



Installation & Operation Manual

A77

RF Level Switch



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1.0 GENERAL DESCRIPTION

- 1.1 K-TEK Corporation's Model A77 is used to detect the presence of a material at a given level in a tank, bin, or other container. It can be used with a wide range of both liquid and solid materials that may be electrically conductive or non-conductive. In some cases, the ALL-STAR II can be used to detect the level of an interface between a lighter and heavier substance, such as that found in an oil and water separator.
- 1.2 The standard version of the ALL-STAR II is housed in a explosion proof enclosure with an integral 12 inch long probe. The standard probe is a solid 3/8 inch diameter stainless steel rod. A time delay circuit is included as standard on the ALL-STAR II. It operates on rising level and may be set to times of 0, 5, 10, and 15 seconds. The standard version of the ALL-STAR II is powered from the 120 VAC, but 240 VAC or 12/24 VDC powered versions are also offered. A quick touch-to-test feature is included to allow verification of proper operation.
- 1.3 Optional extras are available with the ALL-STAR II, including extended probes up to 10 feet and more in length and fully coated or insulated probes. Applications assistance is available through our distributors as well as from the factory.
- 1.4 In most applications, the installation and calibration of the ALL-STAR II is easily accomplished by a competent electrician. Mounting the unit requires three basic steps. First, provide an opening in the tank or other container. Second, fit this opening with a pipe coupling or other threaded entry. Third, install the ALL-STAR II securely into the coupling or other fitting. The wiring of the unit may consist of as few as three wires, depending upon the application. No test equipment is required for calibration since the necessary calibration indicators are built into this unit. Seasonal re-calibration of the unit is unnecessary due to its exceptional stability.
- 1.5 Because of the patented detection technique used in the ALL-STAR II, it can tolerate reasonable amounts of sticky material buildup on the probe. In addition, the rugged construction techniques used in building the probes allow them to support the weight of such buildup. All this is accomplished while maintaining the ultimate in simple probes offering the widest possible range of applications.

2.0 SPECIFICATIONS

Environmental

Housing type	Explosion-Proof, Powder Coated, Copper Free Aluminum
Temperature	Electronics: -40 to 185° F / -40 to 85°C Ambient
Dielectric	Ideal: 10 or greater; Consult factory for probe selection on lower dielectric applications

Electrical

Input Power	95-130 VAC, 50-60 Hz, 2 Watts; 9-35 VDC, 100 mA Max
Relay Contact Rating	Resistive: 5 Amp, 250 VAC; 5 Amp, 30 VDC; Inductive: 1/10 HP 125, 250 VAC
Sensitivity	With an initial load of 30 pF, an increase of 2.5 pF can be detected.
Static Protection	Maximum Surge Current: 100 amps; Clamp Voltage: 16 volts
Process Connection	3/4" NPT

Approvals

Factory Mutual

XP-DIP-AIS / I,II,III / 1 / BCDEFG with all probes except type 5, S, U
 DIP-AIS / II, III / 1 / EFG with probe type 5, S, U
 NEMA 4

