

# Discriminating Leak Sensor Model HD-A2-C Model HD-A2-C-8

## Installation & Operation Instructions

Manual: SDI-HD-A2-C

### INTRODUCTION

This manual describes the installation and operation of the **HD-A2-C** Discriminating Leak sensor. The **HD-A2-C** is compatible with all grades of oil, including #6 thru gasoline.

The **HD-A2-C** can distinguish between DRY, WATER and OIL conditions, and has a 2 wire 4-20mA output signal which allows it to be monitored by the **TG-EL-D4A**, and a wide range of other systems.

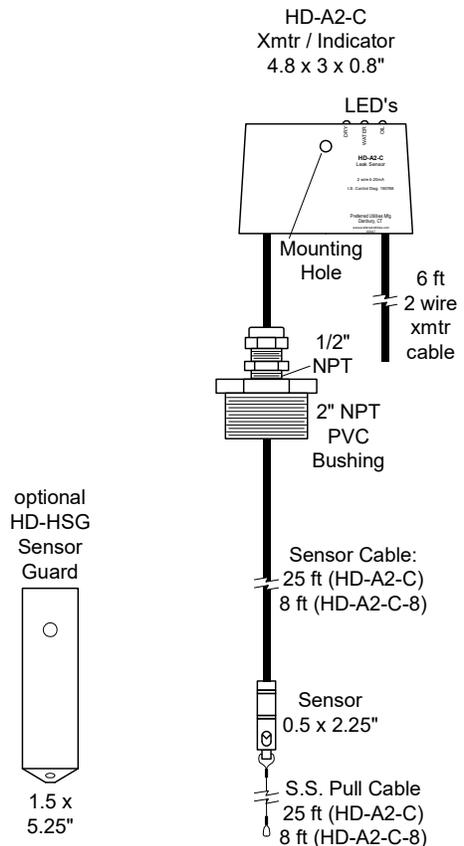
The **HD-A2-C** has no moving parts, is potted in epoxy, and can withstand the harsh environment in a wet, underground manhole.

The **HD-A2-C** has a 25 ft sensor cable.  
The **HD-A2-C-8** has an 8 ft sensor cable.

The **HD-A2-C** is Intrinsically Safe when installed in a Class I, Div 1, Group C or D Hazardous Location and is connected to an Intrinsically Safe Associated Apparatus, such as the **TG-EL-D4A** or other I.S. barriers.

### **WARNING**

If this sensor will be located in a hazardous area, then you must follow all instructions in this manual in order to maintain the Intrinsically Safe design and ratings. Failure to follow all procedures voids the intrinsically safe design, and may create a hazardous condition

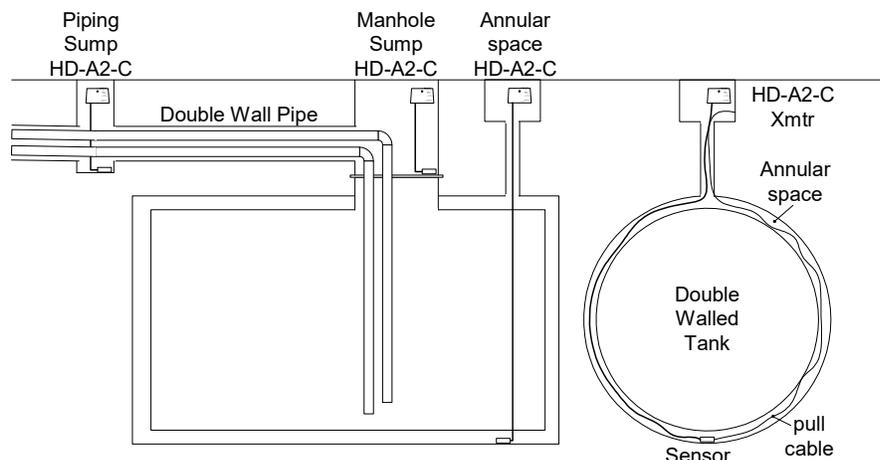


### OPERATION

The HD-A2-C has an dual sensors: an optical fluid sensor and a conductivity sensor with two stainless steel rings. The HD-A2-C determines the type of fluid (and mA output) based on the sensor signals as follows:

