



Department of Environmental Protection

2600 Blair Stone Road ♦ Tallahassee, Florida 32399-2400

DEP Form: 62-762.901(9)

Form Title: Storage Tank Equipment

Registration Form

Effective Date: July 2019

Incorporated in Rule 62-762.851, F.A.C.

Storage Tank System Equipment Registration Form

Fill out completely

General Information

Company Name:

Contact Name:

Company Address:

City, State:

Zip:

E-mail:

Contact Number:

Product Name:

Product Type:

Model Number(s):

Rule(s) citation that registration is being requested within Chapter 62-761 (UST), and/or 62-762 (AST), F.A.C.:

Write a brief description of equipment registration request including product limitations:

Information Checklist (Choose Yes, No, or N/A - Not Applicable):

Yes No N/A

1. Third-party Certification by a Nationally Recognized Testing Laboratory? (Required)
2. Documentation of third-party evaluation that the equipment meets DEP Rules?
3. Documents included about the qualifications of the Nationally Recognized Testing Laboratory?
4. Technical information and drawings included?
5. Installation instructions included?
6. Annual Operability Testing Requirements (Rules 62-761.500, 62-762.501, & 62-762.502 F.A.C.)?
7. Integrity Testing Requirements (Rules 62-761.700, 62-762.701, & 62-762.702, F.A.C.)?
8. Compatible with fuel blends containing >10% ethanol or >20% biodiesel?
9. Has the product been approved or registered in other countries or states? (If so provide list)
10. Any requirements for company-certified installers or trainers?
11. Was this product(s) previously approved or registered by the Department? If yes, EQ-
12. Any changes or modifications to the equipment since the last submittal to DEP?

Document Information: Provide supporting documents indicated as "Yes" above including this form via email to Tanknotify@floridadep.gov, or documents can be sent to FDEP, Division of Waste Management, 2600 Blair Stone Road, MS 4560, Tallahassee, FL 32399.

Write a brief description of equipment installation and performance in the U.S.:

Equipment Registration Certification:

To the best of my knowledge and belief, all information submitted on this form is true, accurate and complete.

see next page

Printed Name and Title

Signature (right click to sign)

Date

For Department Use Only:

Date Application Received:

Application complete:

Yes:

No: Re

EQ-

Date of complete or incomplete letter sent:

Date Equipment Requires Renewal:

Storage tank system equipment requires renewal every 5 years in accordance with subsection 62-762.851(2), F.A.C.



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Form Title: Storage Tank Equipment

Registration Form

Effective Date: July 2019

Incorporated in Rule 62-762.851, F.A.C.

Storage Tank System Equipment Registration Form

Fill out completely

General Information

Company Name:	Morrison Bros. Co.	Contact Name:	Jerry Schollmeyer
Company Address:	570 East 7th Street	City, State:	Dubuque, Iowa
E-mail:	jschollmeyer@morbro.com	Zip:	52001
Product Name:	Tank Alarm For Automotive Fluids	Contact Number:	1.800.583.4840
Model Number(s):	915, 915S, 915ST, 915HB	Product Type:	AST overfill alarm system
Rule(s) citation that registration is being requested within Chapter 62-761 (UST), and/or 62-762 (AST), F.A.C.:		62-762	

Write a brief description of equipment registration request including product limitations:

The 915 consists of a 110 volt wall mounted high level alarm & beacon console for indoor applications. The alarm is activated by the adjustable 915 Sensor installed in the tank. The optional solenoid valve package will close when signaled by the console and will stop the pump from pumping addition fluid. A remote horn & beacon can be installed indoors or outdoors to provide added notification of a high level.

Information Checklist (Choose Yes, No, or N/A - Not Applicable):

	Yes	No	N/A
1. Third-party Certification by a Nationally Recognized Testing Laboratory? (Required)	☒	☐	☐
2. Documentation of third-party evaluation that the equipment meets DEP Rules?	☒	☐	☐
3. Documents included about the qualifications of the Nationally Recognized Testing Laboratory?	☒	☐	☐
4. Technical information and drawings included?	☒	☐	☐
5. Installation instructions included?	☒	☐	☐
6. Annual Operability Testing Requirements (Rules 62-761.500, 62-762.501, & 62-762.502 F.A.C.)?	☒	☐	☐
7. Integrity Testing Requirements (Rules 62-761.700, 62-762.701, & 62-762.702, F.A.C.)?	☒	☐	☐
8. Compatible with fuel blends containing >10% ethanol or >20% biodiesel?	☒	☐	☐
9. Has the product been approved or registered in other countries or states? (If so provide list)	☐	☒	☐
10. Any requirements for company-certified installers or trainers?	☐	☒	☐
11. Was this product(s) previously approved or registered by the Department? If yes, EQ-_____	☐	☒	☐
12. Any changes or modifications to the equipment since the last submittal to DEP?	☐	☒	☐

Document Information: Provide supporting documents indicated as "Yes" above including this form via email to Tanknotify@floridadep.gov, or documents can be sent to FDEP, Division of Waste Management, 2600 Blair Stone Road, MS 4560, Tallahassee, FL 32399.

Write a brief description of equipment installation and performance in the U.S.:

The 915 overfill alarm system is used to prevent the overfilling storage tanks containing automotive fluids by providing audible and visual alarms at preset levels and by closing air operated solenoid valves when the liquid level has reached a specified point.

Equipment Registration Certification:

To the best of my knowledge and belief, all information submitted on this form is true, accurate and complete.

Gerald Schollmeyer, Sales Manager

Printed Name and Title

Signature (right click to sign)

3.2.2020

Date

For Department Use Only:

Date Application Received:

March 2, 2020

Application complete:

Yes: ☒ No: ☐

EQ- 928

Date of complete or incomplete letter sent: March 3, 2020

Date Equipment Requires Renewal: March 3, 2025

Storage tank system equipment requires renewal every 5 years in accordance with subsection 62-762.851(2), F.A.C.

915 Series Tank Alarm

Installation, Operation, and Maintenance Instructions

The 915 Tank Alarm is designed to provide a visible and audible alarm. It is an A.C. powered device intended to be located in an ordinary location. The 915 Series Tank Alarm may be purchased to support either one or two Normally-Open or Normally-Closed, dry contact inputs. The 915 provides two independent form C (SPDT), dry contact outputs. On the two Input Channel 915, the outputs may be configured to respond to either input one or input two, both or none. On the single Input Channel 915, the outputs may only be configured to respond or not respond to Input Channel one.

The outputs may also be configured as normally disengaged or normally engaged (fail-safe) and persistent and non-persistent modes. Additionally, a dedicated output has also been provided for a Remote Horn with Beacon option allowing a visual and audible annunciator to be located at a convenient satellite location; two of these devices may be daisy-chained. On the two Input Channel 915 Tank Alarm, this dedicated output may be configured to respond to either Input Channel one, Input Channel two or both. On the single channel 915 Tank Alarm, this output may be configured to respond to either Input Channel one or not respond to Input Channel one. Two possible applications are use as an overfill alarm or as low level alarm.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

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Specifications

IMPORTANT: *Not approved for use in explosive atmosphere locations.*

IMPORTANT: *Install in accordance with all applicable local, state and federal regulations.*

IMPORTANT: *Never use with highly flammable liquids as defined by OSHA/GHS.*

Output Contact Rating

48 VDC Maximum
0.5 Amps Maximum

Output Power Rating (available to each output)

12 VDC
0.4 Amps Maximum

Tank Alarm Input Power

Nominal Input Voltage: 12 VDC
Maximum Current Draw: 2 Amps
Maximum Power Consumption: 24 Watts

Operating Environment

-4°F to 104°F (-0°C to 40°C) to 100% humidity non-condensing
Indoor

Maximum Wiring Distance

Maximum wiring distance between Alarm and input device is 500 ft.

Chemical Compatibility

The 915 Sensor is compatible with automotive fluids such as:

- Oil
- Waste Oil
- Windshield Washer Fluid
- DEF
- Diesel
- Transmission Fluid
- Brake Fluid
- Antifreeze
- B-20 (bio-diesel)

Installation and Testing



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Mounting

NOTE: *This device is not intended to be mounted at an outside location.*

In order to prevent contamination from entering the enclosures, follow these instructions:

1. Mount the enclosures to a stable surface using the mounting flanges of the enclosure. Do not make additional holes in the enclosure.
2. Morrison has provided an opening with wire gland in the bottom of the enclosure. All wiring should enter and exit through this opening. Do not make additional openings in the enclosure.
3. Once the enclosure is securely mounted on a stable surface and the wiring is complete, place the enclosure cover in the proper orientation on the enclosure base and secure in place by snugging each of the cover screws. These are captive screws and are not intended to be removed. We have found it best to partially thread each screw in place and then move from screw-to-screw to do the final snugging of the screws.

Steps to Wire and Configure the 915 Tank Alarm Console

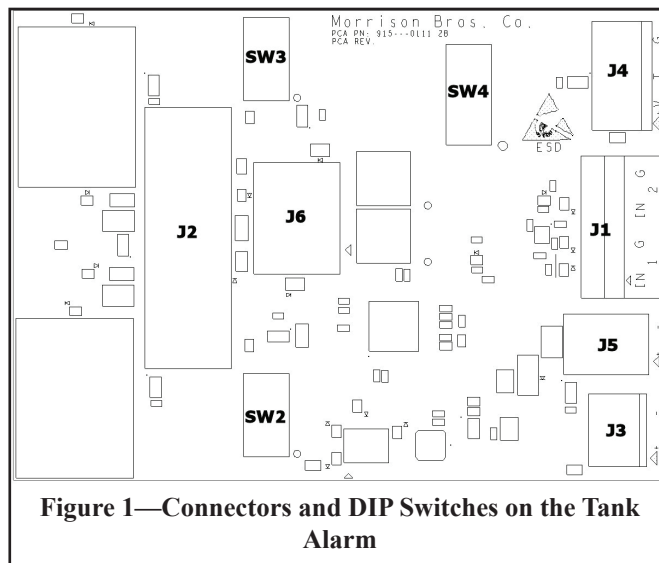


Figure 1—Connectors and DIP Switches on the Tank Alarm

Preparation

Open the front cover of the Tank Alarm Console by first loosening the captive screws at each corner, then fully unscrewing them. This allows the front cover to be carefully removed.

NOTE: *The corner screws that hold the front cover in place are captive screws and are not intended to be removed from the front cover.*

NOTE: There are wires that connect the Tank Alarm Console body (Beacon) to the main PCA on the front cover. These wires are not intended to be used to suspend the front cover. Always support the front cover by some other means.

Installation

Basic Connection Instructions

Most of the connections to the Tank Alarm Console are made using the “pushbutton-type” connector block. Please follow the connection instructions provided below when making connection to these connection blocks. See Figure 2 for an illustration.

IMPORTANT: These connectors are rated to be used with 24AWG to 16AWG wire **ONLY**. All connections to these connectors must adhere to these requirements.

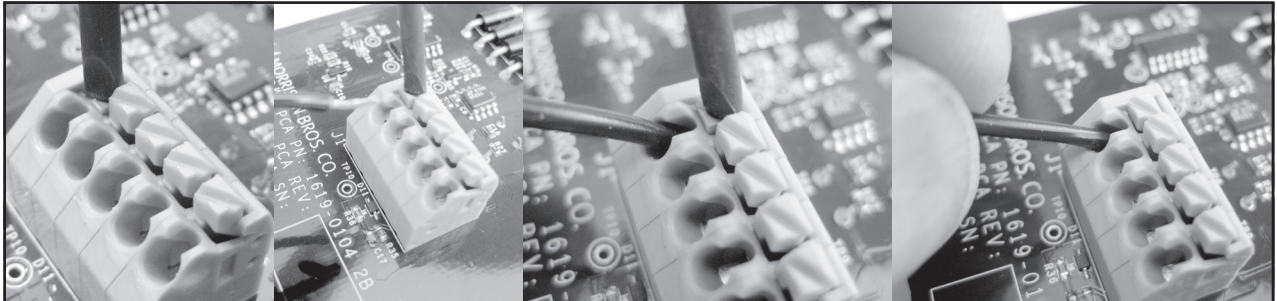


Figure 2—Connecting wires to a “pushbutton-type” connector block.