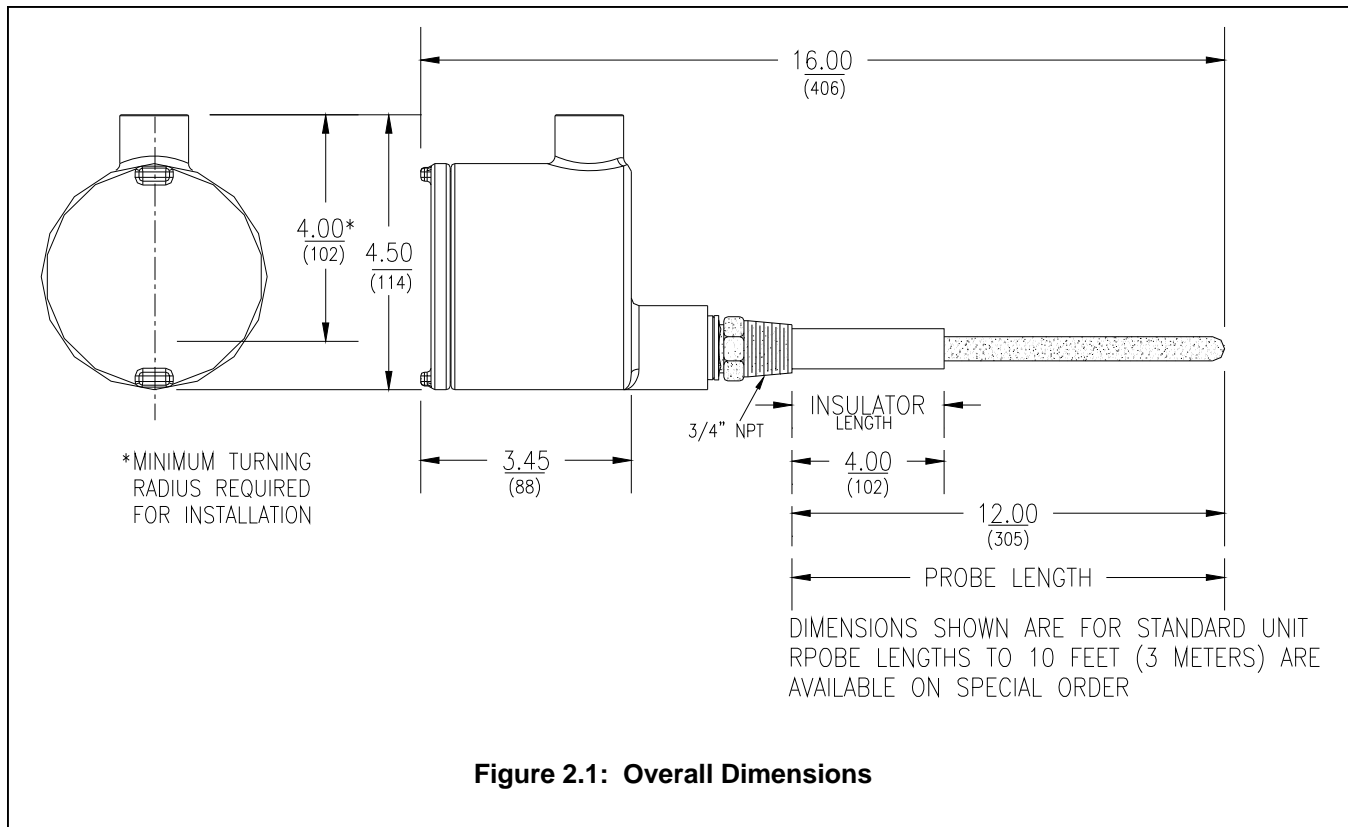


Figure 2.1: Overall Dimensions

3.0 INSTALLATION AND CALIBRATION

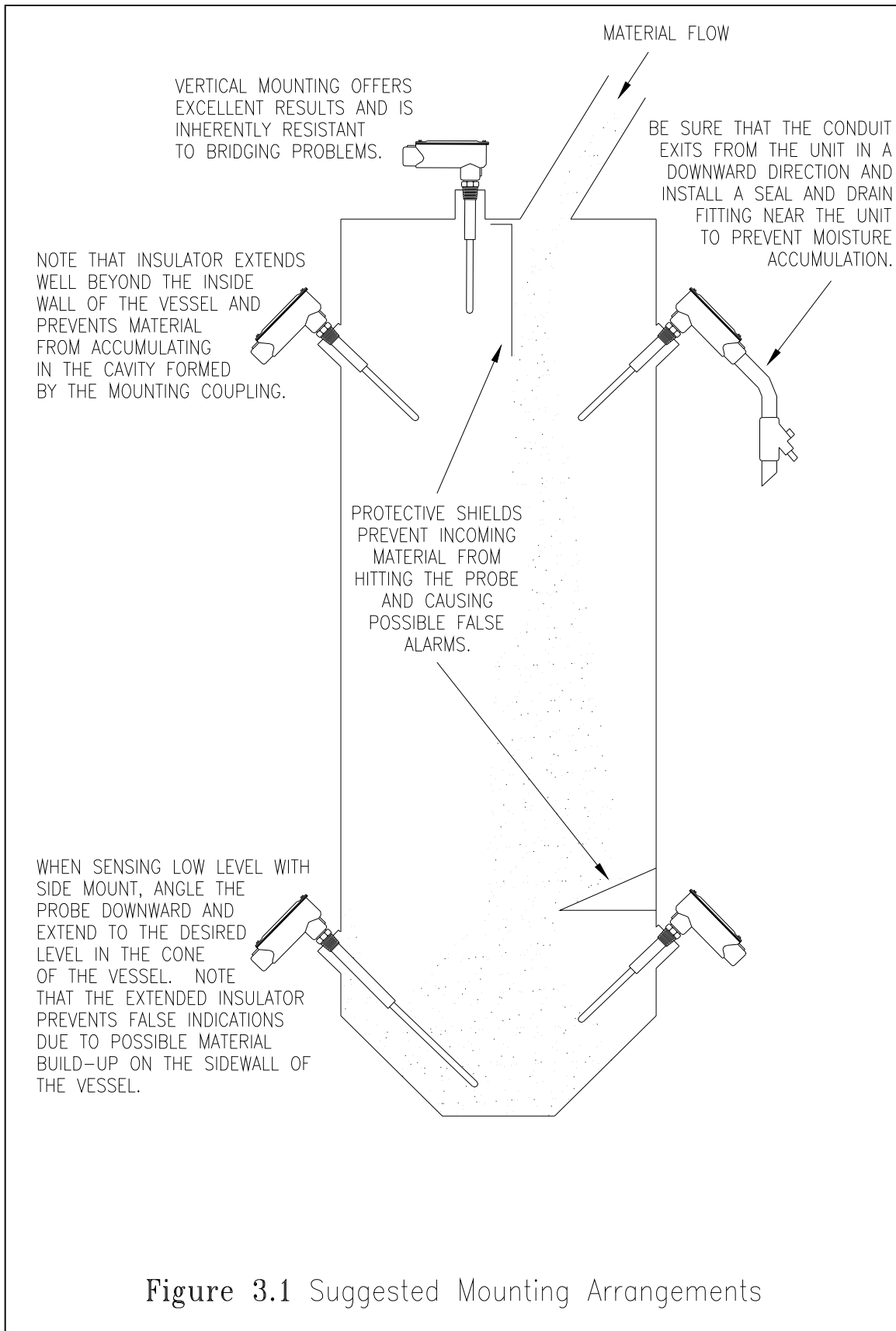
- 3.1 After unpacking the unit, inspect it for any evidence of shipping damage. Any claims for damage due to shipping must be filed with the carrier who handled the package(s).
- 3.2 Select a mounting location for the ALL-STAR II unit and its attached sensing probe. See Figure 3.1 for recommended mounting practices. Figure 3.2 shows some mounting methods that have proved to be troublesome. Be sure that there is sufficient clearance around the mounting position to allow for the turning radius as the unit is screwed into place. Also, in the case of rigid probes, allow sufficient room to be able to insert the probe into the opening in the vessel. Cut a hole in the vessel that is at least large enough to allow the insulator portion of the probe to extend into the inside of the vessel and mount a threaded coupling to the vessel. The thread size of the coupling should be 3/4" NPT for standard probes.

