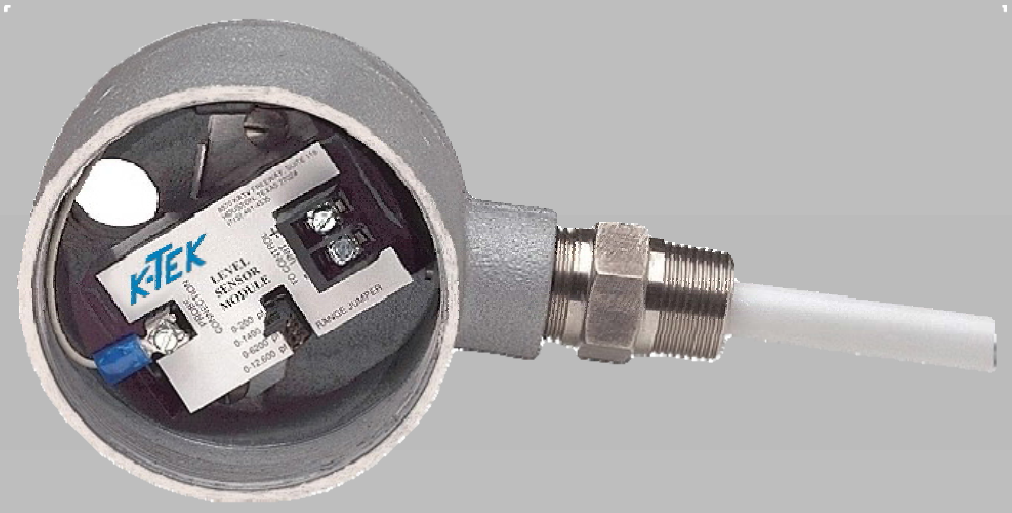
K-TEK

Installation & Operation Manual

A33

Continuous Level Transmitter



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1.0 GENERAL DESCRIPTION

1.1 The K-TEK Model A33 is an inexpensive electronic liquid level measuring system. 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.

1.2 The standard version of the Model A33 consists of two units, the SENSOR unit and the CONTROL unit. The sensor unit includes the sensor module electronics, an enclosure and a measurement probe. The standard probe is a solid 3/8" diameter stainless steel rod inside a Teflon® sheath. The control unit contains power supplies for both the sensor module and the 4-20 milliAmp output loop. Many options are available with the Model A33, including:

- Set point modules (DPDT relay cards)
- Display meters (digital or analog)
- Solid or flexible probes
- Insulated or non-insulated probes
- Special high temperature probes
- Special enclosures

Applications assistance is available through our distributors and representatives as well as from the factory.

1.3 In most applications, the installation and calibration of the Model A33 are easily accomplished by a competent electrician. Mounting the sensor unit requires three basic steps. First, provide an opening in the tank or other container. Second, fit this opening with a suitable coupling, and mount the Model A33 securely in the coupling. Many different types of enclosures are available through K-TEK as options with the control unit to make it suitable for most individual environments. The only test equipment required to calibrate the unit is an accurate volt or current meter to measure the voltage or current in the loop.

1.4 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.

2.0 SPECIFICATIONS

Environmental

Housing Type (Sensor)	Type “H” - Aluminum Enclosure Explosion-Proof NEMA 4
	Type “G” - Aluminum Enclosure NEMA 4
Temperature	Electron-ics: -40° to +185°F / -40° to +85°C Functional Ambient
	-40° to +168°F / -40° to +70°C Rated Accuracy

Electrical Control Unit

Input Power	95-130 VAC, 50-60 Hertz, 2 Watts; 190-260 VAC, 50-60 Hertz, 2 Watts
Output Signal	4-20 mA into 0-1100 Ohms, Fully Isolated
Input Signal	Pulse Duration (Optically Isolated from Sensor Unit)

Sensor Unit

Input Power	From Control Unit
Output Signal	Pulse Duration (to Control Unit)
Calibration Range	Sensitivity 0-200 to 0-12,600 Picofarads
Accuracy	±0.5% of Full Span

Mechanical

Process Connection	1/2” NPT (Unless Otherwise Stated)

3.0 MODEL NUMBER INFORMATION

A33 / a / b / c / d / e :

a Operating Voltage

/A 120 VAC **/B 240 VAC/D 12 or 24 VDC** *(Specify)*

b Probe Type		**Operating Temp**	**Operating Pressure**
/1	316SS Probe / 4" *Delrin® Lower bushing / 1/2" NPT	**A**	**A**
/2	316SS Probe / 4" *Teflon® Lower Bushing	**C**	**A**
/6	PVC Covered Cable / 13" 316SS Weight	**A**	**D**
/8	PVC Covered Cable / 13" Nylon Weight	**A**	**D**
/N	*Teflon® Covered Cable / 13" *Teflon® Weight	**C**	**D**
/R	*Teflon® Sheathed Probe / 316SS Mounting Nipple	**C**	**A**
/S	*Teflon® Sheathed Probe / *Teflon® Mounting Nipple	**A**	**D**
/V	*Teflon® Sheathed Probe / CPVC Mounting Nipple	**C**	**B**
/W	Concentric Shield / *Teflon® Sheathed Probe	**C**	**A**
/X	*Teflon® Sheathed Probe / 316ss Inactive Sheath	**C**	**A**

c Probe Length

Rigid Probe in Inches; Cable Probe in Feet

d Options

/O	No Options
/C	Epoxy Coated Aluminum Enclosure (NEMA 4X)
/F	Flanged Connection
/G	*Teflon® Faced Flange
/L	Stainless Steel Tags
/T	*Teflon® Centralizer (for type "W" probe)
/Z	Any Special Options (Such as Ext. Lower Bushing) Not Included in Above Description
/Z	A36 Power Supply
/Z	A37 Set-point Module
/Z	Belden "8762" Connector Cable
/Z	A33-M-A-ANA (0-100% Analog Only)
/Z	A33-M-D-LED (3 1/2 digit display requires A36 power supply)
/Z	A33-M-D-LCD (3 1/2 digit loop powered display)
/Z	Remote Mount NEMA 4X Enclosures (Specify size as **#1**- 8"x6", **#2**- 10"x8", **#3**- 12"x10", **#4**- 12"x14", **#5**- 16"x14"
/Z	Special - Explain

OPERATING TEMPERATURE CODES		**OPERATING PRESSURE CODES**	
A	-40°F to +185°F / -40°C to + 85°C	**A**	1500 psi @ 77°F / 103 bar @ 25°C
B	-40°F to +320°F / -40°C to + 160°C	**B**	Static Head Only (Consult Factory)
C	-40°F to +450°F / -40°C to + 230°C	**C**	150 psi / 10.3 bar
D	+200°F to +1400°F / +95°C to + 760°C	**D**	100 psi / 7 bar

