USE OMEGA FRONT COVER

USE OMEGA INSIDE FRONT COVER

CONTENTS

FIGURES

1.0 GENERAL DESCRIPTION

1.1 The OMEGA® LV750 Series Level Switch 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 which may be electrically conductive or non-conductive. In some cases, the LV750 can be used to detect the level of an interface between a lighter and a heavier substance such as that found in an oil and water separator.

1.2 The standard version of the LV750 is housed in a general-purpose 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 LV750. It operates on rising level and may be set to times of 0, 5, 10, and 15 seconds. The standard version of the LV750 is powered from 120 VAC but a DC powered version is also offered.

1.3 There are four models available:

LV751	General purpose, 3/8" diameter 316SS rod, acetal bushing, 1/2" NPT 316SS nipple
LV752	General purpose, 3/8" diameter 316SS rod, Teflon® bushing, 1/2" NPT 316SS nipple
LV753	Teflon® coated probe, 1/2" NPT 316SS nipple
LV754	Teflon® coated probe, 3/4" NPT Teflon® nipple

The standard probe length is 12 inches, however, lengths of up to 72 inches are available.

1.4 In most applications, the installation and calibration of the LV750 are 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 LV750 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 the unit. Seasonal recalibration of the unit is unnecessary due to its exceptional stability.

1.5 Because of the patented detection technique used in the LV750, 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 a buildup. For conductive liquids and materials with a high dielectric constant (greater than 30) that additionally have a tendancy to "bridge" between the probe and container wall, a Teflon® coated probe should be used. For chemical compatibility considerations, also request the 3/4" Teflon® nipple.

2.0 SPECIFICATIONS

2.1 ENVIRONMENTAL

Operating temperatures:

Electronics .....-40°C to +85°C (-40°F to +185°F)

Probes.....12 inches min length (standard) to 72 inches(special)

Uncoated, acetal bushing.....-40°C to +85°C (-40°F to +185°F), 1500 psig @ 25°C (77°F), 0 psig @ 85°C (185°F)

Uncoated, Teflon® bushing..... -40°C to +230°C (-40°F to +450°F) 1500 psig @ 25°C (77°F), 0 psig @ 230°C (450°F)

Teflon® coated (except Teflon® nipple)..... -40°C to +230°C (-40°F to +450°F) 1500 psig @ 25°C (77°F), 0 psig @ 230°C (450°F)

Teflon® coated, 3/4" Teflon® nipple.....-40°C to +85°C (-40°F to +185°F), 150 psig @ 25°C (77°F), 0 psig @ 85°C (185°F)

Minimum dielectric constants

Liquid material sensing .....2.0 for standard uncoated probe

Solid material sensing.....8.0 for standard uncoated probe

see Dielectric Chart, pages16 & 17

2.2 ELECTRICAL

Input Power.....95 to 130 VAC, 50 to 60 Hz, 2 watts (standard) or 9 to 35 VDC @ 100 mA max(optional)

Relay DPDT (2 form C) dry contacts

Relay Contact Rating .....5 Amps Resistive @ 120 VAC or 28 VDC

Time delay .....0, 5, 10, 15 seconds, selectable

2.3 MECHANICAL

Process Connection .....1/2" NPT (standard); 3/4" NPT (optional)

Wetted parts ..... 316SS rod, 316SS nipple, acetal (Teflon® optional)

Enclosure .....Cast aluminum, (PVC optional)

Overall Size ..... 16.5 X 6.1 X 1.8 inches(419 X 155 X 46 mm)

Weight ..... 2 lb (4.4 kg)

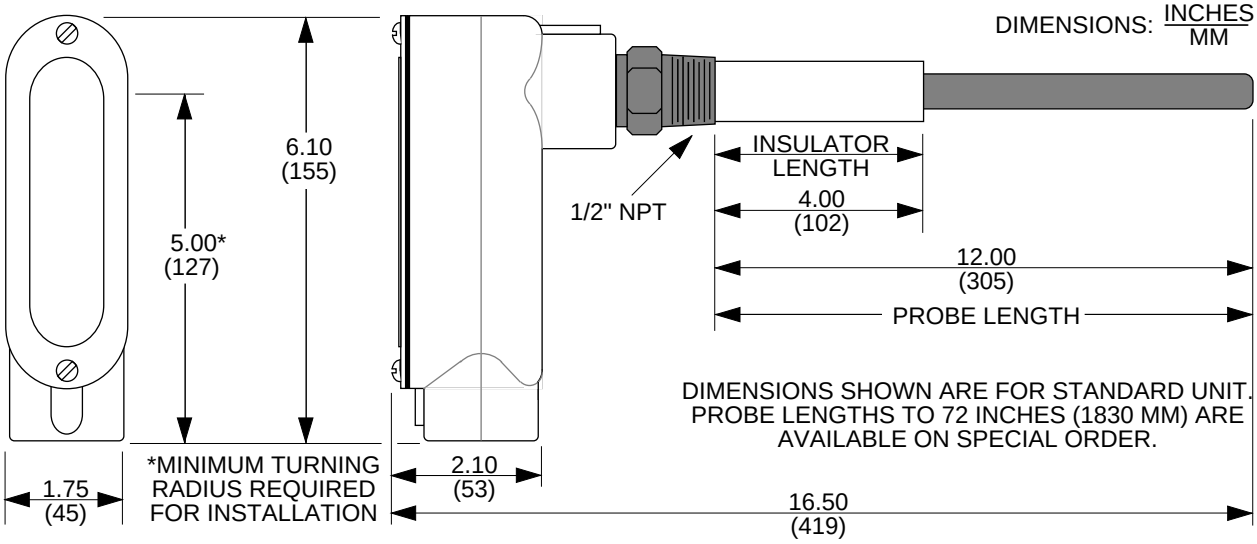


Figure 2.1: Overall Dimensions

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 LV750 unit and its attached sensing probe. See Figure 3.1 for recommended mounting practices. Figure 3.2 shows some mounting methods which have proven 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 1/2" NPT for standard probes. A 3/4" NPT fitting is required for some of the optional 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.

CAUTION: SHOULD IT BE NECESSARY TO REMOVE THE PROBE ASSEMBLY FROM THE HOUSING FOLLOW THE DISASSEMBLY INSTRUCTIONS IN PARAGRAPHS 3.13 AND 3.14.

3.3 Screw the LV750 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 LV750 unit in accordance with the typical wiring diagrams of Figure 3.3, 3.4, or 3.5 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 OMEGA Engineering 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.

