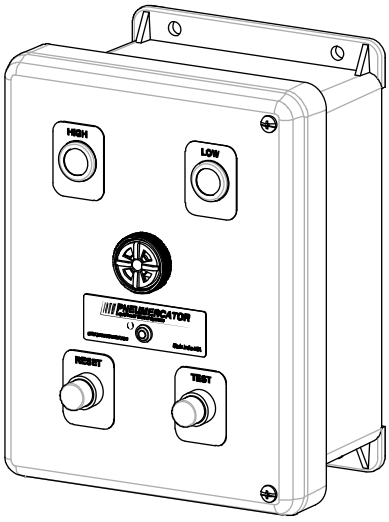
PNEUMERCATOR
Liquid Level Control Systems

AUDIBLE ALARM CONTROLS

INSTRUCTION MANUAL

Revised: February 19, 2020



DRAWING NO. 20215 REV. B

LC1000-A SERIES INTRINSICALLY SAFE ALARM CONSOLE

FM C US APPROVED

1785 EXPRESSWAY DRIVE NORTH
HAUPPAUGE, NY 11788

(631) 293-8450 Phone
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⚠ IMPORTANT SAFETY INFORMATION

This manual contains instructions for installing electrical hardware in hazardous-classified areas. The following warnings must be considered in order to comply with accepted codes. Any inquiries about this manual, or to return defective equipment should be directed to:

PNEUMERCATOR COMPANY
1785 EXPRESSWAY DRIVE NORTH
HAUPPAUGE, NY 11788
Attention: Technical Services
TEL: (631) 293-8450
FAX: (631) 293-8533
TOLL FREE: (800) 209-7858
www.pneumercator.com

⚠ IMPORTANTES INFORMATIONS DE SECURITE

Ce manuel contient des instructions pour l'installation du matériel électrique en zones classées dangereuses. Les avertissements suivants doivent être respectés afin de se conformer aux codes acceptés. Toute demande de renseignements concernant ce manuel, ou de retour d'équipement défectueux doit être adressée à:

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HAUPPAUGE, NY 11788
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⚠ INFORMACIÓN DE SEGURIDAD IMPORTANTE

Este manual contiene instrucciones para instalar hardware eléctrico en áreas clasificadas como peligrosas. Deben tenerse en cuenta las siguientes advertencias para cumplir con los códigos aceptados. Cualquier consulta sobre este manual o para devolver equipos defectuosos debe dirigirse a:

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TEL: (631) 293-8450
FAX: (631) 293-8533
TOLL FREE: (800) 209-7858
www.pneumercator.com

⚠ WARNING

Installation must be performed in strict accordance with this manual as adopted from the following documents:
- ISA RP12.6, "Installation of intrinsically Safe Instrument Systems in Class I Hazardous Locations."
- FM – FM Approvals
- NFPA 70, "National Electric Code."
- NFPA 30A, "Automotive and Marine Service Station Code."
FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

L'installation doit être effectuée en stricte conformité avec ce manuel tel qu'adopté à partir des documents suivants :
- **ISA RP12.6, "Installation de systèmes d'instruments à sécurité intrinsèque dans les zones dangereuses de classe I."**
- **Approbations FM – FM**
- **NFPA 70, « Code Electrique National ».**
- **NFPA 30A, « Code de Station-Service automobile et Maritime ».**

LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

La instalación debe realizarse en estricta conformidad con este manual tal como se adoptó de los siguientes documentos:
- **ISA RP12.6, "Instalación de sistemas de instrumentos intrínsecamente seguros en ubicaciones peligrosas de Clase I".**
- **FM - Aprobaciones FM**
- **NFPA 70, "Código Eléctrico Nacional".**
- **NFPA 30ª, "Código de estación de servicio automotriz y marino".**

EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

⚠ WARNING

Alteration, modification or replacement with non-factory components could impair the intrinsic safety of this equipment, void the warranty and void the FM Listing. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

Une altération, une modification ou un remplacement par des composants non fabriqués en usine pourrait compromettre la sécurité intrinsèque de cet équipement, annuler la garantie et annuler la liste FM. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

La alteración, modificación o reemplazo con componentes que no sean de fábrica podrían afectar la seguridad intrínseca de este equipo, anular la garantía y anular el listado de FM. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

SECTION 1 – PRODUCT DESCRIPTION

1.1 GENERAL SYSTEM OVERVIEW

The basic function of the Model LC1000-A Alarm console is to provide both audible and visual warning alarms at the occurrence of high, low, or leak conditions: typically via float switches, or any tank mounted sensing device that transmits an alarm condition by opening or closing dry switch contacts. The LC1000-A may also be used as a non-intrinsically safe remote alarm panel for any system that provides a dry contact relay output to represent a specific set of conditions. The console is equipped with an AutoSwitching Power Supply that supports 95-250 VAC. It is equipped with a Power LED and also provides 1 to 4 input channels each with a corresponding LED. Each input consists of a pair of intrinsically safe terminals for wiring to field mounted switches. The intrinsically safe inputs allow mounting the switches in explosion hazard environments without requiring additional protective barrier components in the wiring runs. For every input, there is a single dry contact relay output that can be used to signal a remote alarm device or control an external electrical device, such as a solenoid valve. Confirm the electrical specifications of the load do not exceed the maximum support of the relay output as listed in the Appendix in the back of this manual.

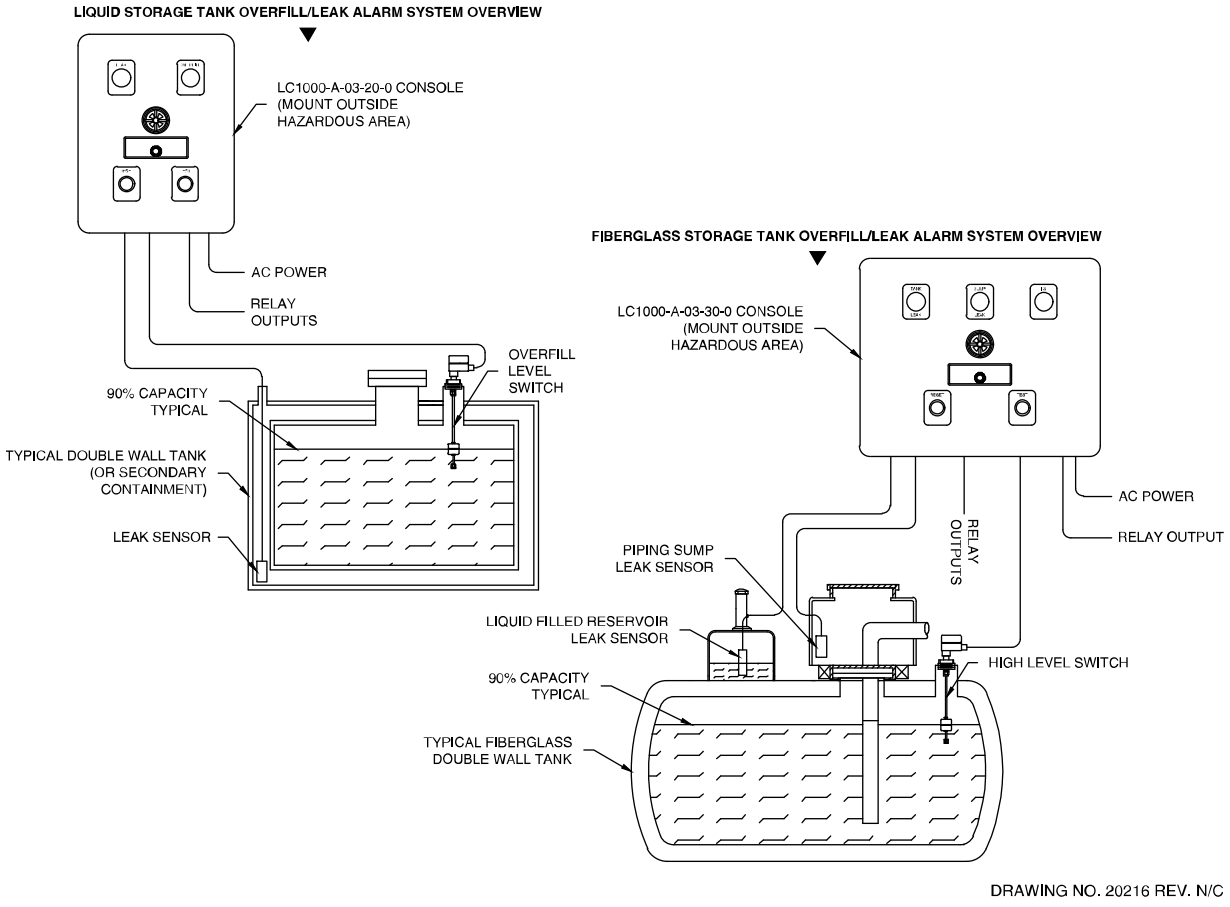


Figure 1-1 - LC1000-A Series Overview

1.2 CONTROL CONSOLE DESCRIPTION

The console is housed in a NEMA 4X (weather tight/corrosion resistant) FRP (fiberglass reinforced plastic) enclosure for mounting in the non-hazardous area. Each unit operates on 95-250 VAC power and provides from one (1) to four (4) intrinsically safe alarm channels for monitoring up to four independent sensing points. Bright red alarm LEDs, one for each channel, and a horn are mounted to the enclosure cover.

Each alarm channel is equipped with a 1 Form C output relay, totally isolated from the sensor inputs, for controlling external devices such as pumps (indirectly), valves or remote alarm annunciators. See Appendix in the back of this manual for the electrical specifications of the Relay Outputs. All field wiring is made through pressure-type terminal blocks enclosed under metal barriers to separate the power from the intrinsically safe wiring. Figures 1-2 and 1-3 illustrate the standard LC1000-A outline, mounting flange locations, and dimensions.

The console should be located in an area that is easily accessible to the personnel responsible for operation and maintenance of the system. Use only dedicated conduit entries for their designated purpose as specified in Figure 1-4. Metal conduiting is recommended and may be required by local codes. All outdoor conduits must be watertight.