REMOTE-MOUNT SENSOR ENCLOSURES

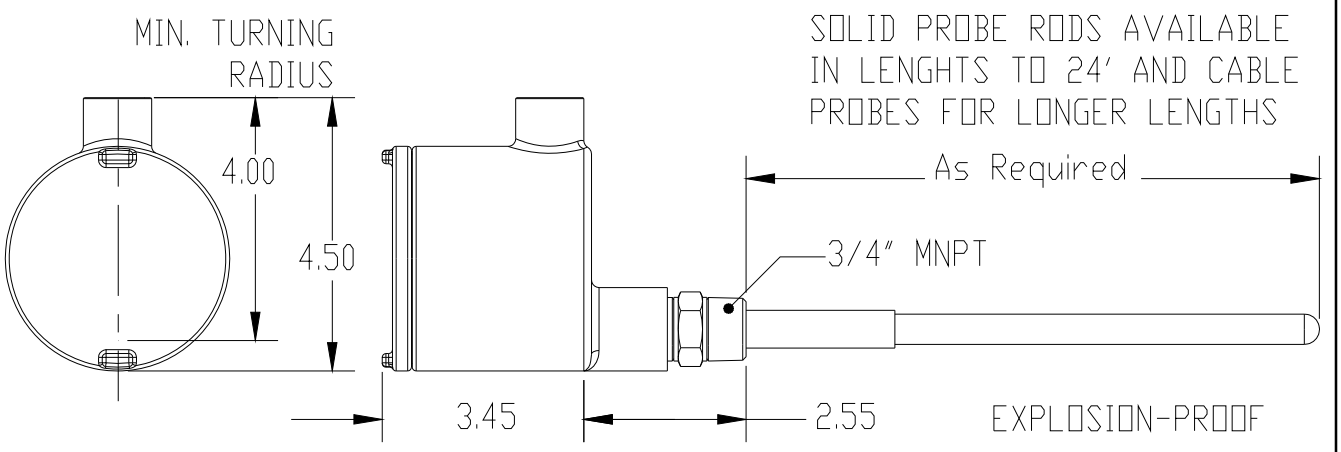


Figure 3.1: Explosion-proof Sensing Unit Dimensions

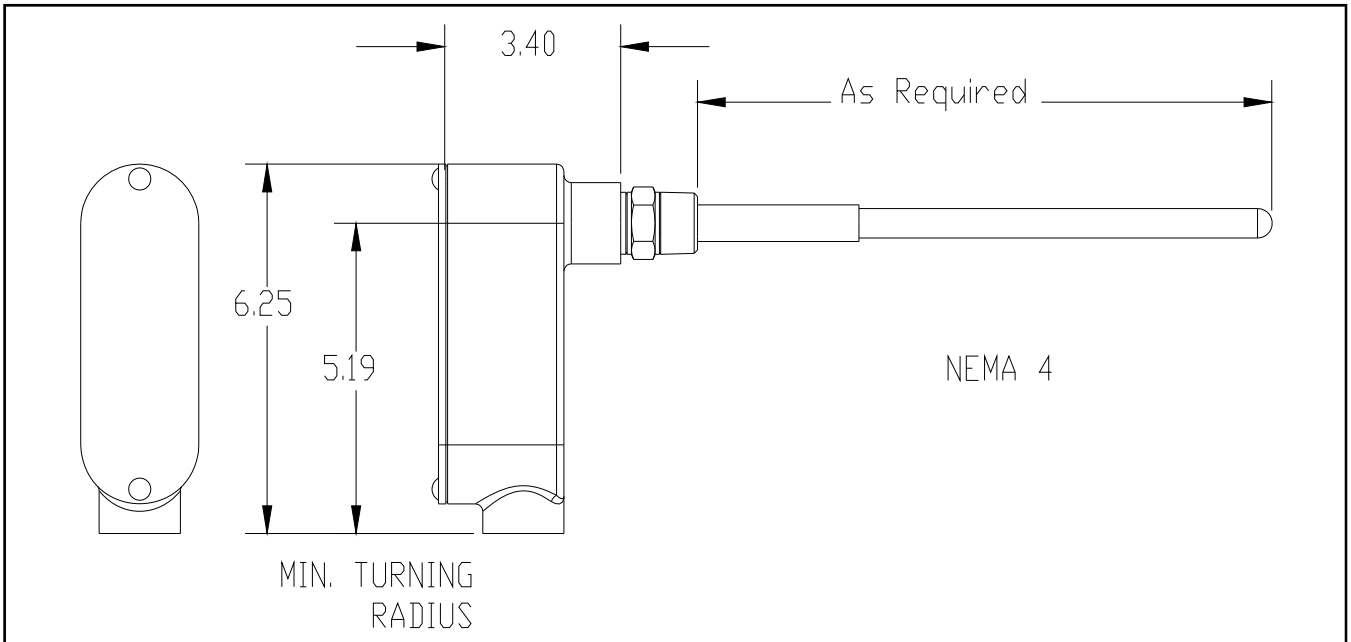
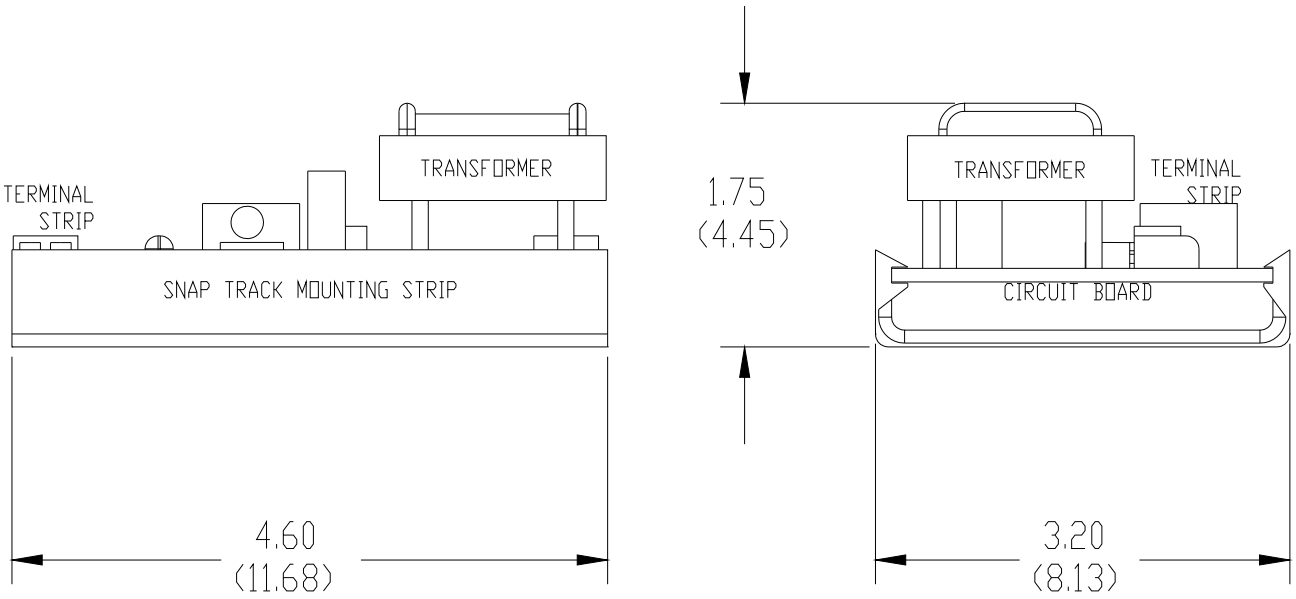


Figure 3.2: NEMA 4 Sensing Unit Dimensions

Figure 3.3: Overall dimensions-Control Unit



4.0 INSTALLATION

4.1 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).

4.2 Select a mounting location for the Model A33 sensor unit and its attached sensor probe. See figure 4.1 and Figure 4.2 for some recommended mounting practices. Be sure that there is sufficient clearance around the mounting position to allow for the turning radius of the sensor enclosure 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 of the vessel. Be careful not to damage any coating that may be on the probe. The thread size of the coupling should be ¾" NPT for most probes. Certain special applications may utilize couplings of different sizes.

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 pressure vessels.

4.3 The Model A33 unit may not work properly if:

- The material dielectric constant is less that 1.8.
- 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 figures 4.1 and 4.2.

4.4 The Model A33 unit may be damaged if:

- Temperature in the Model A33 housing in which the sensor module is located exceeds 185°F upper limits or –40°F lower limits.
- If the probe temperature exceeds appropriate limits. See probe types on page 5.
- The electronics unit is subjected to excessive vibration or shock.
- Vessel pressure exceeds pressure rating of probe.
- Probe is mounted in direct flow of material.

If any of the above statements apply to your application, do not install Model A33 until contacting your local distributor, representative or the K-TEK factory for instructions.

4.5 Install the Model A33 unit into the coupling and connect conduit between the sensor unit and the control unit as required. Be sure the conduit is suitable for the environment in which the units are to be used. See section 4.9 for a discussion of intrinsic safety barriers.

4.6 Select a mounting location for the Model A33 control unit. Because many facilities have existing control panels, the control unit may be supplied with a length of snap track mounting strip and no enclosure. This offers maximum economy of installation. Remove the control unit from the mounting strip and mount the strip in a convenient location inside the selected enclosure using two screws. Snap the control unit back into the snap track strip and proceed to section 4.8.

4.7 If an optional housing has been provided with the control unit, the mounting within the enclosure has already been done at the factory. Considerations should be given to several factors when selecting the mounting location.

- The temperature range at the mounting location should not exceed that shown in the specifications.
- The environmental conditions at the mounting location must be consistent with the enclosure ratings (hazardous, washdown, etc.).
- If the unit contains a display, the mounting location should allow for convenient viewing by operating personnel.
- The mounting location should provide for ready access for calibration and service.