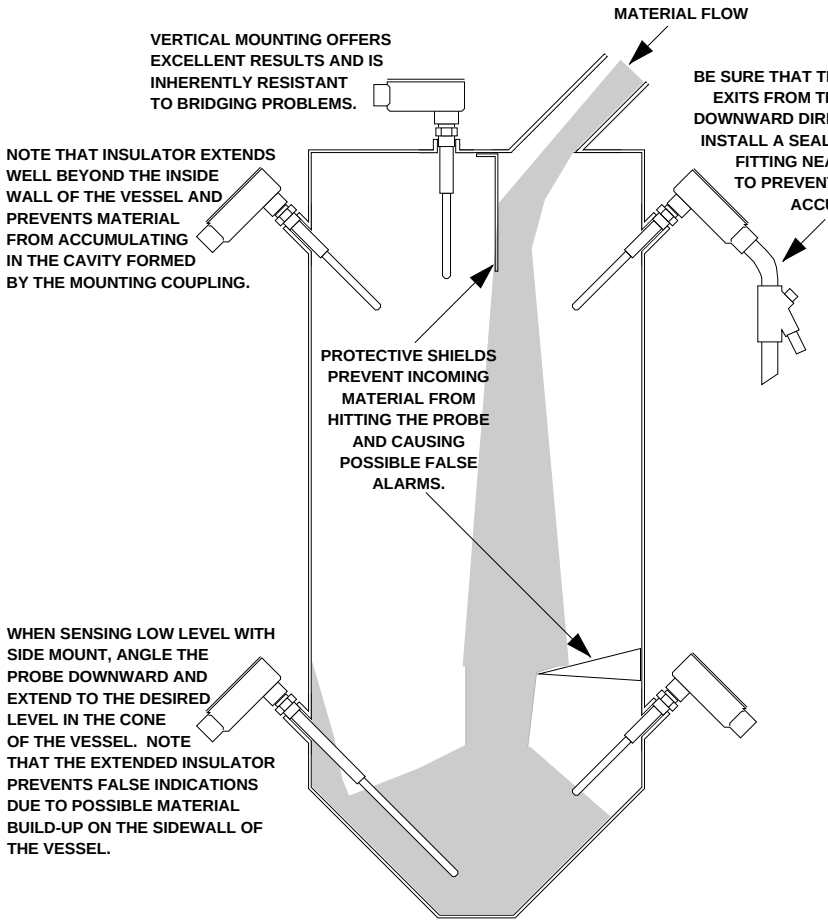


Figure 3.1: Suggested Mounting Arrangements

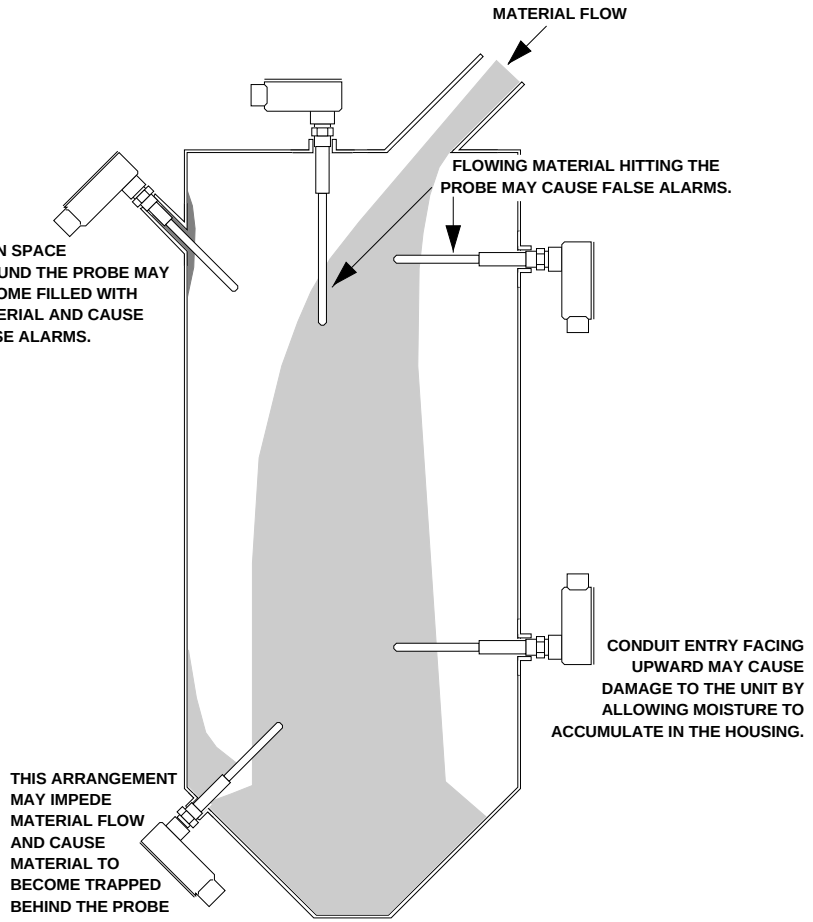


Figure 3.2: Doubtful Mounting Arrangements

120 VOLTS A. C. WIRING

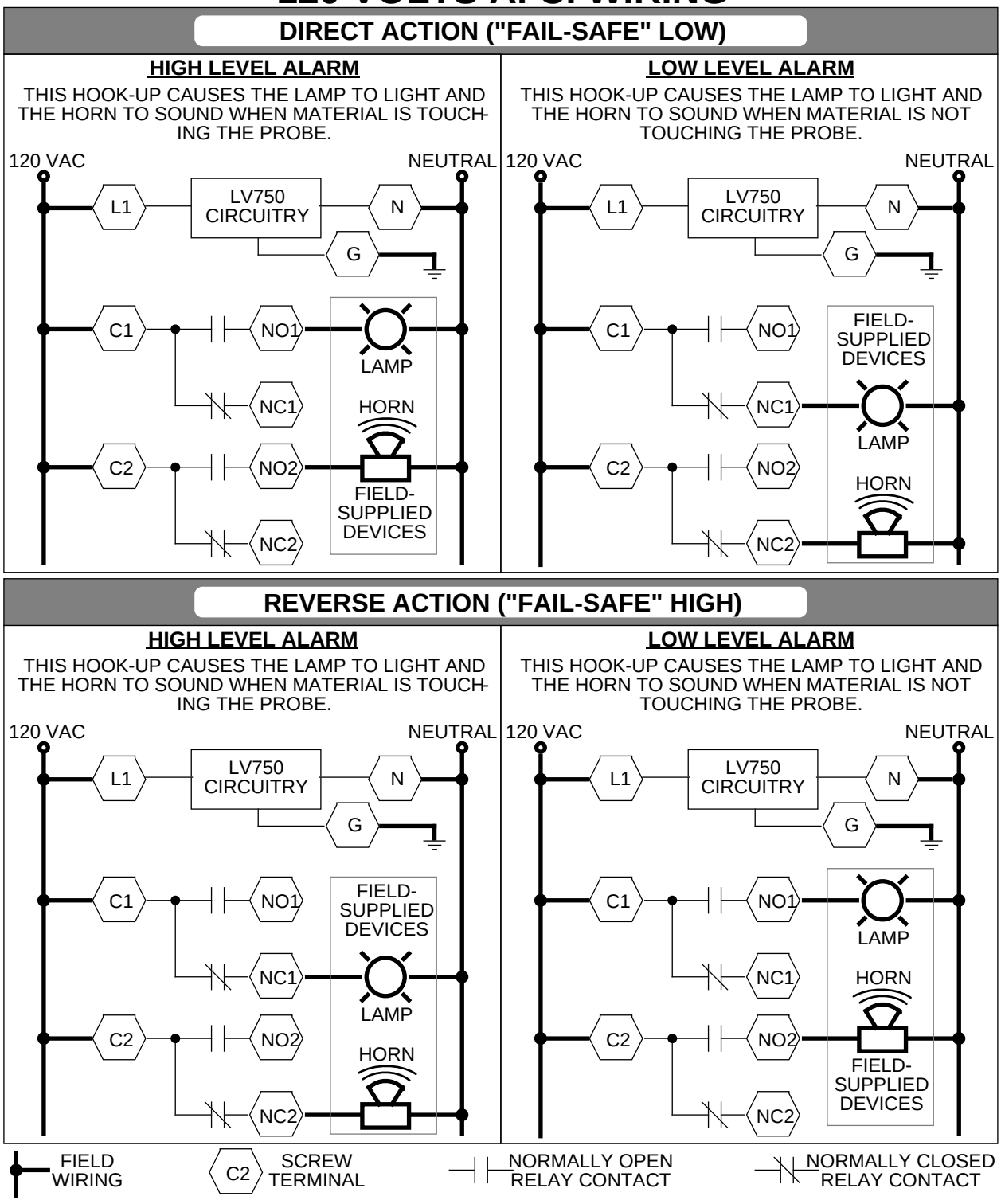


Figure 3.3: Typical Field Wiring Diagrams for 120 Volt A. C. Applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the LV750. Many other hook-ups are possible. Consult OMEGA Engineering if you desire help.