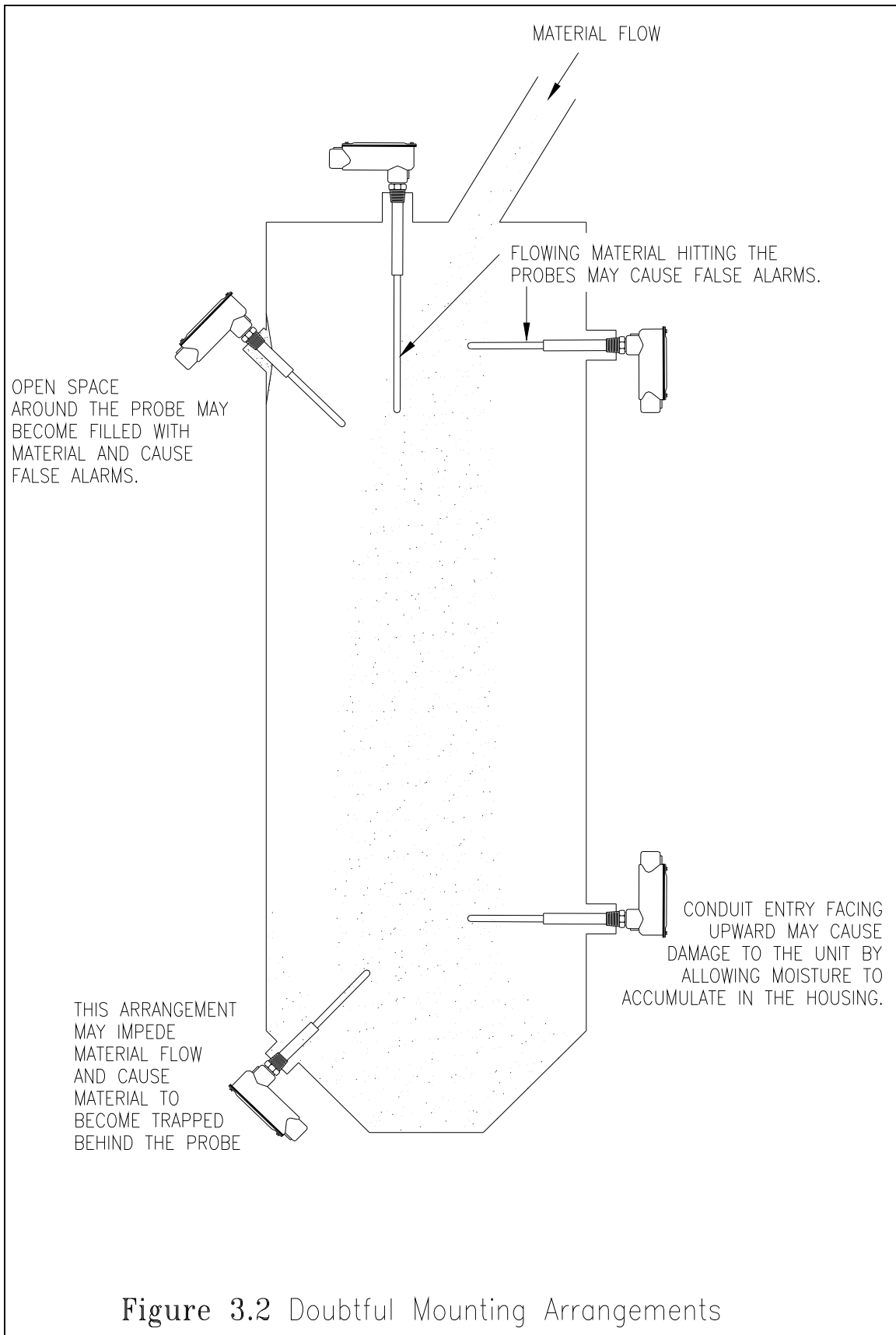
CAUTION: When making the opening in the vessel, observe all safety requirements of the area in which the work is being done. Be especially careful of pressurized vessels.

- 3.3 Screw the ALL-STAR II unit into the coupling and install conduit suitable to the environment in which the unit is to be used. See Figure 3.1 for a suggested conduit arrangement,
- 3.4 Wire the ALL-STAR II unit according to the typical wiring diagrams of Figure 3.4 through 3.7 or as may be required by the particular application in which the unit is to be used. Because of 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 distributor, representative, or K-TEK Corporation if assistance is desired.

CAUTION: Be sure that all wiring conforms to the requirements of the National Electrical Code and any enforcing authorities or agencies having jurisdiction over the installation.

- 3.5 Calibrate the ALL-STAR II unit using the following procedure. See figure 3.8 for location of adjustments and controls.
- 3.6 The "fail-safe" selection is used to determine the mode of operation of the relay. In the "fail-safe" high (reverse action) mode, the relay will be energized until the material in the vessel touches the sensing probe. At this time the relay will de-energize. In the "fail-safe" low (direct-action) mode, the relay will be de-energized until the material in the vessel touches the sensing probe. At this time the relay will energize. The "fail-safe" mode selection may be altered in the field by setting the "fail-safe" switch to the desired position. Unless otherwise specified, all units are preset at the factory for operation in the reverse action or "fail-safe" HI mode.
- 3.7 There is a choice of four time delay setting of 0, 5, 10, and 15 seconds. The time delay in all units operates upon a rising level of material in the vessel. That is, as the level rises and material touches the sensing probe, the time delay period will begin. At the end of the time delay period, the relay will change condition. The time delay selection may be altered in the field by setting the time delay switches to the desired positions as described in Section 3.12 and Step 7.
- 3.8 The calibration potentiometer is used to adjust the level switch for a particular installation in a specific vessel. Once it is adjusted, it should not require further adjustments unless the installation is changed or the unit is moved to a different vessel.
- 3.9 During calibration, the red indicator light shows the proper setting of the calibration potentiometer. Once the level switch is properly calibrated, the indicator light will show the presence of material at the sensing probe: ON when material is present and OFF when material is absent.





