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Model A38

CAPACITANCE LEVEL TRANSMITTER

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The Direction in Level Detection

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1.0 General Description

Thank you for using the K-TEK A38 Capacitance Level Transmitter. The A38 has been designed for ease of use and to offer extensive configuration capabilities. You are urged to review this manual in its entirety prior to use. This will eliminate most installation problems due to improper configuration.

We, the K-TEK Family, sincerely hope you receive many years of reliable use from this transmitter and welcome your feedback to consistently improve our products.

The K-TEK Model A38 is a 2-wire microprocessor based level transmitter. It is used to measure the amount of material in a tank, bin or other container. It can be used with a wide range of liquids.

The standard version of the transmitter consists of an electronic module housed in an explosion-proof enclosure with an attached sensing probe. The standard probe is a solid 3/8 inch diameter stainless steel rod inside a Teflon sheath. Power and signal are both provided via a standard 4 to 20 mA DC current loop.

An optional version of the transmitter allows the sensing probe to be remotely mounted at some distance from the electronic module housing.

In most applications, the installation and calibration of the Model A38 is easily accomplished by a competent technician. Mounting the sensor unit requires three basic steps:

1. Provide an opening in the tank or other container.
2. Fit this opening with a suitable coupling.
3. Mount the Model A38 and its attached sensing probe securely into the coupling. The only test equipment required to calibrate the unit is an accurate milliamp meter to measure the current in the loop.

The rugged construction techniques used in building the probes allow them to withstand the rigors of industrial environments. All of this is accomplished while maintaining the ultimate in simple probes offering the widest possible range of applications.

There are no operating controls associated with the Model A38 unit and no specific operator actions are required in connection with the use of this device. However, the unit provides information to the operator that should be very helpful in making other operating decisions. In most cases, a visual display will keep the operator informed of how much material is in the measured vessel. Optional set point modules may be used to sound audible or visible alarms or to control various types of machinery associated with the measured vessel. The Model A38 may also provide information to a computer or programmable controller. The operator should be fully aware of how the Model A38 fits into the whole system and be prepared to take whatever action is necessitated as system conditions change.

2. Installation

2.1 General

After unpacking the unit, inspect it for any evidence of shipping damage. Any claims for damage due to shipping must be filed with the carrier who handled the package(s).

- Select a mounting location for the transmitter unit and the sensor probe. Your unit may be the integral mounting option or the remote mounting option. The integral mounting unit consists of a single enclosure that includes the electronic module and the sensor probe. The remote mounting unit consists of two enclosures, one containing the electronic module and the other containing the sensor probe. See Section 3.1 and Section 3.2 for some recommended mounting arrangements for integral units. See Section 3.3 for a typical mounting arrangement for remote units.

- Be sure that there is sufficient clearance around the mounting position to allow for the turning radius of the transmitter or remote sensor enclosure as the unit is screwed into place. Also, in the case of rigid probes, allow sufficient room above the vessel entry to be able to insert the probe into the opening of the vessel.

- Be careful not to damage any coating that may be on the probe.

- The thread size of the vessel coupling should be 3/4" NPT for most probes. Certain special applications may utilize couplings of different sizes.

- The information included in the label should be visible. If necessary to make it readable, clean the label using a cloth soaked with either water or isopropyl alcohol.

CAUTION: When making the opening in the vessel, observe all safety requirements of the area in which the work is being done. Be especially careful when working with pressure vessels.

The Model A38 unit may not work properly if:
- The material dielectric constant is less than 1.7.
- If a conductive bridge occurs between probe and vessel wall.
- If the unit has inadequate grounding.
- Probe insulation is damaged.
- Probe is located near a material fill line.

Probe is mounted improperly. See Sections 3.1 through 3.3.

The Model A38 unit may be damaged if:
- Temperature in the Model A38 housing exceeds appropriate limits.
- If the probe temperature exceeds appropriate limits.
- The electronics unit is subjected to excessive vibration or shock.

Vessel pressure exceeds pressure rating of probe.

CAUTION: If any of the above statements apply to your application, do not install the transmitter until you contact your local representative or the K-TEK factory for instructions.

2.2 RECOMMENDATIONS

2.2.1 Integral Units

- Install the transmitter unit into the vessel coupling and connect conduit between the transmitter unit and the current loop source as required.
- Be sure the conduit is suitable for the environment in which the units are to be used.

2.2.2 Remote Units

- Install the remote sensor probe into the vessel coupling. Select a suitable location for the instrument housing that allows convenient access for calibration.
- Connect conduit between the remote sensor housing and the instrument housing. See Section 3.3 for a typical installation arrangement.
- Connect the type RG62 coaxial cable assembly supplied with the unit from the remote probe to the instrument input. See Section 4.3 for coaxial cable wiring details.
- Connect conduit between the transmitter unit and the current loop source as required. Be sure the conduit is suitable for the environment in which the units are to be used.

Refer to Section 2.4 for a general schematic layout of a typical loop wiring arrangement. Due to the extremely wide range of control and/or alarm applications in which the unit may be used, it is not possible to show all conceivable wiring diagrams. Consult your representative or K-TEK factory if assistance is desired.

CAUTION: Be sure that all wiring and conduit conforms to the requirements of the National Electrical Code and any enforcing authorities or agencies having jurisdiction over the installation. Be sure that any special conditions, such as areas having explosion hazards, are given full consideration.

- IMPORTANT: Reference Appendix C: A38 Series Electrical Interconnection Diagram for proper installation of I.S. units.
- After installing and wiring, it is necessary to calibrate the unit to the particular vessel and material that will be measured. This is accomplished by first emptying the vessel and setting the zero point, then filling the vessel and setting the full point.
- The A38 has a unique capability of being able to perform a useable calibration on a vessel that is partially filled at the time of installation. See *Establishing custom ZERO/SPAN SENSOR CALIBRATION PRESETS* in Section 4.4 for details of this procedure.
- To obtain the most accurate results, the final calibration should include setting zero with the vessel empty and full scale with the vessel full. Read all of the following step-by-step instructions before beginning. Refer to Section 4.5 for the locations of adjustments and controls. These instructions describe the calibration procedures for the Model A38 transmitter.
- For calibration of optional accessory equipment, consult the appropriate manual(s) for such equipment.
- Both liquid and dry products have dielectric values. The A38 transmitter is designed to monitor continuous levels of liquid and dry products with a stable dielectric constant greater than 1.7.

2.2.3 Interface Measurement

All level measurements are actually interface measurements. The most common is air and product. The term interface in this document refers to the immiscible liquids.

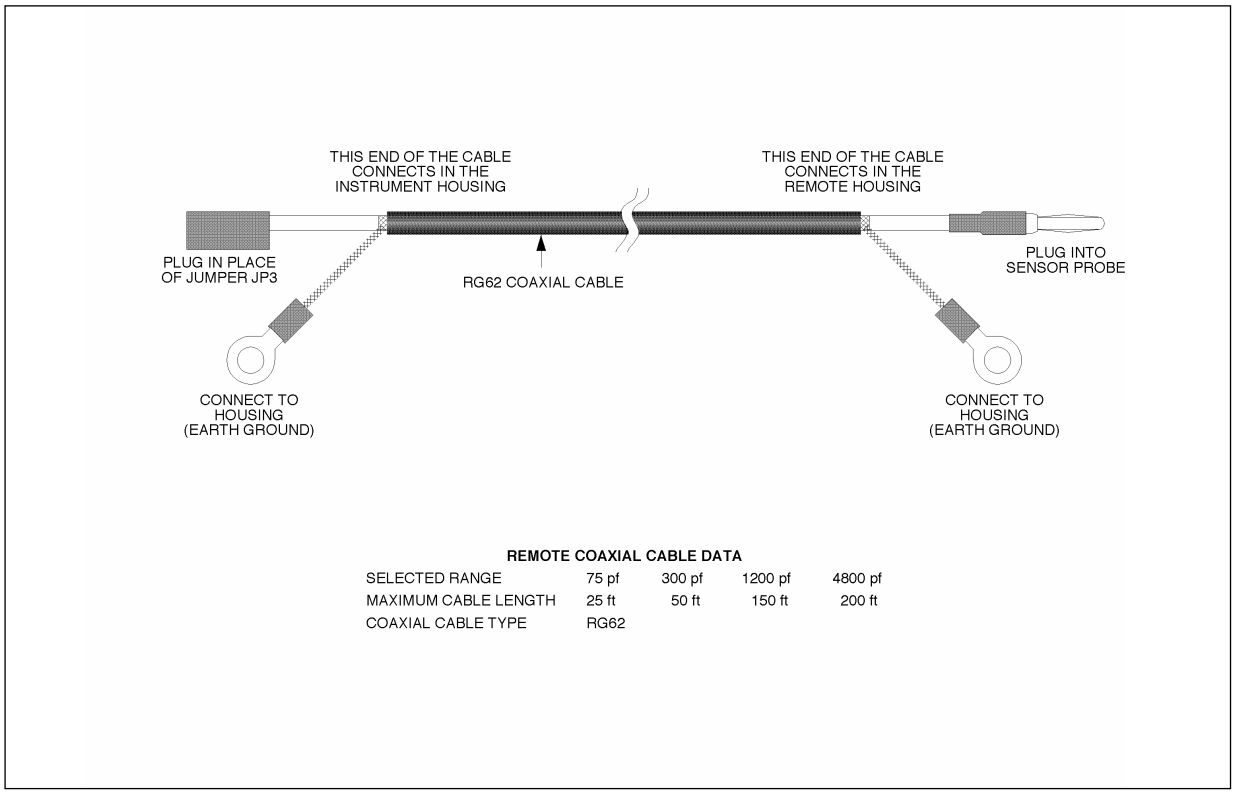
When applying level controls to interface detection between a hydrocarbon and water we will refer to the term **normal interface** where the higher dielectric product, water (conductive) is on the bottom of the liquid measurement and the lower dielectric product hydrocarbon (non-conductive) is on the top of the liquid measurement.