4.8 Wire the Model A33 unit in accordance with the National Electric Code and any pertinent local codes. See Figure 4.8 for a general schematic layout of a typical loop wiring arrangement. 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 if assistance is desired. Figure 4.5 through 4.8B are included in this manual for convenience. These figures give general wiring information about some of the optional units available for use with Model A33. Individual manuals for each of these optional units should also be consulted for further details.

SUGGESTED MOUNTING ARRANGEMENTS

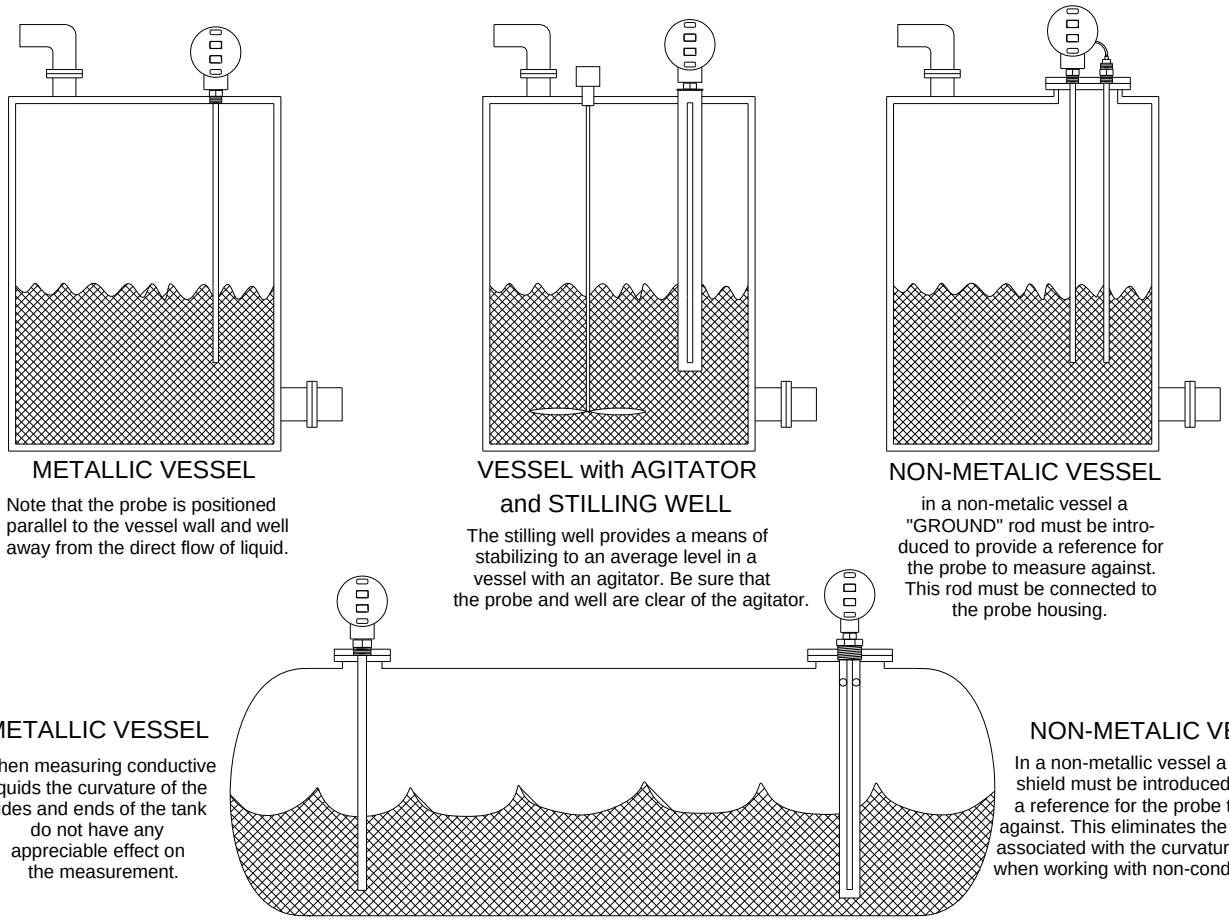


Figure 4.1

SUGGESTED MOUNTING ARRANGEMENTS

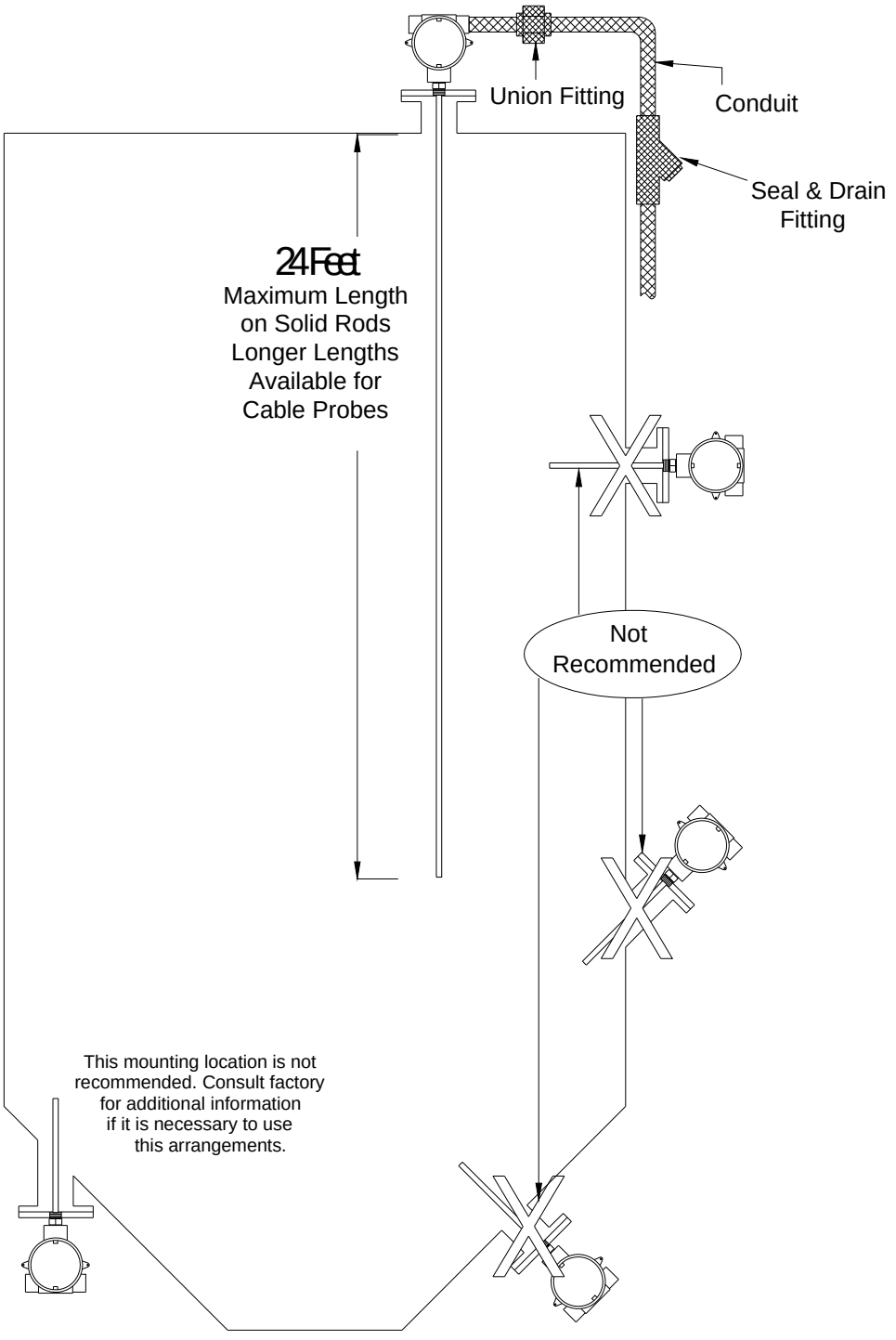