⚠ WARNING

Installation MUST be performed by qualified personnel familiar with local wiring codes and explosion hazard electrical safety practices. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

L'installation DOIT être effectuée par un personnel qualifié connaissant les codes de câblage locaux et les pratiques de sécurité électrique contre les risques d'explosion. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

La instalación DEBE ser realizada por personal calificado que esté familiarizado con los códigos de cableado locales y las prácticas de seguridad eléctrica con riesgo de explosión. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

⚠ WARNING

This product is designed for Ordinary Location, Non-Hazardous classified installation only, as defined by FM Approvals (FM) and the National Electrical Code (NEC). DO NOT install where flammable vapors may be present. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

Ce produit est conçu pour un emplacement ordinaire, uniquement pour installations classées non dangereuses, telles que définies par les Approbations FM et le Code Electrique National (NEC). NE PAS installer là où des vapeurs inflammables peuvent être présentes. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Este producto está diseñado para la ubicación ordinaria, instalación clasificada no peligrosa solamente, según lo definido por las aprobaciones de FM (FM) y el Código Eléctrico Nacional (NEC). NO lo instale donde puedan estar presentes vapores inflamables. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

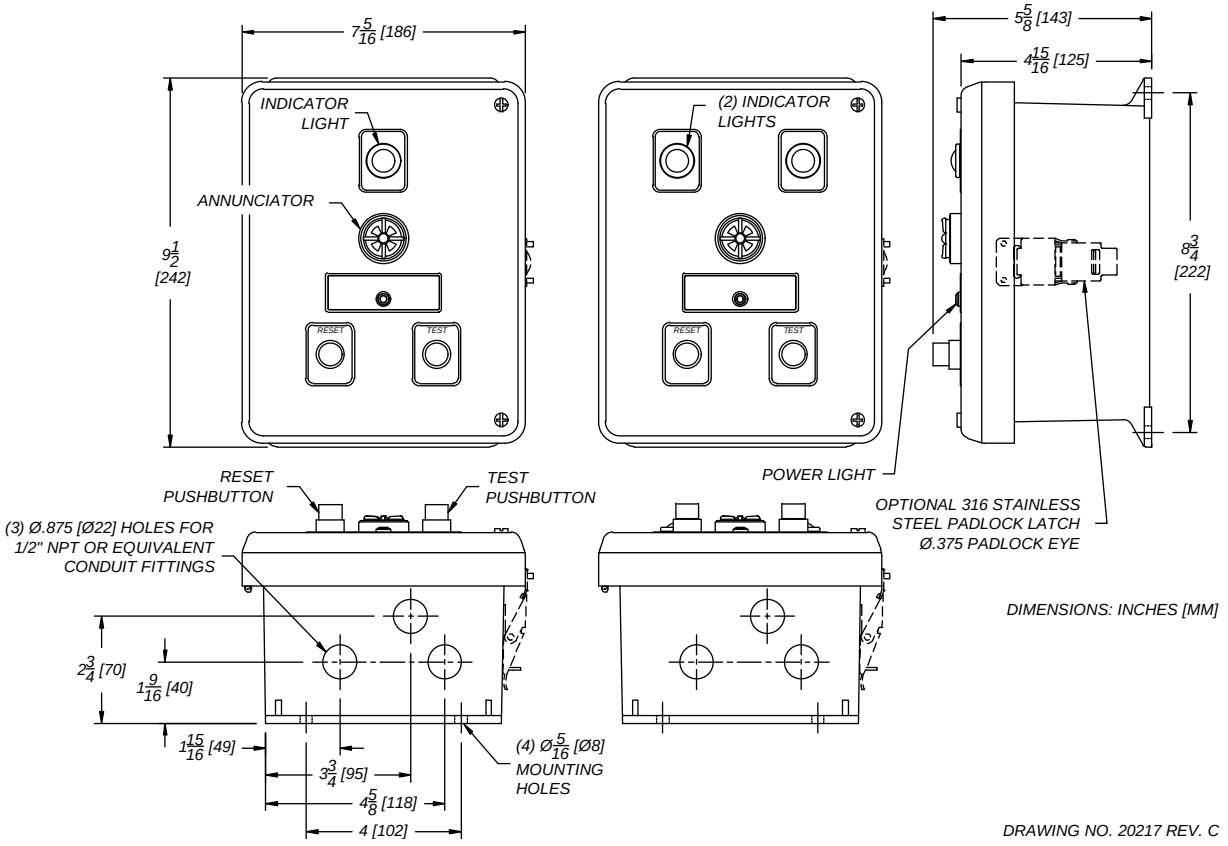


Figure 1-2 - LC1000-A Console Outline (1-2 Channel)

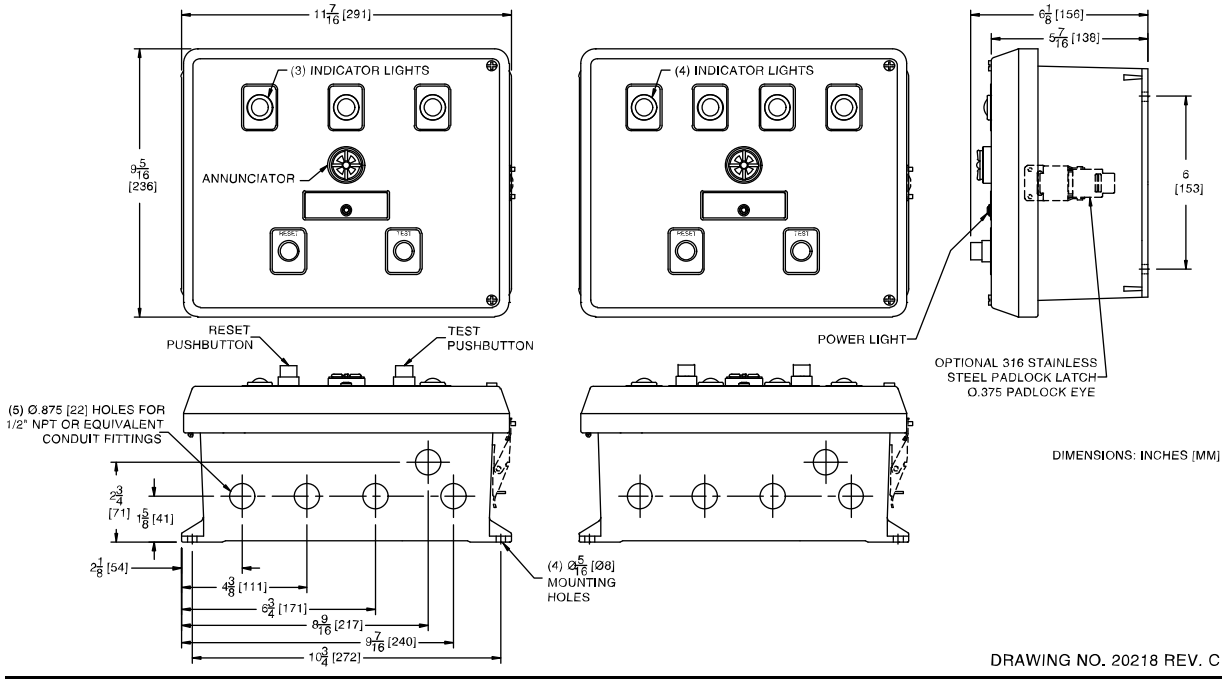


Figure 1-3 - LC1000-A Console Outline (3-4 Channel)

⚠ WARNING

Do not drill or modify enclosure. Use only conduit entries provided. FAILURE TO COMPLY WILL VOID WARRANTY AND MAY PRESENT A SAFETY HAZARD RESULTING IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

Ne percez pas et ne modifiez pas le boîtier. Utilisez uniquement les entrées de conduit fournies. LE NON-RESPECT ANNULERA LA GARANTIE ET PEUT PRÉSENTER UN DANGER DE SÉCURITÉ POUVANT ENTRAINER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

No taladre ni modifique el recinto. Utilice solo entradas de conducto proporcionadas. EL NO CUMPLIMIENTO ANULARÁ LA GARANTÍA Y PUEDE PRESENTAR UN PELIGRO DE SEGURIDAD RESULTANTE DE LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

⚠ WARNING

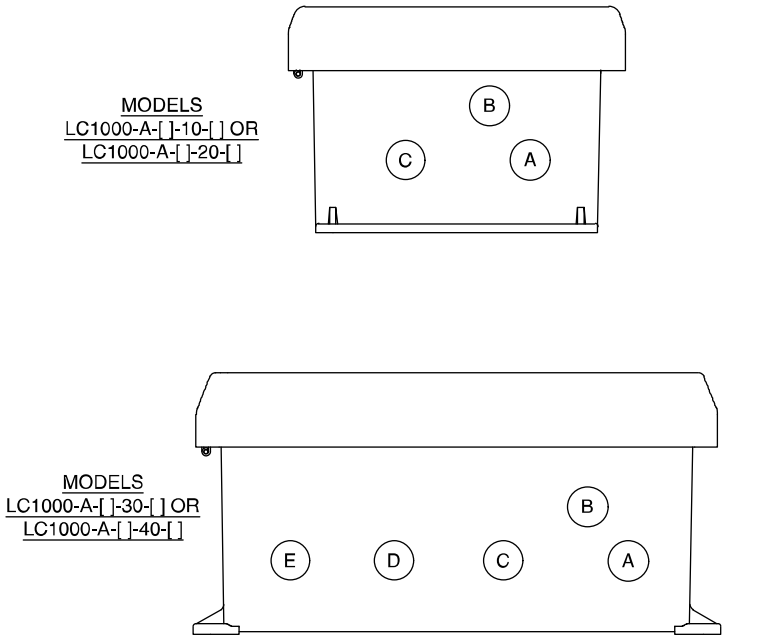
Conduit entries must only be used for their designated purpose in order to assure safe operation and to maintain safety certification. FAILURE TO COMPLY WILL VOID WARRANTY AND MAY PRESENT A SAFETY HAZARD RESULTING IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

Les entrées des conduits ne doivent être utilisées qu'aux fins prévues afin d'assurer un fonctionnement sûr et de maintenir la certification de sécurité. LE NON-RESPECT ANNULERA LA GARANTIE ET PEUT PRÉSENTER UN DANGER DE SÉCURITÉ POUVANT ENTRAINER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Las entradas de conducto solo deben usarse para su propósito designado a fin de garantizar un funcionamiento seguro y mantener la certificación de seguridad. EL NO CUMPLIMIENTO ANULARÁ LA GARANTÍA Y PUEDE PRESENTAR UN PELIGRO DE SEGURIDAD RESULTANTE DE LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.



NON-INTRINSICALLY SAFE CONDUIT OPENINGS AND DESIGNATED USES:

1/2" NPT CONDUIT SIZE *

ALL MODELS:
A = POWER AND EARTH GROUNDS
B = RELAY OUTPUT(S)
LC1000-A-[ ]-30-[ ] OR LC1000-A-[ ]-40-[ ]:
D = RELAY OUTPUTS

INTRINSICALLY SAFE CONDUIT OPENINGS AND DESIGNATED USES:

1/2" NPT CONDUIT SIZE *

ALL MODELS:
C = I.S. INPUT(S)
LC1000-A-[ ]-30-[ ] OR LC1000-A-[ ]-40-[ ]:
E = I.S. INPUTS

* OR EQUIVALENT

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Figure 1-4 - LC1000-A Conduit Usage

1.3 LIQUID SENSOR DESCRIPTION

The LC1000-A can be integrated with a variety of liquid sensors used for monitoring in-tank levels and secondary containment areas around tanks and pipes. The maximum is 4 sensors depending on the overall job configuration; check the specific job design drawings for the actual number and type specified. Figures 1-5 through 1-8 show four (4) sensor types provided by Pneumercator with their most typical applications. Other non-Pneumercator models may be used; however, their use with the LC1000-A should have been approved by Pneumercator and local regulators before attempting to wire them into the system.