IMPORTANT SETUP INFORMATION: In an oil/water example, as the interface rises on the electrode, a greater percentage of it is submerged in the higher dielectric constant liquid. This causes an increase in the capacitance generated and a corresponding increase in the output signal.

For purposes of this document, we will only discuss the “Normal Interface” measurement. By following the calibration procedures outlined in Section 4 of this manual, calibration can be done on the higher dielectric product only.

The A38 may not be used to measure total level only when an interface is present. For example, in an oil-water interface, the A38 may be used to measure the interface of oil and water but not the oil only.

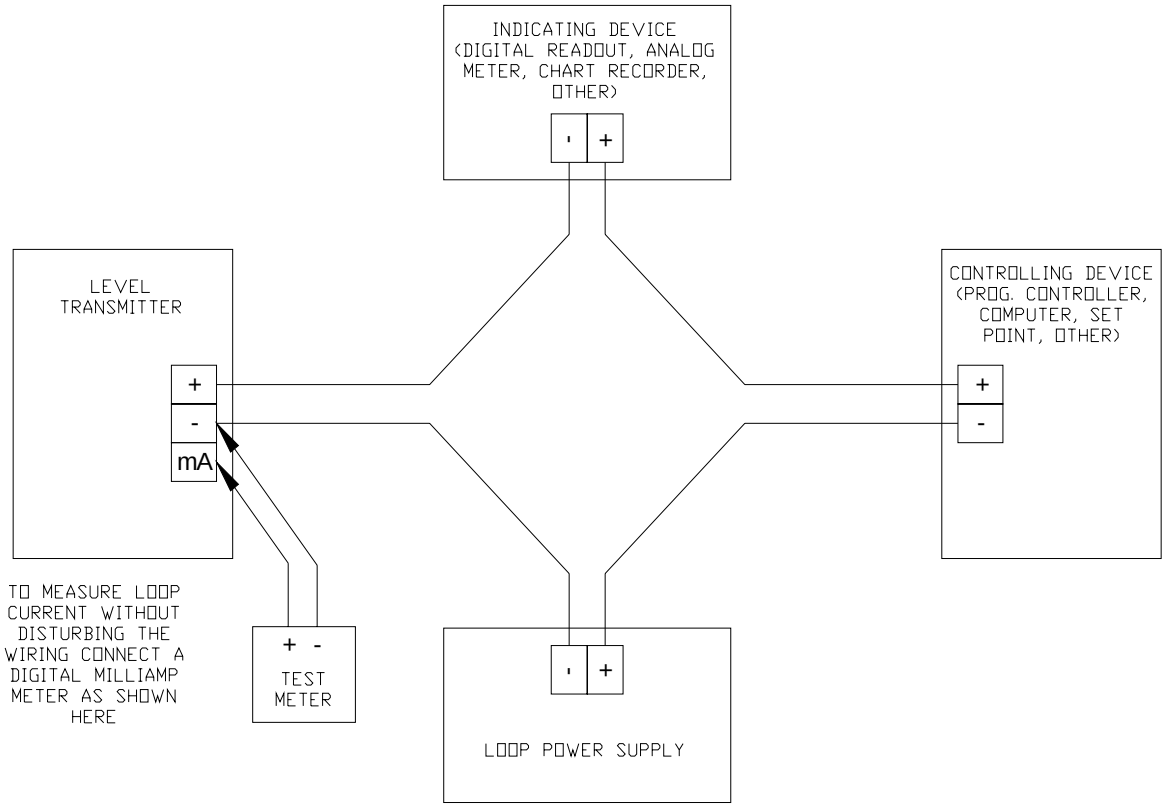
2.3 Coaxial Cable Details



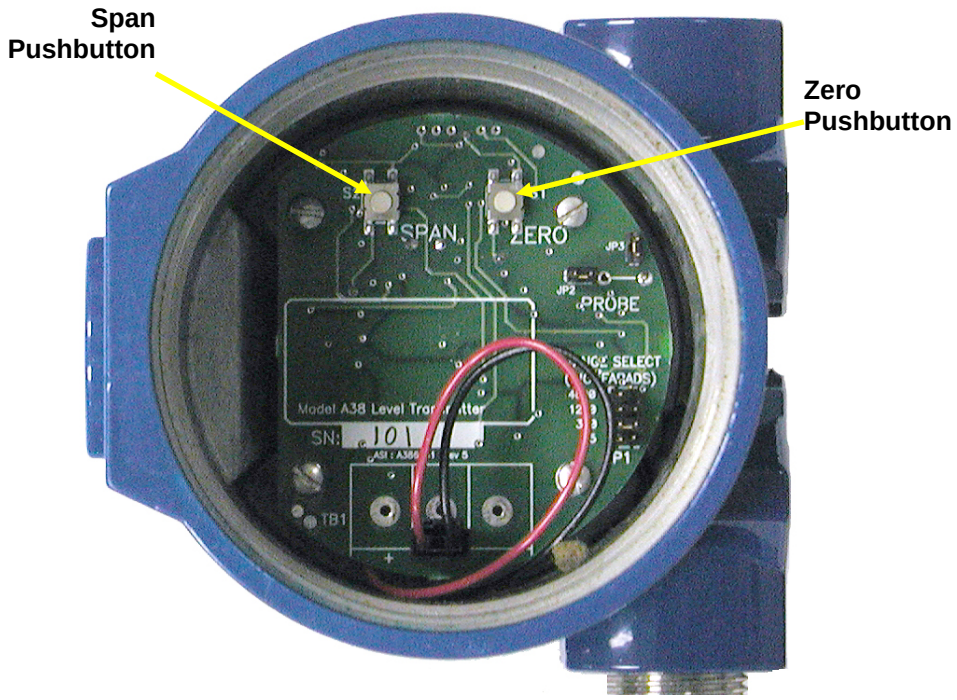
REMOTE COAXIAL CABLE DATA

SELECTED RANGE	75 pf	300 pf	1200 pf	4800 pf
MAXIMUM CABLE LENGTH	25 ft	50 ft	150 ft	200 ft
COAXIAL CABLE TYPE	RG62			

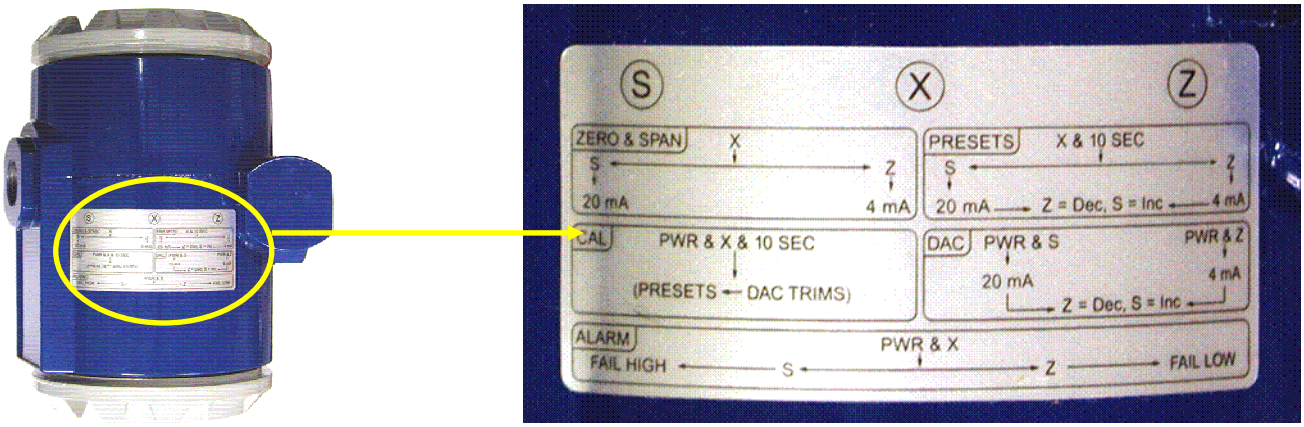
2.4 Typical Wiring Diagram



2.5 Location of Adjustments & Controls



- Pushing the **SPAN** Pushbutton is equivalent to placing the Magnet at position **S**.
- Pushing the **ZERO** pushbutton is equivalent to placing the magnet at position **Z.**
- Pushing both **SPAN** and **ZERO** at the same time is equivalent to placing the magnet at position **X.**