Figure 4.2

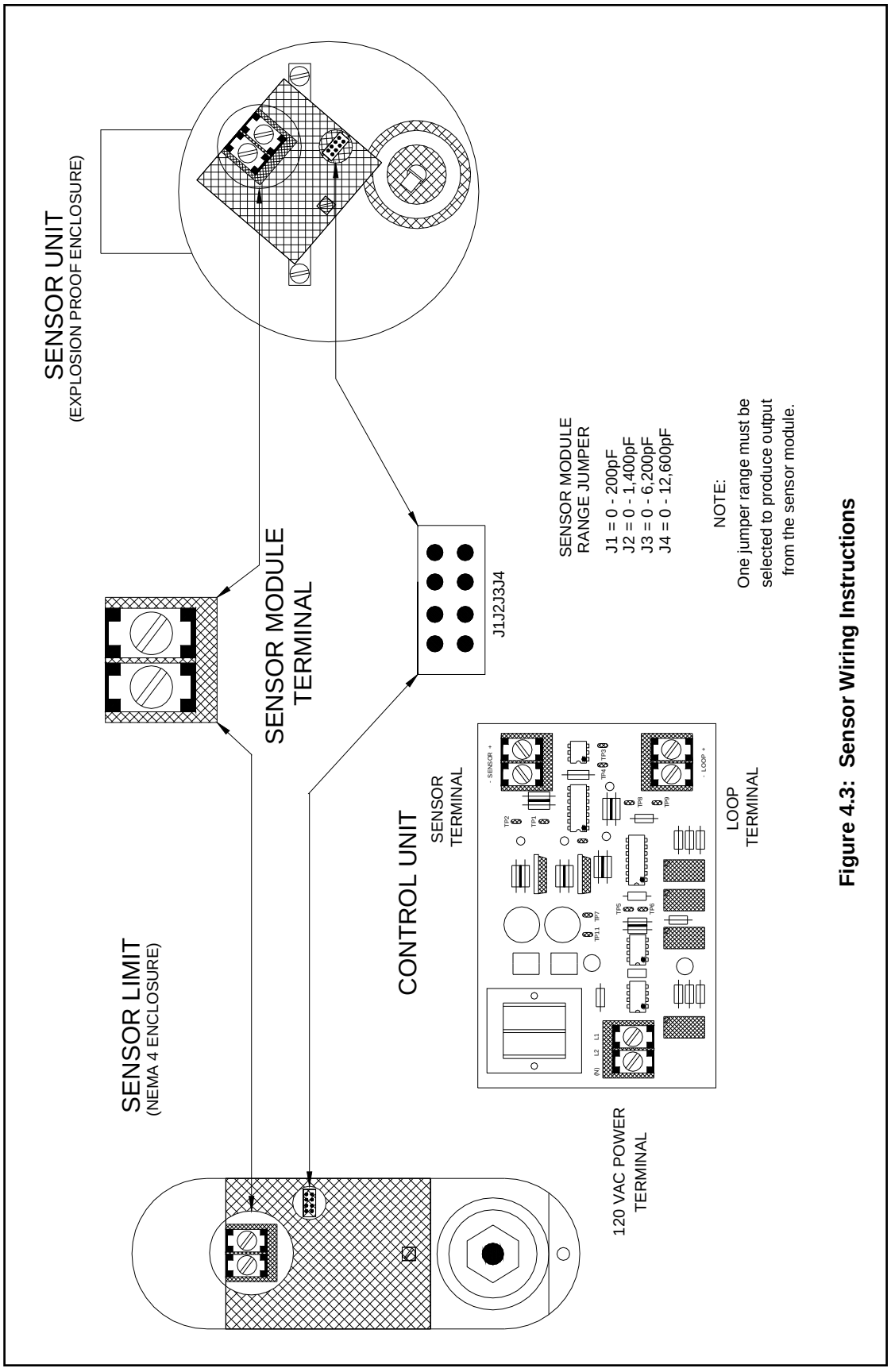


Figure 4.3: Sensor Wiring Instructions

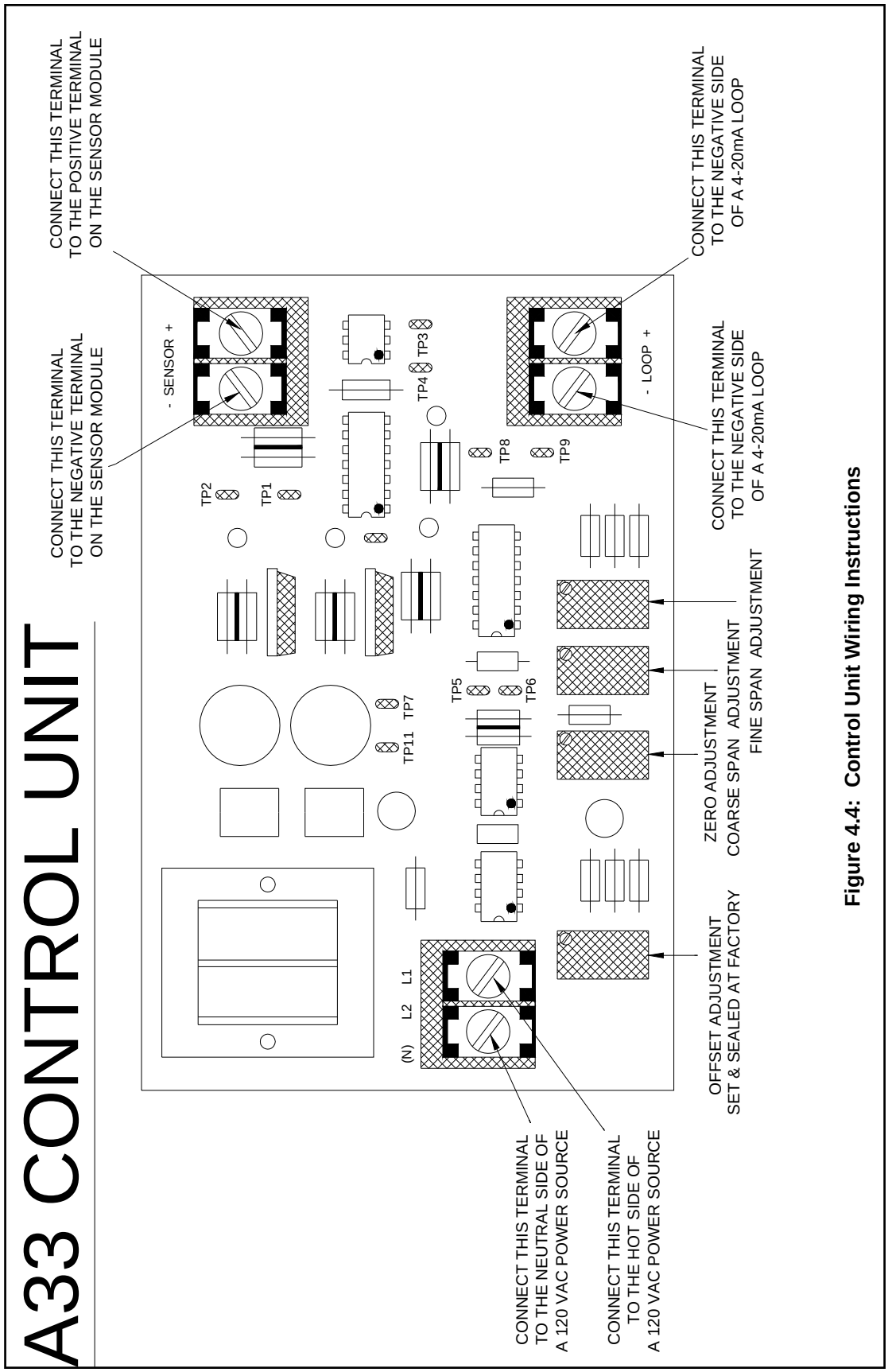


Figure 4.4: Control Unit Wiring Instructions

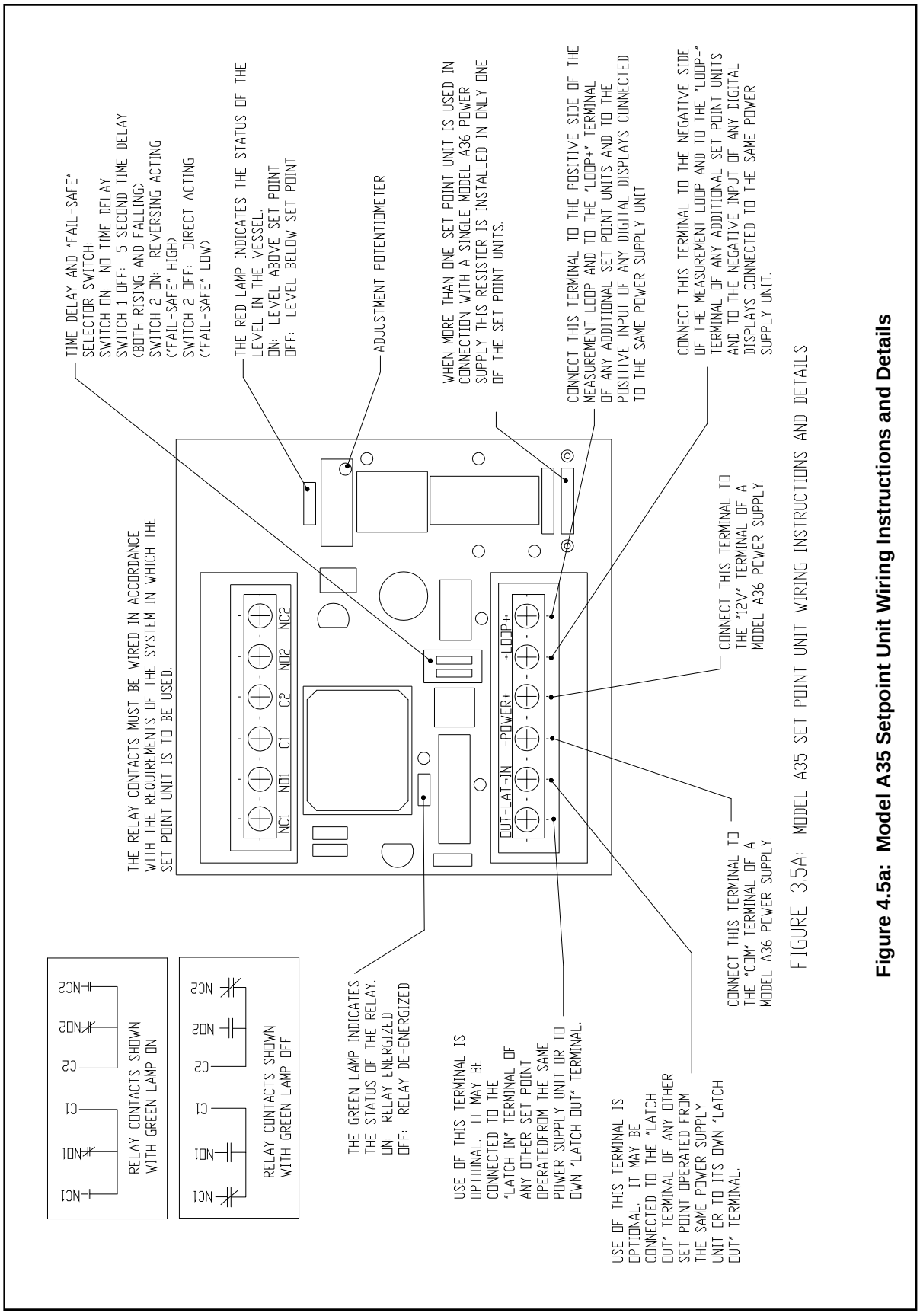


FIGURE 3.5A: MODEL A35 SET POINT UNIT WIRING INSTRUCTIONS AND DETAILS

Figure 4.5a: Model A35 Setpoint Unit Wiring Instructions and Details

