1218S Sensor

Installation, Operation, and Maintenance Instructions

The 1218S Sensor is designed to be connected to a 1218C Console and when used together, will measure liquid level in an aboveground storage tank. The Sensor mounts on top of the tank and is activated by a float connected to a cable. The Sensor also has two dry contact, intrinsically safe inputs for additional simple switch inputs.

WARNING: *This is an intrinsically safe device and must be wired in accordance with National Electrical Code Article 500. This device and its wiring may not share any junction box, conduit, or raceway with any other type circuit or wiring. Do not perform live maintenance. Do not substitute components with anything other than Morrison Bros. Co. components. Care must be taken to avoid an ignition hazard from impact or friction with the enclosure.*

AVERTISSEMENT: *Cet appareil intrinsèquement sécuritaire doit être branché conformément à l'article 500 du code électrique national. Il se peut que ce dispositif et son câblage ne partagent pas de boîte de connexion, de conduit ou de canalisation avec un autre type de circuit ou de câblage. Ne menez pas de travaux de maintenance sous tension. Ne remplacez les composantes que par des composantes de Morrison Bros. Co. Assurez-vous d'éviter le risque d'inflammation pouvant découler d'un impact ou de friction avec l'enceinte.*

Maximum Wiring Distance

Maximum wiring distance between the 1218C Console and the 1218S Sensor is 1000 ft.

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.

Le fait de ne pas se conformer à l'un ou l'autre des avertissements ou à l'une ou l'autre des directives apparaissant dans ce document pourrait donner lieu à des déversements de liquides dangereux, lesquels pourraient engendrer des dommages matériels, des risques de contamination environnementale, d'incendie ou d'explosion, des blessures graves ou la mort.

NOTE: The most accurate method to calibrate the tank is with fluid in it. This will take into account variables associated with the float position, the mechanism, and the fluid density.

Inspection of the Unit Upon Arrival

It is recommended that the system be inspected for shipping damage upon arrival at the site. Perform a quick check of the Sensor by doing the following.

1. **DO NOT REMOVE THE COVERS.**
2. Inspect each Sensor. Each box should contain one Sensor and one float. Also, in the box will be a bag containing these instructions, 8 wire nuts, and a small tube of adhesive. Make certain that none of the items were damaged. (See Figure 1)
3. Also inspect the exterior of the sensor for signs of damage. Check cable washer at the end of the 1" connection pipe, make sure that the washer is tight against the white bushing in the end of the pipe. If the cable washer is not tight against the white bushing, or if the cable can be pulled out of the pipe, the Sensor must be returned to Morrison Bros. Co. for repair.

Figure 1

WARNINGS

- **Fire Hazard –** Death or serious injury could result from spilled liquids.
- You must be trained to install or maintain this Electronic Tank Gauge. **Stop** now if you have not been trained.
- 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.
- 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.
- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing maintenance. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on tank system.
- Use a dampened cloth when cleaning the alarm enclosure to prevent static buildup and discharge.
- In the event of malfunction, contact Morrison Bros. Co. Customer Service.

AVERTISSEMENTS

- **Risque d'incendie –** Un déversement de liquide pourrait entraîner des blessures graves ou la mort.
- Vous devez avoir reçu une formation pour installer cette jauge de réservoir électronique ou en assurer la maintenance. Arrêtez-vous immédiatement si vous n'avez reçu aucune formation à cet effet.
- Toutes les modifications apportées à cette unité autres que celles indiquées dans ces directives engendreront l'annulation de la garantie du produit.
- Pour assurer votre sécurité, il est important de vous conformer à la réglementation locale, d'État, fédérale ou OSHA régissant les travaux à l'intérieur, au-dessus ou autour du réservoir de stockage et de la zone de canalisation. Utilisez tout l'équipement de protection individuelle exigé pour travailler dans l'environnement spécifique.
- Cet appareil est destiné à être utilisé comme mécanisme avertissant l'opérateur d'un état anormal du système tel une situation de remplissage excessif et ne devrait pas être le seul système en place pour empêcher un état indésirable, par exemple, un réservoir qui se remplit trop. L'opérateur a l'entière responsabilité de s'assurer continuellement de prévenir tout déversement, quelle que soit la situation.
- Les réservoirs pourraient être sous pression. Des vapeurs pourraient être expulsées des conduits d'aération, des canalisations, des soupapes ou des raccords du réservoir durant la maintenance. Les vapeurs pourraient s'enflammer ou engendrer une explosion. Évitez les étincelles, les flammes nues ou les outils chauds lors de travaux menés dans le système du réservoir.
- Utilisez un linge humide pour nettoyer l'enceinte de l'alarme afin de prévenir l'accumulation d'électricité statique et les décharges.
- En cas de défaillance, communiquez avec le service à la clientèle de Morrison Bros. Co.