3.0 SUGGESTED MOUNTING ARRANGMENTS

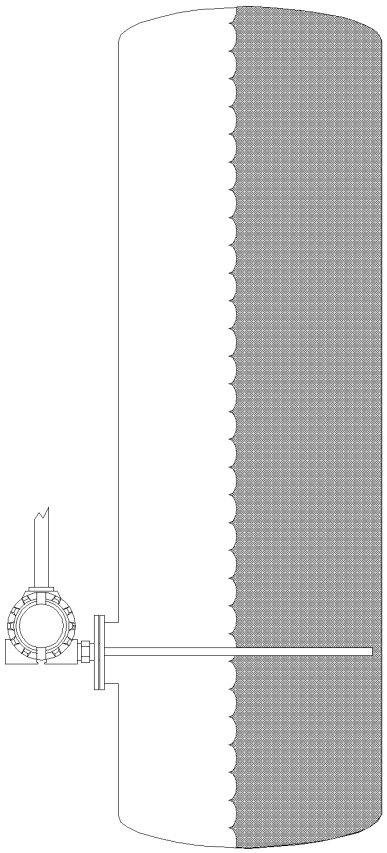
3.1 Horizontal Cylindrical Tanks

SUGGESTED MOUNTING ARRANGEMENTS

HORIZONTAL CYLINDRICAL TANKS

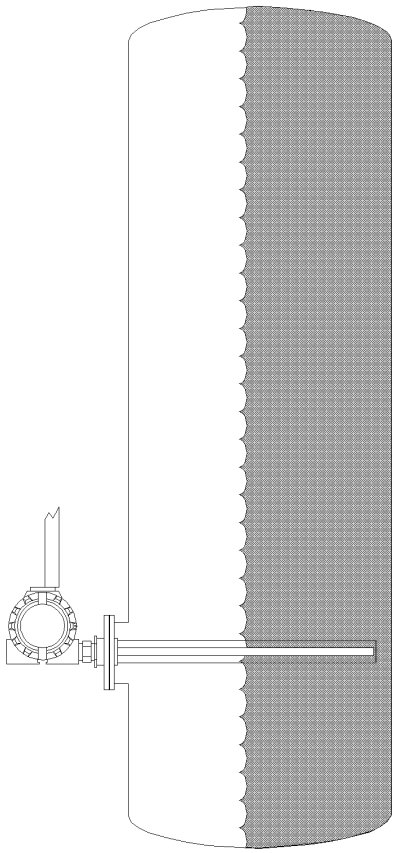
METALLIC VESSEL

When measuring conductive liquids the curvature of the sides and end of the tank do not have any appreciable effect on the measurement.

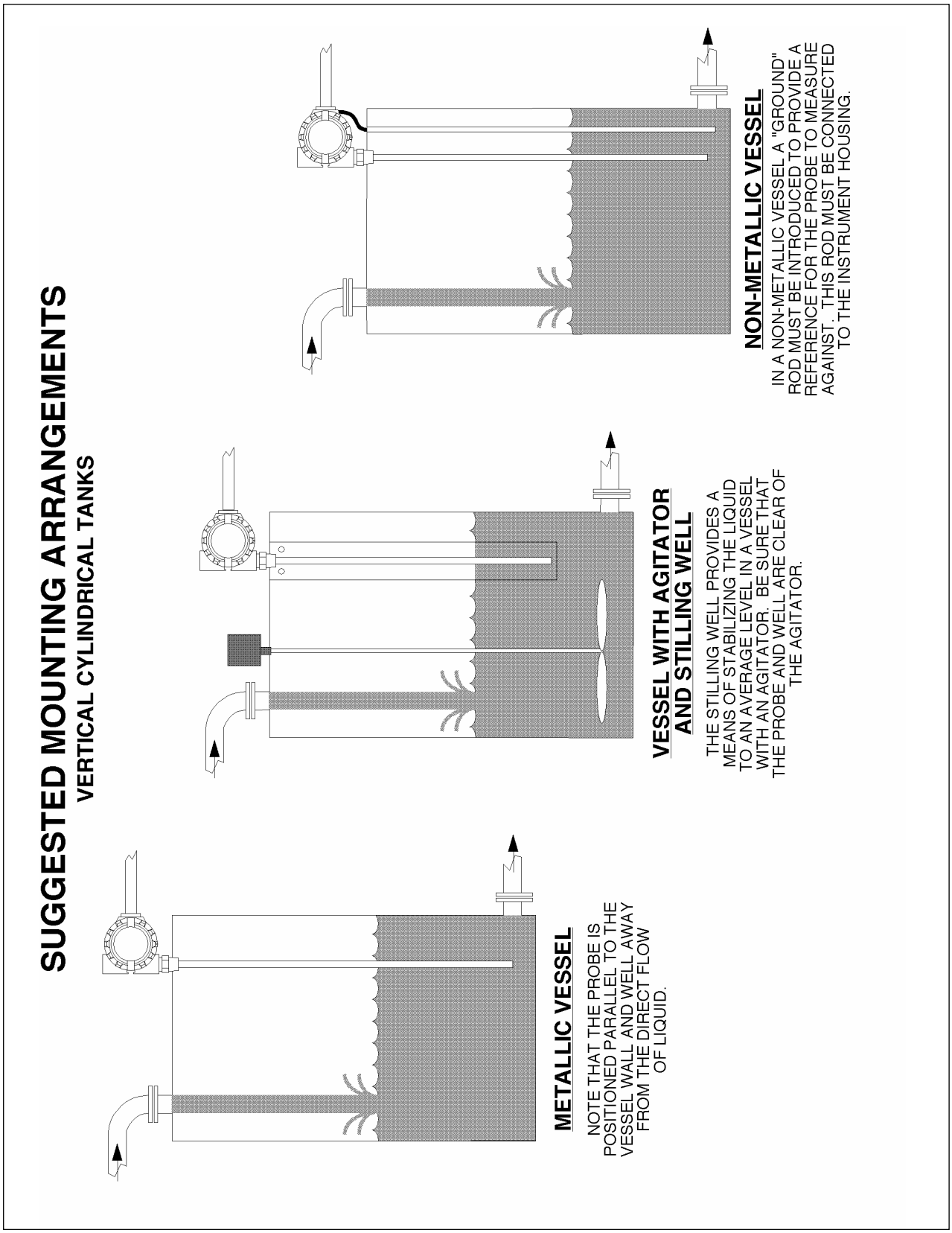


NON-METALLIC VESSEL

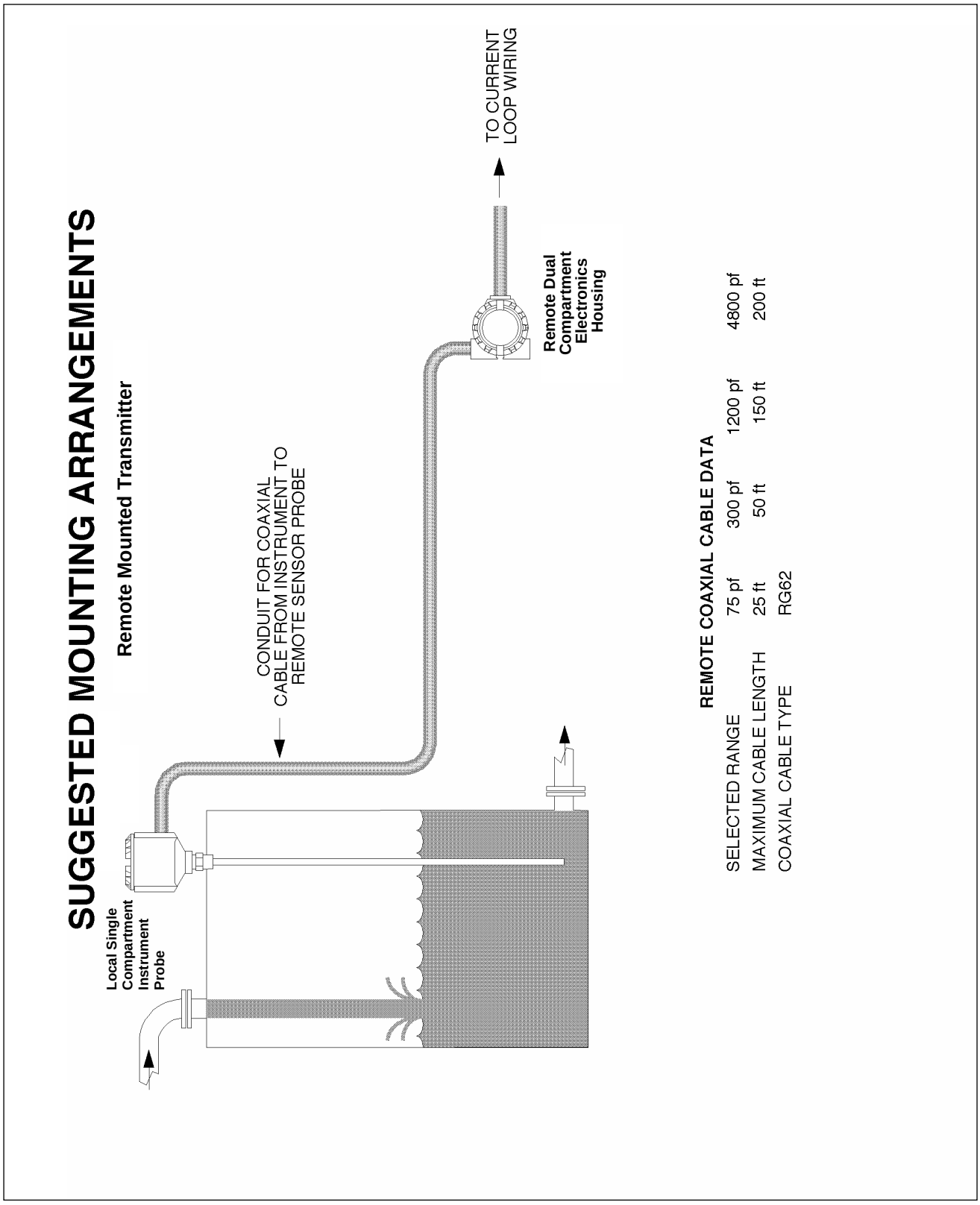
In a non-metallic vessel, a metal concentric shield or stilling well must be used to provide a ground reference. Also used to eliminate the non-linearity associated with the curvature of the tank when working with non-conductive liquids in a metallic tank.