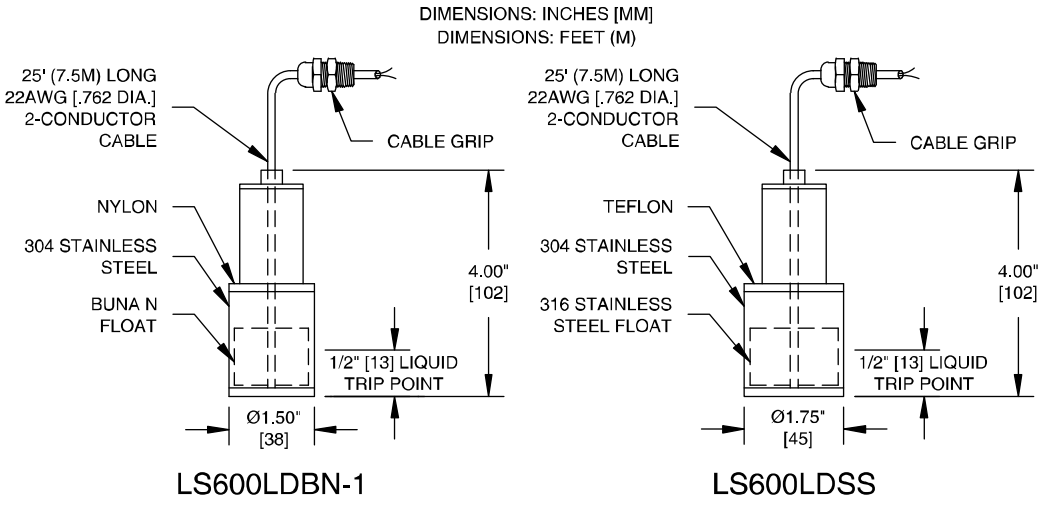


Figure 1-5 – LS600 LD Series
Commonly used in Sumps, Dispenser Pans, and Steel Tank Interstitial Spaces

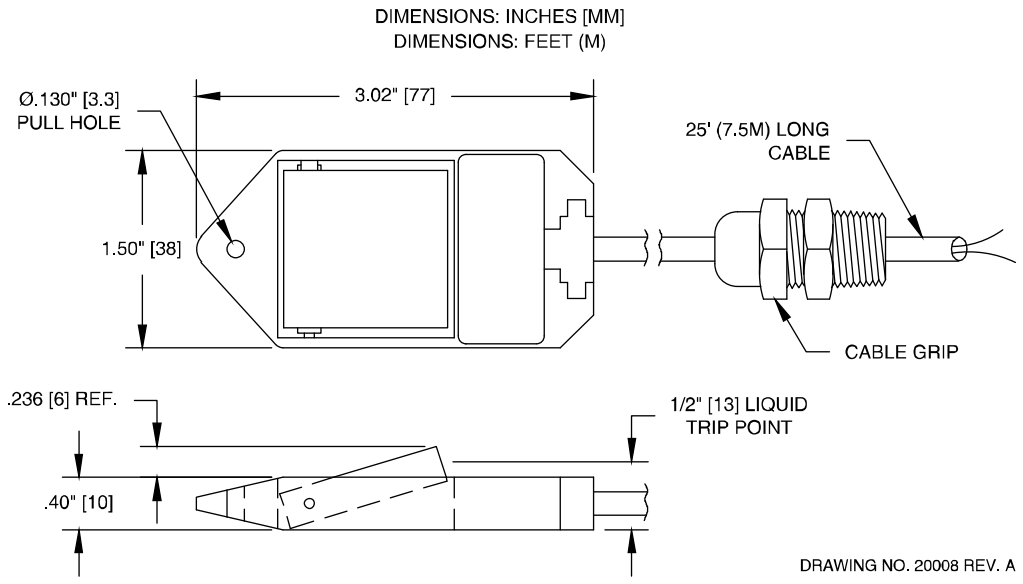


Figure 1-6 – LS610
Commonly used in Dry Interstitial Spaces of Fiberglass Tanks

MODEL SERIES		FEATURE [2] TEST LEVER	FIGURE OR OUTLINE DRAWING
LS600 [1]	S.S. OR BRASS STEM	NO	FIG. 1 (BELOW)
		YES	FIG. 2 (BELOW)
	PVC STEM	NO	10660
LS600F4	S.S. STEM	YES	10682

MODEL SERIES		FEATURE [2] TEST LEVER	FIGURE OR OUTLINE DRAWING
LS600M	S.S. STEM	NO	10620
LS600W	S.S. OR BRASS STEM	NO	FIG. 1 (BELOW)
LS600X	S.S. STEM	YES	10651
	PVC STEM	NO	10678

[1] Single float catalog lengths for 2" NPT STANDARD TANK MOUNT shown in price book. Sized using INCHES as the unit of measure. Multiply by 25.4 for MILLIMETERS (mm) equivalent for "S" (set point), "SL" (sensing length) and "L" (stem length) dimensions.
[2] See outline drawing 10702 for ADJUSTABLE stem (requires bushing/flange) or 10704 for RISER SPACER MOUNT. Consult factory for other features.
[3] Optional 150-pound mounting flange or quick release cap (not shown) is available upon request. Consult factory for flange/cap size availability.

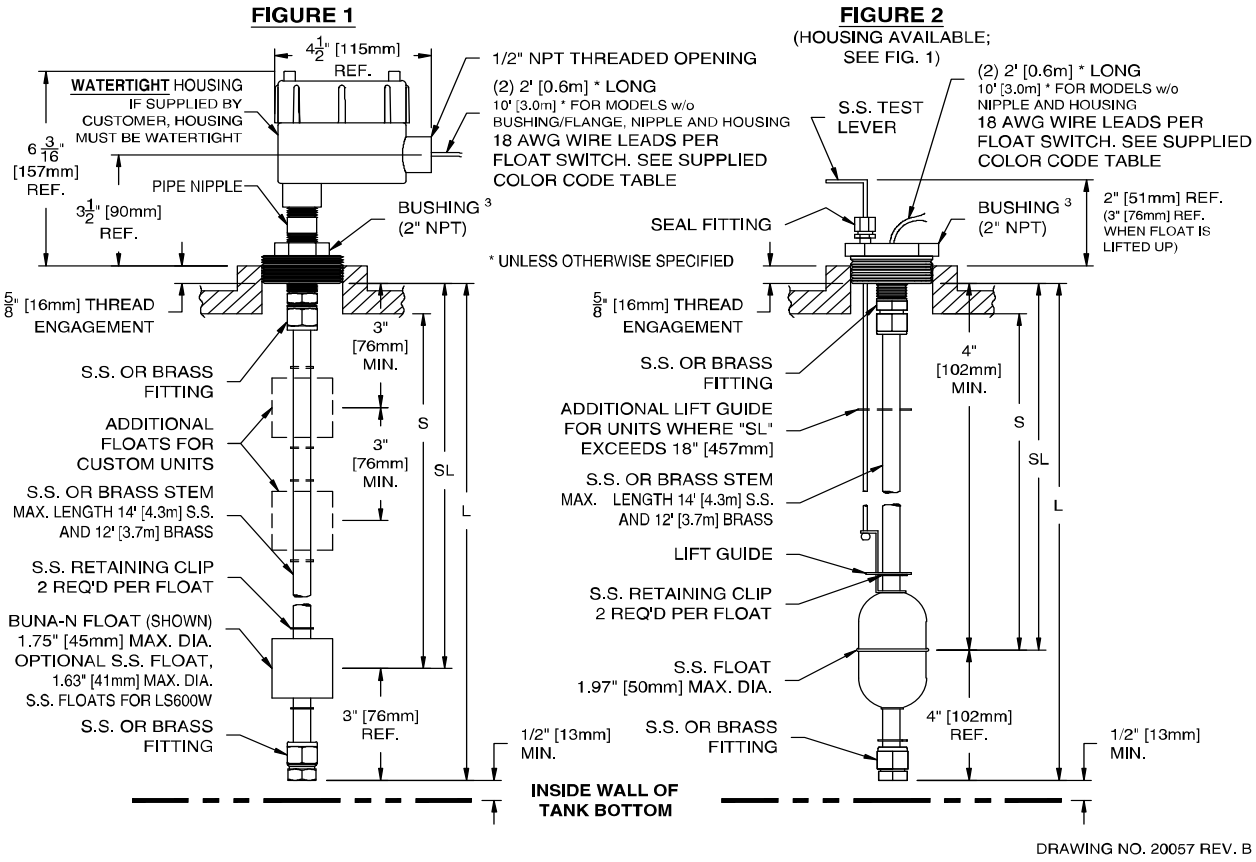


Figure 1-7 – LS600 Series

(Refer to Bulletin 193 for Installation/Operation/Testing Instructions)
Commonly used for Overfill Protection
May also be used for Low alarms and Indirect Pump On/Pump Off Conditions
See PC1000 literature for direct pump control applications

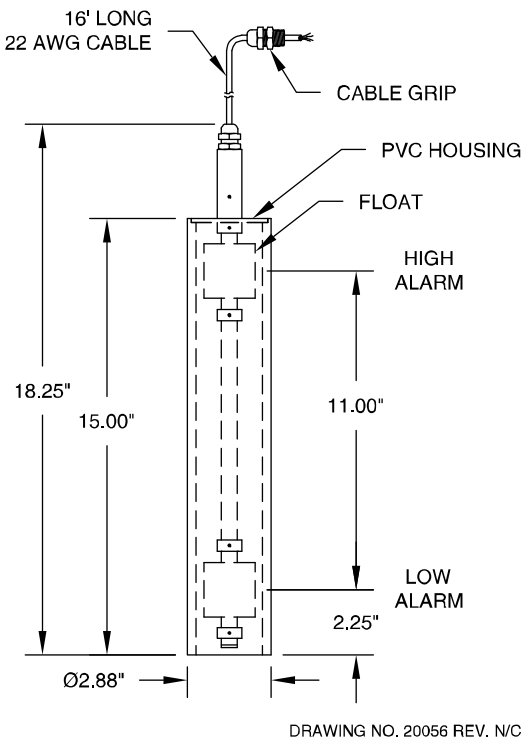


Figure 1-8 – RSU800

(Refer to Bulletin 134 for Installation/Operation/Testing Instructions)
Commonly used in Wet Interstitial Spaces of Fiberglass Tanks

SECTION 2 – INSTALLATION DETAILS

2.1 INSTALLATION CHECKLIST

⚠ WARNING

Do NOT apply power to this product until its installation has been checked and found to be in accordance with these instructions, National Electric Code, Federal, State and Local codes, and any other applicable safety codes. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

NE PAS alimenter ce produit tant que son installation n'a pas été vérifiée et jugée conforme à ces instructions, au Code Electrique National, aux codes Fédéral, Provincial et Local et à tout autre code de sécurité applicable. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

NO aplique energía a este producto hasta que su instalación haya sido verificada y se encuentre de acuerdo con estas instrucciones, el Código Eléctrico Nacional, los códigos federales, estatales y locales, y cualquier otro código de seguridad aplicable. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

The following points should be reviewed in preparation for installation, and again when installation is complete.

1. Review Figures 3-2 and/or 3-3 to ensure that all of the safety/wiring requirements have been met.

2. Check that all equipment at job site matches the DESIGN DRAWING SPECIFICATIONS for the tank sizes and control features required.

3. The console should be located as close as possible to the demarcation point of the hazardous area. **Never mount inside the hazardous area.** Note: If the LC1000-A was provided with a NEMA 7 Explosion-proof enclosure, then it is permitted to install the LC1000-A in the hazardous location provided that all fittings and conduit are explosion-proof and all applicable regulations are followed.

4. POWER to the console should be properly wired to a DEDICATED 120/240 VAC CIRCUIT BREAKER. No other equipment can be powered from the same circuit breaker as the LC1000-A console.

5. System cannot be connected to equipment that uses or generates more than 250 volts with respect to earth.

6. All LC1000-A grounds must be terminated at the GND BUSS BAR in the same service panel as LC1000-A power. A grounding rod, coldwater pipe or other connection should not be used.

7. **Do not drill or modify enclosure.** Use only conduit entries provided. Failure to comply will void warranty and may present a safety hazard.

8. WATERPROOFING FIELD WIRE SPLICES using factory supplied splice kits is required for proper system operation.

2.2 CONTROL CONSOLE INSTALLATION

The console is the center of operations for any tank monitor system therefore its location should be selected for the operator's convenience, or as specified on the DESIGN DRAWINGS.

Select a flat wall surface and prepare it with four wall-mounting inserts to accept up to 1/4-inch size bolts. Allow sufficient room for door to open and for conduit runs to enter ONLY THE CONSOLE BOTTOM. See Figures 1-2 or 1-3 for the appropriate console dimensions.