1. Strip the wire to be connected to the connector **9mm/0.35inches**.
2. Twist the strands of wire together.
3. Fully depress the connector’s plunger using a suitable tool.
4. Fully insert the wire into the connector.
5. Release the connector’s plunger while maintaining the wire’s position in the connector.
6. Gently tug on the wire to verify that it has been captured by the connector.

Console Power

The Tank Alarm Console is powered by a single, wall mounted AC-DC Wall Adapter.

IMPORTANT: Do **NOT** plug in the wall adapter until the entire installation is complete including final inspection.

1. Prepare the ends of the two conductors that make up the wall adapter’s power cable per the instructions in Basic Connection Instructions steps 1-2 above.
2. Bring the AC-DC Wall Adapter’s cable into the console’s enclosure through the cable gland provided in the bottom of the enclosure base **ONLY**.



Figure 3—Power Adapter Cable’s White Stripe and the Tank Alarm Console’s Power Connector

3. Inspect the wall adapter’s cable and locate the conductor that has the white stripes on it (see Figure 3).
4. Following the connection instructions in Basic Connection Instructions steps 3-6 above, connect the power cable conductor **WITH** the white stripes to pin two (2), the side labeled with a MINUS sign (-) (see Figure 3).
5. Following the connection instructions in Basic Connection Instructions steps 3-6 above, connect the other power cable conductor (**WITH OUT** the white stripes) to pin one (1), the side labeled with a PLUS sign (+) (see Figure 3).

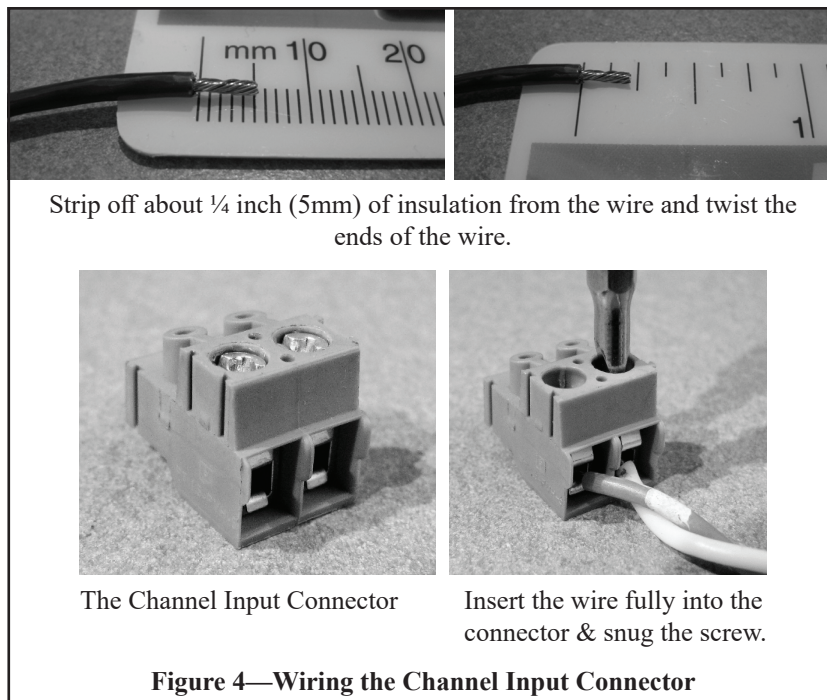
Inputs

There are up to two independent inputs in the 915 Tank Alarm depending on the model purchased. These are individually configurable to work with sensors with either Normally-Open or Normally-Closed contacts.

Wiring

1. Run two 18 to 24 AWG oil resistant wires from each input device to the location where the Tank Alarm Console will be mounted. Enter the enclosure through the cable gland provided in the bottom of the enclosure base ONLY. If a junction box is used, do NOT attach the wires of the input device(s) at this time. If the input device is a Normally-Closed contact, connect the two wires together at the device end. If the device is a Normally-Open contact, verify that the two wires are not connected to one another.
2. Remove the pluggable terminal block from the Tank Alarm Console's J1 to facilitate the wiring process.

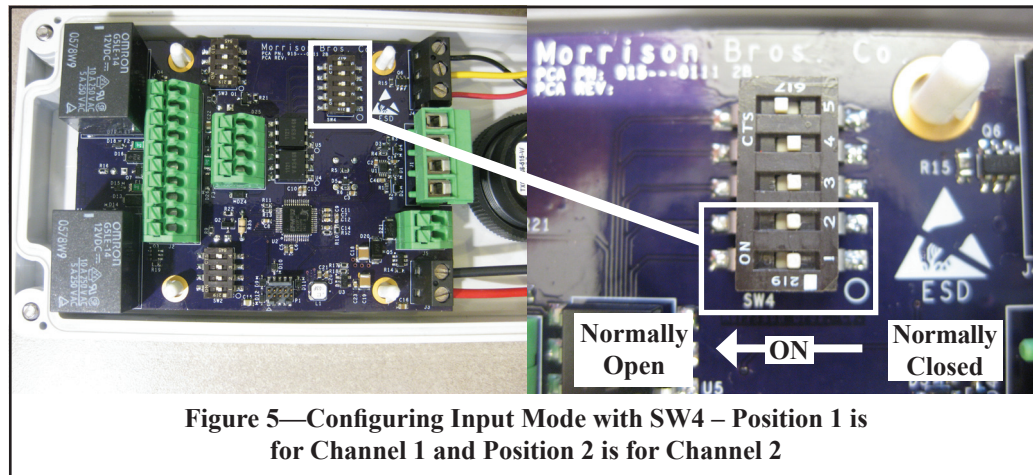
NOTE: *The wires are intended to exit the pluggable terminal block vertically from the circuit board.*



3. Connect the two wires from each input device to the two screw terminals for each channel input of the Channel Input Connector (J1) for each Input. J1 pins 1 and 2 are channel 1 with pin 2 being the ground reference. J1 pins 3 and 4 are channel 2 (if you are using a two channel version) with pin 4 being the ground reference for the input.
4. Verify that each wire is securely held in the connector by gently tugging on them.
5. Plug the connector onto the Channel Input pins of the Tank Alarm Console's J1 with the wires vertical to the PC Board.

Configuration

1. **For Normally-Open Contact Input Devices:** If the input device to be connected to a particular Input utilizes Normally-Open contacts, place that input's DIP switch to the “OFF” position (see Figure 5).



2. **For Normally-Closed Contact Input Devices:** If the input device to be connected to a particular Input Module utilizes Normally-Closed contacts, place that input's DIP switch to the “ON” position (see Figure 5).

Outputs

There are two independent Output Channels available on the 915 Tank Alarm. These outputs are a set of both Normally-Open and Normally-Closed dry contacts (Single Pole Double Throw).

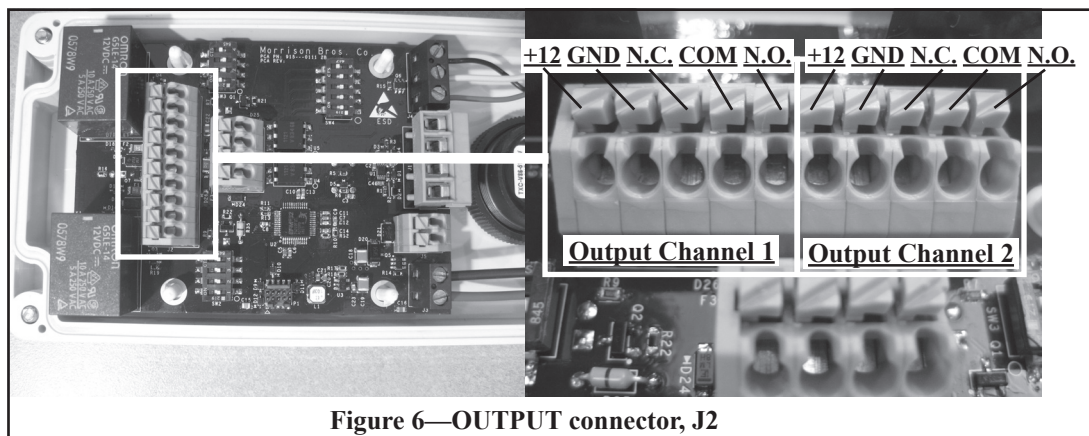
IMPORTANT: *Do not exceed 48 Volts AC/DC and 500 mA current maximum.*

In addition to these switch contacts, a current limited (400 mA), +12VDC power source is available to be used with each output.

IMPORTANT: *Do not place a load on this current limited output that exceeds 400mA. These are fused outputs.*

While the 915 Tank Alarm Console is designed to accommodate many different possible applications, it was also designed to interface to Morrison Bros. Co.'s 915S (Solenoid Without Timer) and 915ST (Solenoid With Timer) devices. The wiring and configuration for these will be covered below.

The outputs have three possible configuration choices to be made. These will be covered in the CONFIGURATION section to follow.



Wiring (see Figure 6 and Figure 2 for details)

The specific connections that need to be made to the output connector is highly dependent on the specific application for the 915 Tank Alarm. All connections for either Output Channel 1 or Output Channel 2 will be made via the Tank Alarm Console's J2 connector. Instructions for making connections to this connector may be found in 2.a, **Basic Connection Instructions**, above.

The instructions provided below are for the 915S and the 915ST which utilize the same Tank Alarm Console connections and configuration settings.

1. Prepare a 2 inch long piece of 24 AWG to 18 AWG wire stripped the requisite 9mm/0.35" at each end.
2. Following the Basic Connection Instructions provided above, connect one end of this wire to the +12V output of the Output Channel (J2 pin 1 for Output Channel 1 and J2 pin 6 for Output Channel 2).
3. Connect the other end of this jumper wire to the COMMON of the same Output Channel (J2 pin 4 for Output Channel 1 and J2 pin 8 for Output Channel 2).
4. Strip the ends of the wire pair coming from the 915S or 915ST the requisite 9mm/0.35"
5. Following the Basic Connection Instructions above, connect the NEGATIVE wire of the wire pair coming from the 915S or 915ST to the GND of the Output Channel (J2 pin 2 for Output Channel 1 and J2 pin 7 for Output Channel 2).
5. Connect the POSITIVE wire of the wire pair to the N.O. connection to the Output Channel (J2 pin 5 for Output Channel 1 and J2 pin 10 for Output Channel 2).
6. In each case, gently tug on the wire to verify that it has been captured by the connector.

Configuration

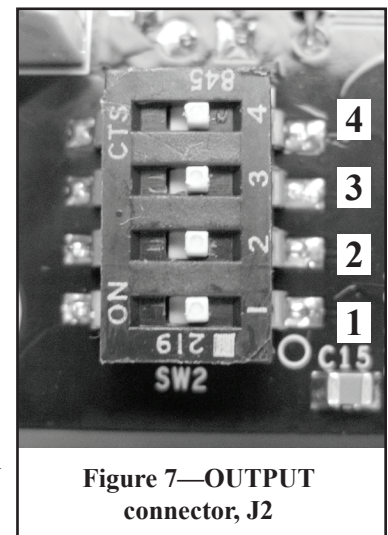
Each Output Channel has its own Configuration DIP switch. Output Channel One uses SW2 and Output Channel Two uses SW3.

1. CHANNEL(s) TO RESPOND TO (positions 1 & 2) Each OUTPUT may be configured to respond to either Input Channel One or Input Channel Two or BOTH.
 - a. If your application requires an output to respond to Input Channel One, then place the Output Channel's DIP switch position one (1) in the ON position.
 - b. If your application requires an output NOT respond to Input Channel One, then place the Output Channel's DIP switch position one (1) in the OFF position.
 - c. If your application requires an output to respond to Input Channel Two, then place the Output Channel's DIP switch position two (2) in the ON position.
 - d. If your application requires an output NOT respond to Input Channel Two, then place the Output Channel's DIP switch position two (2) in the OFF position.