3.2 Vertical Cylindrical Tanks



3.3 Remote Mounting



4.0 CALIBRATION

Calibration of the A38 Transmitter can be easily accomplished by applying the proper procedure. The most common procedure involves calibrating the device in place with a known pre-existing tank level. This method is referred to in this document as Partially Filled Vessel Calibration (Step 4.3).

An alternative method of calibration is available when it is practical to change the level of the vessel as needed to complete calibration. This method is known as an Alternate Tank Fill. This method of calibration can be used by employing steps 4.4, then 4.3

Although the Partially Filled Vessel Calibration is the more practical procedure, the Alternate Tank Fill Calibration Method should be employed when the most accurate measurement is desired.

Push Button Calibration: When using the internal pushbuttons to calibrate the A38 the procedure is the same as outlined below with the exception that pushbuttons replace the use of the magnet. Refer to Section 4.5 for button location. Substitute the following:

X Position	Press the Zero and Span buttons at the same time
Z Position	Press the Zero button only
S Position	Press the Span button only

4.1 Capacitance Range Selection

To calculate the Capacitance Span for a specific application it is necessary to have the following input data:

- Type of probe.
- Dielectric constant of the material.
- Diameter of the vessel
- Length of the probe

For the calculation, choose the closest curve in your chart for your application (reference Appendices). Use the curve corresponding to 96 inches if the diameter of the tank is bigger than 96 inches. These curves represent the probe concentrically located within each diameter.

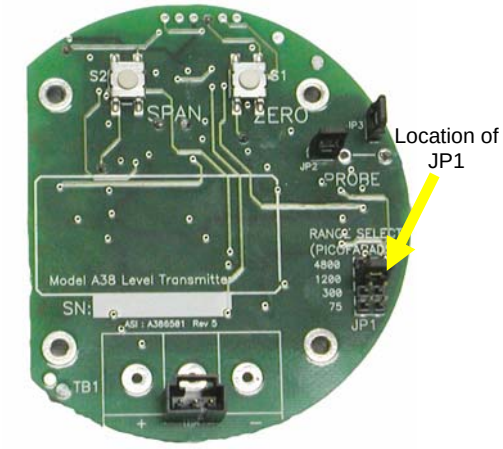


Figure 4-1

Note 1: If a probe is near one wall of a large tank, do the following: multiply the distance from the tank wall by 2 (to develop a diameter)

1. Find the place where a line drawn vertically from the value of the dielectric constant of the material intersects the curve corresponding to the diameter of the tank.
2. The value of the "Y" axis of that intersection point corresponds to the capacitance gain (pf per inch of probe).
3. Multiply the capacitance gain by the length of the probe to obtain the Capacitance Span.

If Note 1 applies to your application then multiply the resultant pf value x78%. This will account for the probe not being completely surrounded by the ground reference. This Capacitance Span allows you to select the appropriate range of sensitivity. Make sure that the Capacitance Span selected is lower than the required range of sensitivity (Figure 4-3).

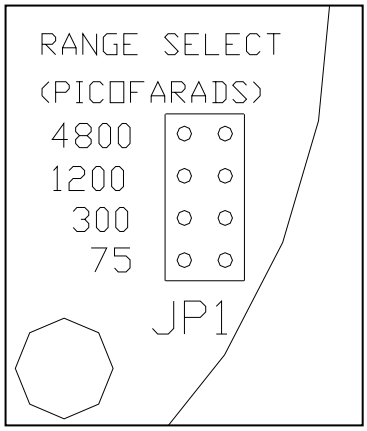


Figure 4-2

Range Selection Example:

Probe type: “R” Dielectric constant of the material: 80 (water)

Diameter of the tank: 96 in. Length of the probe: 36 in.

Using the chart for the probe R (Appendix B) find the point where a vertically drawn line at dielectric constant equal 80 intersects the curve corresponding to 96 inches diameter of the tank. The value of the coordinate axis Y of that point is the capacitance change, and in this example is equal 6.7 pf/inch.

Cap. Span = Cap. Gain x Length = 6.7pf/inch x 36 inches = 241.2pf

The recommended range of sensitivity is 76-300 pf (Figure 4-3). Locate the jumper JP1 on the electronics board (Figure 4-1) and move the black connector to the appropriate jumper position 300 pf (Figure 4-2).

4.2 Remote Option Cable Length

If you are using the remote option it will be necessary to know the maximum length possible. This is determined by the JP1 Setting. Refer to Figure 4-3 for maximum cable lengths for each capacitance range and corresponding jumper setting.

If the cable length is longer than the maximum recommended in Figure 4-3 it can result in an alarm condition (3.6 mA or 21 mA). Moving JP1 to the next available range to allow a longer length of cable will affect the resolution of the instrument. Resolution will be decreased by a factor of three for each jumper setting on JP1. It is highly recommended to stay within the allowable remote length ranges to optimize level measurement resolution

In the example from Section 4.1 the derived capacitance span of 241.2 pf and a JP1 setting of 300 allows for a remote cable length up to 50 feet.

Figure 4-3

Calculated Pf Range	JP1 Setting	Maximum Remote Cable Length
0 – 75	75	25ft / 7.6m
76 – 300	300	50ft / 15.2m
301 – 1200	1200	100ft / 30.5m
1201 – 4800	4800	200ft / 61.0m

4.3 Standard Calibration

The A38 is a digital transmitter and must be calibrated in the measured tank before its first use. No routine recalibration is required can be changed using the built in switch points. Use the following procedure if the level in the vessel can be raised and lowered to the required 4 and 20 milliamp points. If the level in the vessel cannot be raised and lowered to the 4 and 20 milliamp points, proceed to Section 4.4.

- **Setting the Zero point:**
    1. Establish a desired tank level corresponding to the Zero Calibration point.
    2. Enter the calibration mode by placing magnet at position X for more than 1 second, but less than 5 seconds.
    3. Move magnet from position X to position Z to set the Zero setpoint. This step is verified by checking that the output is now at the Zero Calibration point.
    4. Remove the magnet. The unit will time out and resume normal operation after 10 seconds of no switch activity.
- **Setting the Span point:**
    1. Establish a desired tank level corresponding to the Span Calibration point.
    2. Enter the calibration mode by placing magnet at position X for more than 1 second, but less than 5 seconds.
    3. Move magnet from position X to position S to set the Span setpoint. This step is verified by checking that the output is now at the Span Calibration point.
    4. Remove the magnet. The unit will time out and resume normal operation after 10 seconds of no switch activity.

4.4 Alternate Partially Filled Vessel Calibration

The A38 transmitter makes use of presets for the Zero and Span Calibration points. From the factory, these presets will be set to the values of the DAC Trim (4mA for Zero and 20mA for Span.) In order to calibrate the A38 the level of the vessel must be raised or lowered to establish two points for calibration. Using the Standard Calibration in Section 4.3, the level in the vessel will need to be raised or lowered to the levels for 4 and 20 mA. If this is not possible, the values for the Zero and Span presets can be changed to coincide with two alternate points along the required calibration range that the level can be raised and lowered to. Once this procedure is complete, the A38 can be calibrated following the procedure in Section 4.3. Use the following procedures to change the presets for Zero and Span.

The two presets must be at least 10% of the measuring range apart from each other.
The Zero Calibration preset can be set in a range from 3.90 mA to 18.50 mA (0-90% of the tank level).
The Span Calibration preset can be set in a range from 5.50 mA to 20.10 mA (10 – 100%) of the tank level).