Steps

1. **DO NOT REMOVE THE COVERS.**
2. Locate the opening on the top of the tank where the Sensor is to be installed (minimum opening size is 2" schedule 40 pipe). 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, upon which the float and cable could get tangled. The Sensor location **CANNOT** interfere with the normal operation of the tank.
3. **NOTE:** Once an opening is selected, use a tank stick or gauging tape to determine the current liquid level height in the tank. Record this liquid level as you will need it to set the gauge once it is installed. **Failure to use the actual measured liquid level, when calibrating the system, will cause inaccurate tank readings.**
4. Carefully lay the Sensor head on the top of the tank, near your selected tank opening.
5. Attach the necessary pipe bushing to adapt the 1" Sensor connection pipe to the connection on the tank opening. Teflon tape has been applied to the male threads on the Sensor connection pipe to create a seal with the pipe bushing. **DO NOT use pipe dope as this may get on the Sensor cable and cause a malfunction.**
6. Next you need to attach the float to the cable screw on the end of the Sensor cable. Using the small tube of adhesive provided, place a drop or two of the adhesive onto the male threads, of the cable screw. Thread the float onto the cable screw and, while using pliers to carefully hold the float connector, snug the float onto the cable screw (See Figure 2). **NOTE: BE CAREFUL not to damage the cable with the pliers.**

Figure 2

7. At this point the front cover should still be installed and the cable should be locked, unable to be pulled out from the Sensor. If the cable is **not** locked but the covers remain in the Sensor, the unit may need to be returned to Morrison Bros. Co. for re-calibration.
8. With the Sensor lying on top of the tank, using the steps below, remove the Cover with the yellow sticker on it. This cover contains the lock mechanism for the pulley and cable.
    a. Remove the retaining ring with a flat head screwdriver (See Figure 3).
    b. With the retaining ring removed, lift and remove the back cover. Use the tab on the yellow sticker or a flat head screwdriver for leverage (See Figure 4). **DO NOT TWIST the cover when removing it from the Sensor.**
    c. **DO NOT** remove the O-Ring when removing the cover, make sure it stays in place,

Figure 3

Figure 4

9. With the cover removed, the pulley lock mechanism is driven by the shipping stud, remove this stud and discard (See Figure 5).
10. The cable should be taught with no slack. **DO NOT** pull the float or cable out and release or let it back in rapidly! **IF** checking the tension on the cable, do so carefully and slowly; always keep hold of the cable.
    a. **IF THE CABLE COMES OFF THE PULLEY, THE SENSOR CANNOT BE REPAIRED IN THE FIELD! IT MUST BE RETURNED TO MORRISON BROS. CO. FOR RE-CALIBRATION.**

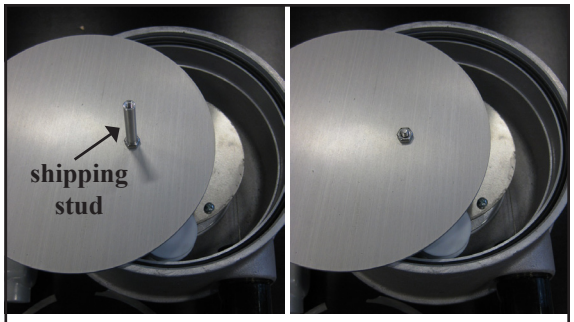

Figure 5

11. **CAREFULLY** place the float through the tank opening and guide the cable through your fingers letting the cable slide through slowly (See Figure 6). **DO NOT** allow the float to free fall into the tank as this will cause the cable to come off the pulley mechanism and render the gauge inoperable. **NOTE: Make certain that when lowering the float, that the cable DOES NOT rub on the edge of the tank opening and that you DO NOT get any pipe dope on the cable.**