24 VOLTS D. C. WIRING

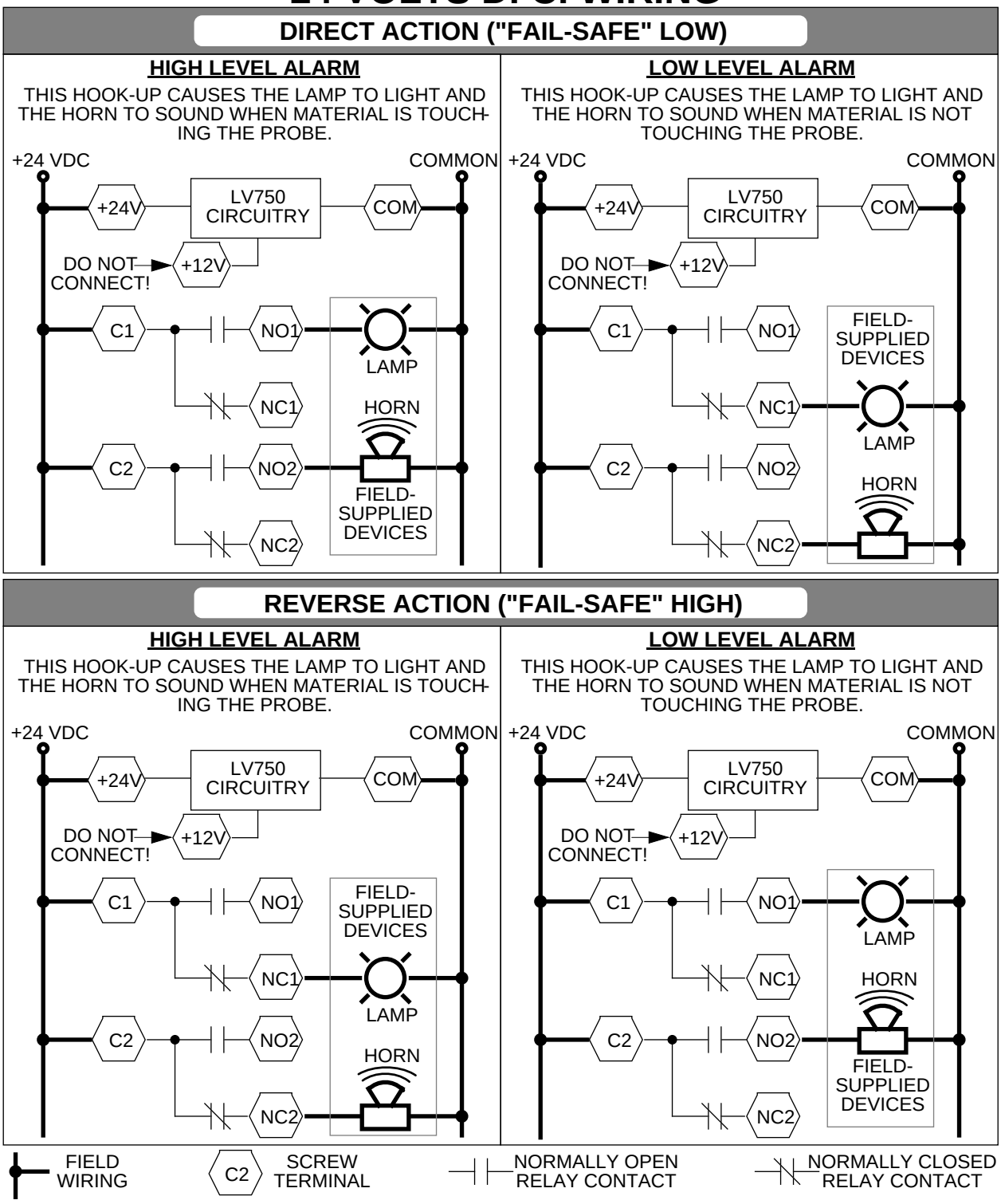


Figure 3.4: Typical Field Wiring Diagrams for 24 Volt D. C. Applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the LV750. Many other hook-ups are possible. Consult OMEGA Engineering if you desire help.

