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GE
Measurement & Control Solutions Moisture

Moisture Monitor Series 35

Single-Channel Hygrometer

User's Manual



imagination at work

910-140 Rev. H
March 2011

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GE
Measurement & Control Solutions

Moisture Monitor Series 35

Single-Channel Hygrometer

User's Manual

910-140 Rev. H
March 2011

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Information Paragraphs

- **Note** *paragraphs provide information that provides a deeper understanding of the situation, but is not essential to the proper completion of the instructions.*
- **Important** *paragraphs provide information that emphasizes instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.*
- **Caution!** paragraphs provide information that alerts the operator to a hazardous situation that can cause damage to property or equipment.
- **Warning!** paragraphs provide information that alerts the operator to a hazardous situation that can cause injury to personnel. Cautionary information is also included, when applicable.

Safety Issues

WARNING! It is the responsibility of the user to make sure all local, county, state and national codes, regulations, rules and laws related to safety and safe operating conditions are met for each installation.

Auxiliary Equipment

Local Safety Standards

The user must make sure that he operates all auxiliary equipment in accordance with local codes, standards, regulations, or laws applicable to safety.

Working Area

WARNING! Auxiliary equipment may have both manual and automatic modes of operation. As equipment can move suddenly and without warning, do not enter the work cell of this equipment during automatic operation, and do not enter the work envelope of this equipment during manual operation. If you do, serious injury can result.

WARNING! Make sure that power to the auxiliary equipment is turned OFF and locked out before you perform maintenance procedures on the equipment.

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Qualification of Personnel

Make sure that all personnel have manufacturer-approved training applicable to the auxiliary equipment.

Personal Safety Equipment

Make sure that operators and maintenance personnel have all safety equipment applicable to the auxiliary equipment. Examples include safety glasses, protective headgear, safety shoes, etc.

Unauthorized Operation

Make sure that unauthorized personnel cannot gain access to the operation of the equipment.

Environmental Compliance

Waste Electrical and Electronic Equipment (WEEE) Directive

GE Measurement & Control Solutions is an active participant in Europe's *Waste Electrical and Electronic Equipment* (WEEE) take-back initiative, directive 2002/96/EC.



The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

The crossed-out wheeled bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

Visit **http://www.ge-mcs.com/en/about-us/environmental-health-and-safety/1741-weee-req.html** for take-back instructions and more information about this initiative.

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Chapter 1. Features and Capabilities

1.1 Electronics Unit 1
1.2 Probes 2
1.3 Sample System 2
1.4 User Program 2

Chapter 2. Installation

2.1 Introduction 3
2.2 Choosing a Site for Best Performance 4
2.3 Precautions for Moisture Probes 6
2.4 Sample System Guidelines 8
2.5 Installing the Sample System 10
2.6 Installing a Probe in the Sample System 11
2.7 Mounting the Electronics Unit 13
2.8 Making Wiring Connections to the Electronics Unit 14
2.8.1 Modified or Non-GE Cables 15
2.8.2 Connecting the Probe 16
2.8.3 Connecting the Alarms 18
2.8.4 Connecting a Recorder Output Device 20
2.8.5 Connecting Power to the Unit 23
2.8.6 Performing an MH Calibration/Test Adjustment 24

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Chapter 3. Operation

3.1 Introduction 27
3.2 Getting Started 28
3.2.1 Powering Up 28
3.2.2 Entering Data into the User Program 29
3.2.3 Verifying and Changing Factory Setup Data 32
3.3 Changing the Measurement Display 38
3.4 Setting Up the Alarm Relays 39
3.4.1 Enabling or Disabling the Alarms 41
3.4.2 Selecting the Measurement Mode 41
3.4.3 Selecting the Measurement Units 42
3.4.4 Configuring the Alarm 43
3.5 Setting Up a Recorder 44
3.5.1 Selecting the Output Signal 44
3.5.2 Selecting the Measurement Mode and Units 45
3.5.3 Setting the Zero and Span Values 46
3.6 Setting Up User-Defined Functions 47
3.6.1 Entering an Offset Value 48
3.6.2 Entering a Constant Pressure 49
3.6.3 Entering an Automatic Calibration Interval 50
3.6.4 Entering a Backlight-On Time Interval 52
3.6.5 Setting Up Computer Enhanced Response 53
3.6.6 Setting Up Range Error Processing 54
3.6.7 Setting Up Calibration Error Processing 56