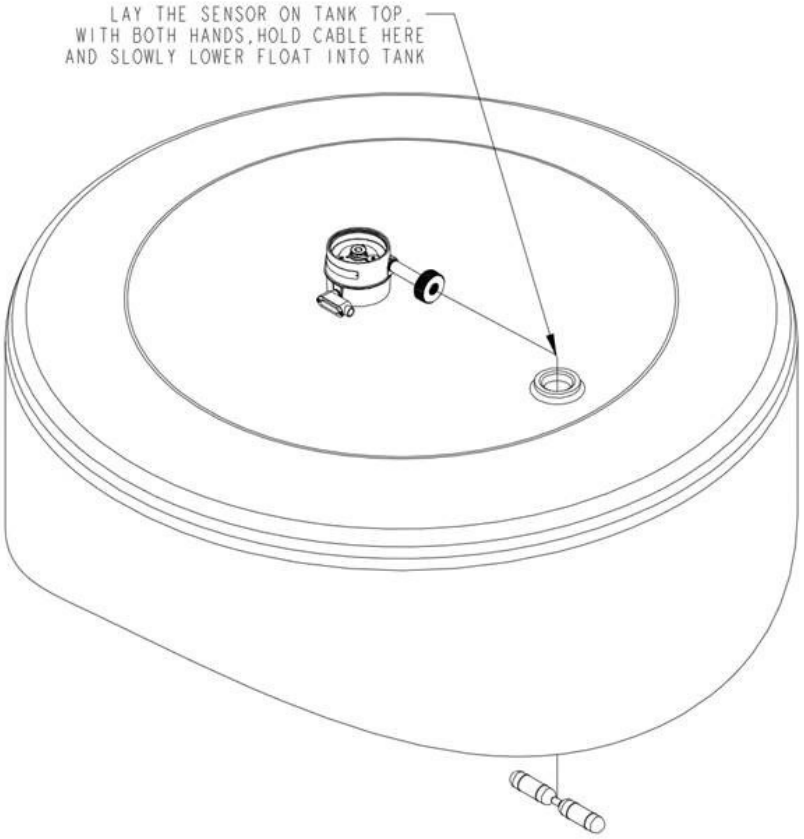

Figure 6

12. Once the float is resting on the liquid level (or tank bottom if the tank is empty) apply Teflon tape to the adapter bushing on the bottom of the Sensor connection pipe. **DO NOT use pipe dope as this may get on the Sensor cable and cause a malfunction.**
13. Lift the Sensor to the vertical position and thread the adapter bushing into your tank opening. **Make certain that you do not allow any excess slack in the cable or kink the cable in any way.** Once you have threaded the Sensor into the tank opening hand tight, use a pipe wrench or strap wrench, on the 1" Sensor connection pipe, to complete tightening. Torque threads to 75-85 ft-lbs.
14. Check the cable one more time to make sure it is taught around the pulley. Check to ensure the shipping stud was removed, then replace the cover that held the shipping stud.
    a. Place the cover on top of the o-ring and install the retaining ring into the retaining ring groove. Use pliers to squeeze the retaining ring completely into the groove (see Figure 7).
15. Once the cover is re-installed, the yellow sticker can be removed and thrown away.

Figure 7

Steps to Wiring OPTIONAL Inputs to the 1218S Sensor

The 1218S Sensor has two dry contact, intrinsically safe inputs for additional simple switch inputs. These are optional. If you choose to use these please follow the steps below.

1. Remove the cover to the wiring junction box on the side of the Sensor (see Figure 8).
2. Locate the Red/Black wire pairs labeled P1 and P2.
3. Use secure wire nuts to connect the wires from your simple switch device(s) to the P1 or P2 pairs. Note: one Red and one Black wire should go to each device.