- **Setting the Zero Calibration Preset:**
    1. Enter the preset calibration mode by placing magnet at position X for more than 8, but less than 15 seconds.
    2. Move magnet from position X to position Z to set the Zero Calibration Preset to the desired value.
    3. Placing magnet at position S will increase the output at + 0.01 mA intervals
    4. Placing magnet at position Z will decrease the output at - 0.01 mA intervals
    5. This function incorporates a system in which the first 20 steps occur at 0.01mA/step, then shift to 0.05mA/step for the next 10 steps, then to 0.25mA/step. Interrupting or changing the direction of this function causes the speed to revert to slow
    6. Remove the magnet. The unit will time out after 10 seconds of no switch activity and return to operation.

- **Setting the Span Calibration Preset:**

    1. Enter the preset calibration mode by placing magnet at position X for more than 8, but less than 15 seconds.
    2. Move magnet from position X to position S to set the Span Calibration Preset to the desired milliamp value.
    3. Placing magnet at position S will increase the output at + 0.01 mA intervals.
    4. Placing magnet at position Z will decrease the output at - 0.01 mA intervals.
    5. This function incorporates a system in which the first 20 steps occur at 0.01mA/step, then shift to 0.05mA/step for the next 10 steps, then to 0.25mA/step. Interrupting or changing the direction of this function causes the speed to revert to slow.
    6. Remove the magnet. The unit will time out after 10 seconds of no switch activity and return to operation.

Note: **<u>In order to complete the partially filled vessel calibration, complete the procedures in Section 4.3.</u>**

Example: When performing the Partially Filled Vessel Calibration the presets need to be set to indicate the levels used for calibration:

CP = (CL * 0.16) +4 where:
CP = Calibration Preset expressed in milliamps
CL = Calibration Level expressed in percent

Calibrating the unit at 35% and 55% of tank level:
CP Low = (35 * 0.16) + 4 = 9.6 mA

4.5 Alarm Mode Setup

This procedure is optional and allows you to select either the Low Alarm (3.6mA) or the High Alarm (21mA), which is going to be output when a shorted probe is detected. It is set by default to 21.0mA. If further changes are required, use the following procedure:

- **Setting the Low Alarm:**

    1. Enter the Alarm Mode Setup by applying power to the unit while magnet is at position X. The magnet should not stay at this position for more than 5 seconds.
    2. Move magnet from position X to position Z to set the Low Alarm Mode.
    3. A digital multimeter connected to the Loop will indicate 3.6 mA confirming that the Low Alarm has been set.
    4. Remove the magnet. The unit will time out and resume normal operation after 10 seconds of no switch activity.

- **Setting the High Alarm:**

    1. Enter the Alarm Mode Setup by applying power to the unit while magnet is at position X. The magnet should not stay at this position for more than 5 seconds.
    2. Move magnet from position X to position S to set the High Alarm Mode.
    3. A digital multimeter connected to the Loop will indicate 21.0 mA confirming that the High Alarm has been set.
    4. Remove the magnet. The unit will time out and resume normal operation after 10 seconds of no switch activity.

4.6 4 mA / 20 mA DAC TRIM (optional)

The DAC TRIM points are the settings used to tune the output circuit to 4 and 20 mA. They have been set at the factory prior to shipment and should require no further attention. Should there be a question about these settings, the unit's 4 ma and 20 ma outputs can be trimmed going through the step 4.4.

- **Setting 4.0 mA DAC TRIM:**

  1. Enter the 4 mA DAC TRIM MODE by applying power to the unit while magnet is at position Z.
  2. Placing magnet at position S will increase the output at + 0.01 mA intervals
  3. Placing magnet at position Z will decrease the output at - 0.01 mA intervals
  4. Continue to Increase/Decrease the output until the output is at 4.00 mA
  5. The unit will time out after 5 seconds of no switch activity and resume normal operation using the new 4.00 mA trimmed value.

- **Setting 20.0 mA DAC TRIM:**

  1. Enter the 20 mA DAC TRIM MODE by applying power to the unit while magnet is at position S.
  2. Placing magnet at position S will increase the output at + 0.01 mA intervals
  3. Placing magnet at position Z will decrease the output at - 0.01 mA intervals
  4. Continue to Increase/Decrease the output until the output is at 20.00 mA
  5. The unit will time out after 5 seconds of no switch activity and resume normal operation using the new 20.00 mA trimmed value.

- **Reset Set Zero/Span Calibration Presets to DAC Trim Points:**

Note: Optional. Use this procedure only after any DAC Trim changes when standard calibration is used.

1. Apply power to the unit for more than 8 seconds while magnet is at position X.
2. A digital multimeter connected to the Loop will indicate 4 mA for a few seconds and just before the timeout it will indicate 20.00 mA for 2 seconds confirming that the sensor calibration presets have be adjusted to 4.00 mA and 20.00 mA.

5.0 TROUBLESHOOTING

Symptom	Possible cause	Action
The output reading remain at 20.6 mA, either with an empty tank or the level of the tank is decreasing.	– Bad range selection. – Transmitter malfunction – Water in probe conduit – Cut in probe insulation	– Change range jumper to higher range. – Check for water and dry if present. – Replace A38 electronics with working electronics – Check probe insulation for tears, cuts or worn spots and if damaged replace with new probe.
Unit will not detect material, or the output doesn't move enough when the level is rising.	– Bad range selection – Transmitter malfunction	– Change range jumper to lower range. – Replace A38 electronics with working electronics
The output indicates one of the alarm conditions (3.6 or 21 mA).	– Short either in the probe or between the banana connector and the housing. – Conductive bridge between the probe and the vessel wall. – Cut in probe insulation. – Improper pf range selection	– Check the connection between the probe and the board. Replace the probe. – Clean up to remove bridge between probe & vessel wall – Check probe insulation for tears, cuts or worn spots and if damaged replace with new probe. – Change range jumper JP1 to applicable range per guidelines in Section 5.0
Unstable output	– Bad ground connection. – Radio frequency interference. – Agitation or waves in liquid	– Correct ground connection,. – Make sure housing covers are closed and completely screwed into housing – Stop agitation or wave action and check output to see if stable if output is stable, install stilling well for probe
Erratic or incorrect readings	– Ungrounded conductive liquid in a fiberglass vessel	– Process may need to be grounded a dual probe or concentric shield may be required.
Output reading 3.6 mA	– Wiring short from shield to ground in probe head. – Probe not connected to transmitter	– Check and correct wiring – Connect probe to transmitter
Transmitter reading 5% or greater in error	– Conductive buildup on probe – Transmitter malfunction	– Inspect and clean probe – Replace transmitter electronics
Concentric Shield probe installed and readings are incorrect	– Probe touching wall of concentric shield, material in concentric shield may be bridged or partially plugged. – Calibration is incorrect. – Vent holes may be plugged	– Center probe in concentric shield (may require probe centering adapter). – Recalibrate transmitter. – Clean out probe and reinstall. – Clean holes and make sure there are no obstructions

For advanced troubleshooting contact the K-TEK Factory:

K-TEK
Attn: Service Department
18321 Swamp Road
Prairieville, Louisiana 70769 USA

Tel: (1) 225-673-6100
Fax: (1) 225-673-2525
Email: service@ktekcorp.com

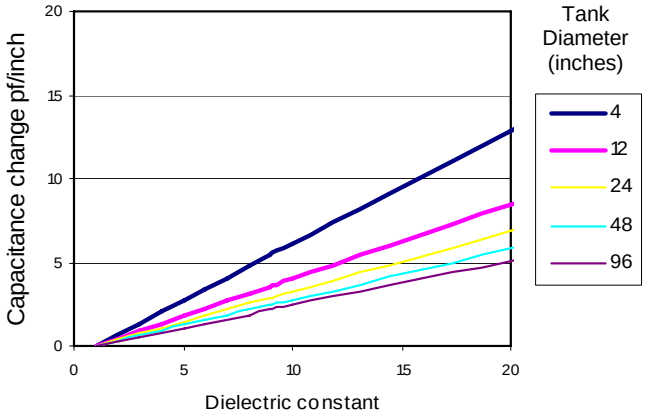
6.0 APPENDICES

6.1 Appendix A: Capacitance Change pF / inch Bare Probes

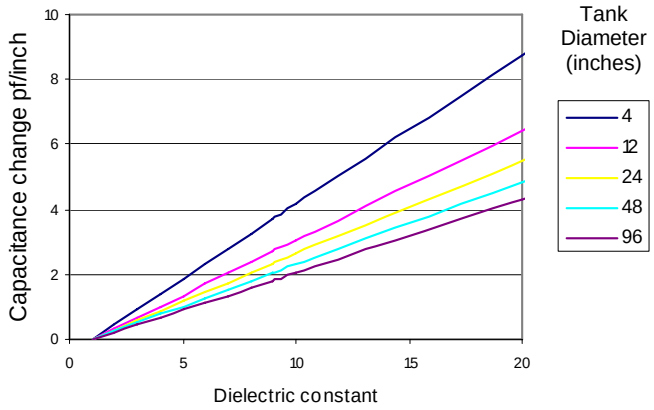
These curves are meant as an application aid; actual values may differ slightly. Always give yourself a 10% margin to ensure satisfactory performance.