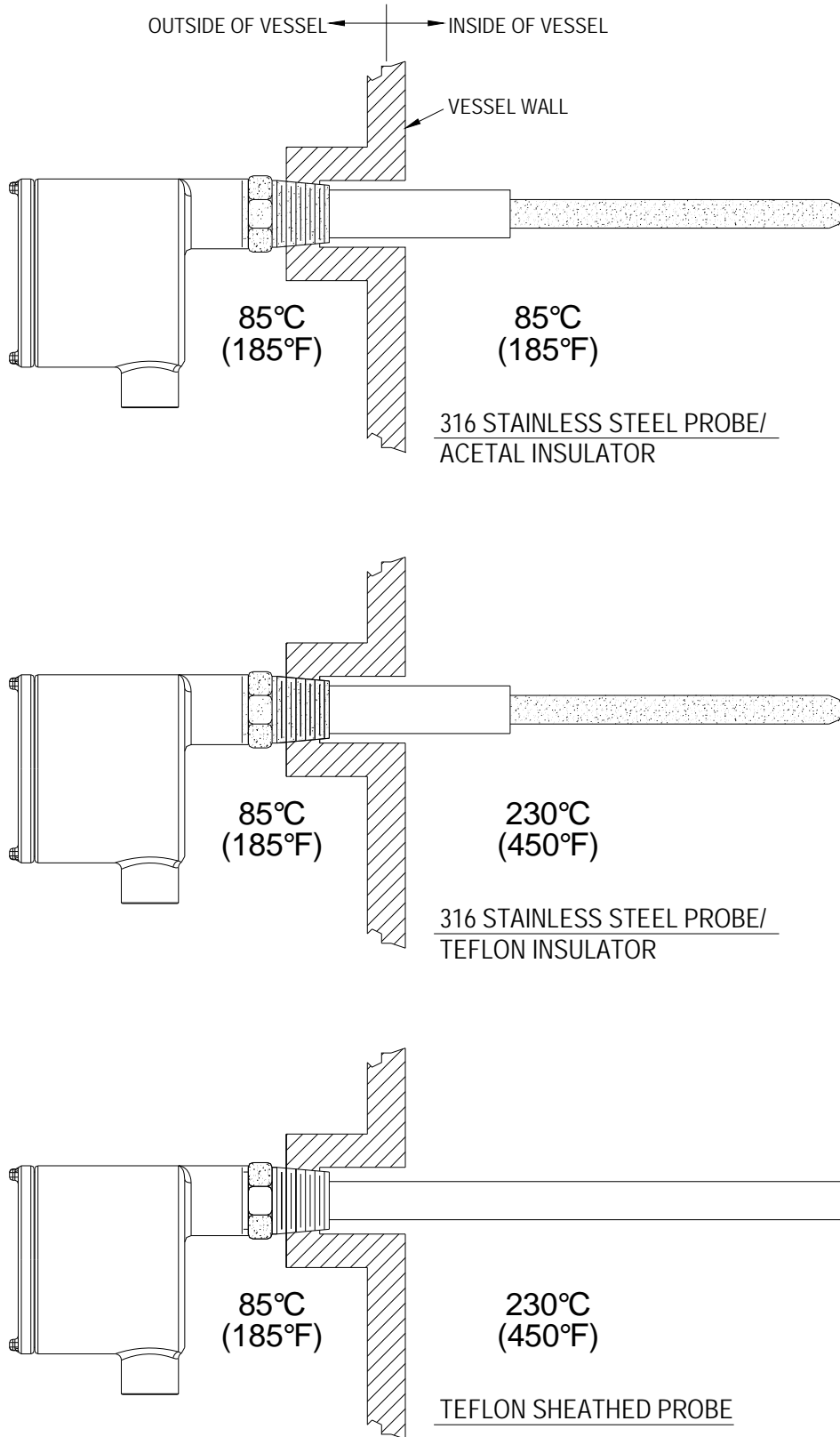


Figure 3.3: Maximum Temperature Ratings

120 VOLTS A.C. WIRING

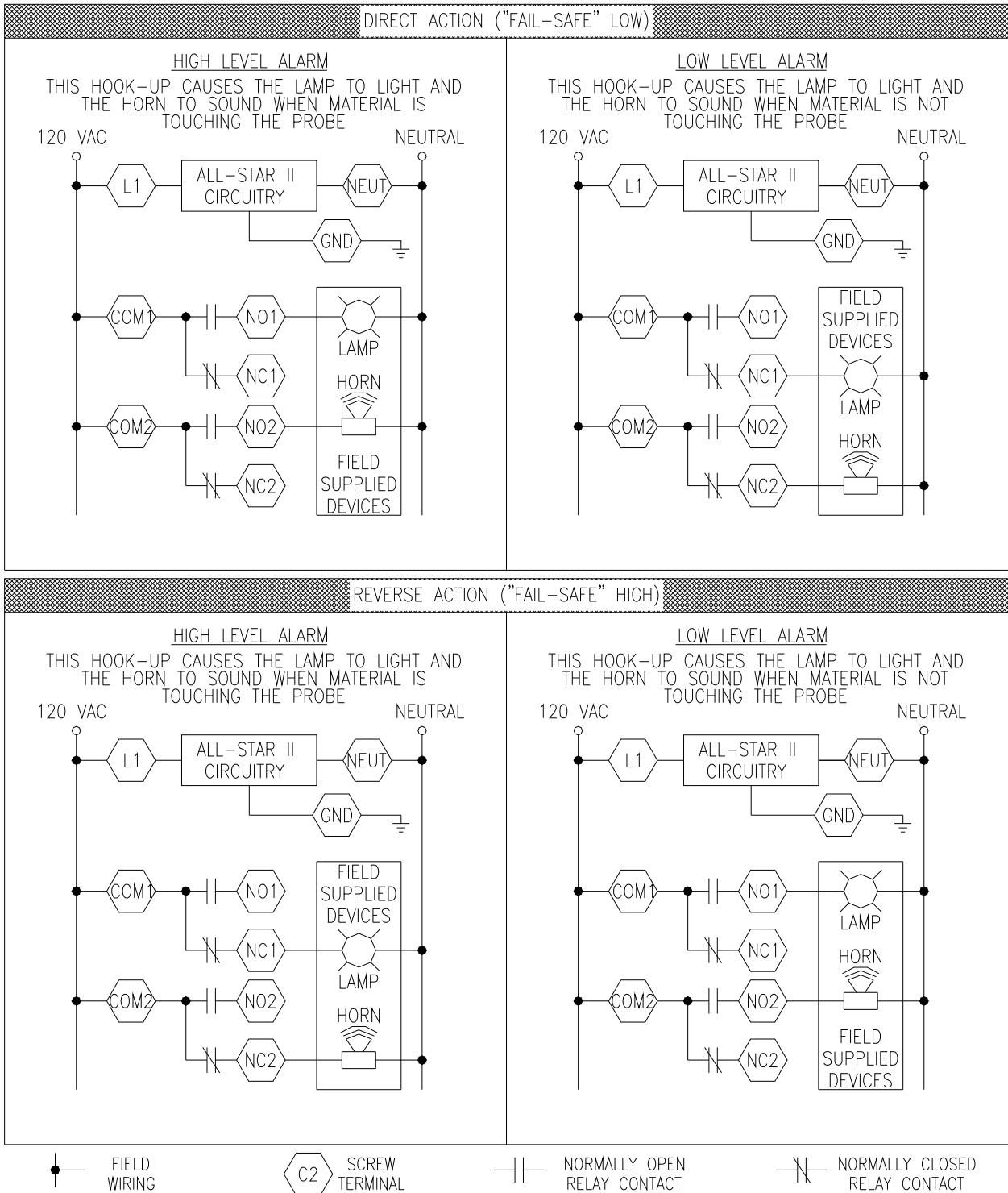


Figure 3.4 Typical Field Wiring diagrams for 120 Volt AC applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the ALL-STAR II. Many other hook-ups are possible. Consult your K-TEK Corporation distributor, representative, or the factory if you desire help.