2. NORMALLY ACTIVATED/NORMALLY DEACTIVATED (position 3)

When we say "NORMALLY" in this context, this means in the "non-alarming condition." When an Output is configured as NORMALLY ACTIVATED, this means that if the power is applied to the Tank Alarm AND there is no alarming condition on the Input Channel that the output is supposed to respond to, then the relay itself will be energized. In this position, the Normally-Open contacts of the Output are now Normally-Closed and the Normally-Closed Contacts are Normally-Open. This configuration may be chosen as a failsafe implementation in the case of a power failure.

NOTE: For the 915S and 915ST, verify that the Output Channel configuration is set for NORMALLY ACTIVATED operation: DIP switch position three (3) is turned ON.



**Figure 7—OUTPUT
connector, J2**

- a. If your application requires the Output to be Normally Activated, then place the Output Channel's DIP Switch position three (3) in the ON position.
 - b. If your application requires the Output Channel to be Normally Deactivated, then place the Output Channel's DIP switch position three (3) in the OFF position.
3. PERSIST / NON_PERSIST (position 4)
- An Output may be configured to remain active as long as the alarm condition continues to exist; this is referred to as being Persistent. Conversely, you may desire the Output to remain active only until the alarm condition has been acknowledged by pressing the Test/Cancel Button on the front of the Tank Alarm Console.

NOTE: For the 915S and 915ST, verify that the Output Channel configuration is set for *PERSISTENT* operation: DIP switch position four (4) is turned OFF.

- a. If your application requires the Output to remain active until the Alarm Condition ceases, then place the Output Channel's DIP switch position four (4) in the OFF position.
- b. If your application requires the Output to return to an inactive state once the alarm condition has been acknowledged, then place the Output Channel's DIP switch position four (4) in the ON position.

Remote Horn with Beacon

The 915 Tank Alarm allows up to two Remote Horn with Beacon satellite annunciators attached to a single dedicated output. With a two Input Channel 915, this output may be configured to respond to Input Channel One or Input Channel Two or BOTH. With a single Input Channel 915, this output may be configured to either respond to or not respond to Input Channel 1 only. The Tank Alarm connector associated with the Remote Horn with Beacon is J6, located in the center of the main PC board.

Wiring (see Figure 2 for details)

NOTE: When making connections to this connector, follow the instructions provided in 2.a., **Basic Connection Instructions**, above

1. Pin 1 of the Tank Alarm's J6 is wired to Pin 1 of the Remote Horn With Beacon.
2. Pin 2 of the Tank Alarm's J6 is wired to Pin 2 of the Remote Horn With Beacon.
3. Pin 3 of the Tank Alarm's J6 is wired to Pin 3 of the Remote Horn With Beacon.
4. Pin 4 of the Tank Alarm's J6 is wired to Pin 4 of the Remote Horn With Beacon.
5. In all cases, gently tug on each wire to verify that it has been captured by the connector.

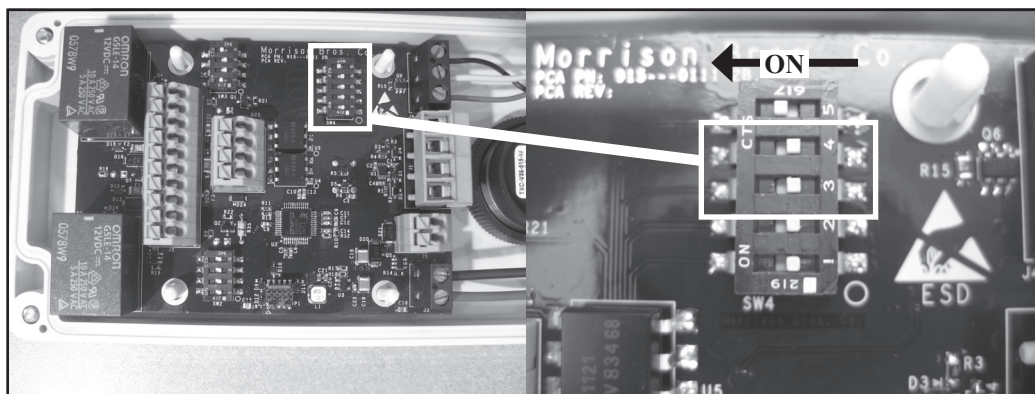


Figure 8—Configuring Remote Horn with Beacon output with SW4 – Position 3 selects Input Channel 1 and Position 4 selects Input Channel 2

Configuration

Configuration consists of choosing which input the Remote Horn with Beacon is going to respond to. With the single channel 915 Tank Alarm Console it is a choice of either responding to or not responding to the single channel (Input Channel 1). With the two channel 915 Tank Alarm Console, it is a choice between either responding to Input Channel One, Input Channel Two or both.

1. If you want the Remote Horn with Beacon to respond to Input Channel One (1), then place SW4, position three (3) in the ON position.
2. If you want the Remote Horn with Beacon NOT to respond to Input Channel One (1), then place SW4, position three (3) in the OFF position.
3. If you want the Remote Horn with Beacon to respond to Input Channel Two (2), then place SW4, position four (4) in the ON position.
4. If you want the Remote Horn with Beacon NOT to respond to Input Channel Two (2), then place SW4, position four (4) in the OFF position

Auto-Silence Feature

The 915 Tank Alarm Console has the capability of silencing itself after 10 minutes in the case of an alarm condition. “Silencing itself” means that the Horn/Buzzer ceases to sound; all visual annunciators will continue to be active until either the alarm condition ceases or the alarm condition is acknowledged by pressing the Test/Silence button on the front of the Tank Alarm Console.

Alternatively, you may choose to have the Horn/Buzzer continue to sound until either the alarm condition ceases or the alarm condition is acknowledged by pressing the Test/Silence button on the front of the Tank Alarm Console.

1. If you want the 915 to automatically silence the Horn/Buzzer after 10 minutes while in an alarm condition, then place SW4, position 4 in the ON position.
2. If you want the 915 to continuously sound the Horn/Buzzer until either the alarm condition ceases or the alarm condition is acknowledged, then place SW4, position 4 in the OFF position.

Completion

1. Inspect all of the wiring to verify that it has been done properly. Correct any discrepancies and re-inspect.
2. When the installation has passed inspection, reinstall the front panel of the Tank Alarm Console.
 - a. Place the front panel on the enclosure base being careful to orient the panel in the upright position, carefully folding the wires into the enclosure.
 - b. Partially thread in the four screws that hold the front cover in place.
 - c. Verify the proper seating of the cover.
 - d. Snug the four screws in place.

IMPORTANT: DO NOT APPLY POWER TO THE 915 or any of the system components until the entire installation is complete and the wiring has passed final inspection.

Testing

Testing the system should only be performed after the entire system has been inspected, verifying both the wiring and the configuration.

NOTE: When power is first applied to the Tank Alarm Console, the Beacon on top of this console and the Beacon(s) on any Remote Horn with Beacon should go through a quick “hello” flash, demonstrating that it is ready for action.

1. Apply power to the system by plugging in each of the AC-DC Wall Adapters.
2. Verify that:
 - a. The Beacon on the Tank Alarm Console does its quick flash.
 - b. The Beacon on any Remote Horn with Beacon units also does their quick flash.
 - c. The GREEN Power Indicator is brightly illuminated on the front panel of the Tank Alarm Console.

- d. The RED Channel Alarm Indicators on the Tank Alarm Console are not blinking or illuminated.
- e. The Horn/Buzzer on the Tank Alarm Console is silent.
- f. The Horn/Buzzer on any Remote Horn With Beacon units are also silent.
- g. The GREEN Ready Indicator on each 915S and/or 915ST unit(s) associated with the system are brightly illuminated.
 - i. 915S – Verify that the downstream air activated device is fully functional
 - ii. 915ST –
 - Set the Timer for 1 minute run time by turning the dial to the 1.
 - Press and release the Start/Stop button in the front panel of the 915ST. Verify that
 - 1. The Ready Indicator now blinks ... about one second on, one second off.
 - 2. The downstream air activated device is fully functional
 - Wait for the one minute
 - Verify that
 - 1. The Ready Indicator stops blinking.
 - 2. The downstream air activated device is no longer functional.
- h. The following test should be performed on each Input Channel
 - i. If the input device utilizes Normally-Open contacts, then connect the two wires together at the tank. If the input device utilizes Normally-Closed contacts, then disconnect the two wires at the tank. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Ready light should be extinguished.

- ii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Tank Alarm Console.
- iii. Remove the alarm condition at the tank.

PREFERRED TEST:

- iv. Connect the two Tank Sensor wires to the Tank Sensor
- v. Simulate an alarm condition by moving the Tank Sensor float into the alarming position
- vi. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Ready light should be extinguished.

- vii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Tank Alarm Console.
- viii. Remove the alarm condition at the tank.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Operation

The 915 Tank Alarm may be used in applications where one to two sets of Normally-Open or Normally-Closed dry contacts are available. Two possible applications are use as an overfill alarm or as a low level alarm. These two uses are addressed below.

Use as an Overfill Alarm

1. Use as an Overfill Alarm—use with the Morrison Brothers 915 Tank Sensor or other similar input device.
 - a. At the beginning of each work shift press and hold the Test/Cancel button on the front of the 915 Tank Alarm Console for more than 3 seconds. Verify that:
 - i. The front panel Channel Indicator(s) blink
 - ii. The Beacon on top of the console is illuminated
 - iii. The Horn/Buzzer in the console sounds
 - iv. The Remote Horn With Beacon follows the action of the Tank Alarm Console's Horn and Beacon
 - v. All attached output devices go into the alarm condition

EXAMPLE: If a 915S or 915ST Solenoid device is installed as part of the system, the GREEN Ready light should extinguish.

2. Prior to filling a tank
 - a. Check for an existing overfill condition by observing the front panel.
 - i. A blinking channel indicator and no audible alarm tells you that there is an existing, auto-silenced alarm on that channel.
 - ii. A solidly illuminated indicator tells you that there is an existing, manually acknowledged alarm on that channel.
3. If an overfill occurs while filling the tank, the Channel Alarm Indicator associated with the overfill condition will flash, the Beacon will illuminate and Horn/Buzzer will sound.
 - a. The alarm can be acknowledged and silenced by pressing the “Test/Cancel” button on the front of the Alarm.
 - b. If the alarm is not silenced by the operator and the 915 is configured to “Auto-Silence,” then the 915 Tank Alarm will continue in the alarm state for no more than 10 minutes at which point it will silence itself. The channel indicator on the front panel will continue to blink, the Beacon will continue to be illuminated showing a new, un-acknowledged alarm.

Use as Low Level Alarm

1. Should the contacts associated with a Low Level Tank Sensor be activated, the Tank Alarm will immediately go into an alarm state; it will illuminate the Channel Alarm Indicator associated with the alarm condition, the Tank Alarm Beacon will illuminate and Horn/Buzzer will sound.
2. If the 915, Tank Alarm is configured to “auto-silence” and the alarm is not silenced manually by pressing the “Test/Cancel” button, the 915 Tank Alarm will continue in this alarm state for no more than 10 minutes at which point it will silence itself. All visual Indicators will remain illuminated in the alarming state showing a new, un-acknowledged alarm.
3. If an operator acknowledges the alarm condition by pressing the “Test/Cancel” button, the 915 tank Alarm will silence the audible enunciator, extinguish the Beacon and the channel alarm indicator will illuminate continuously until the alarm condition is removed.
4. To check for an alarm state once the Alarm has silenced itself simply observe the front panel. A blinking channel indicator and no audible alarm tells you that there is an existing, auto-silenced alarm on that channel. A channel indicator which is continuously illuminated indicates that there is an existing, acknowledged (silenced) alarm

Maintenance



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overflow situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service

There are two scheduled maintenance operations:

- **At the Beginning of Each Work Shift:** Test the overall operation of the 915 Tank Alarm
- **YEARLY:** Check the Enclosure for water ingress (see 0 below)

At the Beginning of Each Work Shift

1. If necessary, clean the 915 Tank Alarm enclosure with a damp cloth.
2. Test the overall operation of the Alarm **at the beginning of each work shift.**
 - a. Press and hold the “Test/Cancel” button while listening to the audible alarm and observing the Channel Alarm indicator(s) and the Beacon.
 - Audible Alarm is loud and strong.
 - Channel Alarm Indicator(s) is (are) blinking
 - Beacon is operating
 - Outputs are operating as with an alarm.
 - b. If alarm does not sound, the Channel Alarm Indicator(s) do not blink or the Beacon is not operating, verify that power is applied to the Tank Alarm and re-test. If the alarm still does not sound replace the Tank Alarm or call Morrison Bros. Co Customer Service.