These curves represent the probe concentrically located within each diameter. If a probe is near one wall of a large tank, do the following: multiply the distance from the tank wall by 2 (to develop a diameter), choose the closest curve in your chart for your application, then multiply the resultant pf value x78%. This will account for the probe not totally surrounded by the ground reference.

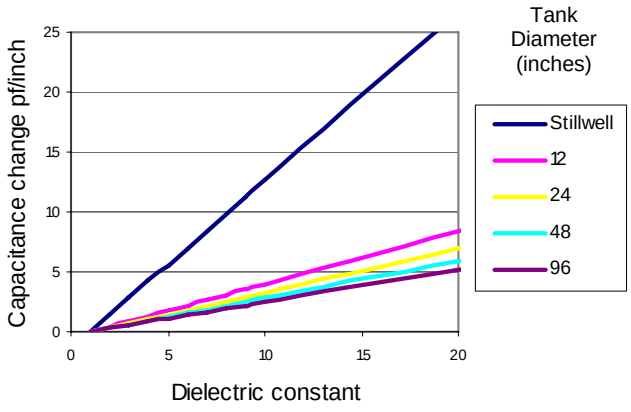
Type 2, C2H2 Probes



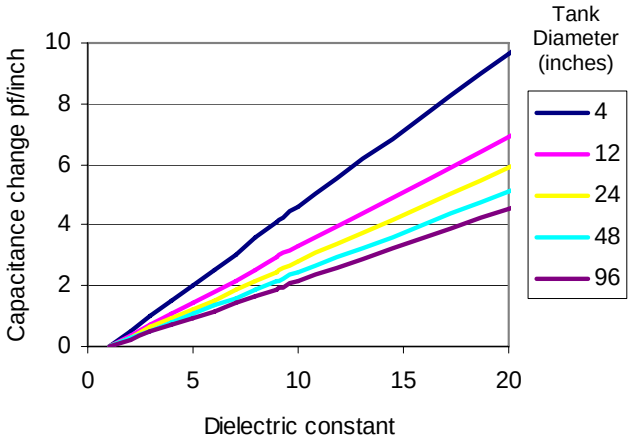
Type 6, C1H6 Probes



Type W2, C2HW2 Probes



Type C1H1, C2H7 Probes

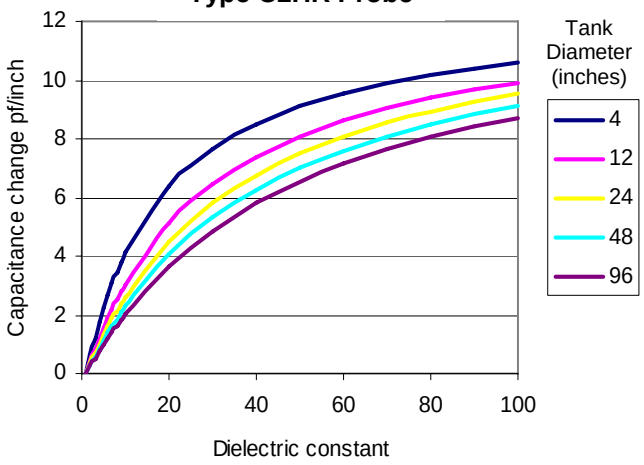


6.2 Appendix B: Capacitance Change pF / inch Insulated Probes

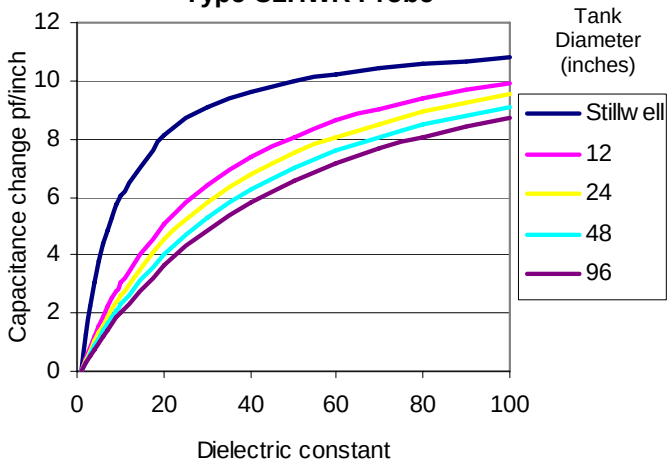
These curves are meant as an application aid; actual values may differ slightly. Allow a 10% margin to ensure satisfactory performance.

These curves represent the probe concentrically located within each diameter. If a probe is near one wall of a large tank, do the following: multiply the distance from the tank wall by 2 (to develop a diameter), choose the closest curve in your chart for your application, then multiply the resultant pf value x78%. This will account for the probe not totally surrounded by the ground reference.