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Chapter 4. Troubleshooting and Maintenance

4.1 Introduction 59
4.2 Common Problems 59
4.3 Screen Messages 62
4.4 Replacing the User Program 63
4.4.1 Removing the Circuit Board (Bench-Mount Only) 64
4.4.2 Removing and Replacing the EPROM (All Units) 65
4.4.3 Replacing the Circuit Board (Bench-Mount Only) 66
4.5 Replacing and Recalibrating the Moisture Probes 67
4.6 Testing the Alarm Relays and Recorder Output 67
4.6.1 Testing the Alarm Relays 68
4.6.2 Testing the Recorder Output 69
4.7 Adjusting the Recorder Zero/Span Values 70
4.7.1 Adjusting the Recorder Zero 70
4.7.2 Adjusting the Recorder Span 73

Chapter 5. Specifications

5.1 Electronics 75
5.2 Moisture Measurement 78

Appendix A. Outline and Installation Drawings

Appendix B. Menu Maps

Appendix C. Data Information Sheet

Appendix D. Spare Parts List

Appendix E. Older Version Circuit Boards

E.1 Replacing the User Program 101

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Chapter 1. Features and Capabilities

The Series 35 is a microprocessor-based, single-channel hygrometer that measures moisture content in gases. The Series 35 is suitable for a wide range of process conditions requiring real-time moisture measurement. It measures dew/frost points over a range of –110 to +60°C (–166 to +140°F), and comes equipped with two optional alarm relays, one fault alarm, and a single analog output.

1.1 Electronics Unit

The Series 35 is available in four configurations: rack mount, bench mount, panel mount, and NEMA-4X weatherproof.

All Series 35 configurations display measurement data on a one-line, 16-character alphanumeric LCD display screen. Users enter probe information into the unit using the programming keys on the front panel keypad (see Figure 1). The Series 35 accepts line voltages of 100, 120, 230, and 240 VAC, and can also be powered by 24VDC.

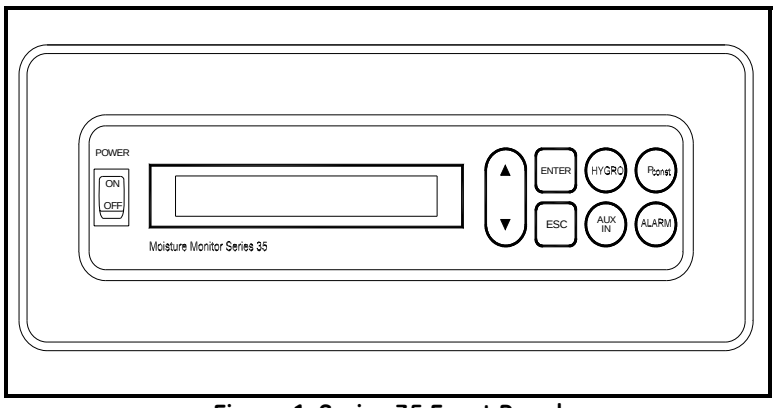


Figure 1: Series 35 Front Panel

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1.2 Probes

The moisture probe is the part of the system that comes in contact with the process, and is usually installed in a sample system. The Series 35 uses any M Series probe to measure dew point temperature in °C or °F. A sensor assembly is secured to the probe mount and protected with a sintered stainless steel shield (see Figure 2). Other types of shields are available.