12 VOLTS D. C. WIRING

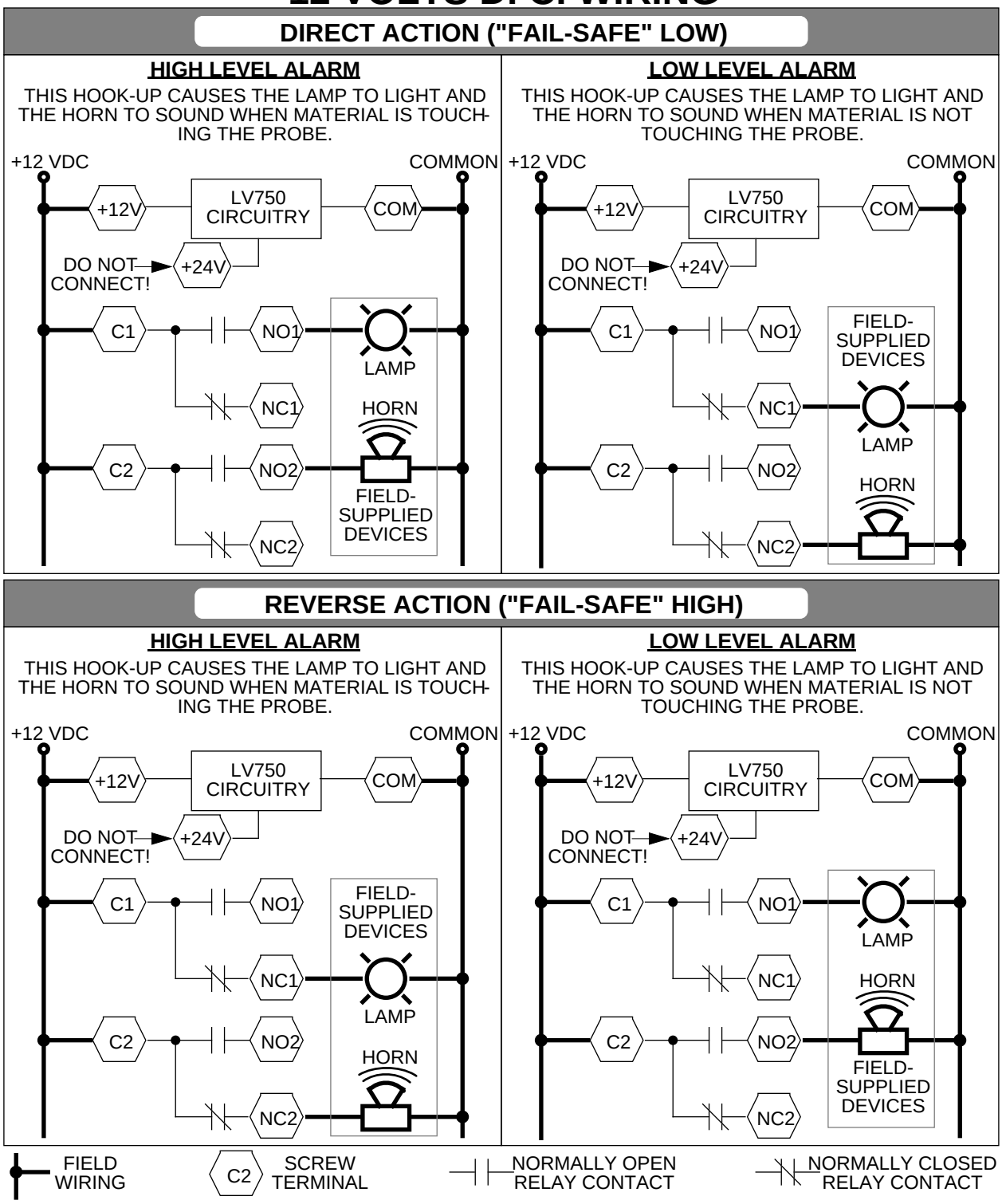


Figure 3.5: Typical Field Wiring Diagrams for 12 Volt D. C. Applications. These diagrams show typical hook-ups that may be useful in certain field situations. The lamp and horn represent visible and audible devices which may be controlled by the LV750. Many other hook-ups are possible. Consult OMEGA Engineering if you desire help.

3.5 Calibrate the LV750 unit using the following procedures. See Figure 3.6 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 settings 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 makes contact with 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 Paragraph 3.12, Step 6 below.

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 or absence of material at the sensing probe: ON when material is present and OFF when material is absent.

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.

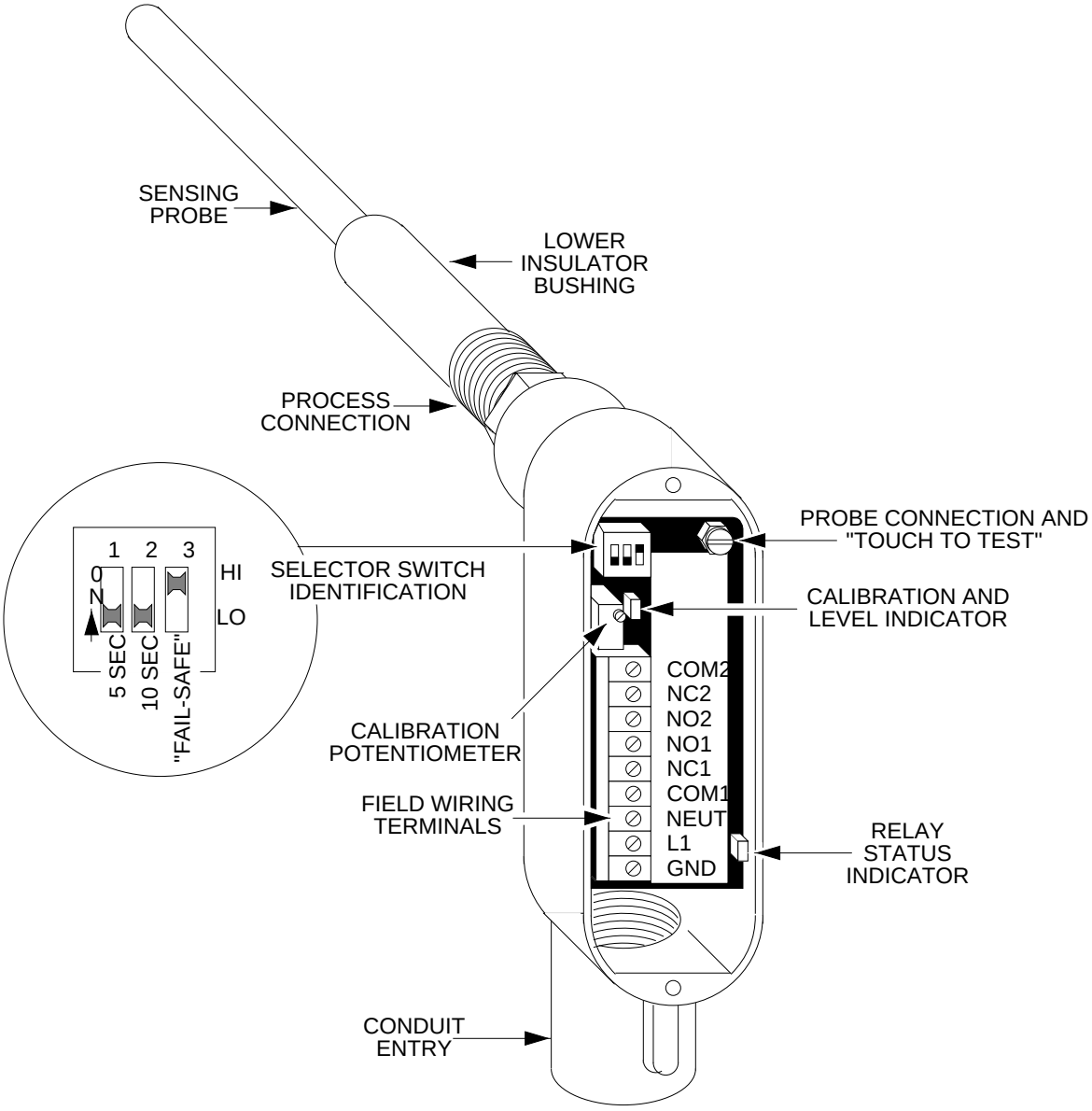


Figure 3.6: Location of Adjustments and Controls

3.12 **READ ALL STEPS BEFORE BEGINNING:**

STEP 1. Select the desired mode of operation for the relay. See Paragraph 3.6 for complete details. For ease of calibration set both time delay switches to the OFF position until STEP 6 is reached.

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

STEP 3. Remove the cover of the enclosure and locate the adjustment potentiometer. See Figure 3.6.

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 indicator light and proceed as follows:

If the light is **ON:**
Turn the potentiometer clockwise until the light goes OFF. Then slowly turn counter-clockwise until the light just comes back ON. Proceed to STEP 5.

If the light is **OFF:**
Turn the potentiometer counter-clockwise until the light just comes ON. Proceed to STEP 5.

STEP 5. Very carefully turn the potentiometer clockwise until the indicator light just barely goes OFF. Then turn the potentiometer one-fourth turn further clockwise.

STEP 6. Place your finger on the TOUCH TO TEST point. The red light should come on. Remove your finger and the red light should go back off. This verifies that the unit is functional.

STEP 7. 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 8. 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.