Yearly

This check is to be performed **no less than once per year.**

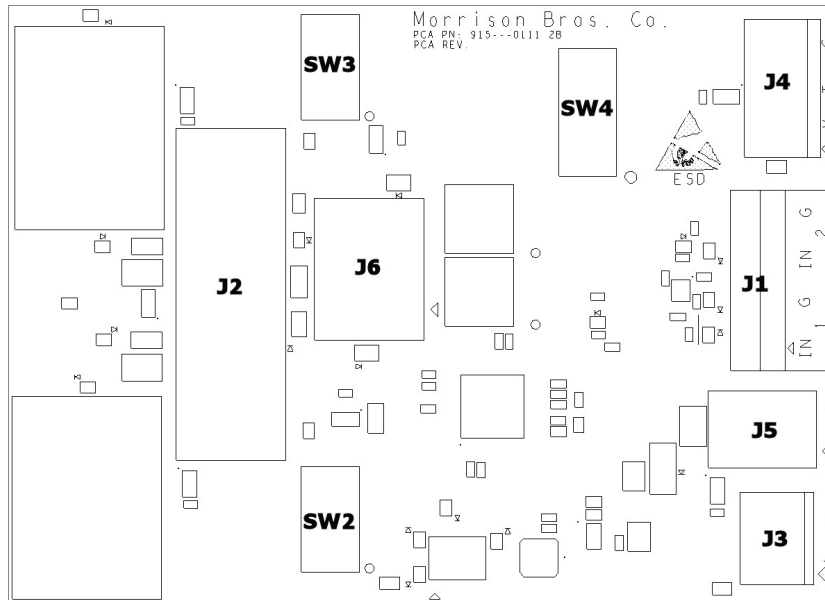
1. Perform Monthly check as outlined above to verify the overall operation of the Tank Alarm.
2. It is recommended to simulate an alarm condition and manually trigger the alarm using input device (Clock Gauge, float switch or other dry contact device). If it does not respond as with an alarm condition, check wiring at junction box and verify that the installation procedure was performed correctly. The alarm can be silenced after being activated by pressing the “Test/Cancel” button.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Appendix A:

Dip Switch Configuration Tables



Input Configuration

Position	SW4 Setting	
	ON	OFF
1	Configures input 1 for Normally-Closed contacts	Configures input 1 for Normally-Open contacts
2	Configures input 2 for Normally-Closed contacts	Configures input 2 for Normally-Open contacts

Table 1—Input Configuration (J1) SW4 - Normally-Open/Normally-Closed Contacts

Output Configuration

Position	SW2 Setting	
	ON	OFF
1	Responds to Channel 1 input	Does NOT respond to Channel 1 input
2	Responds to Channel 2 input	Does NOT respond to Channel 2 input
3	Normally Activated (failsafe)	Normally Deactivated
4	Persist	Non-persist

Position	J2 Pin Assignments
	ON
1	+12V power OUT; Current limited and fused
2	Power return
3	Normally-Closed contact
4	COMMON Contact
5	Normally-Open contact

Table 2—Output 1 (J2 positions 1 through 5) SW2

Output Configuration *(continued)*

	SW3 Setting	
Position	ON	OFF
1	Responds to Channel 1 input	Does NOT respond to Channel 1 input
2	Responds to Channel 2 input	Does NOT respond to Channel 2 input
3	Normally Activated (failsafe)	Normally Deactivated
4	Persist	Non-persist

	J2 Pin Assignments
Position	ON
6	+12V power OUT; Current limited and fused
7	Power return
8	Normally-Closed contact
9	COMMON Contact
10	Normally-Open contact

Table 3—Output 2 (J2 positions 6 through 10) SW3

Remote Horn with Beacon Output

	Setting	
Position	ON	OFF
3	Responds to Channel 1 input	Does NOT respond to Channel 1 input
4	Responds to Channel 2 input	Does NOT respond to Channel 1 input

Table 4—Remote Horn with Beacon (J6) SW4

Autosilence

	Setting	
Position	ON	OFF
5	The audible alarm will automatically silence after 10 minutes of alarming.	The audible alarm will continue to sound until either the alarm condition ceases to exist or the alarm condition has been acknowledged by pressing the Test/Silence button on the front panel.

Table 5—Autosilence (SW4)

915 Single Float Sensor

Installation & Maintenance Instructions

The 915 detects the level of liquid in a tank when used in conjunction with an alarm device like the Morrison Figures 915 Series Console. Once the liquid has reached the level of actuation, the sensor will send a signal causing the alarm, to which the sensor is connected, to be activated. This sensor is shipped in the Normally Open state but can also be used as Normally Closed by flipping the float.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Installation



WARNINGS

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- Any modification of this sensor other than those stated in these installation instructions will void the product warranty.
- This device is intended to be used as an auxiliary warning to the operator of a possible alarm condition and should not be the only system in place to prevent a tank or sump from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the sensor.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on gauge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

Electrical Switch Ratings

100 Watt resistive load, 300VAC/350VDC - 1.0A max (*Ratings for resistive loads only.*)

*Do not use for inductive loads.

IMPORTANT: *Not approved for use in explosive atmosphere locations.*

Install in accordance with all applicable local, state and federal regulations.

Never use with highly flammable liquids as defined OSHA/GHS

Chemical Compatibility

- Oil
- Waste Oil
- Windshield Washer Fluid
- Diesel
- Transmission Fluid
- Brake Fluid
- Antifreeze
- B-20 (bio diesel)

Steps

1. Inspect unit for shipping damage. Replace unit if damage is found.
2. Check inside float area for foreign matter such as packaging material. Remove any that is found.
3. This sensor is designed to be connected to an alarm device like the Morrison Figures 915 Console.
4. Turn off power to console.
5. Before installing sensor into the tank, temporarily connect the wires coming from the alarm device to the sensor.
6. Once sensor is attached properly to the console, power the console.
7. With the sensor in the vertical position, slowly move float up until the alarm is actuated.
8. For proper actuation point height adjustment, loosen the compression fitting nut on the top of the 2" NPT Bushing and move the entire pipe up or down to the desired height, see Figure 1. You can fine tune your adjustment by raising the float again to see if the alarm actuation occurs at your desired point.

Note that the specific gravity of your liquid will have an impact on the amount of liquid required to move the float and activate the alarm. See Figure 2. Take this into consideration when making final adjustment. If you are storing a liquid, other than those noted in Fig. 2 and the specific gravity of your liquid is not the same as one of the liquids shown, you can use the calculation, shown at the end of this document, to determine the measurement to mark your float.

9. Once you are satisfied with your adjustment, tighten compression fitting nut finger tight to tube. Then tighten nut with wrench an additional 1¼ turns.
10. Turn off power to console.
11. Disconnect temporary wire connections.

WARNING: If alarm does not actuate, wires may have been sliced, cut, and/or damaged. Do not use if alarm does not actuate.

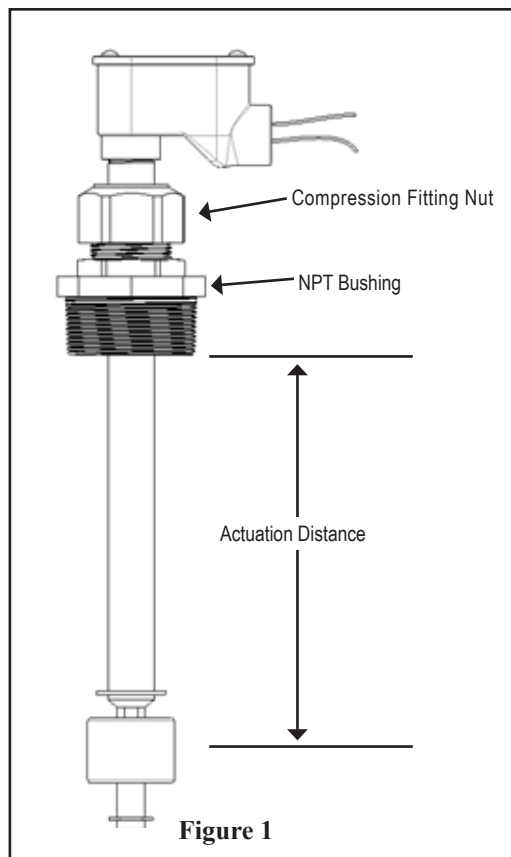


Figure 1

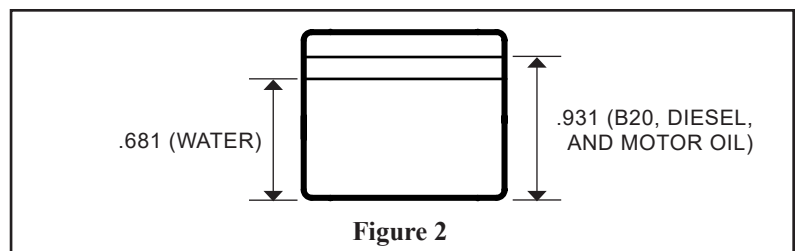


Figure 2

Calculation for shut-off point for liquids with specific gravities different than those shown in Fig. 2.

$$\text{Float shut-off point distance} = ((1 - \text{Specific Gravity}) \times 1.49) + .681$$

Measure this distance up from the bottom of the float and mark as indicated in steps 3 & 4 of the installation steps and then follow the rest of the installation steps.

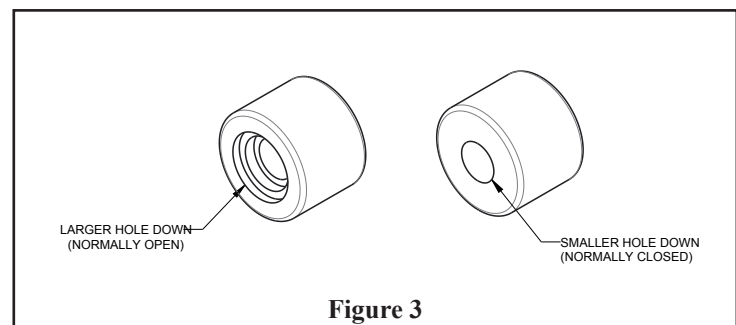


Figure 3

Sensor Installation

1. To ensure proper function, the sensor must be installed in the vertical position.
2. Locate the opening, on the top of the tank, where the sensor is to be installed. If possible, select a location away from the fill port to avoid excessive turbulence that could affect the float. Also make certain that there are no objects inside the tank, near the selected opening, that could interfere with float function.
3. Verify the compression fitting nut is securely tightened.
4. Apply a non-hardening fuel resistant pipe sealant to the threads on the 2" NPT threaded bushing.
5. Lower the Sensor into the Tank.
6. Thread the bushing into the tank bung and tighten until secure.
7. Complete permanent wiring to alarm device.

The retaining clips are not to be moved, unless the operation needs to be changed from Normally Open to Normally Closed. If this is desired, remove the lower retaining clip, slide the float off the tube, flip the float over so the NC position (see Figure 2 or 3) is facing upright. Test the function of the float in the NC position to make certain it performs as desired. You may need to reposition the lower retaining clip to achieve desired performance.

Alarm Installation and Testing

Refer to 915 Series Tank Alarm Installation, Operation and Maintenance Instructions.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Maintenance

This device should be maintained and checked for proper operation per applicable codes or at least once a year.