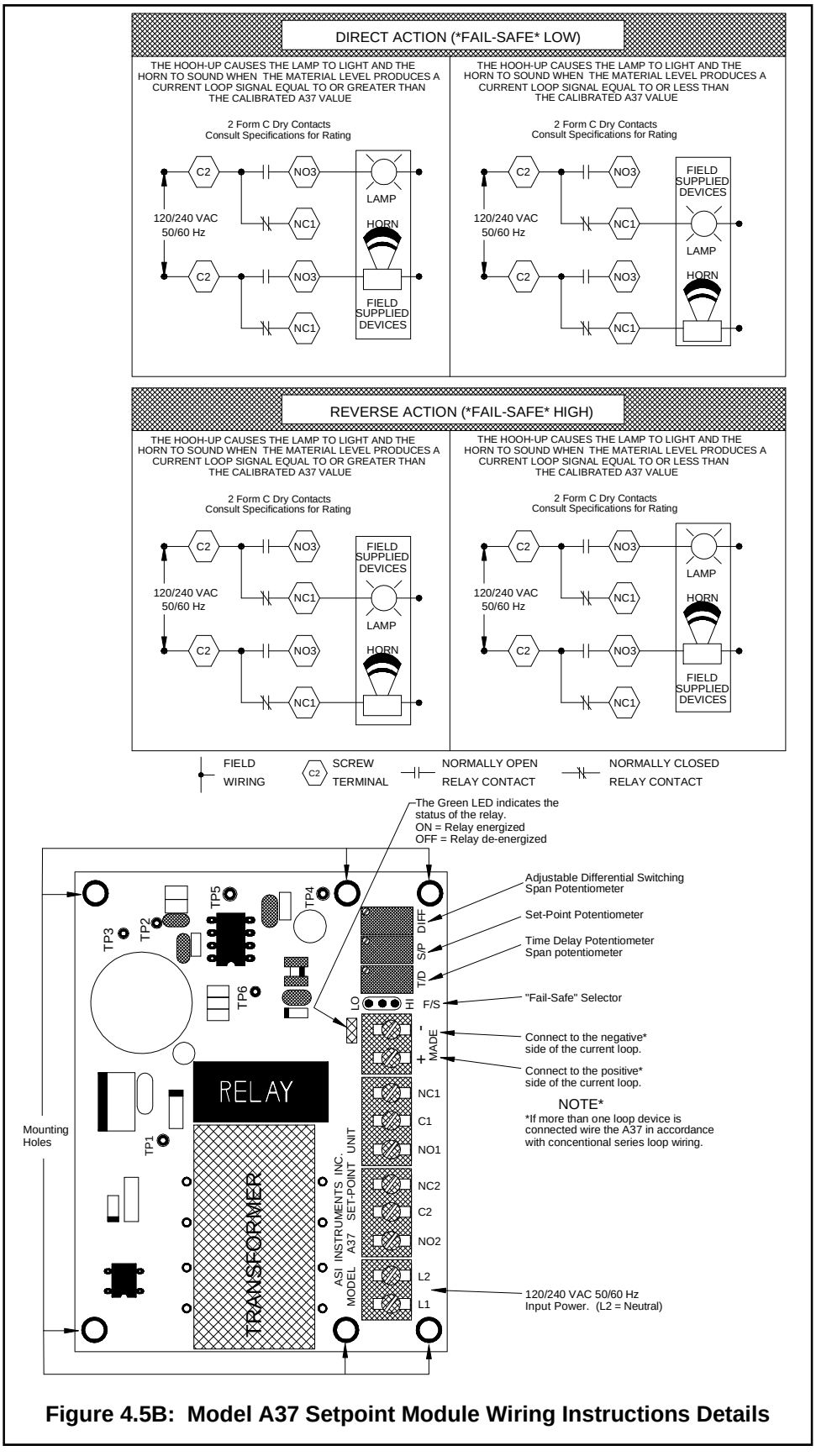


Figure 4.5B: Model A37 Setpoint Module Wiring Instructions Details

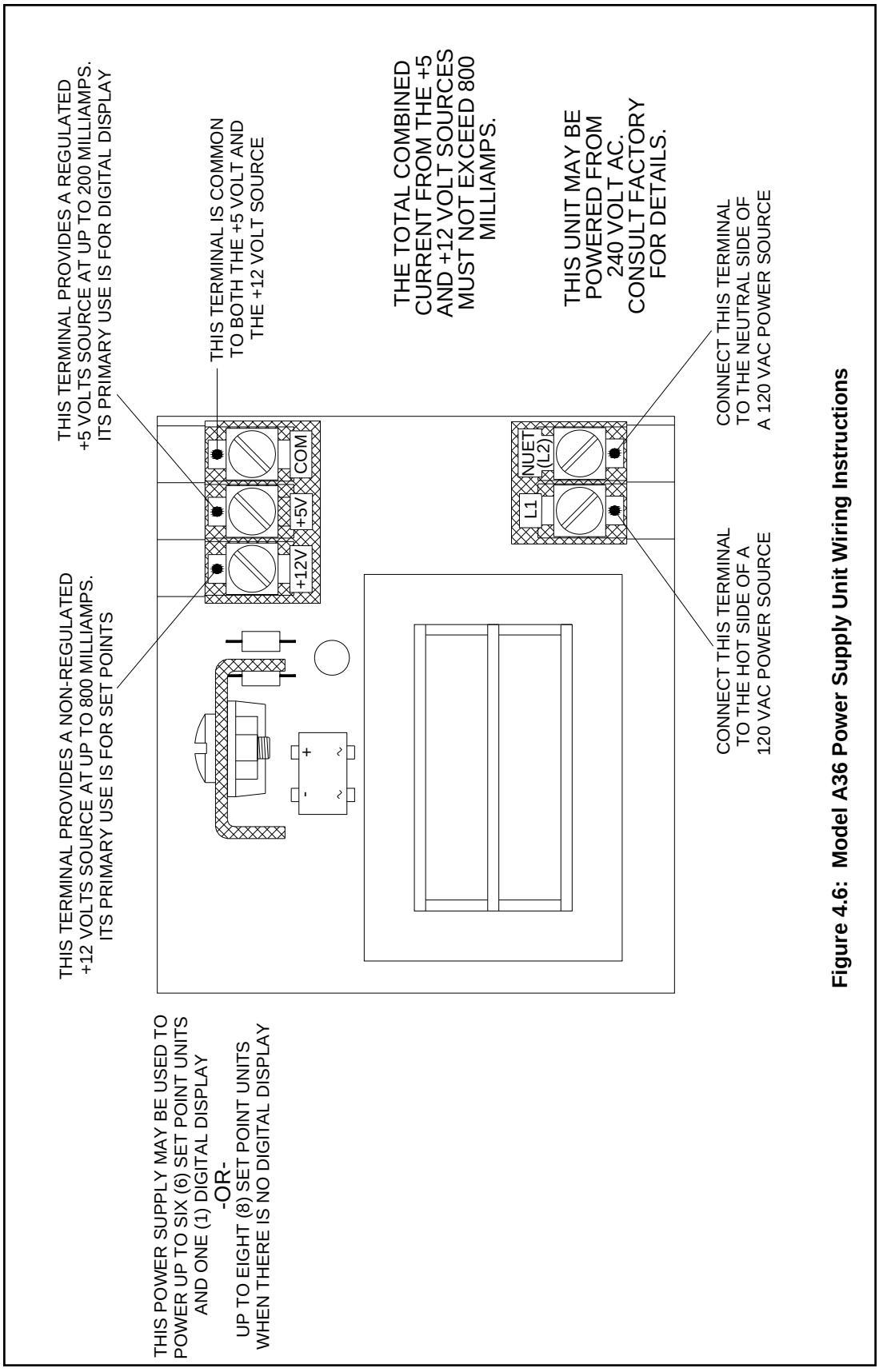


Figure 4.6: Model A36 Power Supply Unit Wiring Instructions

Figure 4.7A: A33-M-D-LCD
Loop Powered 3 1/2 Digit Display

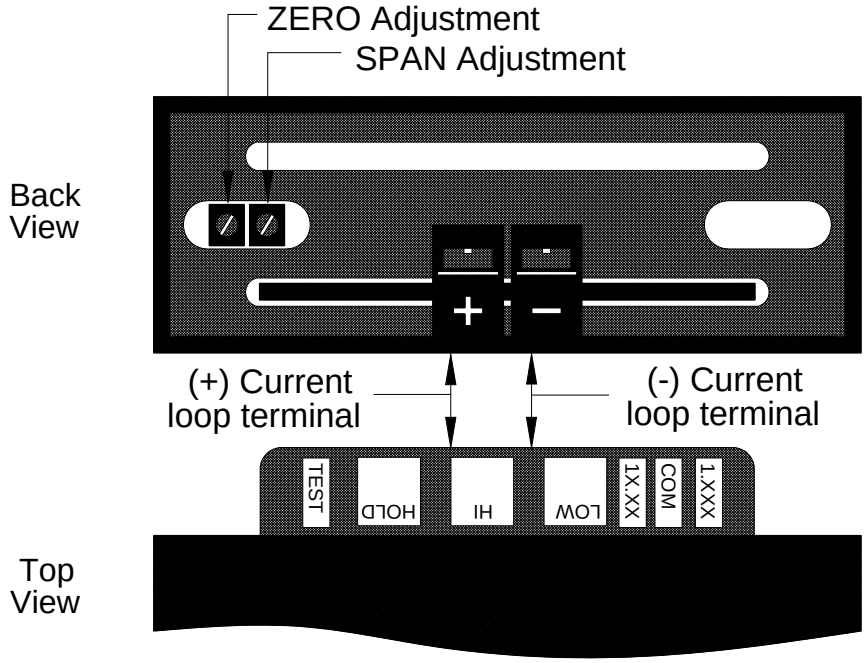
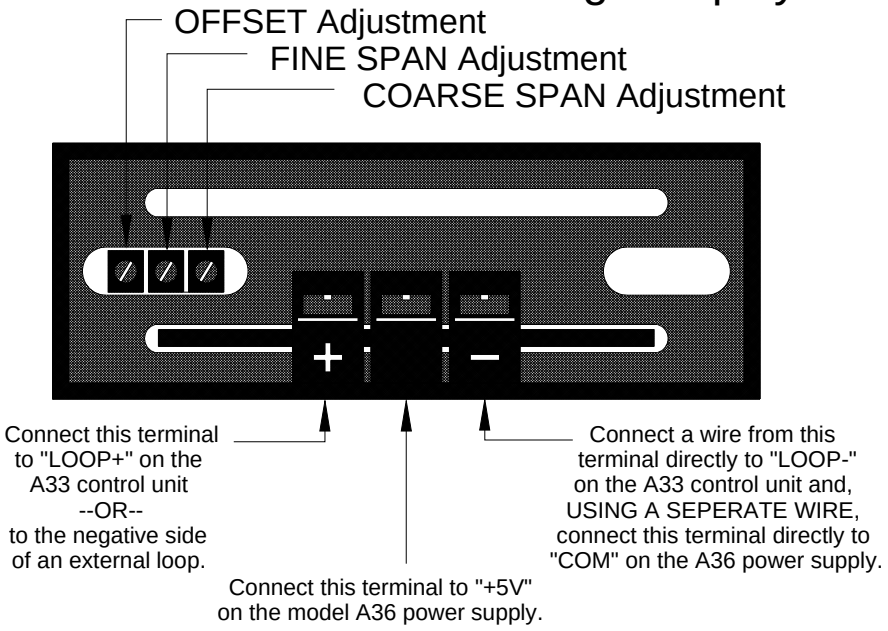