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

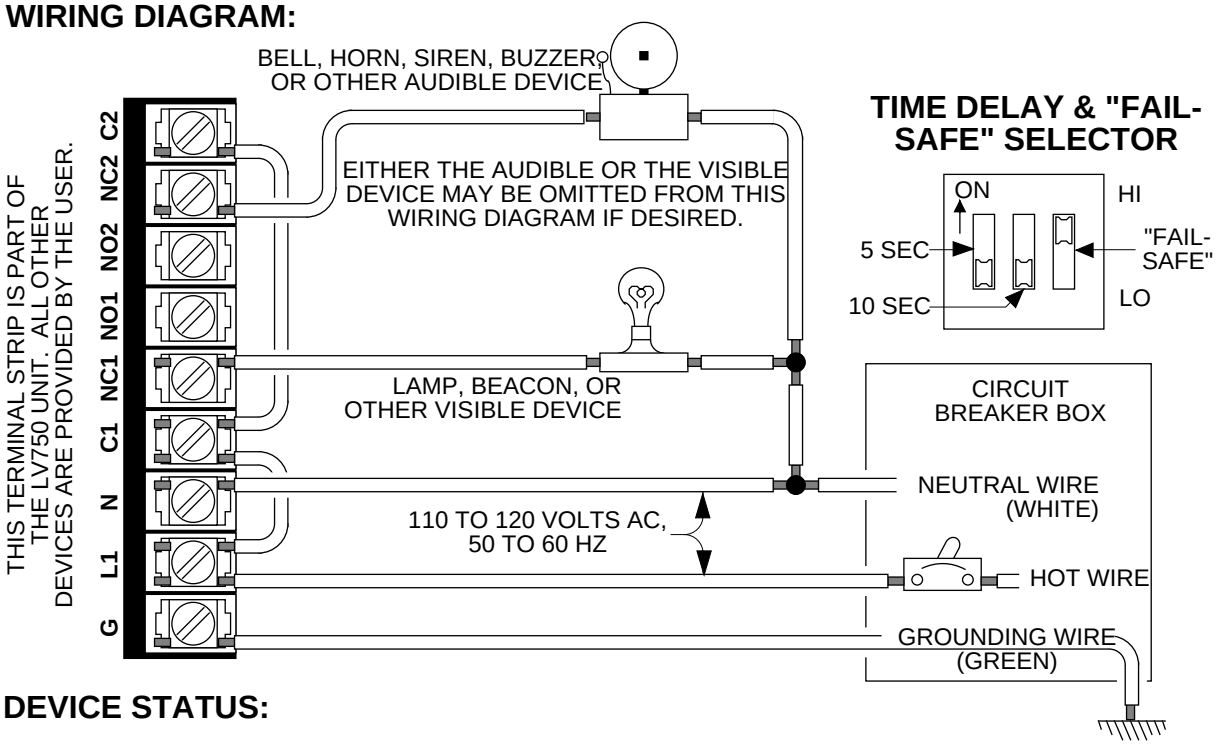
3.13 Should it be necessary to remove the probe assembly from the enclosure while the probe assembly remains installed in the process, first, loosen the screw at the TOUCH TO TEST point. Slip the wire lug off of the loosened screw. Position the probe wire straight out from the enclosure so that it may rotate freely without twisting as the enclosure is unscrewed from the probe assembly. When the enclosure is free of the probe assembly carefully guide the probe connection wire through the space between the enclosure and the encapsulated electronics module. Removing the two screws on the bottom of the enclosure will allow the encapsulated electronics module to be removed from the enclosure.

3.14 Reverse the procedure in Paragraph 3.13 to restore the unit to operation. Repeat the calibration procedure after any changes.

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 upon loss of contact of the sensing probe with the material. 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 and be prepared to take any action required by the system in which the LV750 is used.

WIRING DIAGRAM:



DEVICE STATUS:

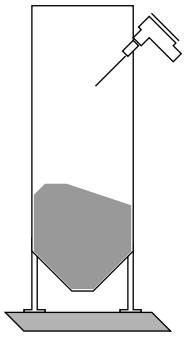
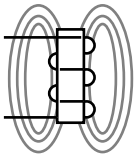
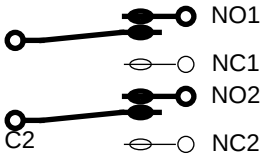
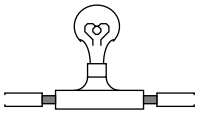
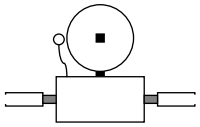
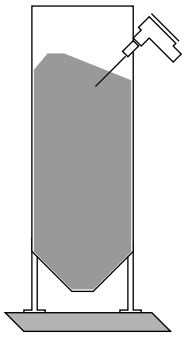
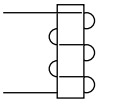
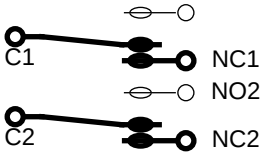
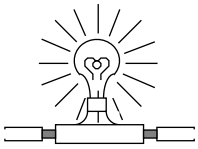
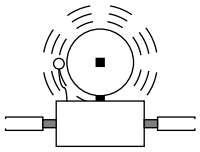
VESSEL LEVEL	INDICATORS	RELAY	VISIBLE	AUDIBLE
	RED LED  GREEN LED 	 		
LOW	**ON**	**ENERGIZED**	**OFF**	**SILENT**
	RED LED  **ON** GREEN LED 	 		
HIGH	**OFF**	**DE-ENERGIZED**	**ON**	**SOUNDING**

Figure 3.7: Typical Wiring Diagram and Device Status Chart. This diagram shows only one of many possible applications for the LV750 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.

5.0 MAINTENANCE AND 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 LV750 consists of two main sub-assemblies. These are the enclosure with the encapsulated detector 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
5.3	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.
		Detector module non-functional.	Replace detector module.
5.4	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, replace, or clean sensing probe.
		Detector module non-functional.	Replace detector module.
5.5	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 Paragraph 3.12.
		Excessive material buildup on probe.	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.
5.6	Unit will not detect material.	Improper calibration.	See Paragraph 3.12.
		Unit was calibrated with material touching probe.	Be sure material is not touching probe, then recalibrate.

	PROBLEM	POSSIBLE CAUSE	SOLUTION
5.7	Unit will not stay in calibration.	Poor grounding of case to vessel.	Provide secure ground connection.
5.8	Relay operates properly, but no contact closure at wiring terminals.	Burned or broken lands in detector module.	Replace detector module.