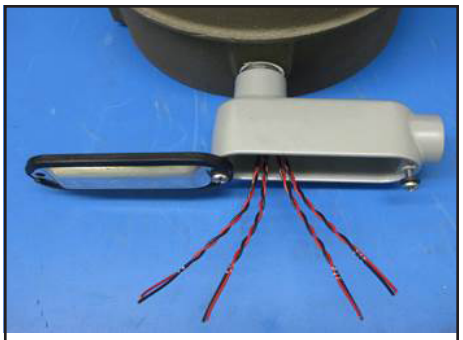

Figure 8

IMPORTANT: *You must follow the wiring diagram and the entity parameters shown on the Control Drawing, located at the back of this document.*

Wiring to the 1218C Console: See pages 7 & 8 of the 1218C Electronic Tank Gauge Installation, Operation, and Maintenance Instructions.

For Level Calibration: See page 16 of the 1218C Electronic Tank Gauge Installation, Operation, and Maintenance Instructions.

Copies of all of the 1218S and 1218C Installation, Operation, and Maintenance Instructions can be found online at www.morbros.com.

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Maintenance

This Sensor should be maintained per applicable codes or at least once each year.

WARNINGS

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- Tanks could be under pressure. Vapors could be expelled from tank vents, piping, valves or fittings while performing maintenance. Vapors could catch fire or cause an explosion. Avoid sparks, open flame, or hot tools when working on tank system.
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- Vous devez avoir reçu une formation pour installer cette jauge de réservoir électronique ou en assurer la maintenance. Arrêtez-vous immédiatement si vous n'avez reçu aucune formation à cet effet.
- Pour assurer votre sécurité, il est important de vous conformer à la réglementation locale, d'État, fédérale ou OSHA régissant les travaux à l'intérieur, au-dessus ou autour du réservoir de stockage et de la zone de canalisation. Utilisez tout l'équipement de protection individuelle exigé pour travailler dans l'environnement spécifique.
- Les réservoirs pourraient être sous pression. Des vapeurs pourraient être expulsées des conduits d'aération, des canalisations, des soupapes ou des raccords du réservoir durant la maintenance. Les vapeurs pourraient s'enflammer ou engendrer une explosion. Évitez les étincelles, les flammes nues ou les outils chauds lors de travaux menés dans le système du réservoir.
- Utilisez un linge humide pour nettoyer l'enceinte de l'alarme afin de prévenir l'accumulation d'électricité statique et les décharges.
- En cas de défaillance, communiquez avec le service à la clientèle de Morrison Bros. Co.