HD-A2-C 4-20 mA Output Signal Ranges

Condition (also LED)	Fluid is Detected	Fluid is Conductive	mA Range
<b>DRY</b>	NO	n/a	<b>15.5-18.5</b>
<b>WATER</b>	YES	YES	<b>12.5-15.5</b>
<b>OIL</b>	YES	NO	<b>9.5-12.5</b>



## OPERATION (continued)

**Continuous Self-Checking:** The HD-A2 internal microprocessor continuously self-checks the HD-A2 operation and will force the output outside of the 15.5-18.5mA DRY signal range if a malfunction is detected.

**Fail Safe:** The optical sensor is the primary sensor. The optical sensor is continuously monitored by the processor and the HD-A2 will change to a non-DRY signal if the optical sensor malfunctions.

The processor continuously pulses the infrared light source on/off and observe the response of the optical sensor. If the light source burns out, or if the sensor wiring breaks or corrodes open, the HD-A2 will indicate OIL.

If the sensor wiring shorts, or if the optical sensor is forced ON continuously by high levels of ambient infrared light (sunlight or bright incandescent bulb), the OIL LED will blink and the HD-A2 output is forced to 20mA +/-1.5mA.

## INSTALLATION

### Examine the Shipment

The HD-A2-C xmtr is pre-wired to the sensor and includes a 2" NPT reducing bushing, wiring crimp connectors, and epoxy filled waterproof splice kit. If any parts are missing contact the factory for replacements.

### Installation

Locate the sensor at the low point of the space being monitored. Leaked fluid must be free to drain by gravity to the sensor location. If the system does not have a single low point, then install multiple HD-A2's, or other leak sensors, to insure that all spaces that require protection are monitored.

The sensor must be horizontal in order to provide 'discriminating' leak detection (Dry vs Oil vs Water). A vertical sensor will provide non-discriminating leak detection and will indicate "Oil" for either an Oil leak or a Water leak condition.

Do not bury the HD-A2 xmtr or sensor. When the tank is underground, a suitable chamber and cover should be provided to permit installation and removal of the HD-A2. Do not paint the sensor.

If the sensor is exposed to high ambient infrared light conditions, or is exposed to physical damage; purchase and install the optional **HD-HSG** sensor guard.

**Annular Space Pre-Test:** If the HD-A2 is going to be installed in the Annular space of a double wall tank... TEST the HD-A2 and the field wiring BEFORE pulling the sensor into the annular space.

Put some oil in an opaque cup and some water in a second opaque cup and submerge the sensor tip into each to verify that the correct LED turns ON.

If the OIL LED blinks, this indicates that there is too much ambient infrared light (outdoor site with blue sky exposure or an nearby incandescent light bulb). Cover the cups to block ambient light to allow proper operation.

**Epoxy Splice Kit:** To prevent corrosion and false alarms, water/moisture must not contact any of the field wiring. Use the 190271 epoxy encapsulation wiring splice kit provided with the HD-A2-C to water proof all cable splices in areas that may be wet or damp. Do not encapsulate the wiring splices until after all tests are completed.

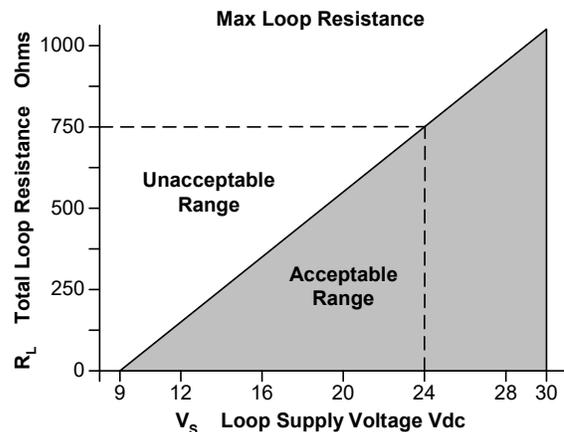
### Wiring

The HD-A2-C is a 2 wire, loop powered, reverse polarity protected, 4-20 mA level xmtr. Maximum loop power supply voltage: 30 Vdc