240 VOLTS A.C. WIRING

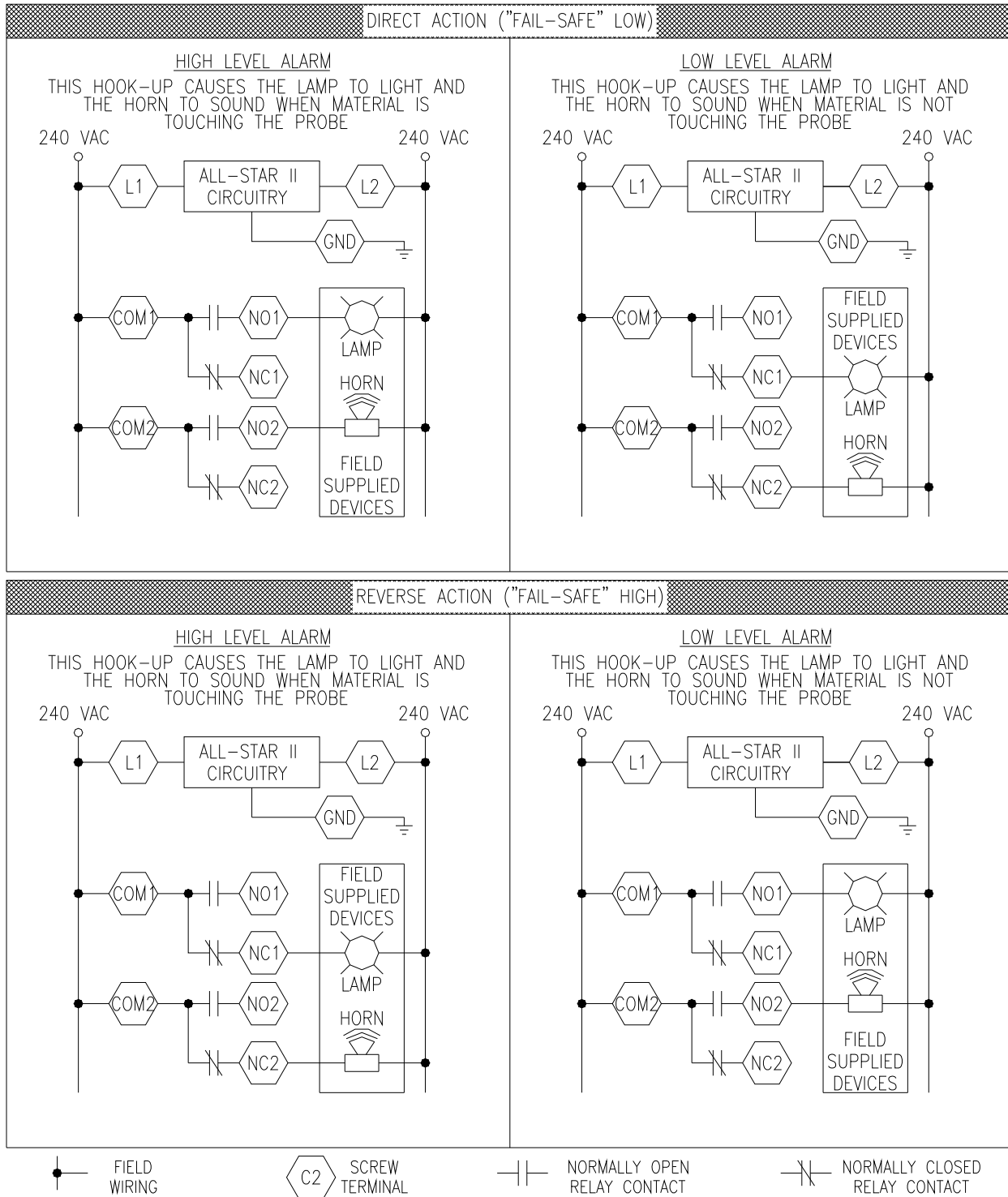


Figure 3.5 Typical Field Wiring diagrams for 240 Volt AC applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the ALL-STAR II. Many other hook-ups are possible. Consult your K-TEK Corporation distributor, representative, or the factory if you desire help.

