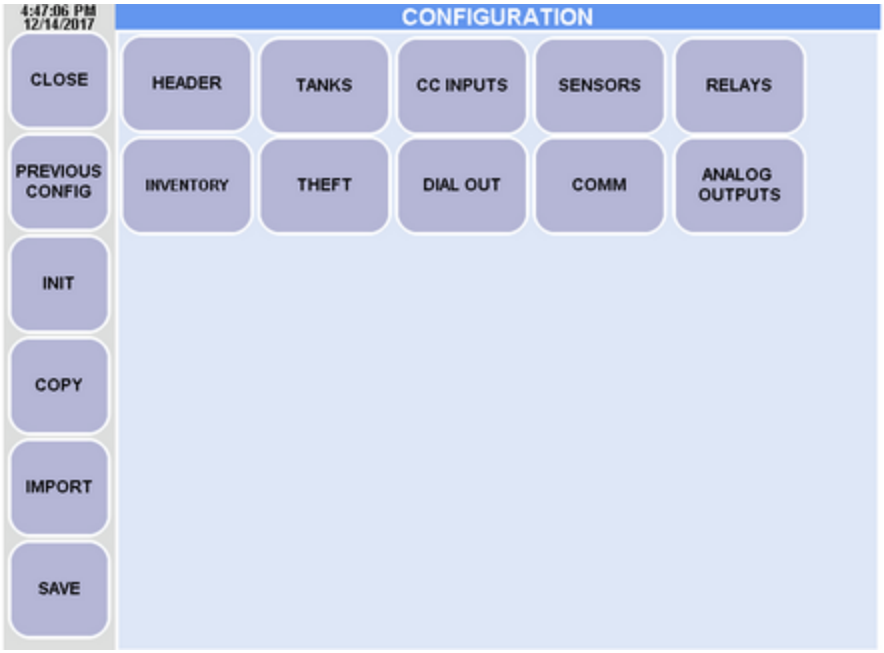
4) Change CC Enable for Input 1 to Acknowledge and the Normal State to Open as shown below.

5) Tap on the + to advance to CC Input 2.

6) Change CC Enable for Input 2 to Relay and the Normal State to Open

7) Tap on the Back Arrow in the Top Right corner to return to the Main Config Screen.

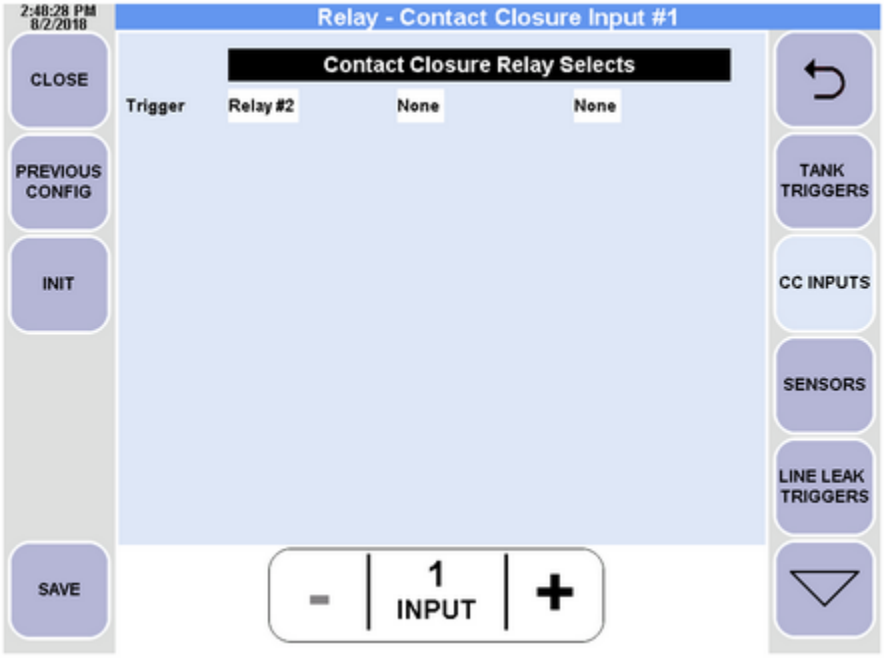




8) Tap the Relays button.

9) Change the Product SetPoint Relay Selects as shown below. This will result in the Remote Annunciator activating for both the High and High High Product conditions for Tank Channel 1. If additional Tank Channels should be activated, click the + to advance to the next Tank Channel and repeat the below programming for each intended Tank Channel.

10) Tap the CC Inputs button on the right side of the screen.



11) Change the Contact Closure Input Selects for CC Input 1 as shown above.

12) Tap on the + to advance to CC Input 2.

13) Change the Triggers for CC Input Selects for CC Input 2 to Relay #1, Relay #2, None.

14) Tap the Down Arrow in the bottom right corner, then Tap on Relay Mode.

15) Tap the + to advance to Relay 2. Check the Front Panel Ack box.

16) Tap Save to complete the changes.