White wire: +      Black wire: -

See the diagram below for the maximum acceptable total 4-20mA loop resistance:

The shielded cable carries Intrinsically Safe low



Acceptable Total Loop Ohms:  $R_L \leq ((V_s - 9V) / 0.020A)$  voltage DC. Do not run the HD-A2-C cable in conduits with any other non-Intrinsically Safe wiring (DC or AC).

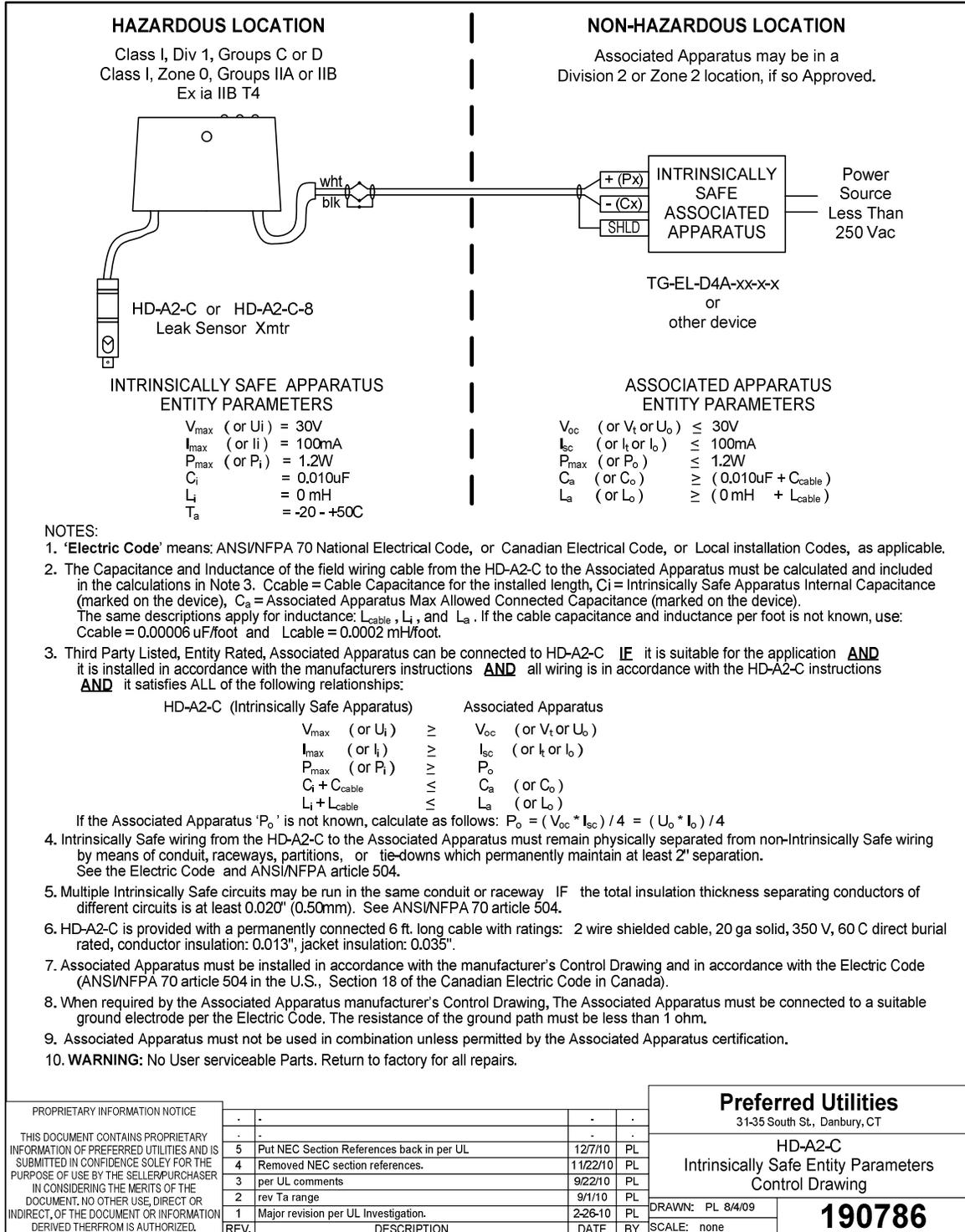
If mounted in a Class I, Zone 0, Group C or D Hazardous Location, the HD-A2-C is Intrinsically Safe **if all of the following are true:**