24 VOLTS D.C. WIRING

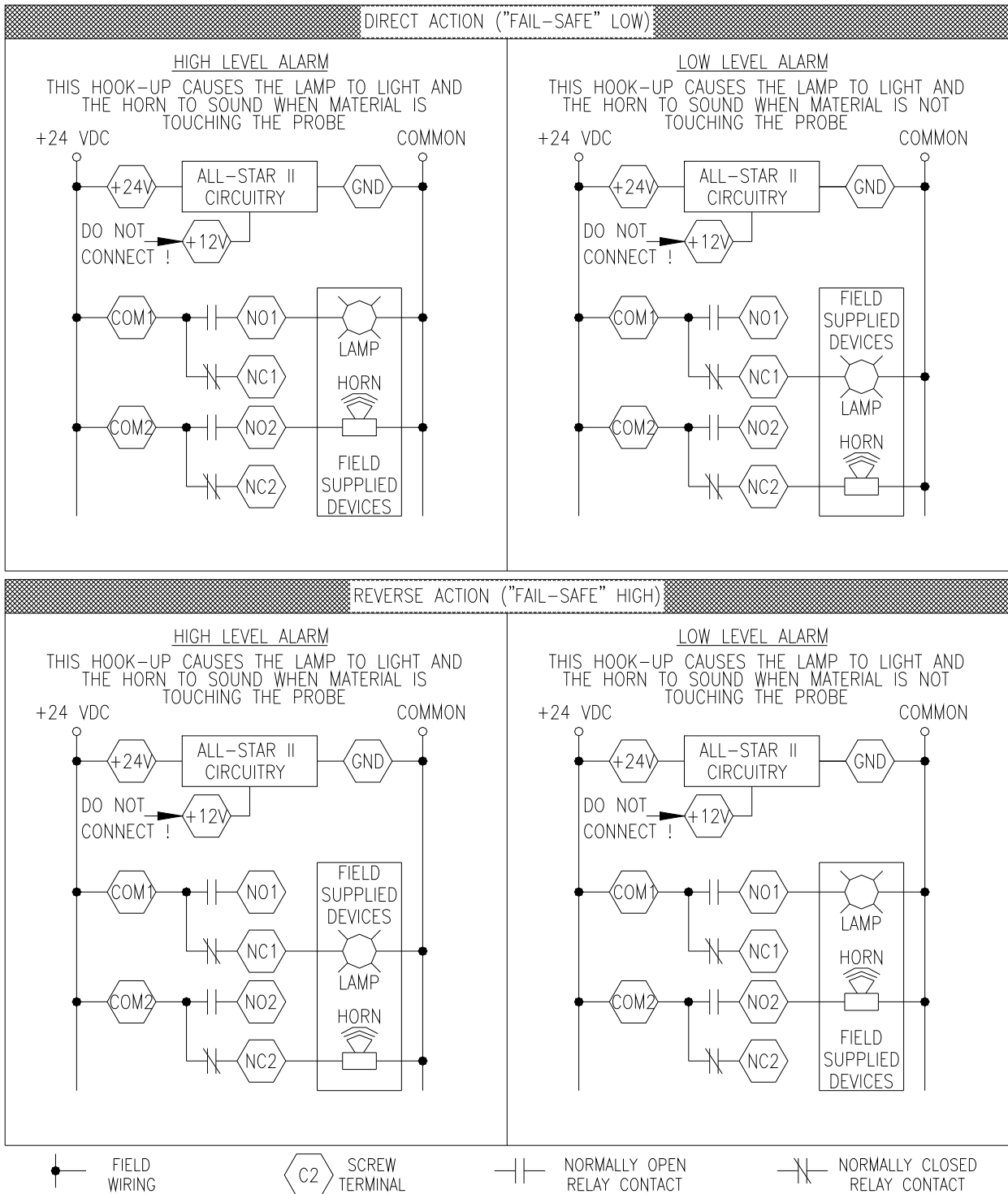


Figure 3.6 Typical Field Wiring diagrams for 24 Volt AC applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the ALL-STAR II. Many other hook-ups are possible. Consult your K-TEK Corporation distributor, representative, or the factory if you desire help.

12 VOLTS D.C. WIRING

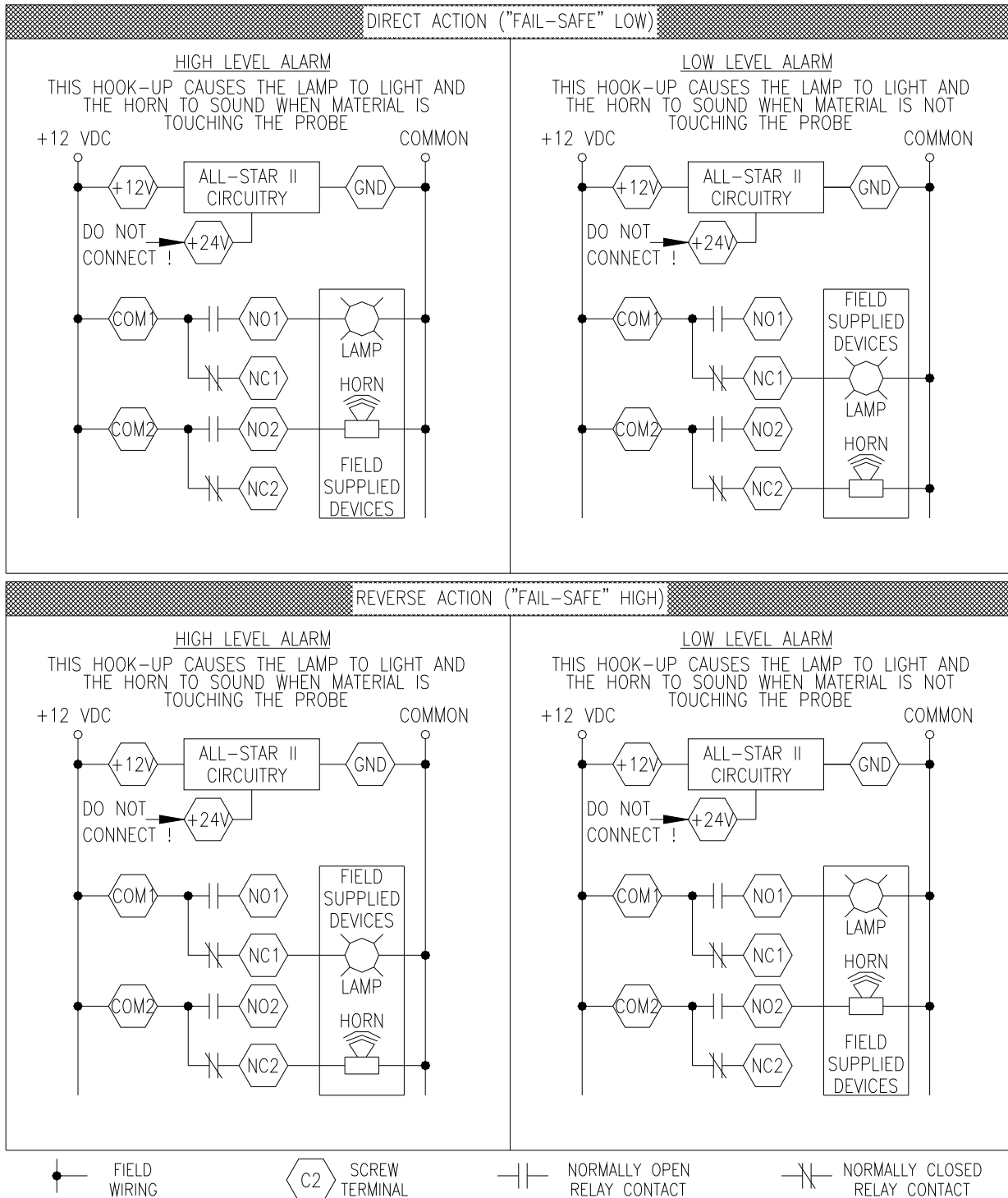


Figure 3.7 Typical Field Wiring diagrams for 12 Volt AC applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the ALL-STAR II. Many other hook-ups are possible. Consult your K-TEK Corporation distributor, representative, or the factory if you desire help.