WARNINGS

- **Fire Hazard** – Death or serious injury could result from spilled liquids.
- Any modification of this sensor other than those stated in these installation instructions will void the product warranty.
- This device is intended to be used as an auxiliary warning to the operator of a possible alarm condition and should not be the only system in place to prevent a tank or sump from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation or status of the sensor.
- Install in accordance with all applicable local, state, and federal laws.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing installation. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on gauge.
- In the event of malfunction, contact Morrison Bros. Customer Service.

Steps

1. Turn power off to alarming device.
2. If sensor is not accessible to manually move float, remove sensor from tank or sump. This may require disconnecting wiring from sensor to alarming device.
3. Visually inspect the level sensor for damage or excessive wear. If either is found, replace the sensor or alarm.
4. If necessary, temporarily connect wiring to alarming device.
5. Turn on power to alarming device.
6. With the sensor in the vertical position, slowly move float up on tube until the alarm device is actuated.
7. If the sensor did not activate, replace sensor with new unit.
8. Reinstall sensor to original position in tank or sump.

9. Turn off power to alarming device.
10. Complete permanent wiring to alarming device.
11. Turn on power to alarming device.

Refer to 915 Series Console Installation, Operation and Maintenance Instructions.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

915S/915ST Solenoid Unit

Installation, Operation, and Maintenance Instructions

The 915S and 915ST Solenoids are designed to work with the 915 Alarm Console to provide pneumatic control for devices like diaphragm pumps using only a wall mounted power supply. The 915S is normally open and the 915ST (with timer function) is normally closed when connected to a 915 Alarm Console.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

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Specifications

IMPORTANT: *Not approved for use in explosive atmosphere locations.*

IMPORTANT: *Install in accordance with all applicable local, state and federal regulations.*

IMPORTANT: *Never use with highly flammable liquids as defined by OSHA/GHS.*

Solenoid Valve Input Power

Nominal Input Voltage: 12 VDC

Maximum Current Draw: 1 Amps

Maximum Power Consumption: 12 Watts

Operating Environment

-4°F to 104°F (-0°C to 40°C) to 100% humidity non-condensing

Indoor Use Only

Maximum Wiring Distance

Maximum wiring distance between the 915 Tank Alarm Console and the 915S or 915ST Solenoid Valve Unit is 300 ft.

Installation and Testing



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service

Mounting

In order to prevent contamination from entering the enclosures, follow these instructions:

1. Mount the enclosure to a stable, vertical surface using the mounting flanges of the enclosure. Do not make additional holes in the enclosure.
2. Morrison has provided an opening with wire gland in the bottom of the enclosure. All wiring should enter and exit through this opening. Do not make additional openings in the enclosure.
3. Once the enclosure is securely mounted on a stable surface and the wiring is complete, place the enclosure cover in the proper orientation on the enclosure base and secure in place by snugging each of the cover screws. These are captured screws and are not intended to be removed. Partially thread each screw in place and then move from screw-to-screw to do the final snugging of the screws.
4. Using a wrench support the 1/2" NPT fittings on solenoid while attaching mating airlines (do not over tighten).

Steps to Wire and Configure the 915 Solenoid Valve Unit

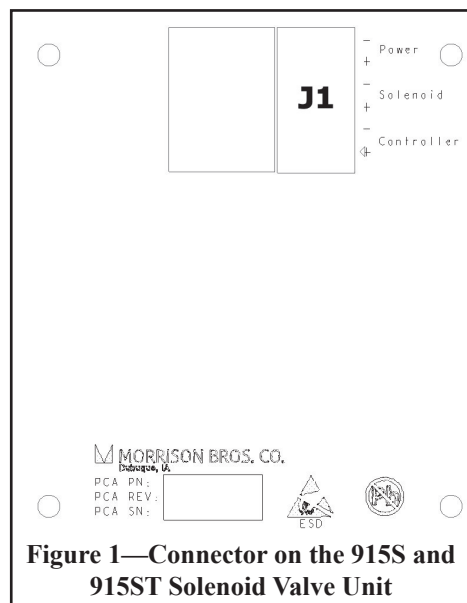


Figure 1—Connector on the 915S and 915ST Solenoid Valve Unit

Preparation

Open the front cover of the Tank Alarm Console by first loosening the captive screws at each corner. This allows the front cover to be carefully removed.

NOTE: The corner screws that hold the front cover in place are captive screws and are not intended to be COMPLETELY removed from the front cover.

NOTE: There are wires that connect the Solenoid Valve to the main PCA on the front cover. Do not suspend the front cover from the wires. Always support the front cover by some other means.

Installation

Basic Connection Instructions

All of the connections to the Solenoid Valve Unit are made using the screwless connector block. Please follow the connection instructions provided below when making connection to these connection blocks. See Figure 2.

IMPORTANT: These connectors are rated to be used with 24AWG to 18AWG wire ONLY. All connections to these connectors must adhere to these requirements.

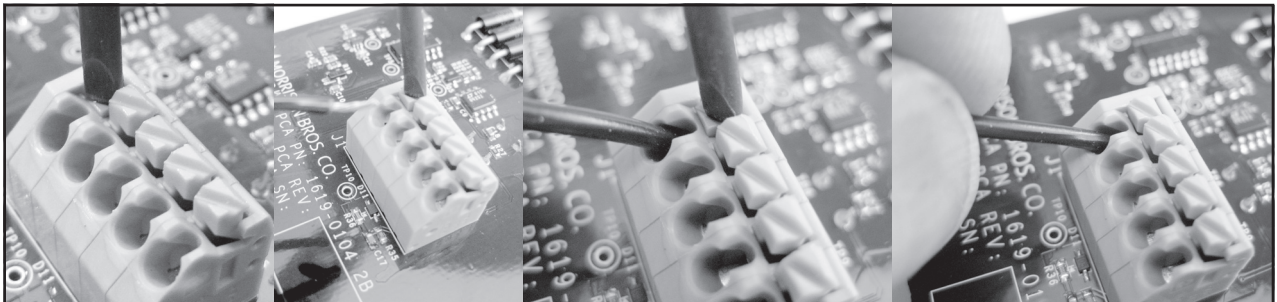


Figure 2—Connecting wires to a screwless connector block.

1. Wire Preparation
 - a. Strip the wire to be connected to the connector **9mm/0.35inches**.
 - b. Twist the strands of wire together.
2. Wire Connection
 - a. Fully depress the connector's plunger using a suitable tool.
 - b. Fully insert the wire into the connector.
 - c. Release the connector's plunger while maintaining the wire's position in the connector.
 - d. Gently tug on the wire to verify that it has been captured by the connector.

Solenoid Valve Unit Power

The Solenoid Valve Unit is powered by a single, wall mounted AC-DC Wall Adapter.

IMPORTANT: Do NOT plug in the wall adapter until the entire installation is complete including final inspection.

1. Prepare the ends of the two conductors that make up the wall adapter's power cable per the instructions in Basic Connection Instructions/Wire Preparation above.
2. Bring the AC-DC Wall Adapter's cable into the console's enclosure through the cable gland provided in the bottom of the enclosure base.

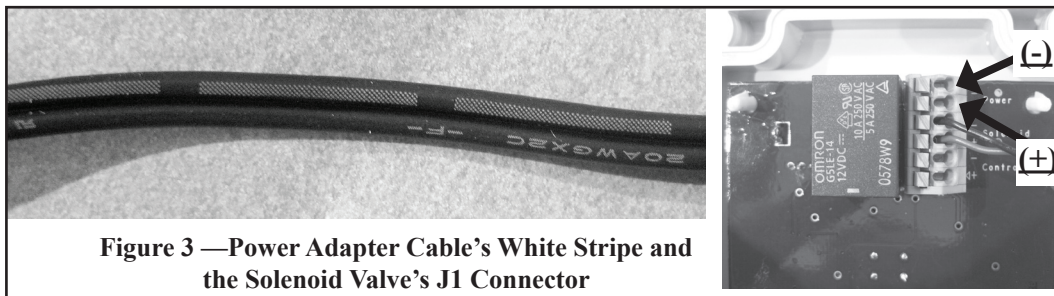


Figure 3 —Power Adapter Cable's White Stripe and the Solenoid Valve's J1 Connector

3. Inspect the wall adapter's cable and locate the conductor that has the white stripes on it (see Figure 3).
4. Following the connection instructions in Basic Connection Instructions/Wire Connection above, connect the power cable conductor WITH the white stripes to pin six (6), the side labeled with a MINUS sign (-) (see Figure 3).
5. Following the connection instructions in Basic Connection Instructions/Wire Connection above, connect the other power cable conductor (WITHOUT the white stripes) to pin five (5), the side labeled with a PLUS sign (+) (see Figure 3).

Interlock Signal Input

1. Run two 18 to 24 AWG oil resistant wires from the 915 Tank Alarm Console to the Solenoid Valve Unit. Note which of the two wires are connected to which of the 915 Tank Alarm Console's J2 connector.
2. Bring the two wires into the 915S or 915ST Solenoid Valve Unit enclosure through the opening provided in the bottom of the unit ONLY.
3. Prepare the ends of the two wires per the instructions in Basic Connection Instructions/Wire Preparation above.
4. Following the connection instructions in Basic Connection Instructions/Wire Connection above, connect the Tank Alarm Interlock Signal to the 915S or 915ST J1 connector. The wire connected to the 915 Tank Alarm Console's:
 - a. J2 pin two (2) {OUT1} or pin seven (7) {OUT2} (this is the NEGATIVE connection) connect to the 915S or 915ST J1 pin two (2) – labeled with a '-' symbol.
 - b. J2 pin five (5) {OUT1} or pin ten (10) {OUT2} (this is the POSITIVE connection) connect to the 915S or 915ST J1 pin one (1) – labeled with a '+' symbol.
5. Follow the instructions in the 915 Tank Alarm Console Installation Manual (PN: 915---0142 PP) for wiring and configuration of the 915 Tank Alarm Console.

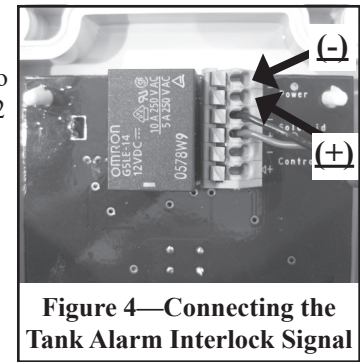


Figure 4—Connecting the Tank Alarm Interlock Signal

915S or 915ST Solenoid	915 Tank Alarm Console	
	OUT1	OUT2
J1 pin 1 (+)	J2 pin 5	J2 pin 10
J1 pin 2 (-)	J2 pin 2	J2 pin 7

Completion

1. Inspect all of the wiring to verify that it has been done properly. Correct any discrepancies and re-inspect.
2. When the installation has passed inspection, reinstall the front panel of the Solenoid Valve Unit.
 - a. Place the front panel on the enclosure base being careful to orient the panel in the upright position, carefully folding the wires into the enclosure.
 - b. Partially thread in the four screws that hold the front cover in place.
 - c. Verify the proper seating of the cover.
 - d. Snug the four screws in place.

IMPORTANT: *DO NOT APPLY POWER TO THE 915 or any of the system components until the entire installation is complete and the wiring has passed final inspection.*

Testing

Testing the system should only be performed after the entire system has been inspected, verifying both the wiring and the configuration.

NOTE: *When power is first applied to the 915 Tank Alarm Console, the Beacon on top of the console and the Beacon(s) on any Remote Horn with Beacon should go through a quick "hello" flash, demonstrating that it is powered up and ready.*

1. Apply power to the system by plugging in each of the AC-DC Wall Adapters.
2. Verify that
 - a. The Beacon on the 915 Tank Alarm Console does its quick flash.
 - b. The Beacon on any Remote Horn with Beacon units also does their quick flash.
 - c. The GREEN Power Indicator is brightly illuminated on the front panel of the 915 Tank Alarm Console.
 - d. The RED Channel Alarm Indicators on the 915 Tank Alarm Console are not blinking or illuminated.
 - e. The Horn/Buzzer on the 915 Tank Alarm Console is silent.
 - f. The Horn/Buzzer on any Remote Horn With Beacon units are also silent.