Note that the console is divided into two electrical areas:

INTRINSICALLY SAFE (LEFT SIDE)	NON INTRINSICALLY SAFE (RIGHT SIDE)
for Sensor signals and IS Earth Grounds	for Power and Control

Figures 2-1 and 2-2 show the console interior, again indicating the power and signal separation. THIS SEPARATION MUST BE MAINTAINED when conduits are connected. Refer to Section 3 for electrical conduit and wiring.

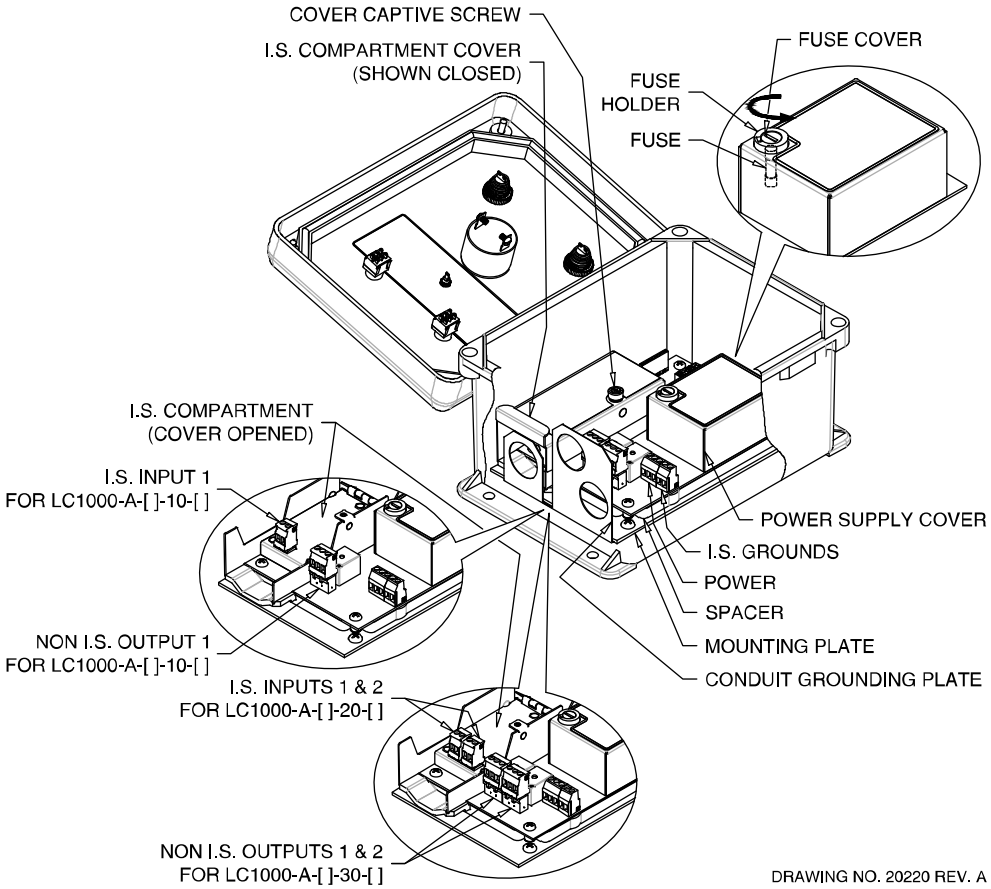


Figure 2-1 – LC1000-A Single Board Control Console Interior (2-channel configuration shown)

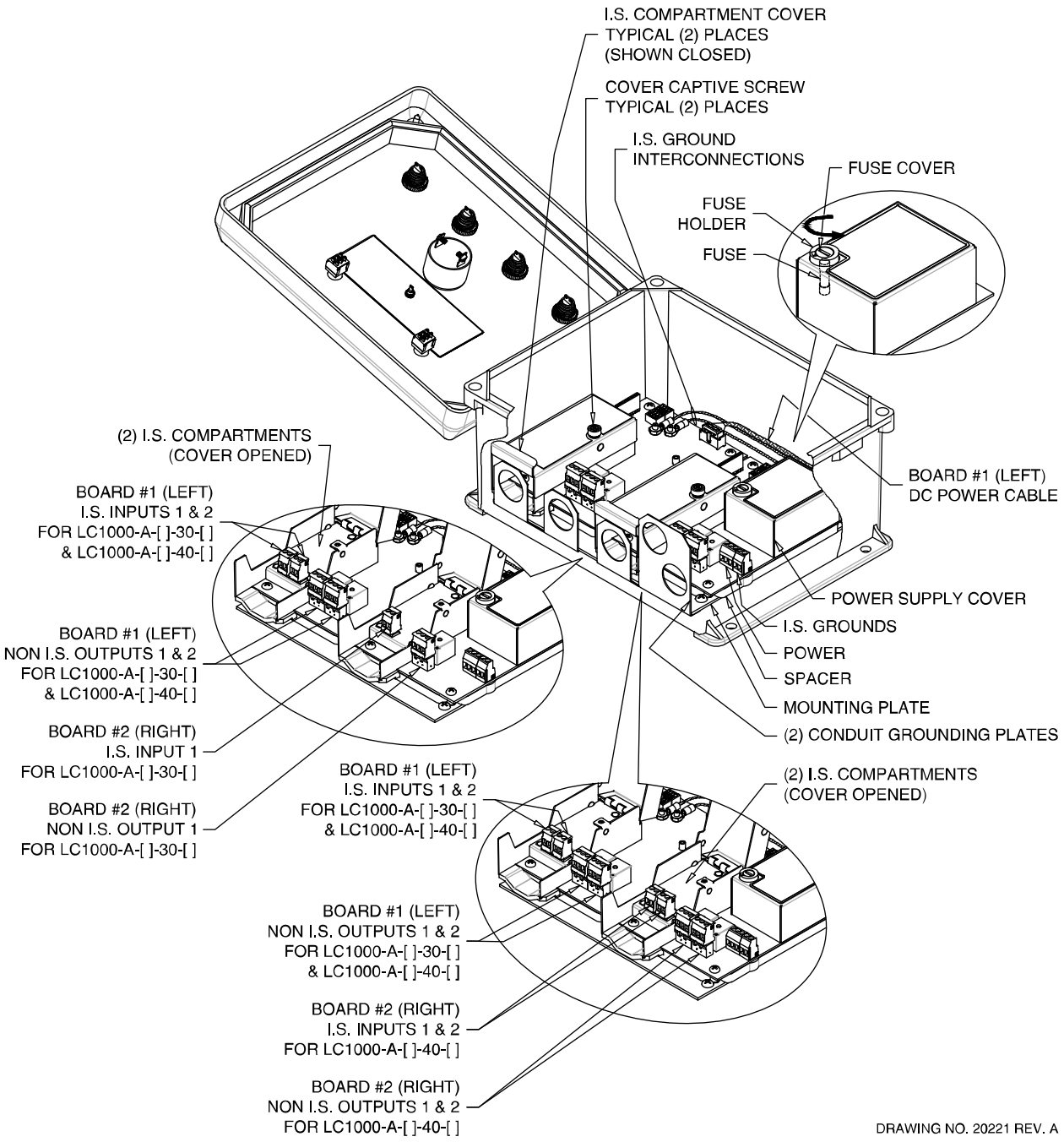


Figure 2-2 – LC1000-A Dual Board Control Console Interior
(4-channel configuration shown)

EXTERNAL LEAK SENSOR INSTALLATION

The interstitial or double-wall space of steel tanks and vaulted tanks as well as many other secondary containment areas can be fitted with leak sensors. Switch actuation may be factory set for either NORMALLY OPEN or NORMALLY CLOSED.

2.3 LEAK SENSOR INSTALLATION IN STEEL AND VAULTED TANKS

Check the specific design drawings for the job, or use the LS600LD Series as illustrated in Figure 1-5. Install sensor per Figure 2-3 as follows:

1. Remove the watertight CORD CONNECTOR supplied by sliding it off the sensor cable.
2. Thread the watertight CONNECTOR into the top of a 2" by 1/2" reducer bushing or monitor pipe cap pre-tapped for a 1/2" NPT hole. (The use of any standard monitor cap from 2" to 4" pipe size is recommended. The cap or reducer bushing IS NOT SUPPLIED with the sensor and must be provided by the installer. A 2” (SK2) or 4” (SK4) Sensor Cap Kit can be ordered separately from Pneumercator).
3. Measure the "MOUNTING HEIGHT" from top to bottom of monitoring pipe.
4. Feed the sensor cable through the watertight CONNECTOR from the BOTTOM SIDE of the REDUCER (or CAP) fitting to a cable length suitable for the MOUNTING HEIGHT; or to allow sensor to rest on the monitor pipe bottom; or as required by local codes. Cable may be cut or extended to proper length.
5. Re-tighten the CORD CONNECTOR to fix the sensor cable length.
6. Mate the REDUCER or CAP to the top of the monitor pipe. Tighten the CONNECTOR to ensure a WATERTIGHT SEAL.
7. Route the sensor cable to the junction box and complete the wiring installation in accordance with Section 3.

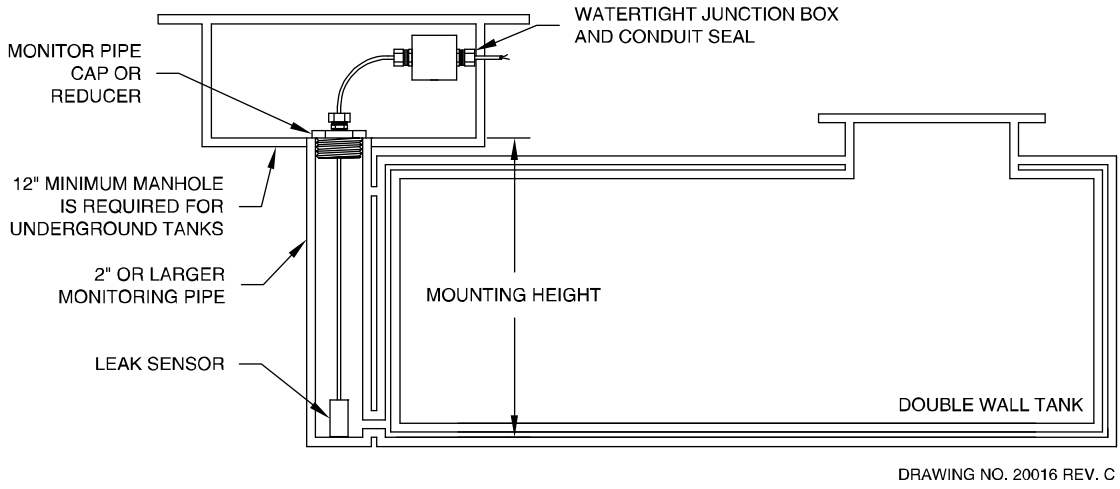


Figure 2-3 - Leak Sensor Installation - Steel Vaulted Tanks

2.4 LEAK SENSOR INSTALLATION IN PIPING SUMPS AND DISPENSER PANS

Check the specific design drawings for the job, or use the LS600LD Series as illustrated in Figure 1-5. Install sensor per Figure 2-3 as follows:

1. Measure the "MOUNTING HEIGHT" from conduit or junction box to the bottom of the SUMP (or MANHOLE, VAULT or DISPENSER PAN).

2. Feed the sensor cable through the watertight CONNECTOR to length suitable for the MOUNTING HEIGHT; or to allow sensor to rest on the containment bottom; or as required by local codes. Feed an additional 12 inches past the CONNECTOR for splicing inside the junction box; cable may be cut to proper length.