DIELECTRIC CONSTANTS

ABS RESIN	2.4
ACENAPHTHENE	3
ACETAL	3.6
ACETAL BROMIDE	16.5
ACETAL DOXIME	3.4
ACETALDEHYDE	21.8
ACETAMIDE	41
ACETANILIDE	2.9
ACETIC ACID	6.2
ACETONE	20.7
ACETONITRILE	37.5
ACETOPHENONE	17.3
ACETOXIME	3
ACETYL ACETONE	23.1
ACETYL BROMIDE	16.5
ACETYL CHLORIDE	15.8
ACRYLIC RESIN	2.7 - 4.5
ACTEAL	3.6
AIR	1
ALCOHOL, INDUSTRIAL	16 - 31
ALKYD RESIN	3.5 - 5.0
ALLYL ALCOHOL	22
ALLYL BROMIDE	7
ALLYL CHLORIDE	8.2
ALLYL IODIDE	6.1
ALLYL RESIN (CAST)	3.6 - 4.5
ALUMINA CHINA	3.1 - 3.9
ALUMINA	4.5 - 11.5
ALUMINUM FLUORIDE	2.2
ALUMINUM HYDROXIDE	2.2
ALUMINUM OLEATE	2.4
ALUMINUM PHOSPHATE	6
ALUMINUM POWDER	1.6 - 1.8
AMBER	2.8 - 2.9
AMINOALKYD RESIN	3.9 - 4.2
AMMONIA	16.5
AMMONIUM BROMIDE	7.2
AMMONIUM CHLORIDE	7
AMYL ACETATE	5
AMYL ALCOHOL	15.8
AMYL BENZOATE	5.1
AMYL BROMIDE	6.3
AMYL CHLORIDE	6.6
AMYL ETHER	3.1
AMYL FORMATE	5.7
AMYL IODIDE	6.9
AMYL NITRATE	9.1
AMYL THIOCYANATE	17.4
AMYLAMINE	4.6
AMYLENE	2
AMYLENE BROMIDE	5.6
AMYLMERCAPTAN	4.7
ANILINE	7.3
ANISOLE	4.3
APATITE	7.4
ARSENIC TRIBROMIDE	9
ARSENIC TRICHLORIDE	12.4
ASBESTOS	4.8
ASPHALT	2.6
[B]	
BAKELITE	3.5 - 5.0
BARIUM CHLORIDE	11
BARIUM NITRATE	5.8
BARIUM SULFATE	11.4
BARLEY FLOUR	3.0 - 4.0
BEESWAX	2.7 - 3.0
BENZAL CHLORIDE	6.9
BENZALDEHYDE	17.8
BENZALDOXIME	3.8
BENZENE	2.3
BENZONITRILE	26
BENZOPHENONE	13
BENZOTRICHLORIDE	7.4
BENZOYL CHLORIDE	19
BENZOYLACETONE	3.8
BENZYL ACETATE	5
BENZYL ALCOHOL	13
BENZYL BENZOATE	4.8
BENZYL CHLORIDE	6.4
BENZYL CYANIDE	18.3
BENZYL SALICYLATE	4.1
BENZYLAMINE	4.6
BENZYLETHYLAMINE	4.3
BENZYLMETHYLAMINE	4.4
BERYL	6
BIPHENYL	20
BLEACHING POWDER	4.5
BONE BLACK	5.0 - 6.0
BORNYL ACETATE	4.6
BORON BROMIDE	2.6
BROMAL	7.6
BROMINE	3.1
BROMOANISOLE	7.1
BROMOBENZENE	5.4
BROMOBUTYLENE	5.8
BROMOBUTYRIC ACID	7.2
BROMOCTADECANE	3.53
BROMODODECANE	4.1
BROMOFORM	4.4
BROMOHEPTANE	5.3
BROMOHEXADECANE	3.7
BROMOHEXANE	5.8
BROMOMETHANE	9.8
BROMONAPTHALENE	5.1
BROMOOCTADECANE	3.5
BROMOPENTADECANE	3.9
BROMOPROPIONIC ACID	11
BROMOTOLUENE	5.1
BROMOTRIDECANE	4.2
BROMYL CHLORIDE	5.21
BUTANOL (1)	17.8
BUTANONE	18.5
BUTYCIC ANHYDRIDE	12
BUTYL CHLORAL	10
BUTYL CHLORIDE	9.6
BUTYL OLEATE	4
BUTYL STEARATE	3.1
BUTYLACETATE	5.1
BUTYLAMINE	5.4
BUTYRALDEHYDE	13.4
BUTYRIC ACID	3
BUTYRONITRILE	20.7
[C]	
CALCITE	8
CALCIUM	3
CALCIUM CARBONATE	9.1
CALCIUM FLUORIDE	7.4
CALCIUM FLUORIDE	7.4
CALCIUM OXIDE	11.8
CALCIUM SULFATE	5.6
CAMPHENE	2.7
CAMPHER, CRYSTAL	10.0 - 11.0
CAMPHORPINACONE	3.6
CAPRYLIC ACID	3.2
CARBIDE	5.8 - 7.0
CARBON BLACK	2.5 - 3.0
CARBON DISULPHIDE	2.6
CARBON TETRACHLORIDE	2.2
CARNAUBA WAX	2.9
CARVENONE	18.4
CARVOL	11.2
CASEIN	6.1 - 6.8
CASTOR OIL	2.6
CEDRENE	3.2
CELLOPHANE	3.2 - 6.4
CELLULOID	3.3 - 11
CELLULOSE	3.2 - 7.5
CELLULOSE NITRATE	6.4
CEMENT	1.5 - 2.1
CHARCOAL	1.2 - 1.81
CHLORINE	2
CHLOROACETIC ACID	21
CHLOROACETONE	29.8
CHLOROBENZENE	5.6
CHLOROCYCLOHEXANE	7.6
CHLOROFORM	4.8
CHLOROHEPTANE	5.5
CHLOROHYDRATE	3.3
CHLORONAPHTHALENE	5
CHLOROOCTANE	5.1
CHLOROPHETANE	5.4
CHLOROTOLUENE	4.7
CHOLESTERIN	2.86
CHROME, ORE	7.7 - 8.0
CHROMYL CHLORIDE	2.6
CINNAMALDEHYDE	16.9
CIS-3-HEXENE	2.1
CLAY	1.8 - 2.8
CM-CHLOROANALINE	13.4
COAL TAR	2.0 - 3.0
COAL, POWDER, FINE	2.0 - 4.0
COCAINE	3.1
COKE	1.1 - 2.2
COMPOUND	3.6
COPPER CATALYST	6.0 - 6.2
COPPER OLEATE	2.8
COPPER OXIDE	18.1
CORDERITE	2.5 - 5.4
CORN	5.0 - 10
COTTON	1.3 - 1.4
COTTON SEED OIL	3.1
CREOSOL	10.6
CRESOL, LIQUID	9.0-11.0
CROTONIC NITRICE	28
CRYSTALE	3.5 - 4.7
CUMALDEHYDE	11
CUMENE	2.4
CUMICALDEHYDE	10.7
CUPRIC OLEATE	2.8
CUPRIC OXIDE	18.1
CYANOACETIC ACID	33
CYANOETHYL ACETATE	19.3
CYANOGEN	2.6
CYCLOHEXANE	2
CYCLOHEXANE, LIQUID	18.5
CYCLOHEXANOL	15
CYCLOHEXANONE	18.2
CYCLOHEXENE	18.3
CYCLOPENTANE	2
CYCOLIC NITRILE	27
CYMENE	2.3
[D]	
D-COCAINE	3.1
DECANAL	8.1
DECANE	2
DECANOL	8.1
DECYLENE	2.7
DECYNE	2.2
DEUTERIUM OXIDE	78.3
DEXTRIN	2.2 - 2.4
DIACETOXYBUTANE	6.6
DIALLYL SULFIDE	4.9
DIAMOND	10
DIBENZYL SEBACATE	4.6
DIBENZYLAMINE	3.6
DIBUTYL PHTHALATE	6.4
DIBUTYL SEBACATE	4.5
DIEBENZYLAMINE	3.6
DINITROGEN OXIDE	1.6
DIOCTYL PHTHALATE	5.1
DIOXANE (1,4)	2.2
DIPENTENE	2.3
DIPHENTYMETHANE	2.6
DIPHENYL	2.53
DIPHENYL ETHER	3.9
DIPHENYLAMINE	3.3
DIPROPYL KETONE	12.6
DIPROPYLAMINE	2.9
DOLOMITE	6.8 - 8.0
DOWTHERM	3.4
[E]	
EBONITE	2.5 - 2.9
EMERY SAND	16.5
EPICHLORCHYDRIN	22.9
EPOXY RESIN (CAST)	3.6
ETHYL ACETATE	6
EUGENOL	6.1
[F]	
FERRIC OLEATE	2.6
FERROCHROMIUM	1.5 - 1.8
FERROMANGANESE	5.0 - 5.2
FERROUS OXIDE	14.2
FERROUS SULFATE	14.2
FLOUR	2.5 - 3.0
FLY ASH	1.5 - 2.6
FORMALIN	23
FORMAMIDE	84
FORMIC ACID	58
FORSTERITE	6.2
FREON 12	2.4
FULLER'S EARTH	1.8 - 2.2
FURAN	3
FURFURAL	42
FURFURALDEHYDE	41
[G]	
GASOLINE	2
GLASS, BEAD	3.1
GLASS, RAW MATERIAL	2.0 - 2.5
GLYCERIN, LIQUID	47 - 68
GLYCOL	37
GLYCOLIC NITRILE	27
GRAIN	3.0 - 8.0
GRAPHITE	12.0-15.0
GYPSUM	2.5 - 6.0
[H]	
HAGEMANNIE ESTER	10.6
HALOWAX	4.5
HEAVY OIL	3
HEPTANE	1.9
HYDRAZINE	52
HYDROCHLORIC ACID	4.0 - 12.0
HYDROCYANIC ACID	2.3
HYDROGEN IODIDE	2.9
HYDROGEN BROMIDE	3.8
HYDROGEN CHLORIDE	4.6
HYDROGEN CYANIDE	95.4
HYDROGEN FLUORIDE	11.0-17.0
HYDROGEN PEROXIDE	84.2
HYDROGEN SULFIDE	5.8
HYDROZINE	52.9
[I]	
ILMENITE	6.0 - 7.0
INDONAL	7.8
IODINE	11
IRON OXIDE	14.2
ISO-BUTYL ALCOHOL	18.7
ISO-PROPYL ALCOHOL	18.3
ISO-PROPYL BENZENE	2.4
[J]	
JET FUEL (JP4)	1.7
[K]	
KENT WAX	6.5 - 7.5
KEROSENE	1.8
KYNAR	2
[L]	
LACTIC ACID	22
LACTRONITRILE	38.4
LEAD OXIDE	25.9
LEAD SULFATE	14.3
LIME	2.2 - 2.5
LIMONENE	2.3
LINOLEIC ACID	2.9
LINSEED OIL	3.2 - 3.5
[M]	
MAGNESIUM OXIDE	9.7
MAGNESIUM SULFATE	8.2
MALACHITE	7.2
MALONIC NITRILE	47
MANDELONITRILE	17
MANGANESE DIOXIDE	5.0 - 5.2
MANNITOL	3
MARGARINE, LIQUID	2.8 - 3.2
MELAMINE RESIN	4.7 - 10.9
MERCURY CHLORIDE	7.0-14.0
MERCURY DIETHYL	2.3
MESITYL OXIDE	15.4
MESITYLENE	2.4
MESITYLENE	3.4
METHANOL	32.6
METHOXYBENZENE	4.3
METHOXYPHENOL	11
METHOXYTOLUENE	3.5
2-METHYL-1-PROPANOL	17.7
METHYL ACETATE	6.7