Figure 4.7B: A33-M-D-LED
5VDC Powered 3 1/2 Digit Display



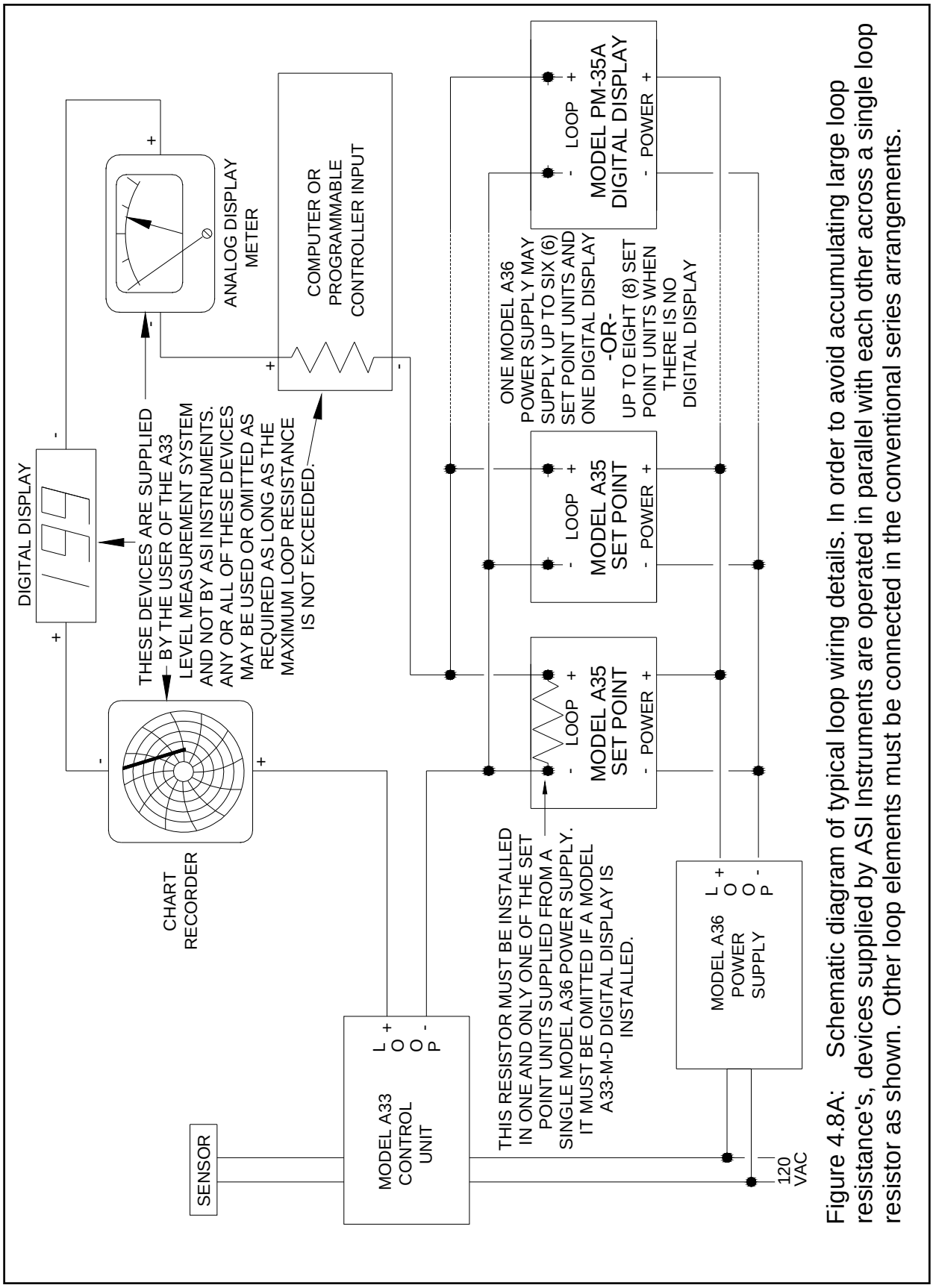


Figure 4.8A: Schematic diagram of typical loop wiring details. In order to avoid accumulating large loop resistance's, devices supplied by ASI Instruments are operated in parallel with each other across a single loop resistor as shown. Other loop elements must be connected in the conventional series arrangements.

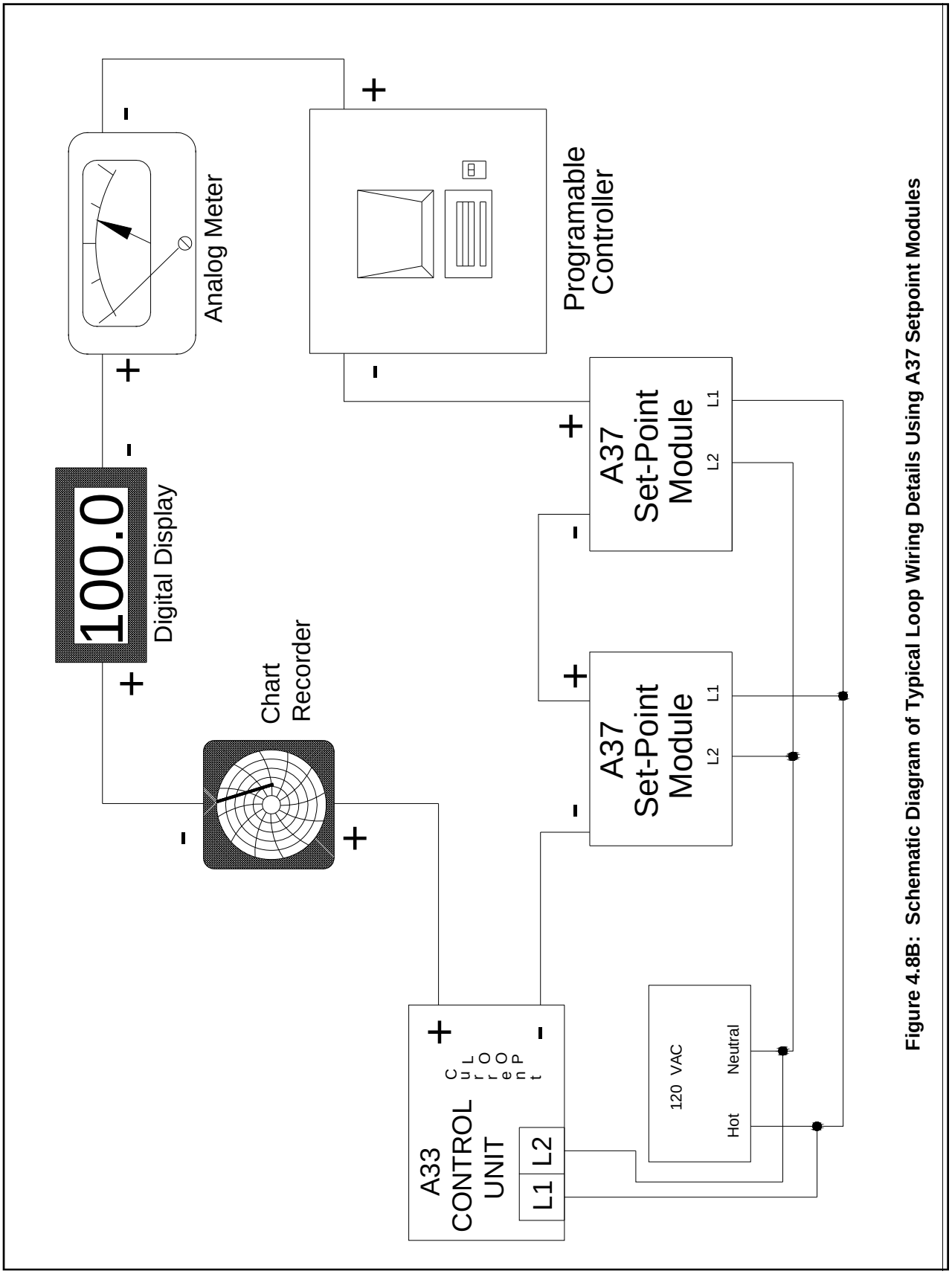


Figure 4.8B: Schematic Diagram of Typical Loop Wiring Details Using A37 Setpoint Modules

4.9 Intrinsic Safe Barriers may provide both an economical and an effective means of insuring safety for hazardous areas. Properly applied, intrinsic safety barriers limit the available energy on certain types of electrical circuits to such low levels that an explosion cannot be produced by arcing of the protected wiring. There are a number of manufacturers who offer barriers that are suitable for use in the wiring between the control unit and sensor unit. However, proper use and installation of these barriers requires specialized knowledge. Consult your distributor, representative or K-TEK if you desire further information about barriers.

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

4.10 After installing and wiring the unit, it is necessary to calibrate the unit to the particular vessel and material that will be measured. This is accomplished by first lowering the product level in the vessel to the minimum span point and setting “ZERO.” Then, raise the product level to the maximum span point to set “SPAN.” It is possible to perform a useable on a vessel that is partially filled at the time of installation. See section 4.11 for details of this procedure. When using this alternate calibration, it is recommended that “ZERO” and “SPAN” be verified when the actual product level reaches the minimum and maximum points on the probe. Read all of the following step-by-step instructions before beginning. Refer to Figure 4.4 for the locations of adjustments and controls. These instructions describe the calibration procedure for the Model A33 Sensor and Control Units. For calibration of optional accessory equipment, consult the appropriate manual.

4.11 In actuality, all level control applications are interface measurements. In most cases, the measurement is made at the interface of air and product. It is possible for the interface of two products if there is a very significant difference between the dieclectric constants. The two products must not mix, thus producing a distinct interface.

5.0 CALIBRATION

5.1 Standard Calibration

Step 1

Using the Range Jumper on the sensor module, select the proper range for the application in which the Model A33 unit is to be used. See Table 5.1 (below) to determine the setting for conductive liquids. In order to use Table 5.1, it is necessary to know the type of probe as well as the measurement length. Find the appropriate setting based on your particular combination.