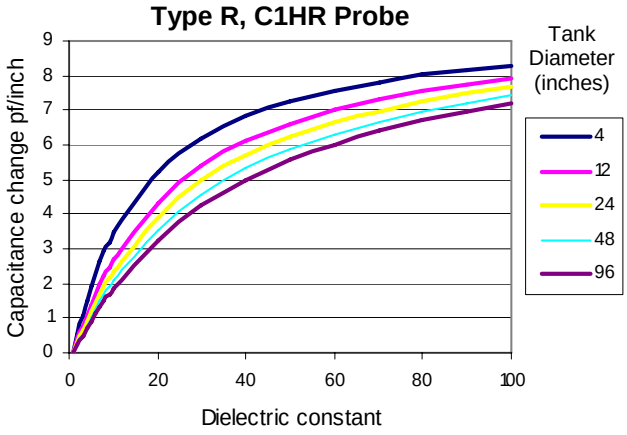
Type C2HR Probe



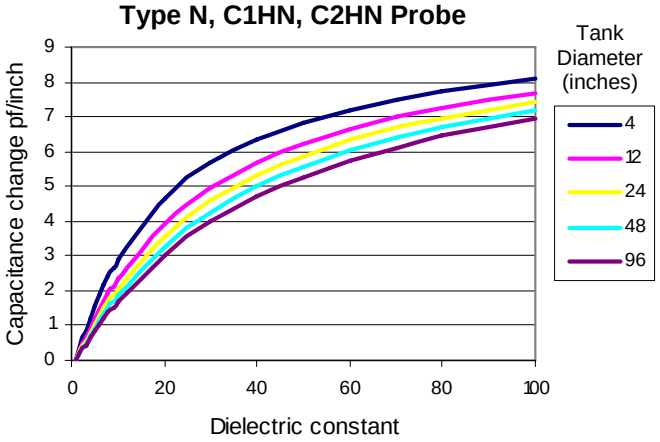
Type C2HWR Probe



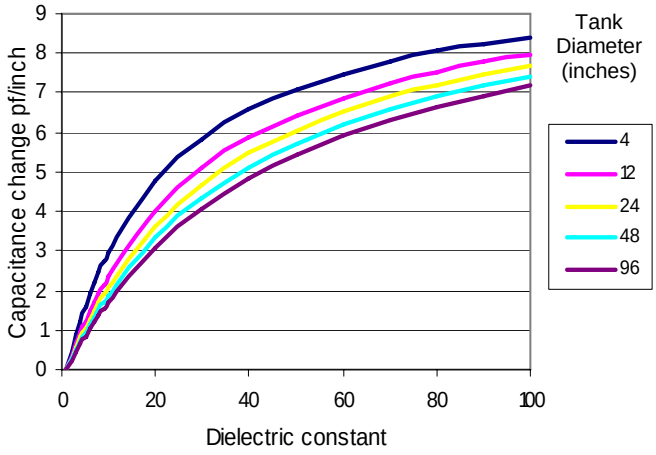
Type R, C1HR Probe



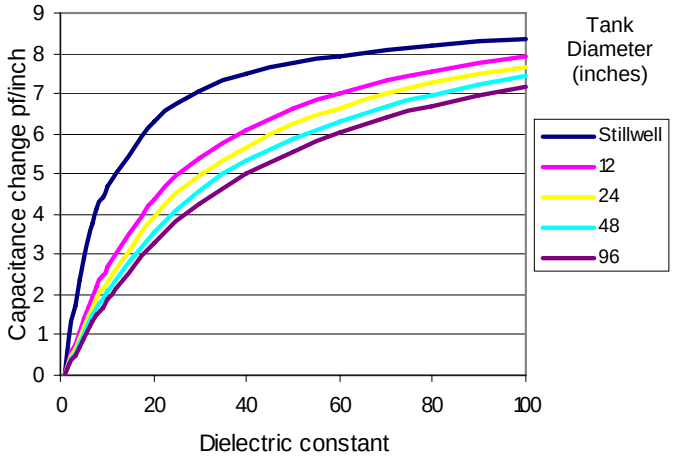
Type N, C1HN, C2HN Probe



Type 8 Probe

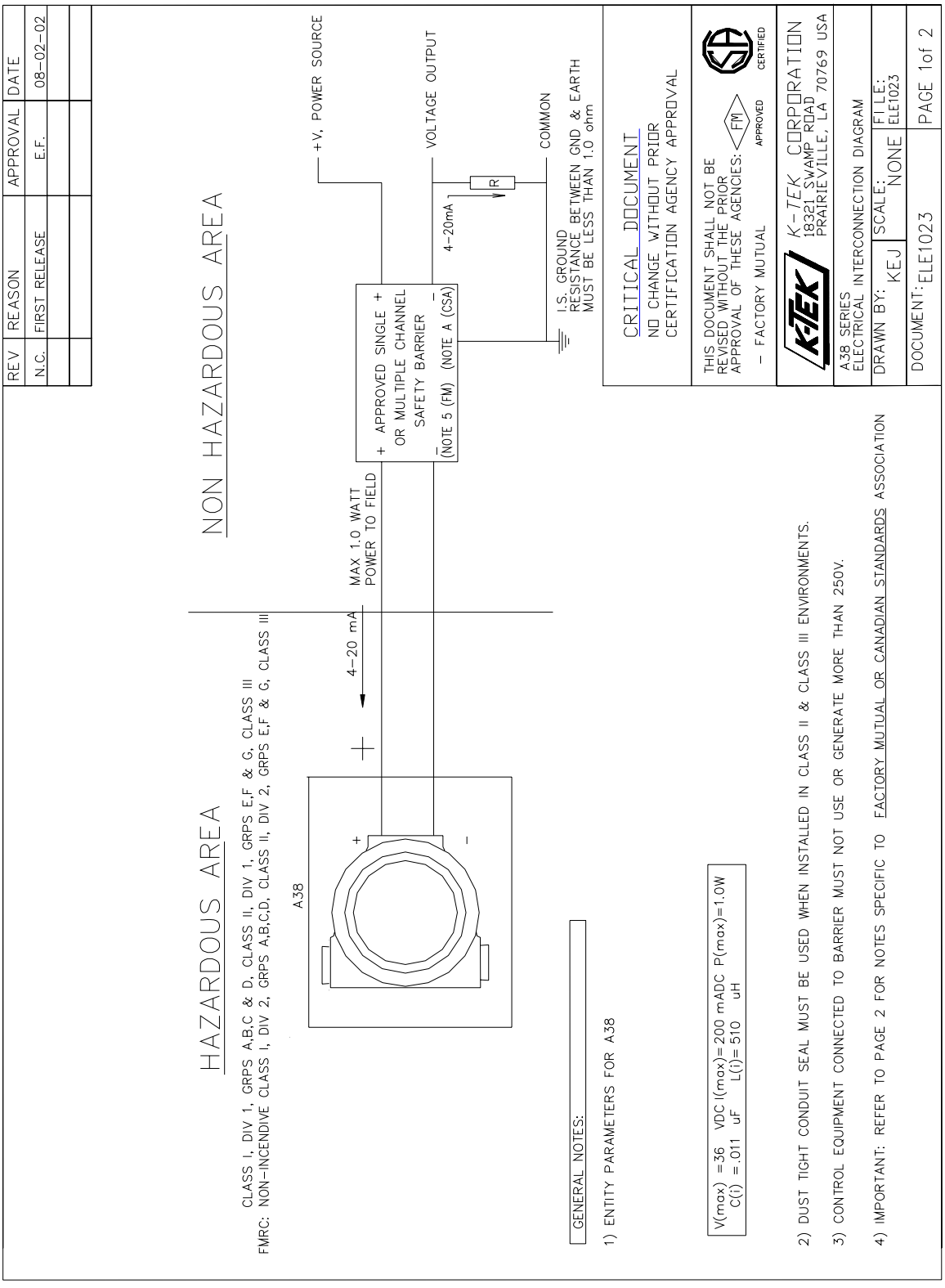


Type WR Probe



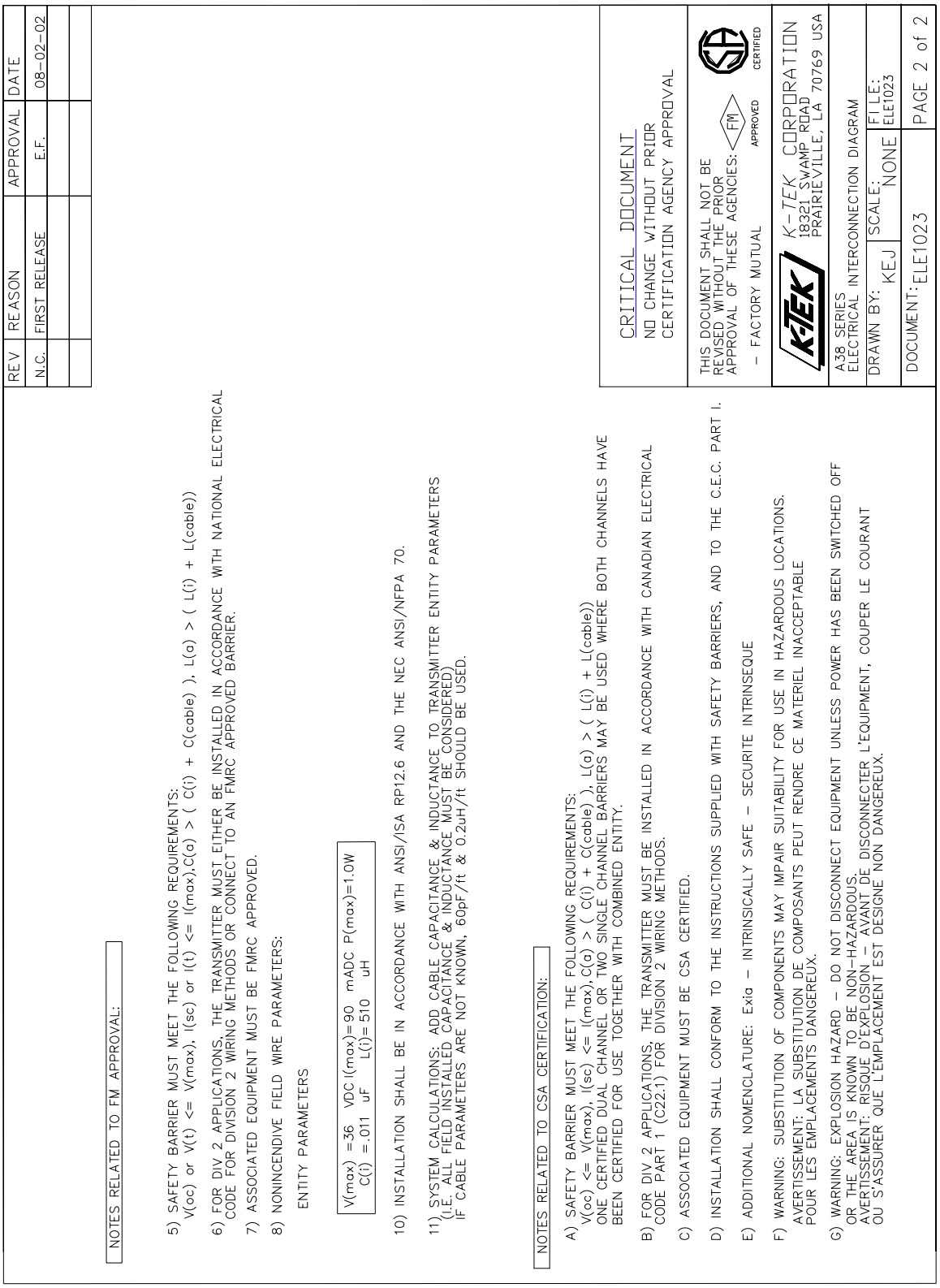
6.3 Appendix C: A38 Series Electrical Interconnection Diagram, Part 1

Make reference to these drawings when installing I.S. rating units.



6.3 Appendix C: A38 Series Electrical Interconnection Diagram, Part 2

Make reference to these drawings when installing I.S. rating units.



NOTES RELATED TO FM APPROVAL:

5) SAFETY BARRIER MUST MEET THE FOLLOWING REQUIREMENTS:
   V(oc) or V(t) <= V(max), I(sc) or I(t) <= I(max),C(a) > (C(i) + C(cable)), L(a) > (L(i) + L(cable))
6) FOR DIV 2 APPLICATIONS, THE TRANSMITTER MUST EITHER BE INSTALLED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE FOR DIVISION 2 WIRING METHODS OR CONNECT TO AN FMRC APPROVED BARRIER.
7) ASSOCIATED EQUIPMENT MUST BE FMRC APPROVED.
8) NONINCENDIVE FIELD WIRE PARAMETERS:

   ENTITY PARAMETERS

   V(max) =36 VDC I(max)= 90 mADC P(max)=1.0W
   C(i) =.011 uF L(i)= 510 uH

10) INSTALLATION SHALL BE IN ACCORDANCE WITH ANSI/ISA RP12.6 AND THE NEC ANSI/NFPA 70.
11) SYSTEM CALCULATIONS: ADD CABLE CAPACITANCE & INDUCTANCE TO TRANSMITTER ENTITY PARAMETERS (I.E. ALL FIELD INSTALLED CAPACITANCE & INDUCTANCE MUST BE CONSIDERED)
    IF CABLE PARAMETERS ARE NOT KNOWN, 60pF/ft & 0.2uH/ft SHOULD BE USED.