DIELECTRIC CONSTANTS

METHYL ALCOHOL	33.1
METHYL ETHYL KETONE	18.4
METHYL P-TOLUATE	4.3
METHYL PROPIONATE	5.4
METHYL SALICYLATE	9
METHYL THIOCYANATE	35.9
METHYL VALERATE	4.3
METHYLAMINE	10.5
METHYLANILINE	6
METHYLBENZYLAMINE	4.4
METHYLCYLOPENTANE	2
METHYLENE IODIDE	5.1
METHYLETHER, LIQUID	5
METHYLHEXANE	1.9
METHYLISOCYANATE	29.4
METHYLOCTANE	30
METHYLPYRIDINE (2)	9.8
MICA	2.6 - 3.2
MICANITE	1.8 - 2.6
MINERAL OIL	2.1
MORPHOLINE	7.3
[N]	
NAPHTHY ETHYL ETHER	3.2
NAPTHALENE	2.5
NAPTHONITRILE	6.4
NEOPRENE	6.0 - 9.0
NITROANISOLE	24
NITROBENZENE	35.7
NITROCELLULOSE	6.2 - 7.5
NITROETHANE	19.7
NITROGLYCERIN	19
NITROMETHANE	39.4
NITROTOLUENE	25
NITROUS OXIDE	1.6
NONANE	2
NYLON	4.0 - 5.0
NYLON RESIN	3.0 - 5.0
[O]	
OIL, ALMOND	2.8
OIL, COTTON SEED	3.1
OIL, GRAPESEED	2.9
OIL, LEMON	2.3
OIL, LINSEED	3.4
OIL, OLIVE	3.1
OIL, PARAFFIN	2.2 - 4.7
OIL, PEANUT	3
OIL, PETROLEUM	2.1
OIL, PYRANOL	5.3
OIL, SESAME	3
OIL, SPERM	3.2
OIL, TERPENTINE	2.2
OIL, TRANSFORMER	2.2
OLEIC ACID	2.5
OPAL WAX	3.1
[P]	
PAINT	5.0 - 8.0
PAPER (DRY)	2
PARAFFIN	1.9 - 2.5
PARAFFIN OIL	4.6 - 4.8
PARALDEHYDE	13.9
PARAWAX	2.3
PARRAFIN CHLORIDE	2.0 - 2.3
PENTACHLOROETHANE	3.7
PERLITE	1.3 - 1.4
PETROLEUM	2.0-2.2
PHENATHIENE	2.8
PHENETOLE	4.5
PHENOL ETHER	9.8
PHENOL RESIN	4.9
PHENOXYACETYLENE	4.8
PHENTIDINE	7.3
PHENYL ACETATE	6.9
PHENYL ETHER	3.7
PHENYL ISOCYANATE	8.9
PHENYL-1-PROPANE	1.7
PHENYLACETALDEHYDE	4.8
PHENYLACETIC	3
PHENYLACETONITRILE	18
PHENYLETHANOL	13
PHENYLETHYL ACETATE	4.5
PHENYLETHYLENE	2.4
PHENYLHYDRAZINE	7.2
PHOSGENE	4.7
PHOSPHORUS	4.1
PHOSPHORUS, RED	4.1
PHOSPHORUS, YELLOW	3.6
PHTHALIC ACID	5.1-6.3
PINACOLIN	12.8
PINACONE	7.4
PINE TREE RESIN	1.5-1.8
PINENE	2.7
PIPERIDINE	5.9
PLASTER	2.5 - 6.0
PLASTIC GRAIN	65-75
PLASTIC PELLETS	1.1-3.2
PLATINUM CATALYST	6.5 - 7.5
POLYACETAL	3.6-3.7
POLYACETOL RESIN	2.6-3.7
POLYACRYLIC ESTER	3.5
POLYAMIDE	2.5-2.6
POLYBUTYLENE	2.2-2.3
POLYCAPROLACTAM	2.0 - 2.5
POLYCARBONATE	2.9-3.0
POLYCARBONATE RESIN	2.9 - 3.0
POLYESTER RESIN	2.8 - 4.5
POLYETHER CHLORIDE	2.9
POLYETHER RESIN	2.8-8.1
POLYETHYLENE	2.2-2.4
POLYMIDE	2.8
POLYPROPYLENE	1.5
POLYSTYRENE RESIN	2.4 - 2.6
POLYSTYROL	2.0-2,6
POLYSULPHONIC ACID	2.8
POLYVINYL ALCOHOL	1.9-2.0
POLYVINYL CHLORIDE	3.4
PORCELAIN	5.0 - 7.0
POTASSIUM CHLORATE	5.1
POTASSIUM CHLORIDE	4.6
POTASSIUM IODIDE	5.6
POTASSIUM NITRATE	5
POTASSIUM SULFATE	5.9
PROPANE	1.6
PROPANEDIOL	32
PROPANOL (1)	20.1
PROPENE	1.9
PROPIONALDEHYDE	18.9
PROPIONIC ACID	3.3
PROPIONIC ANHYDRIDE	18
PROPIONITRILE	27.7
PROPYL ACETATE	6.3
PROPYL ALCOHOL	21.8
PROPYL BENZENE	2.4
PROPYL BROMIDE	7.2
PROPYL BUTYRATE	4.3
PROPYL ETHER	3.4
PROPYL FORMATE	7.9
PROPYL NITRATE	14.2
PROPYL PROPIONATE	4.7
PROPYL VALERATE	4
PROPYLENE LIQUID	11.9
PSUEDOCUMENE	2.4
PULEGONE	9.5
PULEZONE	9.7
PVC, POWDER	1.4
PYREX	4.8
PYREX GLASS	4.3 - 5.0
PYRIDINE	12.5
PYROCERAM	3.5-4.5
PYRROLE	7.5
[Q]	
QUARTZ	4.2
QUINOLINE	9
[R]	
REBURNED LIME	2.2
REFRACTORY (CAST)	6.7
REFRACTORY	1.8 - 2.1
RESORCINOL	3.2
RICE	3.0 - 8.0
RICE BRAN	1.4 - 2.0