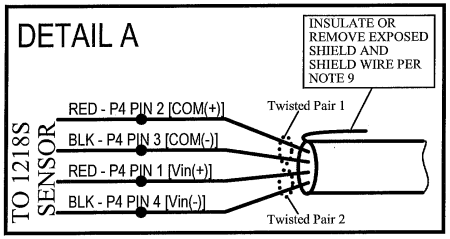
Steps

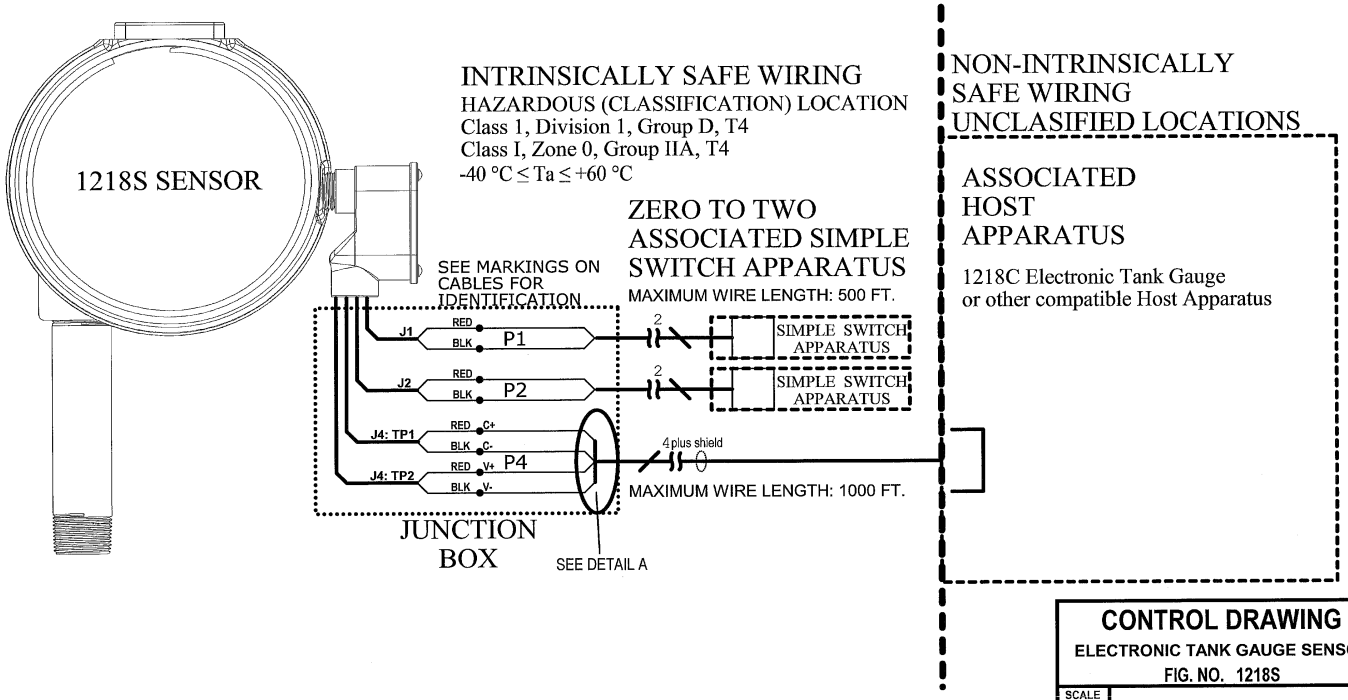
1. Visually inspect the gauge for damage or excessive wear. If either is found the Sensor should be replaced or returned to Morrison Bros. Co. for inspection and possible repair.
2. Remove the face plate located on the same side of the Sensor as the connection pipe to the tank. Removing this cover will expose the pulley mechanism.
3. Inspect the pulley mechanism for any signs of corrosion. If any corrosion is found, the Sensor should be replaced or returned to Morrison Bros. Co. for inspection and possible repair.
4. Check to see that the cable is wound around the pulley and that there is no slack in the cable. If there is any slack in the cable, the Sensor should be replaced or returned to Morrison Bros. Co. for inspection and possible repair.

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.

Le fait de ne pas se conformer à l'un ou l'autre des avertissements ou à l'une ou l'autre des directives apparaissant dans ce document pourrait donner lieu à des déversements de liquides dangereux, lesquels pourraient engendrer des dommages matériels, des risques de contamination environnementale, d'incendie ou d'explosion, des blessures graves ou la mort.

TERMINAL	INTRINSIC SAFETY PARAMETER		
P4	V_{MAX} =	6.51	VDC
	I_{MAX} =	1.08	A
	P_{MAX} =	1.13	W
	Ci =	160	µF
	Li =	200	µH
P1 P2	V_{OC} =	7.14	VDC
	I_{SC} =	1.08	A
	P_O =	1.13	W
	Ca =	30	ηF
	La =	100	µH





CONTROL DRAWING ELECTRONIC TANK GAUGE SENSOR FIG. NO. 1218S	MORRISON BROS. CO. DRAWN: RJ GABLE DATE: JUN-27-16 CHECKED: DATE: 12/13/16
SCALE N/A	PART I.D. NO. **1218S-0106 PP**
	DWG. NO. B-7773-6_UL SHEET 1 OF 2

NOTES:

WARNING: Substitution of components may impair intrinsic safety.

AVERTISSEMENT: La substitution des composantes pourrait compromettre la sécurité intrinsèque.

WARNING: To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

AVERTISSEMENT: Afin de prévenir l'inflammation ou les atmosphères combustibles, débranchez l'alimentation électrique avant de faire l'entretien.