- 1) The HD-A2-C is connected to an Intrinsically Safe Associated Apparatus with I.S. Parameters specified on drawing 190786.
- 2) All other requirements of drawing 190786 are complied with.
- 3) All Installation requirements of the Associated Apparatus are complied with.

The Preferred TG-EL-D4A is a compatible Associated Apparatus.

**WARNING** Plastic Housing:  
Electrostatic Discharge Spark Ignition Hazard

The HD-A2-C must only be cleaned with a damp cloth.  
Do NOT rub with a dry cloth because this can build up an electrostatic charge.



Note: This drawing is part of the Intrinsic Safety Design and Approval. Do not implement any changes without the approval of the Preferred Eng Mgr and the Approval Agency.

## **Periodic Testing**

Oil Tanks have 20-40 year life spans and Leaks may not occur until many years in the future. It is important to periodically test the Leak Detection system as a whole to insure that the system is still functioning properly and that corrosion, aging, or other effects have not disabled the system.

Consult Local Codes to determine the Local testing requirements, and Testing frequency.

Fail-Safe: The HD-A2 is designed to be Fail-Safe. Any signal outside of the DRY range of 15.5 – 18.5mA should be considered to be a potential Leak, field wiring open or short circuit, or an HD-A2 malfunction.

The HD-A2 should be periodically Function Tested to insure that it's output is not malfunctioning and 'stuck' in the DRY signal range.

Function Test: The HD-A2 must be indicating DRY before starting this test.

Remove power from the HD-A2 for 2-3 sec. Re-apply power to the HD-A2.

The HD-A2 LED's should blink as follows: DRY, WATER, OIL, DRY, WATER, OIL and then indicate DRY without blinking.

When the LED's are blinking, the Output should be 20mA +/- 1.5mA.

When the blinking stops, the output should return to 17mA +/- 1.5mA.

The TG-EL-D4A automatically does the above test every day at midnight and triggers an Alarm if any Dry HD-A2 fails this Test. The above Test can also be manually activated from the TG-EL-D4A menu at any time.

Every few years: The HD-A2 sensor should be removed and inspected to determine if sludge or dirt built-up is preventing the flow of fluid to the optical sensor.

## **Trouble Shooting**

OIL LED is blinking:

a) The sensor may be exposed to excessive infrared light from direct sun light or an incandescent light bulb.

Cover the sensor. If the blinking stops, install an HD-HSG Sensor Guard to exclude ambient light.

b) If the blinking does not stop, inspect the sensor cable for damage that could short or open the conductors.

c) Measure the voltage across the Black and White wires at the HD-A2 location to insure it is above 9 Vdc.

If the voltage is low, check for excessive 4-20mA loop resistance (see chart), or a low power supply voltage, or a combination of the two.

All three LED's blink on/off in sequence:

a) Measure the voltage across the Black and White wires at the HD-A2 location to insure it is above 9 Vdc.

If the voltage is low, check for excessive 4-20mA loop resistance (see chart), or a low power supply voltage, or a combination of the two.

The mA signal at the indicator is near 0mA:

Check for an open circuit in the field wiring, or a dead 4-20mA loop power supply.

mA signal at the indicator is above 21.5 mA:

Check for shorts in the field wiring.

# **Preferred Utilities Mfg Corp**

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