3. Thread the CONNECTOR into the WATERTIGHT JUNCTION BOX and tighten the CONNECTOR cord grip over the cable to insure a WATERTIGHT SEAL. The sensor should rest on the containment floor or as required by local codes.

4. Complete the wiring installation in accordance with Section 3.

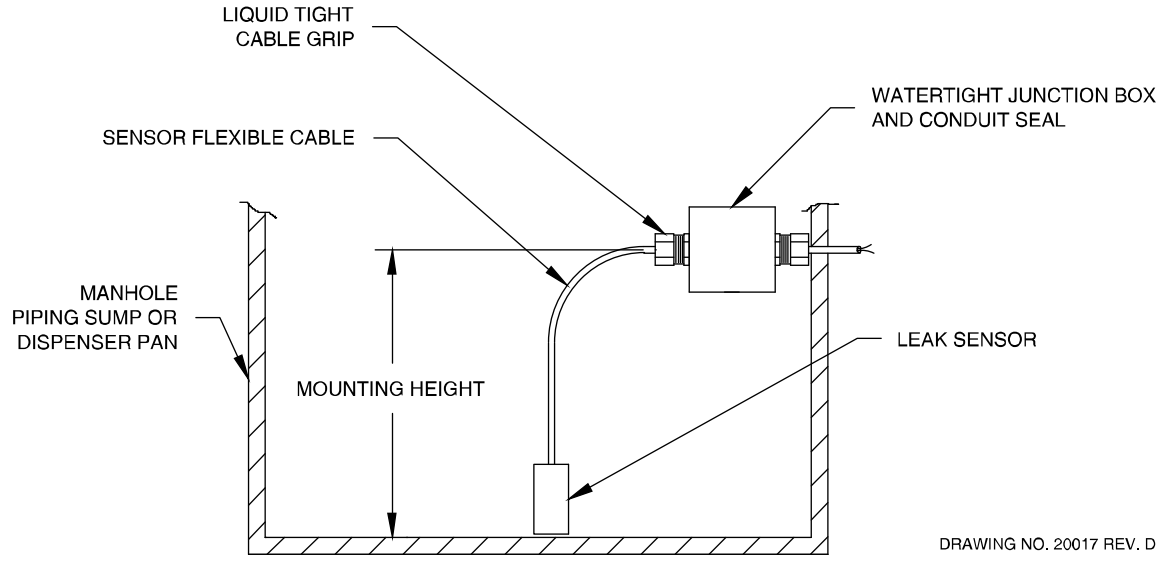


Figure 2-4 - Leak Sensor Installation in Piping Sumps, Manholes, and Dispenser Pans

2.5 LEAK SENSOR INSTALLATION IN FIBERGLASS TANK ANNULUS

The annular space of fiberglass tanks can be fitted with either a DRY ANNULUS type sensor, model LS610 (Figure 1-6), or a WET RESERVOIR sensor model RSU800 (Figure 1-8). The wet reservoir is also referred to as the HYDROSTATIC METHOD. Check the specific design drawings for the job, or choose the type sensor desired from Figures 1-6 or 1-8. Install LS610 sensor per Figure 2-5 or the separate document covering the RSU800: Bulletin 134.

Instructions per Figure 2-5, DRY ANNULUS SENSOR:

1. Calculate the sensor cable's MOUNTING LENGTH from tank size data so the sensor rests at tank bottom; or use the following method.

   Determine the cable's MOUNTING LENGTH by adding the cable measurement M from the table at the right to the RISER HEIGHT. Mark the cable at that length. **DO NOT CUT THE CABLE.**

2. Remove the watertight CORD CONNECTOR supplied by sliding it off the cable.

3. Thread the CONNECTOR into the top of a 2" by 1/2" reducer bushing or riser pipe cap pre-tapped for a 1/2" NPT hole. (The use of any standard monitor cap from 2" to 4" pipe size is recommended. The cap or reducer bushing IS NOT SUPPLIED with the sensor and must be provided by the installer. A 2” (SK2) or 4” (SK4) Sensor Cap Kit can be ordered separately from Pneumercator).

CABLE MEASUREMENT FROM END OF SENSOR

Tank Dia.	Cable M
4 Feet	81 in.
6 Feet	118 in.
8 Feet	150 in.
10 Feet	194 in.
12 Feet	222 in.

4. At riser top, attach the annular space PULL CORD (this is part of the tank supplier's pre-installed accessories) to the sensor's PULL HOLE.

5. Pull the free end of the PULL CORD out of the riser while feeding the sensor into the riser and through the annular space until the sensor is at the bottom centerline of the tank. The MOUNTING LENGTH MARK should be about 5 INCHES above the open riser. Adjust its position as necessary and, without disconnecting the PULL CORD, coil its excess inside the riser pipe.

6. Feed the sensor cable through the BOTTOM of the riser cap (or bushing), and through the CORD CONNECTOR while positioning cap over the riser pipe. Mate riser and cap.

7. Tighten CONNECTOR over the cable to ensure a WATERTIGHT SEAL.

8. Complete the wiring installation in accordance with Section 3.

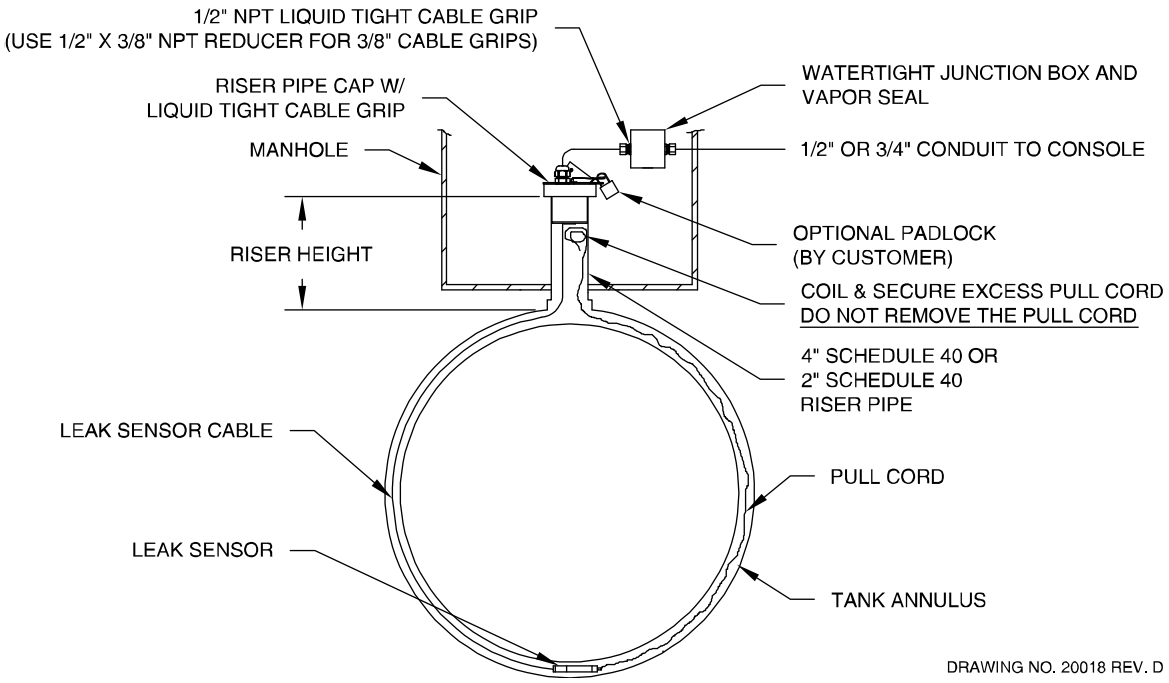


Figure 2-5 - Dry Leak Sensor Installation in Fiberglass Tanks

2.6 OTHER DRY CONTACT FLOAT SWITCHES

The LC1000-A has the electrical ability to read the continuity state of any dry contact sensor. As such, this system will support a variety of sensors from various manufacturers. However, your local regulations may not permit this combination as the LC1000-A has not been specifically approved for use with sensors not manufactured by Pneumercator. Please consult with your local regulators and with Pneumercator to discuss the compatibility of your particular sensor with the console and application.

Some Pneumercator float switch sensors have been covered in their entirety within this Instruction Manual. Select models have separate Instruction Bulletins for specific installation and wiring instructions. Please see the list below for the specific bulletin numbers:

RSU800-2	Bulletin 134
LS600 Series	Bulletin 193
LS600-S	Bulletin 195
2-wire splice kit	Bulletin 179
3-wire splice kit	Bulletin 180

These bulletins were supplied with each sensor and may also be downloaded from www.pneumercator.com by visiting the Tech Support section and scrolling down to Bulletins.

SECTION 3 WIRING INSTALLATION

3.1 PC BOARD LAYOUT AND SETUP

The LC1000-A Series includes either one (1-2 channels) or two (3-4 channels) PC boards within the enclosure. Each board is equipped with a set of switches for each channel to configure the sensor inputs and relay outputs to suit the particular application. The switches will be configured at the factory to match the sensors provided on the order. Figure 3-1 on the following page includes a table detailing the switch settings for configuring inputs and relay outputs.

Each input may be configured to accept normally open or normally closed sensors. Below is a list of commonly used Pneumercator float switch sensors.

LS600* (Striped Wires): Open Circuit in a Dry Tank
LS600* (Solid Color Wires (No Stripe)) Closed Circuit in a Dry Tank
LS600LD: Normally Open
LS610: Normally Closed
RSU800: Normally Closed

* Normal contact state determined based on float being Normally Wet or Normally Dry

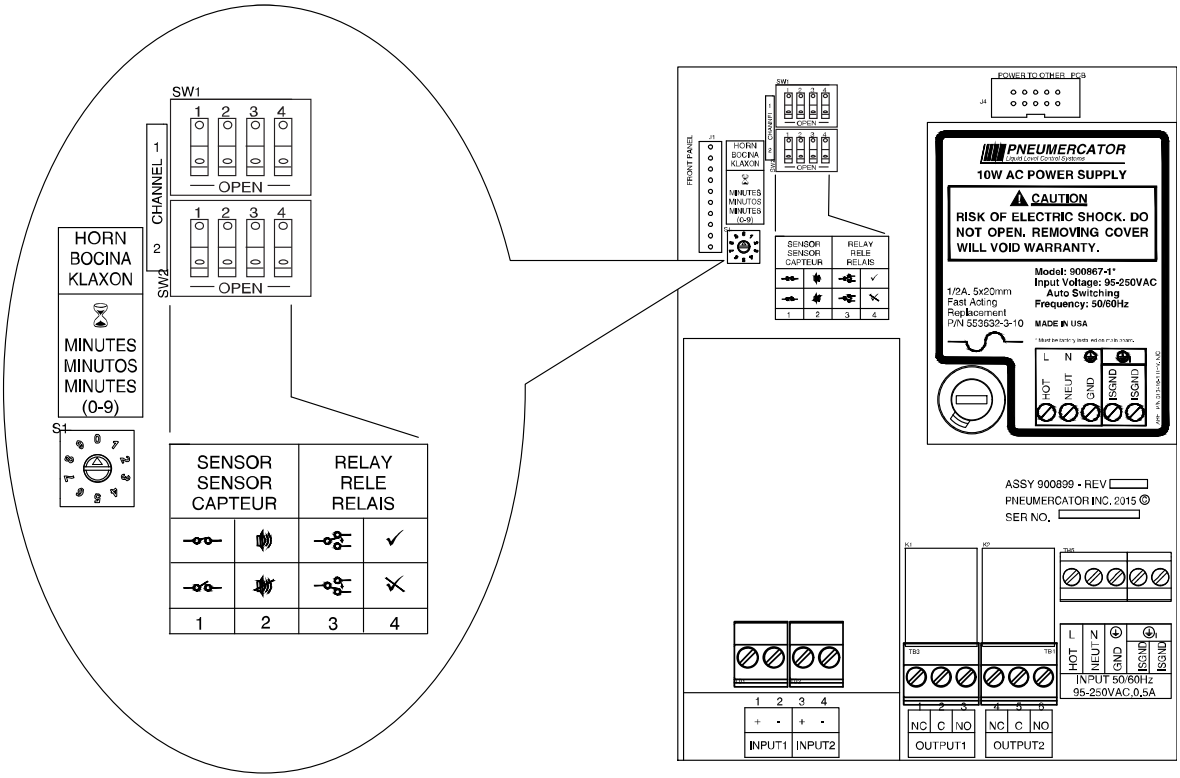
All sensors will change the state of the corresponding relay upon activating. A DIP switch setting will identify the input as supporting an Alarm Sensor (activate the integrated horn) or a Relay Control Sensor (no effect on horn). Relay Control Sensors typically are used in conjunction with valve or indirect pump control applications.