1. Associated apparatus output current must be limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
2. The device complies with following standards;
   - CSA C22.2 NO. 157-92 INTRINSICALLY SAFE AND NON-INCENDIVE EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS- Edition 3- Revision Date 2006/01/01
   - CSA C22.2 NO. 14-13 INDUSTRIAL CONTROL EQUIPMENT - Edition 12 - Issue Date 2013/03/01 – Equivalent Applicable Ordinary Locations Requirements in Sections 4 and 5
   - UL 913 STANDARD FOR INTRINSICALLY SAFE APPARATUS AND ASSOCIATED APPARATUS FOR USE IN CLASS I, II, III, DIVISION 1, HAZARDOUS (CLASSIFIED) LOCATIONS- Edition 8 -Issue Date 2013/12/06
   - UL 508 STANDARD FOR IoNDUSTRIAL CONTROL EQUIPMENT - Edition 17 - Revision Date 2013/10/16 - Applicable Ordinary Locations Requirements Evaluation per UL 508 Part I in Support of Hazardous Locations Certifications
3. Associated apparatus may be in a Division 2 or Zone 2 location if so approved.
4. Selected associated apparatus must be third party listed as providing intrinsically safe circuits for the application, and have Voc or Vt not exceeding Vmax (or Uo not exceeding Ui), Isc or It not exceeding Imax (or Io not exceeding Ii), and the Po of the associated apparatus must be less than or equal to the Pmax or Pi of the intrinsically safe equipment, as shown in Table 1.
5. Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci, must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used:
   Ccable = 60 pF/ft., Lcable = 0.2 µH/ft.

   TABLE 1:

I.S. Equipment		Associated Apparatus
V max (or Ui)	≥	Voc or Vt (or Uo)
I max (or Ii)	≥	Isc or It (or Io)
P max (or Pi)	≥	Po
Ci + Ccable	≤	Ca (or Co)
Li + Lcable	≤	La (or Lo)

   If Po of the associated apparatus is not known, it may be calculated using the formula
   Po = (Voc * Isc)/4 = (Uo * Io)/4.

6. Associated apparatus must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.
7. When required by the manufacturer's control drawing, the associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code, or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
8. Where multiple circuits extend from the same piece of intrinsically safe equipment (1218S) to associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.
9. Associated apparatus must not be used in combination unless permitted by the associated apparatus certification.
10. Insulate or remove exposed shield and shield wire at the device.

Suitability for installation in particular applications is at the discretion of the Authority Having Jurisdiction (AHJ)

WARNING:
This is an intrinsically safe device and must be wired in accordance with National Electrical Code Article 500. This device and its wiring may not share any junction box, conduit, or raceway with any other type circuit or wiring. Do not perform live maintenance. Do not substitute components with anything other than Morrison Bros. Co. components. Care must be taken to avoid an ignition hazard from impact or friction with the enclosure.

AVERTISSEMENT:
Cet appareil intrinsèquement sécuritaire doit être branché conformément à l'article 500 du code électrique national. Il se peut que ce dispositif et son câblage ne partagent pas de boîte de connexion, de conduit ou de canalisation avec un autre type de circuit ou de câblage. Ne menez pas de travaux de maintenance sous tension. Ne remplacez les composantes que par des composantes de Morrison Bros. Co. Assurez-vous d'éviter le risque d'inflammation pouvant découler d'un impact ou de friction avec l'enceinte.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
AVERTISSEMENT : LA SUBSTITUTION DES COMPOSANTES POURRAIT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE.

Failure to follow operations manual could result in a malfunction of this system, which may lead to property damage, personal injury, or loss of life.

Entity Parameters For Terminal:

P1 P2	P4
Voc = 7.14 VDC	Vmax = 6.51 VDC
Isc = 1.08 A	Imax = 1.08 A
Ca = 30 ηF	Pmax = 1.13 W
La = 100 µH	Ci = 160 µF
Po = 1.13 W	Li = 200 µH

Intrinsically safe for use in Class I, Division 1, Group D, T4 Hazardous Locations and installed in accordance with control drawing B-7773-6_UL
SÉCURITÉ INTRINSÈQUE
Exia
-40°C ≤ Ta ≤ 60°C

Model No. 1218S

Serial No.
XXXXX

c UL us
LISTED
Tank Monitoring Equipment for use in Hazardous Locations
E314627

Manufactured by:
Morrison Bros. Co.
570 E. 7th Street
Dubuque, IA 52001

CONTROL DRAWING
ELECTRONIC TANK GAUGE SENSOR
FIG. NO. 1218S

MORRISON BROS. CO.

REV: D

SCALE
N/A

PART I.D. NO.
1218S-0106 PP

DWG. NO. **B-7773-6_UL** SHEET 2 OF 2