3.10 The green indicator light shows the status of the relay in the detector module: ON when the relay is energized and OFF when the relay is de-energized.

3.11 Once the level switch is properly installed, use the following steps to calibrate the unit to the particular tank in which it is to be used. The only equipment required is a small screwdriver to adjust the calibration potentiometer.

3.12 READ ALL STEPS BEFORE BEGINNING:

STEP 1: Select the desired mode of operation for the relay. See Section 3.6 for complete details. For ease of calibration, set both time delay switches to the OFF position until STEP 8 is reached.

STEP 2: Make sure the material is not touching the sensing probe.

STEP 3: Remove the cover of the enclosure and locate the adjustment potentiometer. See Figure 3.8.

NOTE: There are 20 complete turns of the adjustment potentiometer from one end to the other. When one or the other end is reached, the adjustment screw will continue to turn and “free-wheel” (without damage) until the direction of the rotation is reversed.

STEP 4: To make the preliminary setting of the adjustment potentiometer, observe the RED indicator light and proceed as follows:

If the red light is ON:

Turn the potentiometer clockwise until the light goes OFF. Then slowly turn counterclockwise until the light just comes back ON. Proceed to STEP 5.

If the red light is OFF:

Turn the potentiometer counterclockwise until the light just comes ON. Proceed to STEP 5.

STEP 5: Very carefully turn the potentiometer clockwise until the RED indicator light just barely goes OFF. Then turn the potentiometer 1/4 turn further clockwise.

STEP 6: Bring the material in the vessel into contact with the sensing probe. The red indicator light should turn ON. This verifies that the unit is properly calibrated for your application.

STEP 7: The time delay switch adjusts the length of the time delay. When switch 1 is in the ON position, 5 seconds will be added to the time delay. When switch 2 is in the ON position, 10 seconds will be added to the time delay. When both switches (1 and 2) are in the ON position, 15 seconds will be added to the time delay. When both switches (1 and 2) are in the OFF position, nothing will be added to the time delay and the relay action will be nearly instantaneous. Set the desired time delay using switches 1 and 2.

3.13 This completes the calibration of the level switch unit and it is now ready to operate.

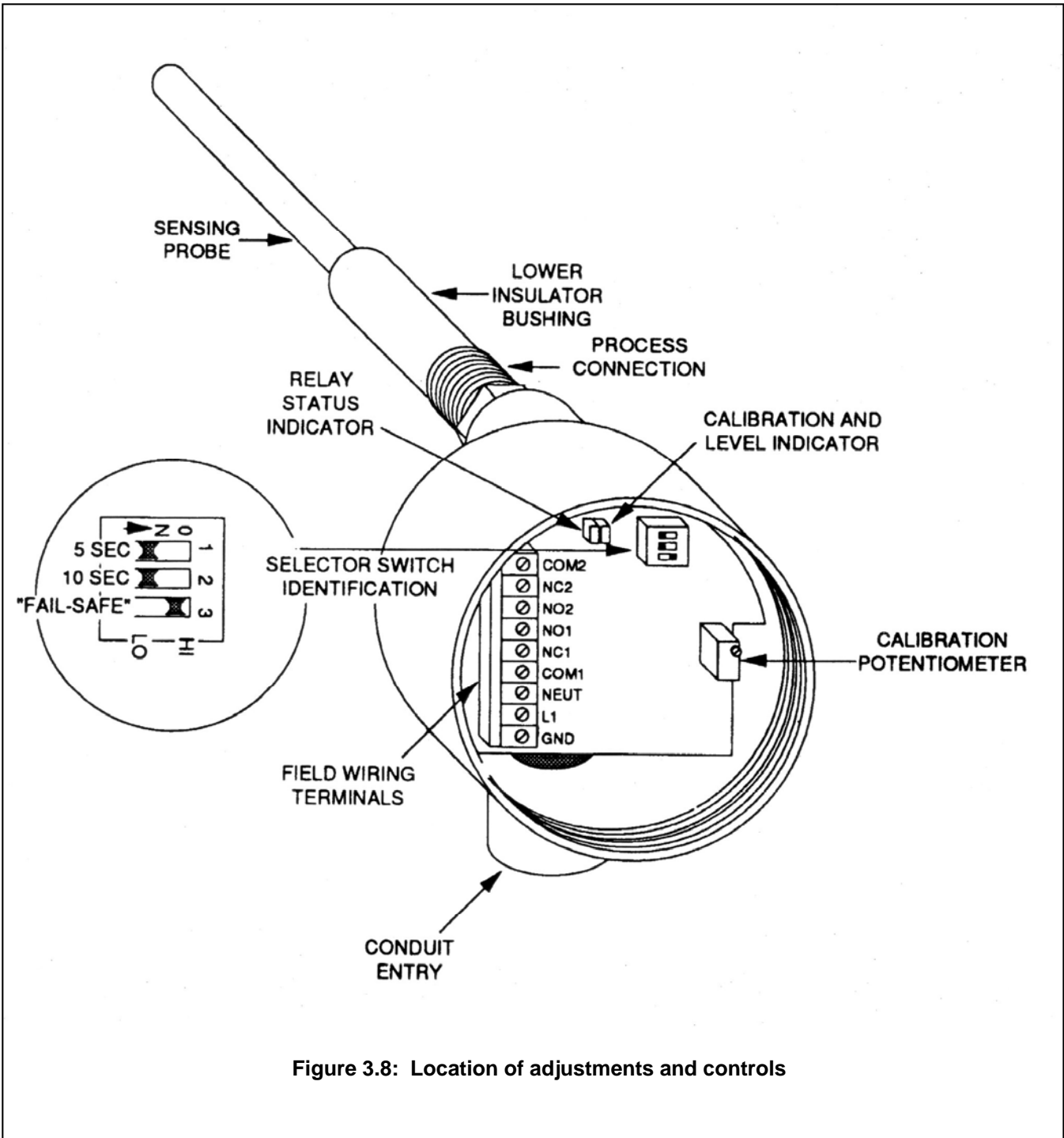
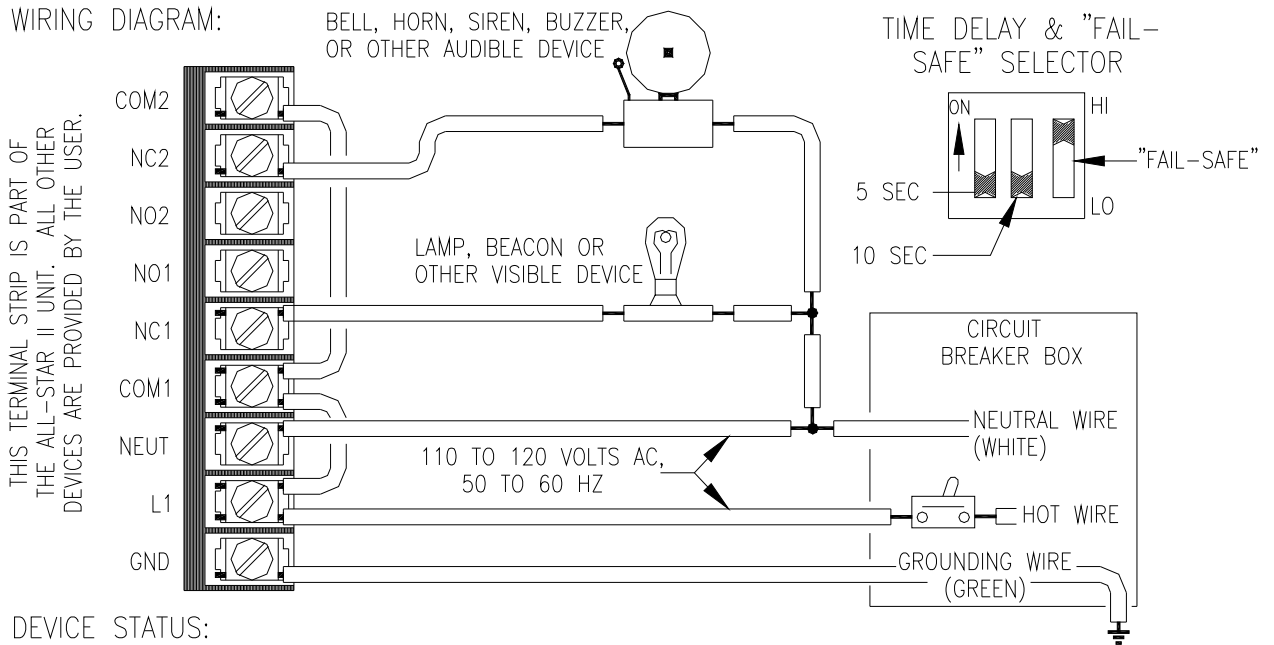