- g. The GREEN ACTIVE Indicator on each 915S and/or 915ST unit(s) associated with the system are brightly illuminated.
- i. 915S—Verify that the downstream air activated device is fully functional
 - ii. 915ST—
 - Set the Timer for 1 minute run time by turning the dial to the 1.
 - Press and release the Start/Stop button in the front panel of the 915ST. Verify that:
 - 1. The ACTIVE Indicator now blinks ... about one second on, one second off.
 - 2. The downstream air activated device is fully functional
 - Wait for the one minute
 - Verify that:
 - 1. The ACTIVE Indicator stops blinking.
 - 2. The downstream air activated device is no longer functional.
 - h. The following test should be performed on each Input Channel of the 915 Tank Alarm Console
 - i. If the input device utilizes Normally-Open contacts, then connect the two wires together at the tank. If the input device utilizes Normally-Closed contacts, then disconnect the two wires at the tank. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN ACTIVE light should be extinguished.

- ii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Solenoid Valve Unit.
- iii. Remove the alarm condition at the tank.
- iv. Connect the two Tank Sensor wires to the Tank Sensor
- v. Simulate an alarm condition by moving the Tank Sensor float into the alarming position
- vi. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN ACTIVE light should be extinguished.

- vii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Solenoid Valve Unit.
- viii. Remove the alarm condition at the tank.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Operation

The 915S or 915ST Solenoid Valve Unit is designed to operate as part of the 915 Tank Alarm system. These Solenoid Valve Units are designed to control a pneumatically operated device such a diaphragm pump.

915S Solenoid Valve Unit Without Timer

If the Interlock Signal from the 915 Tank Alarm is present – AND – the Solenoid Valve Unit has power from its AC-DC Wall Mounted Power Supply, then the GREEN ACTIVE Indicator will be brightly illuminated on the front panel of the Solenoid Unit. Air may pass through this Solenoid Valve Unit allowing the downstream Pneumatic Device to operate.

If the Interlock Signal from the 915 Tank Alarm is NOT present – OR – power has been lost at the site of the Solenoid Valve Unit such as if the AC-DC Wall Mounted Power Supply has become unplugged, then the GREEN ACTIVE Indicator will NOT be illuminated. The Solenoid Valve will be closed and the downstream pneumatic device will not operate.

915ST Solenoid Valve Unit With Timer

If the Interlock Signal from the 915 Tank Alarm is present – AND – the Solenoid Valve Unit has power from its AC-DC Wall Mounted Power Supply, then the GREEN ACTIVE Indicator will be brightly illuminated on the front panel of the Solenoid Unit. Air will still NOT pass to the downstream pneumatic devices without starting the Timer.

To allow air to pass to the downstream pneumatic devices for a set period of time, rotate the “Run Time” control so the pointer points to the desired number of minutes you want the air to be available to your downstream Pneumatic Device.

Press and release the “Start/Stop” button on the front of the 915ST Solenoid Valve Unit. Air is now allowed to pass through this Solenoid Valve Unit allowing the downstream Pneumatic Device to operate for the period of time set on the “Run Time” control. When the Timer is running and the downstream Pneumatic Device should be operating, the “ACTIVE” indicator on the front panel of the Solenoid Valve Unit will blink.



Figure 5—915ST Controls

NOTE: *The Run Time of the downstream Pneumatic Device is set when the “Start/Stop” button is pressed. Changing the setting of the “Run Time” control after this point will not change the run time. If you wish to change the run time, press and release the “Start/Stop” button to stop the timer; reset the desired amount of time and press and release the “Start/Stop” button to start the timer.*

To STOP the Timer and disable the downstream Pneumatic Device, press and release the “Start/Stop” button on the front panel of the 915ST Solenoid Valve Unit. The “ACTIVE” indicator will stop blinking and be continuously illuminated.

If the Interlock Signal from the 915 Tank Alarm is NOT present – OR – power has been lost at the site of the Solenoid Valve Unit such as if the AC-DC Wall Mounted Power Supply has become unplugged, then the GREEN ACTIVE Indicator will NOT be illuminated. The Solenoid Valve will be closed and the downstream pneumatic device will not operate.



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overflow situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Maintenance

There are two scheduled maintenance operations:

- **At the Beginning of Each Work Shift:** Test the overall operation of the 915 Tank Alarm
 - **YEARLY:** Simulate an alarm condition and verify the operation of the System
-

At the Beginning of Each Work Shift

Test the overall operation of the 915 Tank Alarm System **at the beginning of each work shift.**

1. Press and hold the “Test/Cancel” button while listening to the audible alarm and observing the Channel Alarm indicator(s) and the Beacon.
 - Audible Alarm is loud and strong.
 - Channel Alarm Indicator(s) is (are) blinking
 - Beacon is operating
 - GREEN ACTIVE Indicator(s) on all 915S and 915ST Solenoid Valve Units is extinguished.
2. If alarm does not sound, the Channel Alarm Indicator(s) do not blink, the Beacon is not operating or the ACTIVE Indicators on Solenoid Valve Units remain illuminated, verify that power is applied to the Tank Alarm and that there are not wiring faults between the 915 Tank Alarm Console and the 915S and/or 915ST Solenoid Valve Units and re-test. If the alarm still does not sound or the Solenoid Valve Units do not disable, call Morrison Bros. Co Customer Service.

Yearly

This check is to be performed **no less than once per year.**

1. Perform per-work shift check as outlined above to verify the overall operation of the Tank Alarm System.
2. It is recommended to simulate an alarm condition and manually trigger the alarm using input device (Clock Gauge, float switch, 915 sensor, or other dry contact device). If it does not respond as with an alarm condition, check wiring at junction box and verify that the installation procedure was performed correctly. The alarm can be silenced after being activated by pressing the “Test/Cancel” button.

915HB Remote Horn with Beacon

Installation, Operation, and Maintenance Instructions

The 915HB Remote Horn with Beacon is an accessory to the 915 Tank Alarm and provides an audible and visual annunciator which can be located remotely from the console.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

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Specifications

IMPORTANT: *Not approved for use in explosive atmosphere locations.*

IMPORTANT: *Install in accordance with all applicable local, state and federal regulations.*

IMPORTANT: *Never use with highly flammable liquids as defined by OSHA/GHS.*

Remote Horn with Beacon Input Power

Nominal Input Voltage: 12 VDC

Maximum Current Draw: 0.1 Amps

Maximum Power Consumption: 1.2 Watts

Operating Environment

-40°F to 140°F (-40°C to 60°C) to 100% humidity non-condensing

Indoor or Outdoor.

Maximum Wiring Distance

Maximum wiring distance between 915 Tank Alarm Console and the 915HB Remote Horn with Beacon is 300 ft.

Installation and Testing



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Mounting

In order to prevent contamination from entering the enclosures, follow the following instructions:

1. Mount the enclosure to a stable vertical surface using the mounting flanges of the enclosure. Do not make additional holes in the enclosure.
2. Morrison has provided an opening with wire gland in the bottom of the enclosure. All wiring should enter and exit through this opening. Do not make additional openings in the enclosure.
3. Once the enclosure is securely mounted on a stable surface and the wiring is complete, place the enclosure cover in the proper orientation on the enclosure base and secure in place by snugging each of the cover screws. These are captured screws and are not intended to be removed. Partially thread each screw in place and then move from screw-to-screw to do the final snugging of the screws.

Steps to Wire and Configure the 915HB Remote Horn with Beacon

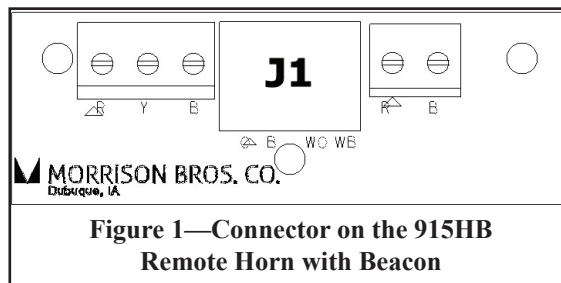


Figure 1—Connector on the 915HB Remote Horn with Beacon

IMPORTANT: Remove all power from the 915 Tank Alarm System before beginning installation. This may be accomplished by unplugging all of the AC-DC Wall adapters associated with the system.

Preparation

1. Open the front cover of the Remote Horn with Beacon by first loosening the captive screws at each corner, then fully unscrewing them. This allows the front cover to be carefully removed.
2. Repeat this process with the 915 Tank Alarm Console if the front cover has not been removed yet.

NOTE: The corner screws that hold the front cover in place are captive screws and are not intended to be removed from the front cover.

NOTE: The wires that connect the Beacon to the main PCA on the front cover for both the 915 Tank Alarm Console and the 915HB Remote Horn with Beacon are not intended to be used to suspend the front cover. Always support the front cover by some other means

Installation

IMPORTANT: Remove all power from the 915 Tank Alarm System before beginning installation.

Basic Connection Instructions

All of the connections are made using screwless connector blocks. Please follow the connection instructions provided below when making connection to these connection blocks. See Figure 2 for an illustration.

IMPORTANT: These connectors are rated to be used with 24AWG to 18AWG wire ONLY. All connections to these connectors must adhere to these requirements.

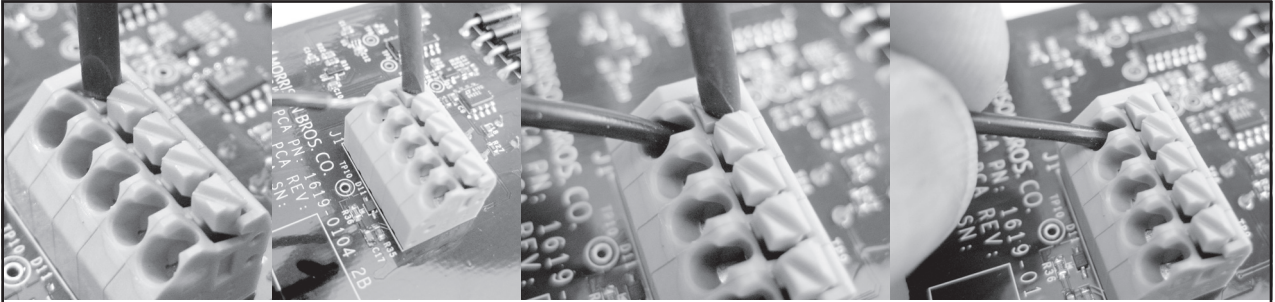


Figure 2 — Connecting wires to a screwless connector block.

1. Wire Preparation
 - a. Strip the wire to be connected to the connector **9mm/0.35inches**.
 - b. Twist the strands of wire together.
1. Wire Connection
 - a. Fully depress the connector's plunger using a suitable tool.
 - b. Fully insert the wire into the connector.
 - c. Release the connector's plunger while maintaining the wire's position in the connector.
 - d. Gently tug on the wire to verify that it has been captured by the connector.

Standard Remote Horn with Beacon Configuration

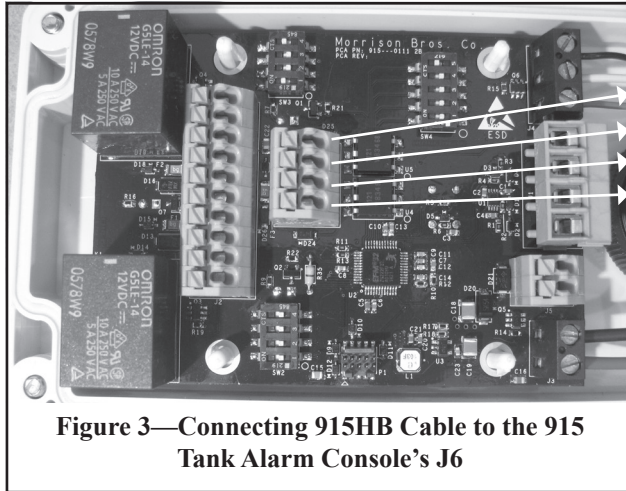
The standard configuration for the Remote Horn with Beacon utilizes a dedicated output of the 915 Tank Alarm Console. Both operational power and control are received from there.