NOTES RELATED TO CSA CERTIFICATION:

A) SAFETY BARRIER MUST MEET THE FOLLOWING REQUIREMENTS:
   V(oc) <= V(max), I(sc) <= I(max), C(a) > (C(i) + C(cable)), L(a) > (L(i) + L(cable))
   ONE CERTIFIED DUAL CHANNEL OR TWO SINGLE CHANNEL BARRIERS MAY BE USED WHERE BOTH CHANNELS HAVE BEEN CERTIFIED FOR USE TOGETHER WITH COMBINED ENTITY.
B) FOR DIV 2 APPLICATIONS, THE TRANSMITTER MUST BE INSTALLED IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE PART 1 (C22.1) FOR DIVISION 2 WIRING METHODS.
C) ASSOCIATED EQUIPMENT MUST BE CSA CERTIFIED.
D) INSTALLATION SHALL CONFORM TO THE INSTRUCTIONS SUPPLIED WITH SAFETY BARRIERS, AND TO THE C.E.C. PART I.
E) ADDITIONAL NOMENCLATURE: Exia – INTRINSICALLY SAFE – SECURITE INTRINSEQUE
F) WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USE IN HAZARDOUS LOCATIONS.
   AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DANGEREUX.
G) WARNING: EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
   AVERTISSEMENT: RISQUE D'EXPLOSION – AVANT DE DISCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

REV	REASON	APPROVAL	DATE
N.C.	FIRST RELEASE	E.F.	08-02-02

CRITICAL DOCUMENT
NO CHANGE WITHOUT PRIOR CERTIFICATION AGENCY APPROVAL

THIS DOCUMENT SHALL NOT BE REVISED WITHOUT THE PRIOR APPROVAL OF THESE AGENCIES: FM APPROVED, CSA CERTIFIED
– FACTORY MUTUAL

K-TEK CORPORATION
18321 SWAMP ROAD
PRAIRIEVILLE, LA 70769 USA

A38 SERIES
ELECTRICAL INTERCONNECTION DIAGRAM

DRAWN BY: KEJ | SCALE: NONE | FILE: ELE1023

DOCUMENT: ELE1023 | PAGE 2 of 2

6.4 Appendix D: Warranty Statement

5 YEAR WARRANTY FOR:
KM26 Magnetic Liquid Level Gauges; MagWave Dual Chamber System; LS Series Mechanical Level Switches (LS500, LS550, LS600, LS700, LS800 & LS900); EC External Chambers and ST95 Seal Pots.

3 YEAR WARRANTY FOR:
KCAP300 & KCAP400 capacitance switches.

2 YEAR WARRANTY FOR:
AT100, AT100S and AT200 series transmitters; VF20 and VF30 vibrating fork switches; RLT100 and RLT200 reed switch level transmitters; TX, TS, TQ, IX and IM thermal dispersion switches; IR10 and PP10 External Relays; MT2000 radar level transmitters; RI100 Repeat Indicator; KP paddle switches; A02, A75 & A77 RF capacitance level switches and A38 RF capacitance level transmitters; Buoyancy Level Switches (MS50, MS10, MS8D & MS8F); Magnetic Level Switches (MS30, MS40, MS41, PS35 & PS45).

1 YEAR WARRANTY FOR:
KM50 gauging device; AT500 and AT600 series transmitters; LaserMeter and SureShot series laser transmitters; LPM200 digital indicator; DPM100 digital indicators; APM100 analog indicators; KVIEW series digital indicators and controllers; SF50 and SF60 vibrating fork switches, KB Electro-Mechanical Continuous Measuring Devices, KSONIK ultrasonic level switches, transmitters & transducers.

SPECIAL WARRANTY CONSIDERATIONS:
K-TEK does not honor OEM warranties for items not manufactured by K-TEK (i.e. Palm Pilots). These claims should be handled directly with the OEM.

K-TEK will repair or replace, at K-TEK's election, defective items which are returned to K-TEK by the original purchaser within the period specified above from the **shipment date** of the item and which is found, upon examination by K-TEK, to its satisfaction, to contain defects in materials or workmanship which arose only under normal use and service and which were not the result of either alterations, misuse, abuse, improper or inadequate adjustments, applications or servicing of the product. **K-TEK's warranty does not include onsite repair or services.** Field service rates can be supplied on request.

If a product is believed to be defective, the original purchaser shall notify K-TEK and request a Returned Material Authorization before returning the material to K-TEK, with transportation **prepaid** by the purchaser. (Request door to door delivery via New Orleans International Airport located in Louisiana, USA.) The product, with repaired or replaced parts, shall be returned to the purchaser at any point in the world with transportation prepaid by K-TEK for best-way transportation only. K-TEK is not responsible for expedited shipping charges. If the product is shipped to K-TEK freight collect, then it will be returned to the customer freight collect.

If inspection by K-TEK does not disclose any defects in material or workmanship, K-TEK's normal charges for repair and shipment shall apply (minimum 250.00 USD).

The materials of construction for all K-TEK products are clearly specified and it is the responsibility of the purchaser to determine the compatibility of the materials for the application.

THE FOREGOING WARRANTY IS K-TEK'S SOLE WARRANTY AND ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND NEGATED TO THE MAXIMUM EXTENT PERMITTED BY LAW. NO PERSON OR REPRESENTATIVE IS AUTHORIZED TO EXTEND ANY OTHER WARRANTY OR CREATE FOR K-TEK ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF K-TEK'S PRODUCTS. THE REMEDIES SET FORTH IN THIS WARRANTY ARE EXCLUSIVE OF ALL OTHER REMEDIES AGAINST K-TEK. K-TEK SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR SPECIAL DAMAGES OF ANY KIND. K-TEK'S SOLE OBLIGATION SHALL BE TO REPAIR OR REPLACE PARTS (FOUND TO BE DEFECTIVE IN MATERIALS OR WORKMANSHIP) WHICH ARE RETURNED BY THE PURCHASER TO K-TEK.

6.5 Appendix E: RMA Form

K-TEK
18321 Swamp Road
Prairieville, Louisiana 70769
Phone: (225) 673-6100
Fax: (225) 673-2525
1-800-735-5835

RA Number:

Return Authorization Form

Customer:	Date:
Contact:	Product Returned:
Contact Email:	Serial No:
Contact Phone:	Job No:
Contact Fax:	Service Rep:

To Be Completed By Customer

Reason for Return:

Problem Found:

Action Requested:

Is expedited return shipping requested? ☐ Yes ☐ No

If yes, please provide a purchase order number. K-Tek pays return transport via standard ground shipment o

Is K-Tek authorized to repair items determined to be non-warranty? ☐ Yes ☐ No

If yes, please provide a purchase order number

Customer PO#: Date:

Has product been in contact with any hazardous chemical? ☐ Yes ☐ No

If yes, decontaminate product and forward MSDS to K-Tek, "ATTN: Repairs

Return Repaired Product To:

Street:

City: State: Zip: Country:

Bill To:

PO Box / Street:

City: State: Zip: Country:

Ship VIA:

****IMPORTANT NOTE TO THE CUSTOMER:**

Be sure to include the RA number on the shipping label or package. A copy of this document should also be included. K-Tek wan to maintain a safe work environment for its employees. Customer must note if the returned material has been in contact with any hazardous chemicals, per federal regulations, please have product or material decontaminated before shipment. Forward applicat MSDS information to K-Tek, per federal requirements. Evaluations will be delayed if these safety aspects of handling the returned material is unknown or unclear. 10-19-98

7.6 Appendix F: EU Declaration of Conformity

K-TEK LLC
18321 Swamp Road
Prairieville, Louisiana 70769, USA
Tel: (225) 673-6100 Fax: (225) 673-2525

EU DECLARATION OF CONFORMITY

The EU Directives covered by this Declaration:

73/23EEC Low Voltage Equipment Directive, amended by 93/68/EEC
89/336/EEC Electromagnetic Compatibility Directive, amended by 92/31/EEC & 93/68/EEC

The Products Covered by this Declaration:

Model A38 Capacitance Switch

The Basis on which Conformity is being declared:

The product(s) identified above complies with the requirements of the above EU Directives by meeting the following standards:

EN50081-2	Radiated and Conducted Emission
EN50082-2	Radiated and Conducted Immunity
EN61000-4	Electro Magnetic Immunity
EN61010	Electrical Safety Conformance

The technical documentation required to demonstrate that the product meets the requirements of the Directives noted above has been complied by the signatory below and is available for inspection by the relevant enforcement authorities. The CE mark was first applied in 2002.

The products described above comply with the essential requirements of the directives specified.

Signed: *Eric P. Fauveau*

Authority: Vice President Research & Development

Date: May 5, 2002

ATTENTION!

The attention of the specifier, purchaser, installer, or user is drawn to the following special measures and limitations to use which must be observed when the product is taken into service to maintain compliance with the above directives:

1) Proper Installation of the instrument requires use of shielded cable for the loop wiring.

Details of these special measures and limitations are also contained in the product manuals.

CE_A38.DOC