ROUGE	1.5
ROUGE (JEWELERS)	1.5 - 1.6
RUBBER	3
RUBY	11.3
RUTILE	6.6 - 8.6
[S]	
SAFROL	3.1
SALICYLALDEHYDE	13.9
SALT	3.0 - 15.0
SAND	3.0 - 5.0
SAND (DRY)	5
SANTOWAX	2.3
SELENIUM	6.6 - 11.0
SESAME	1.8 - 2.0
SHELLAC	2.0 - 3.8
SILICA ALUMINATE	2
SILICA SAND	2.5 - 3.5
SILICON	11.0 - 12.0
SILICONE OIL	2.2 - 2.9
SILICONE RESIN, LIQUID	3.5 - 5.0
SILICONE RUBBER	3.2 - 9.8
SILICONE VARNISH	2.8 - 3.3
SILK	2.5 - 3.5
SILVER BROMIDE	12.2
SILVER CHLORIDE	11.2
SILVER CYANIDE	5.6
SLAKED LIME, POWDER	2.0 - 3.5
SLATE	6.0 - 7.5
SMITHSONITE	9.3
SOAP POWDERS	1.2 - 1.7
SODIUM CARBONATE	8.4
SODIUM CARBONATE	8.4
SODIUM CYANIDE	7.55
SODIUM DICHROMATE	2.9
SODIUM NITRATE	5.2
SODIUM OLEATE	2.7
SODIUM PERCHLORATE	5.4
SODIUM PHOSPHATE	1.6 - 1.9
SODIUM SULFIDE	5
SOY BEANS	2.8
STANNIC CHLORIDE	3.2
STARCH	3.0 - 5.0
STARCH, PASTE	1.7 - 1.8
STEARINE	2.3
STEATITE	5.5 - 7.5
STYRENE	2.4
STYRENE (MODIFIED)	2.4 - 3.8
STYRENE RESIN	2.3 - 3.4
SUCCINAMIDE	2.9
SUCCINIC ACID	2.4
SUCROSE	3.3
SUCROSE (MEAN)	3.3
SUGAR	3
SUGAR, GRANULATED	1.5 - 2.2
SULFUR	1.6 - 1.7
SULFUR DIOXIDE	15
SULFUR TRIOXIDE	3.1
SULFUR, LIQUID	3.5
SULFUR, POWDER	3.6
SULFURIC ACID	84
SULFURYL CHLORIDE	10
SULPHUR	4
SYRUP	50 - 80
SYRUP WAX	2.5 - 2.9
[T]	
TANTALUM OXIDE	11.6
TARTARIC ACID	6
TARTARIC ACID	35.9
TEFLON	2
TEFLON (4F)	2
TEFLON, FEP	2.1
TEFLON, PCTFE	2.3 - 2.8
TEFLON, PTFE	2
TEPINEOL	2.8
TERPINENE	2.7
TERPINEOL	2.8
TETRABROMOETHANE	7
TETRAETHYL SILICATE	4.1
TETRANITROMETHANE	2.2
THALLIUM CHLORIDE	46.9
THINNER	3.7
THIOACETIC ACID	13
THIONYL BROMIDE	9.1
THIONYL CHLORIDE	9.3
THIOPHENE	2.8
THORIUM OXIDE	10.6
THUJONE	10
TIN TETRACHLORIDE	2.9
TITANIUM DIOXIDE	110
TITANIUM OXIDE	40.0 - 50.0
TOBACCO	1.6 - 1.7
TOLUENE	2.4
TOLUIDINE	6
TOLUNITRILE	18.8
TOLYL METHYL ETHER	3.5
TOURMALINE	6.3
TRANS-3-HEXENE	2
TRANSMISSION OIL	2.2
TRIBROMOPROPANE	6.4
TRIBUTYLPHOSPHATE	8
TRICHLORETHYLENE	3.4
TRICHLOROETHANE	7.5
TRICHLOROETHYLENE	3.4
TRICHLOROPROPANE	2.4
TRICHLOROTOLUENE	6.9
TRIETHYL ACONITATE	6.4
TRIETHYL ALUMINUM	2.9
TRIETHYLAMINE	2.4
TRIETHYLAMINE	3.2
TRIFLUOROACTIC ACID	39
TRIFLUOROTOLUENE	9.2
TRIMETHYL BORATE	8.2
TRIMETHYL-3-HEPTENE	2.2
TRIMETHYLAMINE	2.5
TRIMETHYLBENZENE	2.3
TRIMETHYLBUTANE	1.9
TRIMETHYLPENTANE	2.9
TRINITROBENZENE	2.2
TRINITROTOLUENE	22
TRIOLEIN	3.2
TURPENTINE (WOOD)	2.2
TWO-DICHLOROETHANE	10.7
[U]	
UNDECANE	2
UNDECANONE	8.4
UREA	3.5
UREA FORMALDEHYDE	6.4 - 6.9
UREA RESIN	6.2 - 9.5
URETHANE	3.2
URETHANE RESIN	6.5 - 7.1
[V]	
VALERALDEHYDE	11.8
VALERIC ACID	2.6
VALERONITRILE	17.7
VANADIUM SULFIDE	3.1
VASELINE	2.2 - 2.9
VERATROL	4.5
VINYL ALCOHOL RESIN	2.6 - 3.5
VINYL BUTYRAL	3.3 - 3.9
VINYL CHLORIDE RESIN	2.8 - 4.0
VINYL ETHER	3.9
VINYLIDENE CHLORIDE	3.0 - 4.0
VYCOR GLASS	3.8
[W]	
WATER	80.4
WATER	88
WAX	2.4 - 6.5
WHEAT FLOUR	3.0 - 5.0
WHITE MICA	4.5 - 9.6
WOOD, DRY	2.0 - 6.0
WOOD, WET	10.0 - 30.0
[X]	
XYLENE	2.4
XYLENOL	3.9
XYLIDINE	5
[Z]	
ZINC OXIDE	1.7 - 2.5
ZINC SULFIDE	8.2
ZIRCON	12
ZIRCONIUM OXIDE	12.5
ZIRCONIUM SILICATE	5

OMEGA INSIDE BACK COVER

OMEGA BACK COVER