Connecting the 915HB Remote Horn with Beacon to the 915 Tank Alarm Console requires a cable with no less than four (4), 18 to 24AWG conductors.

IMPORTANT: Do NOT plug in the 915 Tank Alarm Console's wall adapter until the entire installation is complete including final inspection.

1. Run the cable between the 915 Tank Alarm Console and the 915HB Remote Horn with Beacon.
2. Bring the cable into the enclosures through the cable gland provided in the bottom of the enclosure base.
3. At the 915 Tank Alarm Console end of the cable
 - a. Prepare the ends of the four (4) conductors of the cable per the instructions in 2.a.i above.

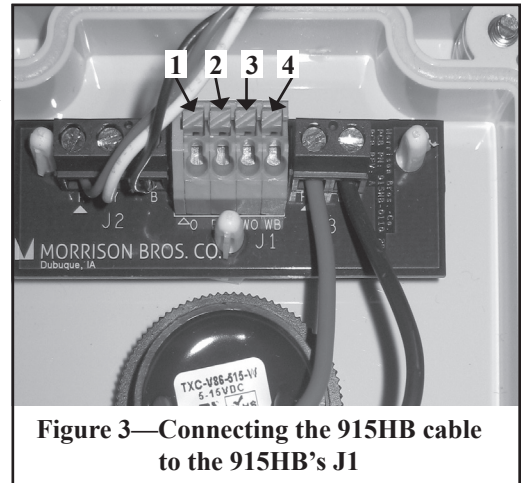
- b. Following the connection instructions in 2.a.i.2 above, connect the conductors of the cable to the pins of J6 using the table below to note which conductor is connected to which pin (see Figure 3, below).



J6 PIN	Cable Wire Color or Number
4	
3	
2	
1	

At the 915HB Remote Horn with Beacon end of the cable

1. Prepare the ends of the four (4) conductors of the cable per the instructions in 2.a.i through.
2. Following the connection instructions in 2.a.i.2 above, connect the conductors of the cable to the pins of J1 using the table above to know which conductor of the cable is to be connected to which pin of the 915HB Remote Horn with Beacon J1.
 - a. J1 pin 1 is connected to 915 Tank Alarm Console J6 pin 1.
 - b. J1 pin 2 is connected to 915 Tank Alarm Console J6 pin 2.
 - c. J1 pin 3 is connected to 915 Tank Alarm Console J6 pin 3.
 - d. J1 pin 4 is connected to 915 Tank Alarm Console J6 pin 4.



915HB J1 pin		915 J6 pin
1	↔	1
2	↔	2
3	↔	3
4	↔	4

Completion

1. Inspect all of the wiring to verify that it has been done properly. Correct any discrepancies and re-inspect.
2. When the installation has passed inspection, reinstall the front panel of the Remote Horn with Beacon and the Tank Alarm Console.
 - a. Place the front panel on the enclosure base being careful to orient the panel in the upright position, carefully folding the wires into the enclosure.
 - b. Partially thread in the four screws that hold the front cover in place.
 - c. Verify the proper seating of the cover.
 - d. Snug the four screws in place.

IMPORTANT: Do NOT apply power to the 915 or any of the system components until the entire installation is complete and the wiring has passed final inspection..

Testing

Testing the system should only be performed after the entire system has been inspected, verifying both the wiring and the configuration.

NOTE: *When power is first applied to the 915 Tank Alarm Console, the Beacon on top of the console and the Beacon(s) on any Remote Horn with Beacon should go through a quick “hello” flash, demonstrating that it is powered on and ready.*

1. Apply power to the system by plugging in each of the AC-DC Wall Adapters.
2. Verify that:
 - a. The Beacon on the 915 Tank Alarm Console does its quick flash.
 - b. The Beacon on any Remote Horn with Beacon units also does their quick flash.
 - c. The GREEN Power Indicator is brightly illuminated on the front panel of the 915 Tank Alarm Console.
 - d. The RED Channel Alarm Indicators on the 915 Tank Alarm Console are not blinking or illuminated.
 - e. The Horn/Buzzer on the 915 Tank Alarm Console is silent.
 - f. The Horn/Buzzer on any Remote Horn With Beacon units are also silent.
 - g. The GREEN Active Indicator on each 915S and/or 915ST unit(s) associated with the system are brightly illuminated.
 - i. 915S—Verify that the downstream air activated device is fully functional
 - ii. 915ST—
 - Set the Timer for 1 minute run time by turning the dial to the 1.
 - Press and release the Start/Stop button in the front panel of the 915ST. Verify that:
 1. The Active Indicator now blinks ... about one second on, one second off.
 2. The downstream air activated device is fully functional
 - Wait for the one minute
 - Verify that:
 1. The ACTIVE Indicator stops blinking.
 2. The downstream air activated device is no longer functional.
 - h. viii. The following test should be performed on each Input Channel of the 915 Tank Alarm Console
 - i. If the input device utilizes Normally-Open contacts, then connect the two wires together at the tank. If the input device utilizes Normally-Closed contacts, then disconnect the two wires at the tank. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Active light should be extinguished

- ii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Solenoid Valve Unit.
- iii. Remove the alarm condition at the tank.
- iv. Connect the two Tank Sensor wires to the Tank Sensor
- v. Simulate an alarm condition by moving the Tank Sensor float into the alarming position
- vi. Verify that:
 - The Channel indicator associated with the channel is blinking
 - The Horn/Buzzer is sounding
 - The Beacon is illuminated
 - The Output Devices associated with the channel are in their alarm condition

EXAMPLE: If the channel is associated with Morrison Bros. Co. 915S or 915ST Solenoid unit(s), the GREEN Active light should be extinguished.

- vii. Acknowledge the alarm by pressing the “Test/Cancel” button on the front of the Solenoid Valve Unit.
- viii. Remove the alarm condition at the tank.



Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Operation

Because the 915HB is ancillary to the 915 Tank Alarm Console, there are no specific operating instructions for this part of the system.



WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state and federal regulations and codes.
- This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overflow situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overflowing. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Maintenance

There are two scheduled maintenance operations:

- **At the Beginning of Each Work Shift:** Test the overall operation of the 915 Tank Alarm
- **YEARLY:** Simulate an alarm condition and verify the operation of the System

At the Beginning of Each Work Shift

Test the overall operation of the 915 Tank Alarm System **at the beginning of each work shift.**

1. Press and hold the “Test/Cancel” button while listening to the audible alarm and observing the Channel Alarm indicator(s) and the Beacon.
 - Audible Alarm is loud and strong.
 - Channel Alarm Indicator(s) is (are) blinking
 - Beacon is operating
 - GREEN ACTIVE Indicator(s) on all 915S and 915ST Solenoid Valve Units is extinguished.
2. If alarm does not sound, the Channel Alarm Indicator(s) do not blink, the Beacon is not operating or the ACTIVE Indicators on Solenoid Valve Units remain illuminated, verify that power is applied to the Tank Alarm and that there are not wiring faults between the 915 Tank Alarm Console and the 915S and/or 915ST Solenoid Valve Units and re-test. If the alarm still does not sound or the Solenoid Valve Units do not disable, call Morrison Bros. Co Customer Service.

Yearly

This check is to be performed **no less than once per year.**

1. Perform per-work shift check as outlined above to verify the overall operation of the Tank Alarm System.
2. It is recommended to simulate an alarm condition and manually trigger the alarm using input device (Clock Gauge, float switch, 915 sensor, or other dry contact device). If it does not respond as with an alarm condition, check wiring at junction box and verify that the installation procedure was performed correctly. The alarm can be silenced after being activated by pressing the “Test/Cancel” button.



915 Tank Alarm for Automotive Fluids

SPECIFICATION SHEET

Application

The 915 tank alarm is an AC-powered console designed to monitor 1 to 2 simple input switch devices and provide both audible and visual indication when an input switch is activated. This tank alarm is compatible with automotive fluids including, but not limited to: windshield washer fluid, antifreeze, transmission fluid, brake fluid, diesel, biodiesel (B-20), lube oil, and waste oil.

Features and Details

Control Console

- One or two configurable input channels
- Two fully configurable low voltage, dry contact outputs with
 - Normally-open and normally closed outputs
 - Current limited 12VDC available to be used with the outputs
- A dedicated configurable output for Remote Horn with Beacon
- Can control up to 20 solenoids (10 per channel)
- Selectable auto-silence feature

Remote Horn with Beacon

- Audible horn (95dB at 2 feet)
- Beacon
 - Visible in bright sunlight at 100 feet or more
 - 360° visibility
- Rated for outdoor or indoor use

Solenoid with Timer

- AC/DC adapter
- Normally-closed (fail safe)
- Adjustable timer (0 to 15 minutes)
- Controlled by start/stop button
- Solenoid deactivated by console on input alarm
- Can be located up to 300 feet from console
- Maximum working pressure—225 PSI

Solenoid without Timer

- AC/DC adapter
- Normally-closed (fail safe)
- Solenoid deactivated by console on input alarm
- Can be located up to 300 feet from console
- Maximum working pressure—225 PSI

Sensor

- Actuation distance: 1" (minimum) to 7.6" (maximum)
- Rated for outdoor or indoor use
- Normally open switch easily converted to normally closed operation
- Installs into a 2" female threaded opening



915 console (1 input channel)



915 console (2 input channels)



915S
Solenoid



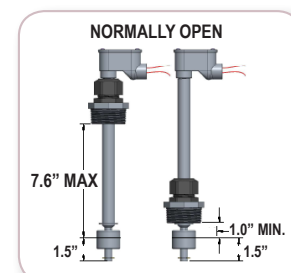
915ST
Solenoid with
timer



915HB
Horn and beacon



915
Sensor



MORRISON BROS. CO.

Code Compliance, part numbers, and tank drawing on next page.



Materials of Construction

- Enclosure... Polycarbonate plastic
- Solenoid... Brass
- Sensor
 - Body... PVC
 - Cable connector... Nylon and Buna-N
 - Conduit box... Aluminum
 - Retaining ring... Copper
 - Float... Nitrophyl-M

Code Compliance

Third party approval pending; wall-mounted power supplies are UL60950-1

Item Number	Description
915---1000 AA	Alarm console; single channel (no sensor)
915---2000 AA	Alarm console; dual channel (no sensor)
915---3000 AS	Tank sensor
915S--1000 AS	Solenoid
915ST-1000 AS	Solenoid with timer
915HB-1000 AB	Remote horn with beacon



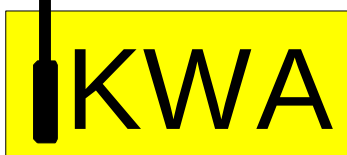


Evaluation of the Morrison Bros. Co. 915 Series Alarm Console, 915 Liquid Sensor 915HB Remote Alarm and 915S/ST Solenoid Unit

Final Report Version 2

**PREPARED FOR:
Morrison Bros. Co.**

February 21, 2020



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E-mail cwilcox@kwaleak.com, Web <http://www.kwaleak.com>

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915 Series Alarm Console, 915 Liquid
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**PREPARED FOR:
Morrison Bros. Co.
570 East 7th Street
Dubuque, IA 52001**

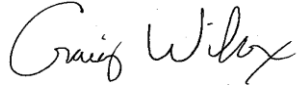
February 21, 2020

Preface

This report presents the results of an independent third-party evaluation of the Morison Bros. Co. 915 Series Alarm Console, 915 Liquid Sensor, 915S/ST Solenoid Unit and 915HB Remote Alarm. The evaluation was conducted by Ken Wilcox Associates, Inc. using procedures described in section 4.5.1, "Liquid Phase Sensor Test Procedures", of the 2019 revised standard protocol "Standard Test Procedures For Evaluating Release Detection Methods: Volumetric And Non- volumetric Tank Tightness Testing", May 2019. The official results of this evaluation are contained in Attachment A of this report on the EPA Results forms. All work was conducted by Ken Wilcox Associates, Inc. at the Fuels Management Research Center in Grain Valley, Missouri.