TABLE 5.1

CONDUCTIVE PRODUCTS				
Probe Type	**Range 1 0-200pF**	**Range 2 0-1400pF**	**Range 3 0-6200pF**	**Range 4 0-12,600pF**
"R" Teflon® Sheathed	<1.5 ft. span	1.5-11 ft. span	11-24 ft. span	n/a
"N" Teflon® Cable	<1.5 ft. span	1.5-11.5 ft. span	11.5-52 ft. span	>52 ft. span
NONCONDUCTIVE PRODUCTS				
Type "W" Concentric Shield Probe				
*K = 2	<7.5 ft. span	7.5-24 ft. span	n/a	n/a
*K = 4	<3.5 ft. span	3.5-24 ft. span	n/a	n/a
*K = 6	<2.5 ft. span	2.5-17.5 ft. span	17.5-24 ft. span	n/a
*K = 8	<1.5 ft. span	1.5-13 ft. span	13-24 ft. span	n/a

Step 2

Connect a voltmeter that is capable of accurately measuring 0.40 to 2.00 volts DC between TP8 (+) and TP9 (-) on the CONTROL UNIT. Alternately, an accurate current meter may be placed in series with the 4-20mA DC current loop.

Step 3

With the material in the vessel at the minimum level, adjust the ZERO potentiometer on the CONTROL UNIT until the voltmeter reads 0.40 volts. (This setting produces 4mA in the loop.)

Step 4

With the material in the vessel at the maximum level, adjust the COARSE & FINE SPAN potentiometers on the CONTROL UNIT until the voltmeter reads 2.00 volts. (This setting produces 20mA in the loop.) Disconnect the voltmeter from the CONTROL UNIT or remove the current meter from the loop. This completes the calibration procedure and the unit is now ready for operation.

5.2 Interface Calibration

Step 1

Using Table 5.1, set the Range Jumper according to conductive materials and your probe type.

Step 2

Connect a voltmeter that is capable of accurately measuring 0.40 to 2.00 volts CD between TP8 (+) and TP9 (-) on the CONTROL UNIT.

Step 3

Adjust the level in the vessel until the probe is covered with only the upper (non-conductive) material. Adjust the ZERO potentiometer on the CONTROL UNIT until the voltmeter reads 0.40 volts. (This setting produces 4mA in the loop.)

Step 4

Raise the interface in the vessel to the desired level. Adjust the COARSE & FINE SPAN potentiometers on the CONTROL UNIT until the output is equal to the actual percentage of interface level on the probe. For example, if the level is at 45% of probe span, the span potentiometers should be adjusted until the voltmeter reads 1.2 volts. (This setting produces 11.2 mA in the loop.) Disconnect the voltmeter from the CONTROL UNIT. This completes the calibration procedure and the unit is now ready for operation.

2.00 VDC - 0.40 VDC = 1.6 VDC X .45 = 0.72 VDC + .40 VDC = 1.120 VDC
20mA - 4mA = 16mA X .45 = 7.2mA + 4mA = 11.20mA

6.0 OPERATION

There are no operating controls associated with the Model A33 unit and no specific operator actions are required in connection with the use of this device. However, the unit provides information to the operator, which 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 setpoint modules may be used to sound audible or visible alarms or to control various types of machinery associated with the measured vessel. The Model A33 may also provide information to a computer or programmable controller. The operator should be fully aware of how the Model A33 fits into the whole system and be prepared to take whatever action is necessary as system conditions change.

7.0 MAINTENACE AND PROBLEM SOLVING

No periodic maintenance is required with the A33 LEV-L-LINE continuous level transmitter.

In the event of a failure:
Make sure that changing or altering the controls of this unit cannot upset the process it is controlling.

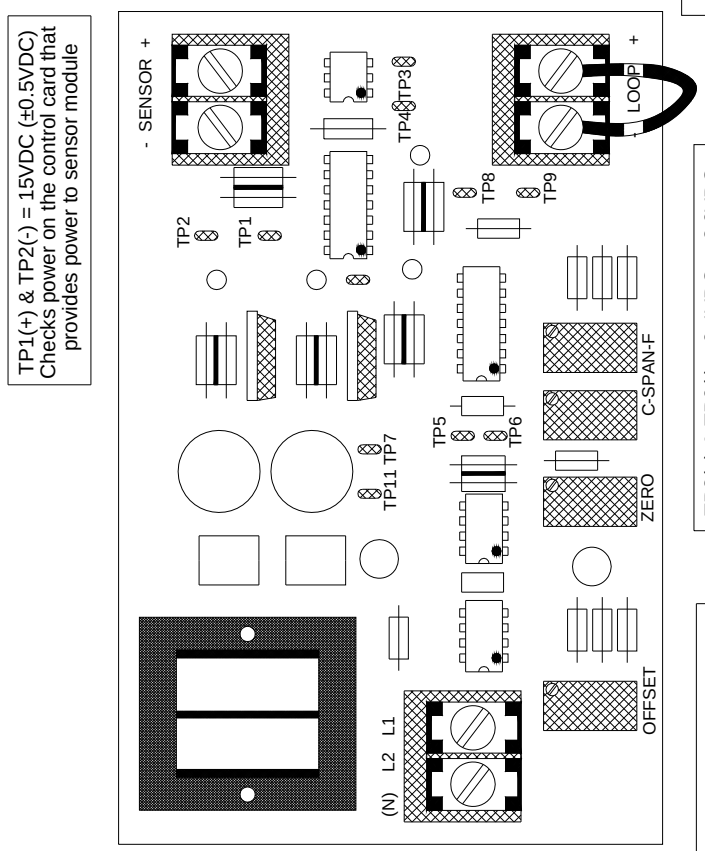
Troubleshooting:

1. Perform a visual inspection of the unit for apparent problems such as broken or disconnected wires.
2. Check the line voltage of the unit.
3. Check the polarity of the wiring between the control card and the remote-mounted sensor module.
4. Check the continuity between the sensor ground and the Bessel ground. This should effectively be a short-circuit.
5. Use the troubleshooting drawing on the following page to check and record the values identified.

Probe Section:
With no product touching the probe and the probe wire disconnected, check for continuity between the Center probe rod and the vessel ground. The measurement should be effectively open-circuit.

If the above steps reveal a problem with the unit(s) please contact the factory or the authorized K-TEK distributor or representative responsible for the sale.

A33 TROUBLESHOOTING TEST POINTS



TP1(+) & TP2(-) = 15VDC (±0.5VDC)
Checks power on the control card that provides power to sensor module

TP3(+) & TP2(-) = 12.5VDC
R1 & R2 act as fuses. if wires to sensor are shorted resistors Will burn open. If 0.0VDC is read then resistor is bad.

TP10(+) & TP9(-) = -6.5VDC
Power supply ± 0.5VDC
If reading not within spec return for replacement

Current loop shorting jumper (single piece of wire, no splices, clips, or lugs)

TP8(+) & TP9(-) = 0.4VDC to 2.0VDC
Corresponds to 4-20mA current loop.
If the "ZERO" & "SPAN" pots do not change the output install the current loop shorting jumper as shown.

TP5(+) & TP9(-) = Some DC voltage this voltage > with capacitance > , max VDC = 3.25
0.0VDC = Bad sensor module
A negative VDC reading indicates that the sensor is not connected or is improperly connected.

TP6(+) & TP9(-) = VDC @ TP5 & TP9 VDC for both should be = when tank level is at the point where you set "ZERO"

TP11(+) & TP9(-) = -6.5VDC
Power supply ± 0.5VDC
If reading not within spec return for replacement

8.0 WARRANTY INFORMATION

3 YEAR WARRANTY FOR:
ShieldPoint™300 & ShieldPoint™400 capacitance switches.

2 YEAR WARRANTY FOR:
WT2000 radar level transmitters; RP paddle switches; A02, A75, & A77 RF capacitance level switches and A33 & A38 RF capacitance level transmitters; A22 Speed Switch; CP2 Conductance Switch.

1 YEAR WARRANTY FOR:
LaserTrak™ and EasyTrak™ series laser transmitters; DPM100 digital indicators; KVIEW series digital indicators and controllers; GranuPoint™ and SlurryPoint™ vibrating fork switches, SoliTrak™ Electro-Mechanical Continuous Measuring Devices, SonikTrak™ultrasonic level transmitters & transducers.

SPECIAL WARRANTY CONSIDERATIONS:
K-TEK will honor OEM warranties for items not manufactured by K-TEK (i.e. Palm Pilots).

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 Houston International Airport located in Houston, TX, 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 100.00 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.

For the latest version of this manual, visit kteksolidslevel.com.

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