Failsafe relay operation (normally energized) is enabled by DIP switch. The default switch setting has failsafe relay mode disabled (normally de-energized).

When acknowledging the internal LC1000-A horn by pressing the integrated Reset button, the state of the relay does not change from active to normal by default. The LC1000-A can be configured so that pressing the Reset button also returns the relay to its normal state. This is usually desired if a remote alarm system is connected to the LC1000-A relay. This feature is enabled by a DIP switch and is disabled by default.

The standard Autosilence feature on the LC1000-A may silence the integrated horn after a time delay of 1 to 9 minutes. The S1 rotary switch is used to configure the time delay. Setting S1 to zero disables this feature and is the default setting.

Note: Soldering on the boards is NOT permitted. ALL repairs to the boards must be performed at the factory.



	AUTOMATIC HORN SILENCE:	1-9 MINUTES.	0 = MANUAL ACKNOWLEDGMENT
	SILENCIO AUTOMÁTICO DEL CUERNO:	1-9 MINUTOS.	0 = AGRADECIMIENTO MANUAL
	AUTOMATIQUE SILENCIEUX:	1-9 MINUTES.	0 = RECONNAISSANCE MANUELLE

DIP SWITCH CONFIGURATION
CONFIGURACIÓN DEL INTERRUPTOR DIP
CONFIGURATION DU COMMUTATEUR DIP

	SENSOR SENSOR CAPTEUR		RELAY RELÉ RELAIS	
	1 NORMAL CONTACT STATE ESTADO DE CONTACTO NORMAL ÉTAT DE CONTACT NORMAL	2 SENSOR MODE MODO SENSOR MODE CAPTEUR	3 NORMAL CONTACT STATE ESTADO DE CONTACTO NORMAL ÉTAT DE CONTACT NORMAL	4 FRONT PANEL ACKNOWLEDGE RECONOCIMIENTO DEL PANEL FRONTAL PANNEAU AVANT RECONNAISSANCE
CLOSED CERRADO FERMÉ	CLOSED CERRADO FERMÉ	ALARM (HORN & RELAY) ALARMA (BOCINA Y RELÉ) ALARME (KLAXON ET RELAIS)	ON ENCENDIDO ACTIVÉ	✓ YES SÍ OUI
OPEN ABIERTO OUVERT	OPEN ABIERTO OUVERT	RELAY (RELAY ONLY) RELÉ (RELÉ SOLAMENTE) RELAIS (RELAIS SEULEMENT)	OFF APAGADO ÉTEINT	✗ NO NO NON

Figure 3-1 – LC1000-A DIP Switch Configuration

See list on previous page for normal contact state of sensors

⚠ CAUTION

Sensors connected to this product may be in installed in hazardous-classified areas typical of hydrocarbon-based liquid fuel tanks. For these applications, it is CRITICAL that electrical conduit and wiring be installed by qualified installers familiar with all provisions of the National Electrical Code relating to equipment intended for use in EXPLOSION HAZARD areas. The primary concern is to maintain segregation between intrinsically safe and non-intrinsically safe wiring by running separate conduits attached to the control console at the designated knockouts. ALL conduits carrying sensor wiring into the hazardous area MUST be fitted with standard vapor seal-off fittings as required by NEC and local codes. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ MISE EN GARDE

Les capteurs connectés à ce produit peuvent être installés dans des zones classées dangereuses, typiques des réservoirs de carburant liquide à base d'hydrocarbures. Pour ces applications, il est CRITIQUE que les conduits électriques et le câblage soient installés par des installateurs qualifiés connaissant toutes les dispositions du Code Electrique National relatives aux équipements destinés à être utilisés dans les zones à risques d'explosion. La préoccupation principale est le maintien d'une séparation entre le câblage à sécurité intrinsèque et non-intrinsèque en installant des conduits séparés et fixés à la console de commande par les débouchés désignés. TOUS les conduits transportant les câbles de capteur dans la zone à risque DOIVENT être équipés de raccords étanches à la vapeur standards comme requis par NEC et les codes locaux. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Los sensores conectados a este producto pueden instalarse en áreas clasificadas como peligrosas típicas de tanques de combustible líquido a base de hidrocarburos. Para estas aplicaciones, es CRÍTICO que el conducto eléctrico y el cableado sean instalados por instaladores calificados que estén familiarizados con todas las disposiciones del Código Eléctrico Nacional en relación con los equipos destinados a su uso en áreas con PELIGRO DE EXPLOSIÓN. La principal preocupación es mantener la segregación entre el cableado intrínsecamente seguro y no intrínsecamente seguro mediante la conducción de conductos separados conectados a la consola de control en los puntos ciegos designados. TODOS los conductos que llevan el cableado del sensor al área peligrosa DEBEN estar equipados con accesorios de sellado de vapor estándar según lo requerido por NEC y los códigos locales. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

3.2 SYSTEM WIRING

The Appendix in the back of this manual contains typical System Wiring Diagrams that must be followed when running conduit and wires between the HAZARDOUS TANK area and the NON-HAZARDOUS CONSOLE area. This follows FM and other codes for proper installation.

SENSOR WIRING INSTALLATION. Refer to Figures 1-4 through 1-8 for console conduit openings and specific sensors that will be wired into the LC1000-A system. Install wiring as follows:

1. Install 1/2" rigid conduit from all sensor areas to the LC1000-A console.

⚠ CAUTION

All sensor wiring from this product may be run in the same conduit. NO OTHER WIRING OF ANY KIND MAY BE RUN IN THESE CONDUITS. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ ATTENTION

Tous les câbles des capteurs de ce produit peuvent être acheminés dans le même conduit. AUCUN AUTRE CÂBLAGE D'AUCUNE SORTE NE DOIT ÊTRE EXÉCUTÉ DANS CES CONDUITS. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

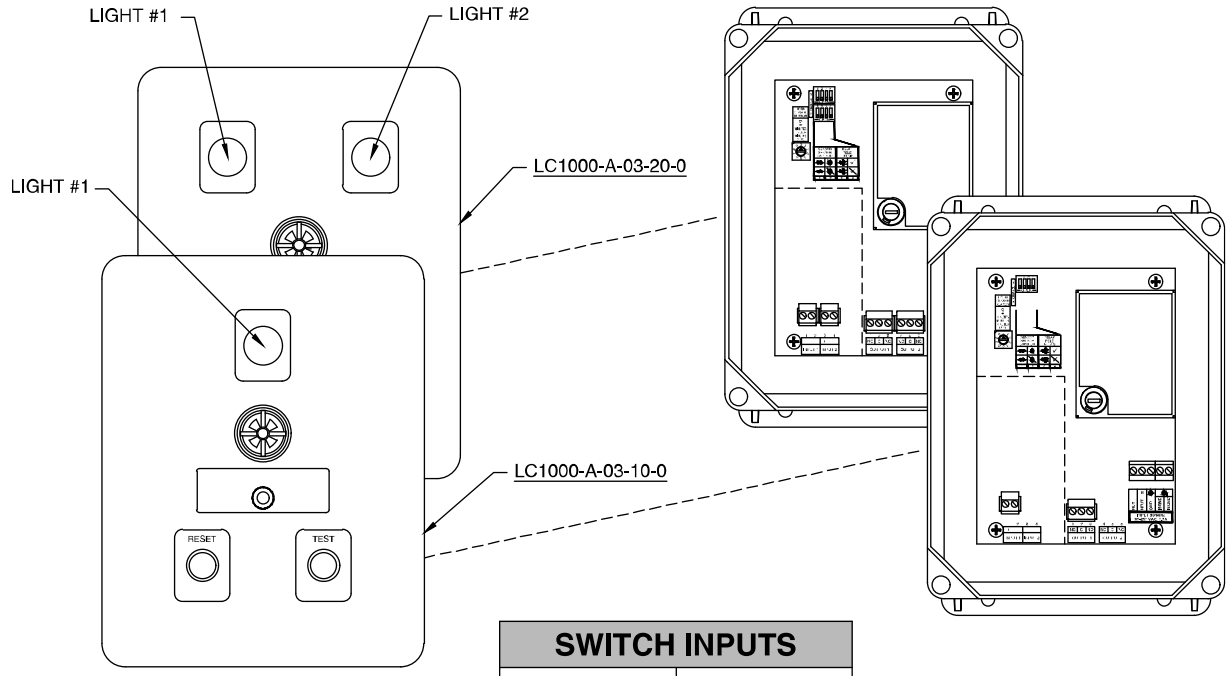
⚠ PRECAUCIÓN

Todo el cableado de los sensores de este producto puede ejecutarse en el mismo conducto. NINGÚN OTRO CABLEADO DE NINGÚN TIPO PUEDE EJECUTARSE EN ESTOS CONDUCTOS. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

2. At appropriate locations along the conduit runs (see Figures 2-3 through 2-5 and/or appropriate sensor Instruction Bulletins) install watertight couplings and approved VAPOR SEAL-OFF fittings.