This report was prepared by Craig D. Wilcox, Ken Wilcox Associates, Inc. Technical questions regarding this evaluation should be directed to Morrison Bros. Co. at (563) 583-5701.

KEN WILCOX ASSOCIATES, INC



Craig D. Wilcox, President
February 21, 2020

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3.0 Evaluation Procedures	3
4.0 Test Results	4
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1.0 Background

The federal Environmental Protection Agency (EPA) has provided a series of documents, which describe the procedures that are to be used to verify that leak detection equipment meets the performance requirements of the Federal Register. The requirements for evaluating liquid level sensors are described in section 4.5.1, “Liquid Phase Sensor Test Procedures”, of the 2019 revised standard protocol “Standard Test Procedures For Evaluating Release Detection Methods: Volumetric And Non-volumetric Tank Tightness Testing”, May 2019. At a minimum the evaluation method must determine the minimum liquid threshold for which a liquid level sensor will alarm.

2.0 Description of the Equipment

Morrison Bros. Co. 915 Series Alarm Console

The Morrison Bros. Co. 915 Series Alarm Console is designed to provide a visible and audible alarm to indicate an occurrence of a liquid overfill or low level in a storage tank. The 915 Series Alarm Console has two different configurations with the first configuration supporting one sensor and the second supporting up to two sensors. The performance of the 915 Alarm Console in the one and two sensor design was found to be identical during this evaluation. Considering this, the evaluation results presented in this report are equally applicable to the 915 Alarm Console in the one and two sensor design. The 915 Series Alarm Console has a dedicated output that allows for the addition of up to two remote horn with beacon (915HB) option allowing a visual and audible alarm to be located in a satellite location. The 915 Series Alarm Console also has an output for each channel that can control a solenoid valve unit (915S/ST) that provides pneumatic control for devices like diaphragm pumps using only a wall mounted power supply.

Morrison Bros. Co. 915 Sensor

The Morrison Bros. Co. 915 Sensor is a single float sensor that is designed to be used with the 915 Alarm Console and is intended to be installed in a tank that contains automotive liquids. The 915 sensor can be used to detect the occurrence of a liquid overfill or low level in a storage tank. The 915 Sensor is designed to be used with automotive liquids including but not limited to windshield washer fluid, antifreeze, transmission fluid, brake fluid, diesel, biodiesel (B-20), lube oil, and waste oil. The 915 Sensor is not compatible with unleaded gasoline.

Morrison Bros. Co. 915HB Remote Horn with Beacon

The Morrison Bros. Co. 915 HB Remote Horn with Beacon is an accessory to the 915 Alarm Console and provides an audible and visible alarm which can be located remotely from the console.

Morrison Bros. Co. 915S and 915ST Solenoid Valve Unit

The Morrison Bros. Co. 915S and 915ST Solenoid Valve Units are designed to work with the 915 Alarm Console to provide pneumatic control for devices like diaphragm pumps using only a wall mounted power supply. The 915S is solenoid valve is in the normally open position and the 915ST is in the normally closed position. The 915ST also includes a timer that can be set between 0-15 minutes. The function of the 915ST only works when the timer is activated.

3.0 Evaluation Procedures for the 915 Sensor

Test Apparatus

The evaluation of this system was designed to determine if the 915 Sensor operates as described by the vendor. The 915 Sensor was mounted in a test container in which water, diesel fuel and waste oil was added.

Threshold Determination

A peristaltic pump was used to add or remove the liquid from the test cylinder containing the 915 Sensor. The liquid level for the alarm threshold was measured with a dial micrometer once an alarm was generated by the 915 sensor. The measurement to determine the height at alarm was taken from the bottom of the sensor to the height of the liquid at the time of alarm. This procedure was repeated a total of 10 times each for water, diesel fuel and waste oil.

Detection Time

The time required for the sensor to respond to liquid levels beyond the sensor's threshold is the sensor's detection time. The average time to alarm for the ten tests conducted for each product type is reported as the detection time. In the case of the 915 Sensor the time to alarm is immediate.

Fall Times

The time required for the sensor to stop responding once the product level has been lowered within the sensor's threshold is the sensor's fall time. The average fall time for the ten tests conducted for each product type is reported as the fall time. In the case of the 915 sensor, the fall time for the alarm is immediate.

Specificity

The specificity defines the different products that liquid level sensors will respond to. Most sensors will respond to any liquid once the sensor's threshold level has been exceeded unless the sensor has been designed otherwise. Although this sensor will respond to any liquid, the testing conducted for this evaluation determined the sensor's response to water, diesel fuel and waste oil. It is recommended to consult with the manufacture on which liquids are compatible with the 915 Sensor.

4.0 Test Results

The data and results for the 915 Sensor are contained in Table 1.

Lower Detection Level (Threshold)

The sensor was only tested for its ability to detect liquid levels at the alarm levels. The height at alarm was recorded as the height of the liquid when measured from the bottom of the sensor.

Precision (Standard Deviation)

Ten replicates were conducted for the liquid level for each of the liquids and an alarm was verified for the 915 Sensor. The standard deviation was determined from these replicates.

Detection Time

The audible and visible alarm was indicated immediately on the 915 Alarm Console once the 915 Sensors threshold was exceeded. This will be true for any liquid in the reservoir.

Fall Time

The 915 Alarm Console stops alarming immediately after the liquid level drops below the threshold of the 915 Sensor. This will be true for any liquid in the reservoir.

Specificity

This sensor will respond to any liquid that is compatible with the system in which it is installed. Water, diesel fuel and waste oil were used for this evaluation.

Time to Alarm under Operating Conditions

The time for the 915 Alarm Console to alarm will depend on the size and geometry of the tank in which it is installed and the rate of the delivery of fuel, sales or loss of fuel due to a leak. The time to alarm can be calculated by dividing the volume necessary to reach the threshold by the fill rate.

Morrison Bros. Co. 915HB Remote Horn with Beacon

When connected to a 915 Series Alarm Console, the 915S Solenoid Unit closed its solenoid valve when a liquid exceeds the threshold of a 915 Sensor.

Morrison Bros. Co. 915S and 915ST Solenoid Valve Unit

When connected to a 915 Series Alarm Console, the 915S/915ST Solenoid Unit opens or closes its solenoid valve when a liquid exceeds the threshold of a 915 Sensor.

Table 1. Test Results for the Morrison Bros. Co. 915 Alarm Console and Sensor**Test Results for the Morrison Bros. 915 Sensor**

Run #	**Height at Alarm(inches)		
	Water	Diesel	Waste Oil
1	1.422	1.584	1.630
2	1.427	1.589	1.633
3	1.419	1.583	1.632
4	1.424	1.586	1.634
5	1.437	1.587	1.630
6	1.441	1.591	1.631
7	1.438	1.588	1.630
8	1.442	1.590	1.632
9	1.440	1.586	1.628
10	1.447	1.582	1.635

Mean	1.4337	1.5866	1.6315
STDEV	0.0098	0.0030	0.0021
Threshold	1.4647	1.5961	1.6382

*Detection Time for any Liquid - immediate

*Fall Time for any Liquid – immediate

** “Height at Alarm” refers to the depth of the liquid measured from the bottom of the sensor at the time of the alarm.

5.0 Conclusions

1. The 915 Series Alarm Console indicates an alarm when the liquid level exceeds the alarm threshold of the 915 Sensor.
2. The 915HB Remote Horn with Beacon indicates an alarm, when connected to the 915 Series Alarm Console, when the liquid level exceeds the alarm threshold of the 915 Sensor.
3. When connected to a 915 Series Alarm Console, the 915S Solenoid Unit closes its solenoid valve when any liquid exceeds the threshold of a 915 Sensor.
4. When connected to a 915 Series Alarm Console, the 915ST Solenoid Unit opens its solenoid valve when any liquid exceeds the threshold of a 915 Sensor.

Attachment A

Results Forms for the Morrison Bros. Co. Sensor

915 Alarm Console and 915 Sensor

Results of U.S. EPA Alternative Evaluation

Liquid Level Sensor

This form documents the performance of the liquid level sensor described below. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's requirements for alternative protocols. The full evaluation report also includes a report describing the method, a description of the evaluation procedures, and a summary of the test data.

Tank owners using this system should keep this form on file to prove compliance with the federal regulations. Tank owners should check with state and local agencies to make sure this form satisfies their requirements.

Method Description

Name Morrison Bros. Co. Liquid Sensors

Version number(s) 915 Series Alarm Console, 915 Sensor, 915HB Remote Horn with Beacon, 915S Solenoid Unit and 915ST Solenoid Unit

Vendor Morrison Bros. Co.

(Name of Manufacturer)

570 East 7th Street

(Address)

Dubuque

(City)

IA

(State)

52001

(Zip Code)

(563) 583-5701

(Phone)

Evaluation Parameters

The sensor listed above was tested for the abilities to respond to liquids when the sensor is installed in underground storage tank applications. The following parameters were determined from this evaluation.

Threshold Levels – The liquid levels at which alarms are triggered.

Precision (standard deviation) - Agreement between multiple measurements of the same product level.

Detection Time - Amount of time the detector must be exposed to product before it responds.

Fall Time - Amount of time before the detector stops responding after being removed from the product.

Specificity - Types of products that the sensor will respond to.

Evaluation Results

Note: If the test data can be presented in a more appropriate manner, the evaluator may select to present the information below in a data table, which can be attached to these forms.

Morrison Bros. 915 Sensor Evaluation Results

Table 1. Results of the 915 Sensor with Water

Parameter	Data
Threshold Level (inches)	1.4647
Precision - Standard Deviation (inches)	0.0098
Detection Time (minute)	Immediate
Fall Time (minute)	Immediate

Table 2. Results of the 915 with Diesel

Parameter	Data
Threshold Level (inches)	1.5961
Precision - Standard Deviation (inches)	0.0030
Detection Time (minute)	Immediate
Fall Time (minute)	Immediate

Table 3. Results of the 915 with Waste Oil

Parameter	Data
Threshold Level (inches)	1.6382
Precision - Standard Deviation (inches)	0.0021
Detection Time (minute)	Immediate
Fall Time (minute)	Immediate

Specificity – The sensors will respond to any liquid after the threshold is exceeded.
This testing was specifically done to determine performance using water, diesel fuel and waste oil.

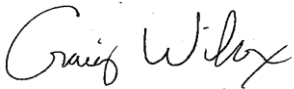
Additional Limitations or Considerations - None

> Safety Disclaimer: This test procedure only addresses the issue of the methods ability to respond to liquids. It does not test the equipment for safety hazards.

Certification of Results

I certify that the liquid level sensor was tested under conditions according to the vendor's operating instructions. I also certify that the evaluation was performed using methods described in the attached Alternative EPA Test Procedures for Liquid level sensors, and that the results presented above are those obtained during the evaluation.

Craig D. Wilcox, President
(printed name)



(Signature)

Ken Wilcox Associates, Inc.
(organization performing evaluation)

Grain Valley, MO 64029
(city, state, zip)

February 21, 2020
(date)

(816) 443-2494
(phone number)

Laboratory Data

Test Results for the Morrison Bros. 915 Sensor

Run #	Height at Alarm(inches)		
	Water	Diesel	Waste Oil
1	1.422	1.584	1.630
2	1.427	1.589	1.633
3	1.419	1.583	1.632
4	1.424	1.586	1.634
5	1.437	1.587	1.630
6	1.441	1.591	1.631
7	1.438	1.588	1.630
8	1.442	1.590	1.632
9	1.440	1.586	1.628
10	1.447	1.582	1.635

Mean	1.4337	1.5866	1.6315
STDEV	0.0098	0.0030	0.0021
Threshold	1.4647	1.5961	1.6382

***Detection Time for any Liquid - immediate**

***Fall Time for any Liquid - immediate**