Figure 3.8: Location of adjustments and controls



DEVICE STATUS:

VESSEL LEVEL	INDICATORS	RELAY	VISIBLE	AUDIBLE
<p>LOW</p>	<p>RED LED</p> <p>OFF</p> <p>GREEN LED</p> <p>ON</p>	<p>C1 NO1 NC1</p> <p>C2 NO2 NC2</p> <p>ENERGIZED</p>	<p>OFF</p>	<p>SILENT</p>
<p>HIGH</p>	<p>RED LED</p> <p>ON</p> <p>GREEN LED</p> <p>OFF</p>	<p>C1 NO1 NC1</p> <p>C2 NO2 NC2</p> <p>DE-ENERGIZED</p>	<p>ON</p>	<p>SOUNDING</p>

Figure 3.9 Typical Field Wiring Diagram and Device Status Chart. This diagram shows only one of the many possible applications for the ALL-STAR II Level Switch. It provides a high level visible and audible alarm which helps the operator to avoid overfilling the vessel and possible spillage of material.

4.0 OPERATION

- 4.1 No operator actions are required to use this unit. When material in the vessel comes into contact with the sensing probe, the relay in the unit will change state. If the unit is programmed for operation in the “fail-safe” high mode, the relay will de-energize upon contact of the sensing probe with the material. If the unit is programmed for operation in the “fail-safe” low mode, the relay will de-energize when the material no longer touches the probe. Since the relay contacts may be used in a number of different ways, the operator should know what to expect when a change of condition occurs. The operator should then be prepared to take any action required by the system in which the ALL-STAR II is used.

5.0 MAINTENANCE & TROUBLESHOOTING

- 5.1 No routine maintenance is required other than keeping the interior of the unit clean and free of dirt, dust, and other contaminants.
- 5.2 The ALL-STAR II consists of three main sub-assemblies. These are the main printed circuit board, the barrier module, and the sensing probe assembly. The following troubleshooting guide will assist in determining how to correct most of the problems that may be encountered. Review the **Installation and Calibration** procedures in section 3.0 prior to using this guide.

Problem	Possible Cause	Solution
The LED cannot be adjusted to turn ON.	Sensing probe assembly not installed.	Install sensing probe assembly into enclosure.
	No power to unit.	Check for correct power to unit.
	Main PC board non-functional.	Replace Main PC board.
LED remains on at all times.	Sensing probe is shorted to case or ground.	Remove module from sensing probe. Turn calibration potentiometer 20 turns clockwise. LED should go out. If so, repair, replaced, or clean sensing probe.
	Main PC board non-functional.	Replace Main PC board.
Unit triggers when material touches sensing probe, but will not reset when material recedes from probe or unit gives false alarms.	Improper mounting of sensing probe.	Revise mounting. See figures 3.1 and 3.2.
	Improper calibration procedure.	See section 3.12.
	Excessive material in flow of material.	Perform a "dirty probe calibration": Recalibrate with built up material on probe.
	Probe is mounted in flow of material.	Revise mounting. See figures 3.1 and 3.2.
Unit will not detect material.	Improper calibration	See section 3.12
	Unit was calibrated with material touching probe.	Be sure material is not touching probe, then recalibrate.
Unit will not stay in calibration.	Poor grounding of case to vessel.	Provide secure ground connection.
Relay operates properly, but no contact closure at wiring terminals.	Burned or broken lands in Main PC board.	Replace Main PC board.

6.0 WARRANTY

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.





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