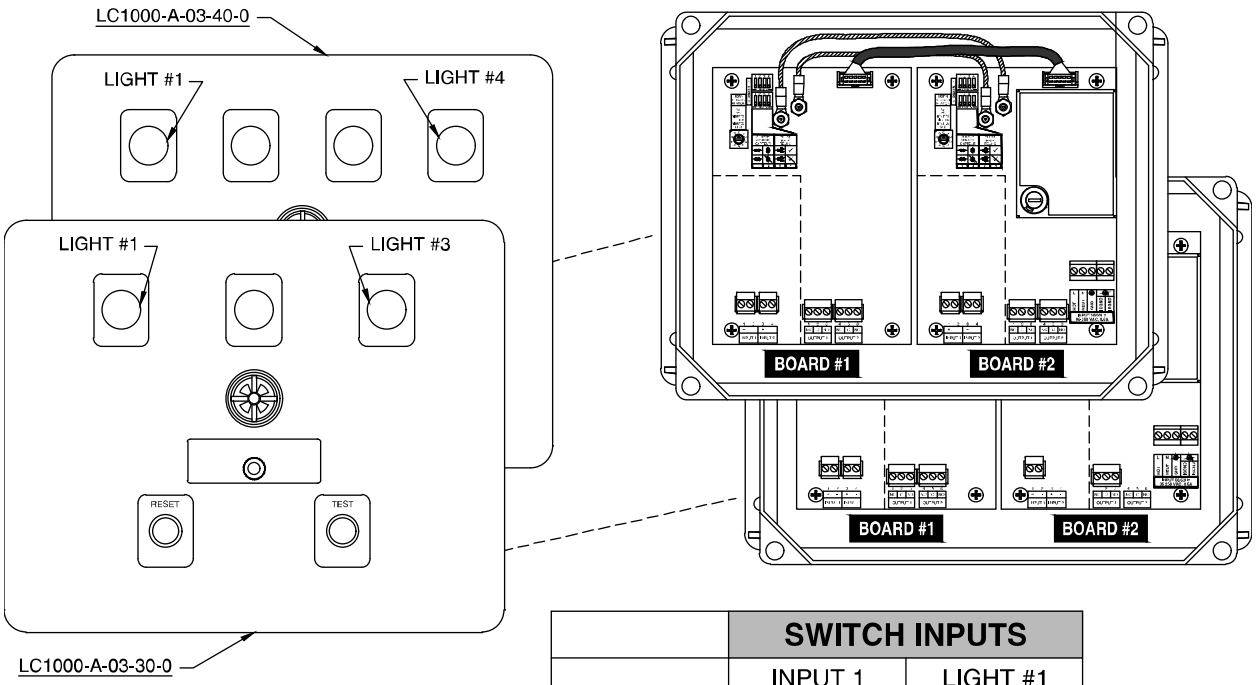
3. At each sensor location install a WATERTIGHT ELECTRICAL JUNCTION BOX. Allow enough room around the sensor tank fitting for proper installation of the sensor and all conduit/junction box fittings, and for later removal if necessary.

4. Attach the conduit at the LC1000-A console ONLY to the 1/2" conduit knockout designated for Intrinsically Safe wiring (see Figure 1-4). Use NEMA 4 fittings for outdoor locations.



SWITCH INPUTS	
INPUT 1	LIGHT #1
INPUT 2	LIGHT #2

DRAWING NO. 20222 REV. N/C



	SWITCH INPUTS	
BOARD #1	INPUT 1	LIGHT #1
	INPUT 2	LIGHT #2
BOARD #2	INPUT 1	LIGHT #3
	INPUT 2	LIGHT #4

DRAWING NO. 20223 REV. N/C

Figure 3-4 – Light & Input Setup

5. The alarm console is separated into two wiring sections, for each printed circuit board, by an aluminum cover. The wiring and terminal block on the left side are intrinsically safe and are physically separated from the AC power wiring on the right side. This separation must be maintained. Remove the protective cover by loosening the two hold-down screws. IMPORTANT - SEPARATION BETWEEN INTRINSICALLY SAFE AND NON-INTRINSICALLY SAFE WIRING MUST BE MAINTAINED.

6. Pull properly marked 2 to 3 conductor wiring (depending on sensor configuration) for each sensor through the conduit leaving at least 24 inches excess at both console and junction box ends for final connections. The field wires must be resistant to hydrocarbon liquids; type THHN or MTW, 22 AWG is recommended.

7. Fill all conduit VAPOR SEAL-OFF FITTINGS with approved filling compound and tighten all conduit fittings.

8. Splice all sensor wires to the respective conduit wires at each WATERTIGHT JUNCTION BOX. (See Bulletins 179 and 180 for a recommended procedure). Maintain correct color-coding between wires.

9. Connect sensor wires to the LC1000-A INPUT TERMINALS following Figures 3-2 or 3-3. The terminal blocks may be removed for ease of wiring by pressing with your finger down toward the conduit openings. Note that for multiple channel consoles, power need only be wired to the right-hand circuit board. Maintain correct polarity between wires and respective terminal points.

10. Properly dress all wires inside the wiring sections and re-install the protective aluminum cover over the terminals.

11. Sensors should be logically identified as to location and type and recorded on the Sensor map provided in this manual, SECTION 3.3.

⚠ CAUTION

Sensor wires are to be routed through their designated conduit openings and connected ONLY to their designated input terminals of the INTRINSIC SAFETY compartment. DO NOT allow sensor wires to cross over into the non-intrinsically safe section. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ ATTENTION

Les fils de capteur doivent être acheminés à travers leurs ouvertures de conduit désignées et connectés UNIQUEMENT à leurs bornes d'entrée désignées du compartiment de sécurité intrinsèque. NE PAS laisser les fils de capteur traverser dans la section sans sécurité intrinsèque. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Los cables de los sensor deben enrutarsen a través de sus aberturas de conducto designadas y conectarse SOLAMENTE a sus terminales de entrada designados del compartimento de SEGURIDAD INTRÍNSECA. NO permita que los cables del sensor pasen a la sección no intrínsecamente segura. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

⚠ CAUTION

Relay output terminals are located on the NON-INTRINSICALLY SAFE side of the console. ALL wiring to these terminals MUST enter through the designated conduit opening. Refer to FIGURE 1-4. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ ATTENTION

Les bornes de sortie des relais sont situées du côté NON INTRINSÈQUEMENT SECURISÉS de la console. TOUS les câbles de ces bornes DOIVENT entrer par l'ouverture de conduit désignée. Reportez-vous à la FIGURE 1-4. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Los terminales de salida de relé están ubicados en el lado NO INTRÍNSECAMENTE SEGURO de la consola. TODO el cableado a estos terminales DEBE ingresar a través de la abertura de conducto designada. Consulte la FIGURA 1-4. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

3.3 SENSOR MAP/SYSTEM SETUP

The sensor map/system setup below should be completed by the electrical installer as each sensor and control output function is wired to the LC1000-A system. This will provide the equipment operator a means of identifying each field device for proper system setup and use. The SENSOR MAP/SYSTEM SETUP should be adhered to or kept near the LC1000-A console.

SENSOR MAP/SYSTEM SETUP

CHNL	LEAK INPUT USAGE	SENSOR
1		
2		
3		
4		

RELAY	ALARMS	USAGE
1		
2		
3		
4		

3.4 INSTALLATION AS A REMOTE ALARM PANEL

The design of the LC1000-A allows this system to be used as a remote alarm panel to another system equipped with dry contact outputs. These outputs can be monitored by the LC1000-A so as to generate an additional alarm for the same condition as the main system has detected. If the LC1000-A is used in this application, then permanently remove the intrinsically safe (IS) cover by removing the two screws holding down the cover, per board. This identifies this particular installation as a non-intrinsically safe application. Do not install intrinsically safe wires on an LC1000-A without the IS cover installed.

A single pair of wires per signal would connect the main system via the dry contact output to the LC1000-A on the Switch input.

All Pneumercator systems equipped with relay outputs are considered dry contact, or outputs without power. Other equipment manufacturers may use powered relay outputs. Consult the system manufacturer to determine if the system is equipped with outputs that are dry contact that can be used to represent the desired alarm condition.

⚠ CAUTION

SENSOR INPUTS ARE FOR DRY CONTACT DEVICES ONLY! DO NOT CONNECT POWER TO THESE INPUTS. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ ATTENTION

LES ENTRÉES DE CAPTEUR SONT DEDIÉS AUX CONTACTS SECS UNIQUEMENT ! NE PAS CONNECTER D'ALIMENTATION À CES ENTRÉES. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

¡LAS ENTRADAS DE LOS SENSORES SON SOLO PARA DISPOSITIVOS DE CONTACTO SECO! NO CONECTE LA ALIMENTACIÓN A ESTAS ENTRADAS. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

The LC1000-A is equipped with relay outputs that can be used to signal another LC1000-A as a remote alarm. In that case, the primary or main LC1000-A would need to have the IS cover installed and would, therefore, be considered intrinsically safe. The second LC1000-A would not be considered intrinsically safe and would, therefore, need the IS cover permanently removed.

SECTION 4 OPERATION

4.1 GENERAL

The LC1000-A Alarm system provides three (3) functions when a field sensor experiences an alarm condition: A light blinks, a horn annunciates and a relay changes state. The horn may be silenced by pressing the RESET button, and the light will stay on without blinking and the relay will remain in the alarm state as long as the field sensor remains in the alarm condition, e.g., high liquid level. After the alarm condition is corrected, i.e., lowering the liquid level below the level switch setting, the alarm light will extinguish, the relay will return to its normal state, and the horn will automatically reset to the silent state. The behavior of the relay for the reset process can be changed to allow the relay to be returned to the normal state upon acknowledging the alarm (See section 3.1). On multiple sensor consoles, each input switch will actuate the horn and its respective light independent of the other sensor's state or the prior state of the alarm console.

4.2 HORN CONTROLS

In addition to silencing the horn by pressing the "Reset" button, four other horn controls are available:

- Loudness Level - A louver on the horn face may be adjusted by hand to decrease the output sound. See Appendix in the back of this manual for the decibel rating for the horn.
- Automatic Silence - A rotary switch on the PC board (see Section 3.1) allows selecting a time delay interval after which the horn will silence automatically, without pressing the "reset" button. The time delay period ranges from 1-9 minutes. This feature can be disabled by setting the rotary switch to zero (see Section 3.1).
- External Horn Reset - If it is desired to have the LC1000-A also control and silence an external, remotely mounted horn, this can be done by wiring the output relay contacts for the selected channel in series with your external horn and its power source. In addition, a DIP switch setting must be changed (see Section 3.1). Note that implementing this feature eliminates using the associated relay contacts for other control devices. Refer to the Appendix in the back of this manual for the electrical specifications of the relay outputs.
- Horn Silence From a Remote Location - If it is desired to silence the LC1000-A horn from a separate location, this can be done by running a pair of wires from your own normally open, momentary pushbutton switch in parallel with the LC1000-A RESET switch normally open contact positions. Separate power is not required.

SECTION 5 TROUBLESHOOTING

5.1 GENERAL

The On/Off switching control operation of the LC1000-A makes it simple to test and troubleshoot the system. Pressing the TEST button performs a functional test of the horn and all indicator lights.

The input wiring can be disconnected to check the functioning of the inputs as well as to allow access to the wiring to perform a continuity test. If the wiring is disconnected and the LC1000-A is configured for normally open operation, all of the lights are expected to turn off. With normally closed operation, the lights would be expected to come on. Using a jumper wire, you can simulate an open and closed state across the input to determine that it is functioning by observing the system lights. You may also take a DC voltage measurement across the input to verify the presence of approximately 12VDC. If there is no voltage present with the wires disconnected from the input, then check the internal fuse with your ohmmeter while the AC power is shutoff from the circuit breaker.

To check the operation of the LC1000-A from a field wiring location, e.g., at the field sensor location, simply place a jumper wire between the field wire pair for normally open sensors, or open the field wire pair for normally closed sensors. This action will set the LC1000-A into the alarm mode. If this works as expected, then you can assume that the wiring is intact.

All sensors can be tested with a continuity meter. By manipulating the float by hand, you can change the state of the sensor to be detected by the meter.

5.2 SPARE PARTS LIST

Description	Part #
1-Channel System Main Board (w/ Power Supply) Also used for 3 Channel System Right Board	900899-1
2-Channel System Main Board (w/ Power Supply) Also used for 4 Channel System Right Board	900899-2
3-4-Channel System Left Board (No Power Supply)	900899-4
1-Channel System Main Board (w/ Power Supply and Intrinsically Safe Cover) Also used for 3 Channel System Right Board	900910-1
2-Channel System Main Board (w/ Power Supply and Intrinsically Safe Cover) Also used for 4 Channel System Right Board	900910-2
3-4-Channel System Left Board (No Power Supply) (w/ Intrinsically Safe Cover)	900910-4
Annunciator (Horn)	553503-1
Fuse (0.5A Fast Acting, 5 x 20mm), 10-pack	553632-3-10
Red Pushbutton Cap	242032-9
Replacement Red LED Light Assembly (1st Gen. to 2nd Gen. Upgrade)	10742-1
Replacement Red LED Light Assembly (2nd Gen.)	553667-1
Switch Assy (Includes: Cap, Switch, Guard)	900534-1
Tags (Dash number varies with printed name)	313048-

SECTION 6 MAINTENANCE/TESTING

⚠ WARNING

Testing MUST be performed by qualified personnel familiar with local wiring codes and explosion hazard electrical safety practices. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY, PROPERTY LOSS AND EQUIPMENT DAMAGE.

⚠ AVERTISSEMENT

Les tests DOIVENT être effectués par un personnel qualifié connaissant les codes de câblage locaux et les pratiques de sécurité électrique contre les risques d'explosion. LE NON-RESPECT PEUT ENTRAÎNER DES BLESSURES PERSONNELLES, DES PERTES DE BIENS ET DES DOMMAGES MATÉRIELS.

⚠ PRECAUCIÓN

Las pruebas DEBEN ser realizadas por personal calificado que esté familiarizado con los códigos de cableado locales y las prácticas de seguridad eléctricas con riesgo de explosión. EL NO CUMPLIMIENTO PUEDE RESULTAR EN LESIONES PERSONALES, PÉRDIDA DE PROPIEDAD Y DAÑO AL EQUIPO.

6.1 CONSOLE

The operation of the LC1000-A lights and horn can be verified by holding down the TEST button. If the lights and horn do not activate as expected, follow the troubleshooting instructions found in Section 5.

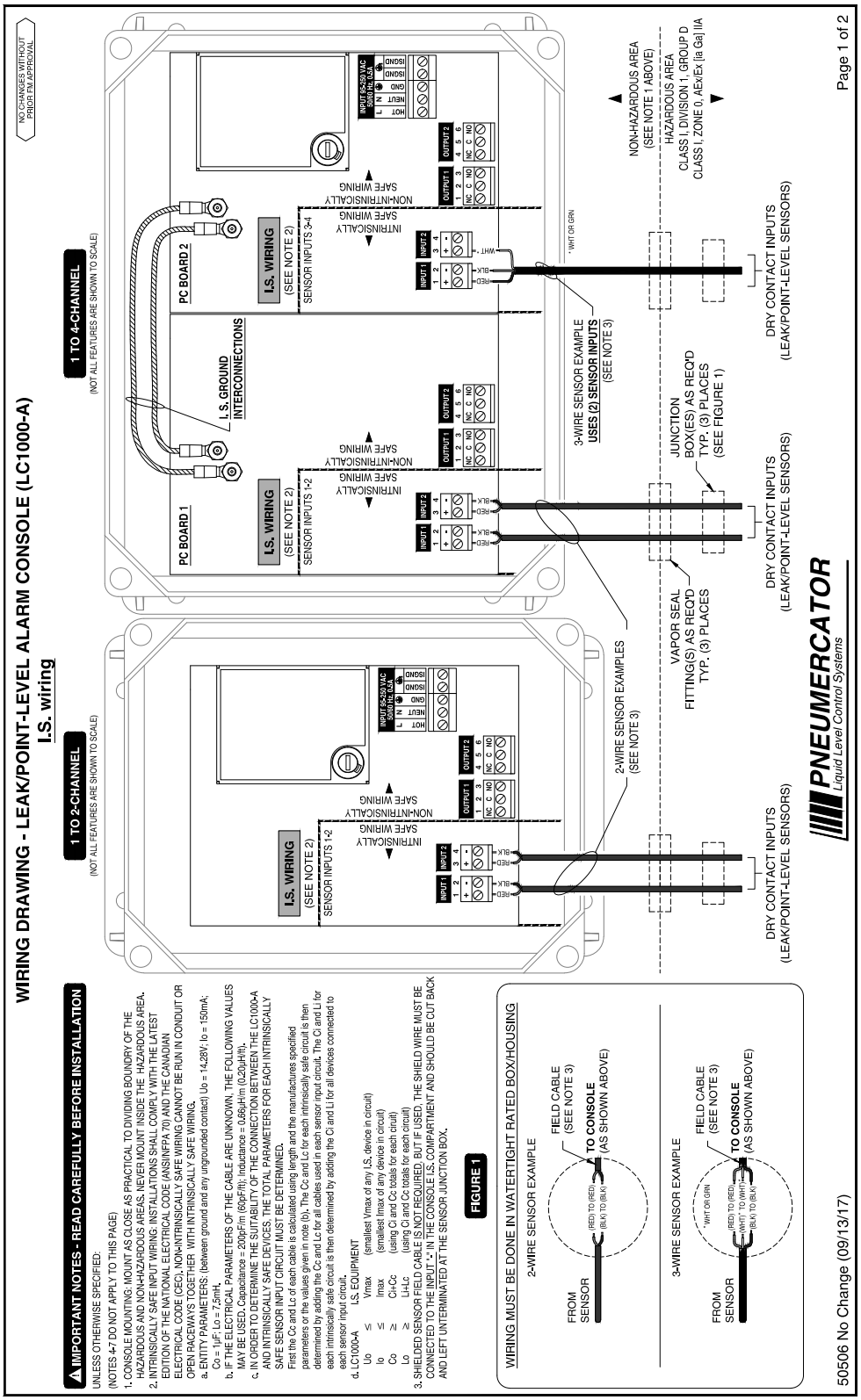
There are no consumables for the LC1000-A therefore no parts need to be changed on a regular basis. Refer to section 5 for a list of service parts available to repair the LC1000-A.

6.2 SENSORS

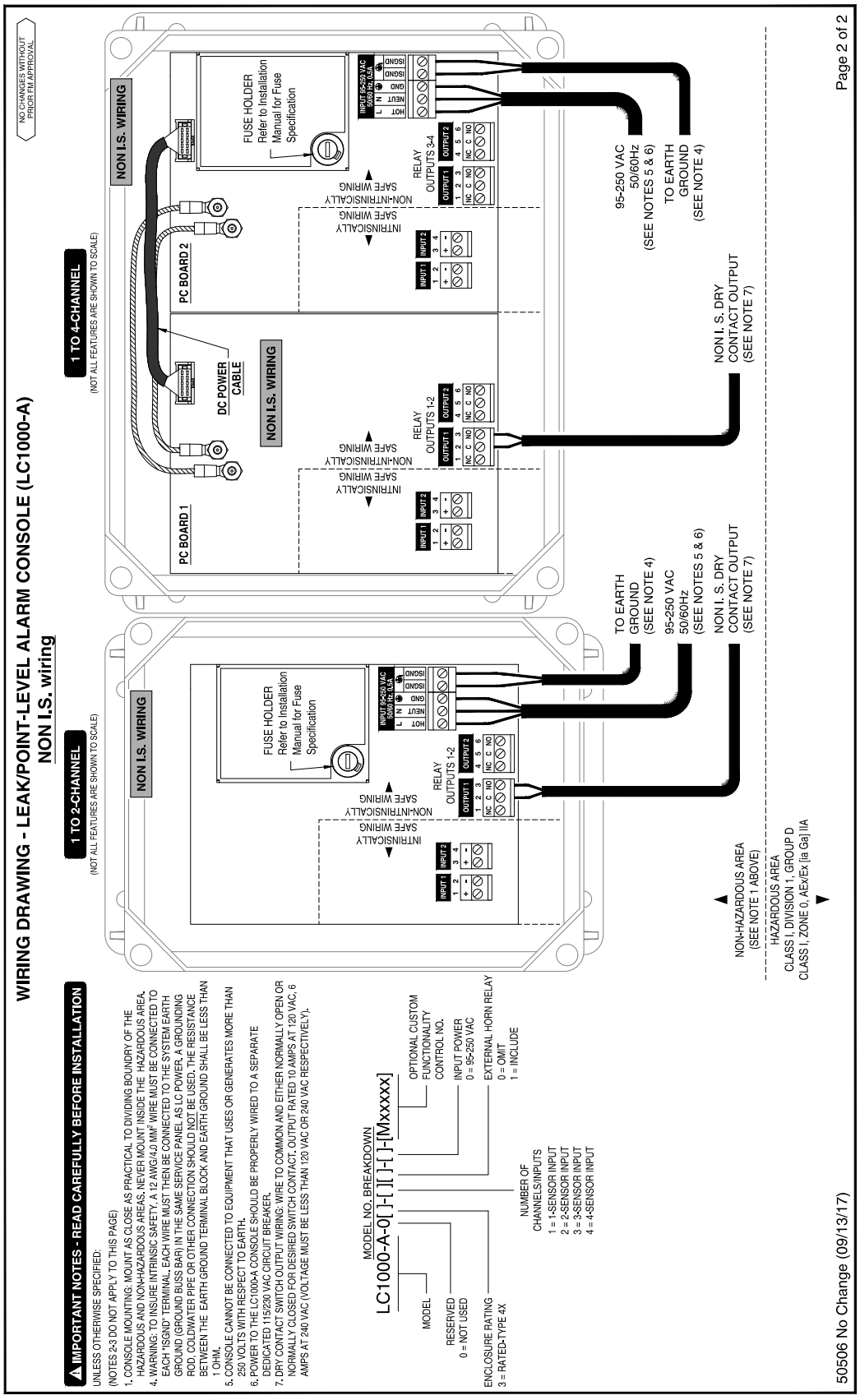
The sensors themselves cannot be tested from the front panel of the LC1000-A. Instead you must remove the sensor and manipulate each float by hand to simulate an alarm condition. The only exception to this rule is in the case of an LS600 equipped with a test lever. This test lever allows for the testing of the uppermost float, typically used as the overfill protection. See Bulletin 193 for details on the LS600 Series sensors.

It is generally considered good practice to ensure that your system is fully operational on an annual basis. For thicker or more viscous liquids, you may want to inspect the system more frequently to confirm that no product has built up on the sensor so as to interfere with its proper operation. Your local regulations may require testing based on a different schedule so consult with your regulator/inspector for the frequency of testing needed for your application.

APPENDIX: WIRING/SPECIFICATIONS



Intrinsically Safe Wiring Diagram



Non-Intrinsically Safe Wiring Diagram

SPECIFICATIONS

Operating Temperature:
-40 ºF to 160 ºF (-40 ºC to 70 °C)

Humidity:
95% Non-condensing

Enclosure Rating:
NEMA 4X (IP56)

Power Requirements:
Universal 95-250 VAC, 50-60 Hz, 10 W Max.

Audible Alarm:
103 dB w/Louvered Volume Control

Visual Alarm Indicators:
Superbright Red LEDs, Wide Viewing Angle

Power Indicator:
Superbright Green LED

Controls:
TEST, RESET

Relay Outputs:
Form C, Rated: 10 A @120 VAC; 6A @240 VAC, One Relay Output per Sensor Input

Sensor Capacities:
1, 2, 3 or 4 Normally Open or Normally Closed Sensors

Release Date: November 17, 2017

WARRANTY

We warrant that our tank gauges, if installed according to instructions will be free from defects in material and workmanship for a period of one (1) year following the date of original shipment by us.

Our liability under this warranty shall be limited to, at our option,
(i) repair of the defective tank gauge,
(ii) replacement of the original tank gauge with new, or
(iii) refund of the original purchase price;
and, we shall not be liable for any labor, other installation costs, indirect or consequential damages, or other damages in connection with such gauge.

This constitutes our obligation and none other stated for any purpose except the above shall apply.

Contact Pneumercator for detailed warranty documentation.

REVISION 101008

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