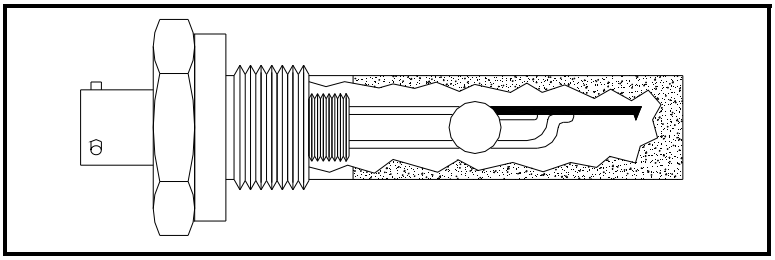


Figure 2: M Series Probe

1.3 Sample System

The sample system delivers a controlled sample stream at the specifications of the measurement probe. Typically, the sample system is kept very simple, with as few components as possible located upstream of the measurement probe. The sample system may include a filter to remove particulates from the sample stream and/or a pressure regulator to control the pressure of the stream. In general, stainless steel is the preferred material for all wetted parts in the sample system. The sample system is located outside of the Series 35 enclosure.

1.4 User Program

The Series 35 *User Program* enables you to change moisture calibration data, set up and test alarms and recorders, and select a number of user-defined program functions. The main menu programming options include: DP RANGE, CURVE, REFERENCE, ALARMS, RECORDER, TEST, USER, and FACTORY SETUP menus.

All functions and features of the Series 35 *User Program* are discussed in Chapter 3, *Operation*.

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Chapter 2. Installation

2.1 Introduction

This chapter discusses installing the Series 35 in all of its configurations. Below is a list of procedures that you must follow to install your unit.

Depending on the type of unit you have, refer to the appropriate section(s) that follow to install your Series 35 correctly.

Installing your Series 35 consists of the following procedures:

- Choosing a Site for Best Performance
- Precautions for Moisture Probes
- Sample System Guidelines
- Installing the Sample System
- Installing the Probe into the Sample System
- Mounting the Electronics Unit
- Making Wiring Connections to the Electronics Unit.

Proceed to the following sections to install your Series 35.

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2.2 Choosing a Site for Best Performance

Before you receive your Series 35, discuss environmental and installation factors with a GE applications engineer or field sales person. The equipment should be suited to the application and installation site.

Before installing the unit, read the guidelines below to verify that you have selected the best installation site.

- Choose an installation site for the probes and sample systems that is as close to the process line as possible. Avoid long lengths of connecting tubing. If long distances are unavoidable, a fast sampling by-pass loop is recommended.
- Do not install any other components, such as filters, upstream of the probe or sample system unless instructed to do so by GE. Many common components, such as filters and pressure regulators, are not suitable for sample systems because they have wetted parts that may absorb or release materials such as moisture into the sample stream. They may also allow ambient contamination to enter the sample stream. In general, use stainless steel for all parts in contact with the sample.
- Observe all normal safety precautions. Use the probes within their maximum pressure and temperature ratings.
- Although the Series 35 may not need to be accessed during normal operation, install the electronics unit at a convenient location for programming, testing and servicing. A control room or instrument shed are typical locations.
- Locate the electronics unit away from high temperatures, strong electrical transients, mechanical vibrations, corrosive atmospheres, and any other conditions that could damage or interfere with the Series 35 operation. See Chapter 5, *Specifications*, for limitations.

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2.2 Choosing a Site for Best Performance (cont.)

- Observe the proper cable restrictions for the probes. The M Series probes require specially shielded cable. You can locate the M Series probes up to 600 meters (2,000 feet) from the Series 35.
- Protect the probe cables from excessive physical strain (bending, pulling, twisting, etc.). Do not subject the cables to temperatures above +105°C (221°F) or below –40°C (–40°F). Avoid splicing the cables.

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2.3 Precautions for Moisture Probes

The M Series probes consist of an aluminum oxide sensor located on a connector and covered by a protective stainless-steel shield.

The probe sensor materials and housing maximize durability and insure a minimum of water absorbing surfaces in the vicinity of the aluminum oxide surface. A sintered stainless-steel shield is used to protect the sensor from high flow rates and particulate matter (other shields are available). The shield should not be removed except upon advice from GE.

The sensor has been designed to withstand normal shock and vibration. Make sure that the active sensor surface is never touched or allowed to come into direct contact with foreign objects, since this may adversely affect performance.

Observing these precautions will result in a long and useful probe life. GE recommends that probe calibration be checked routinely, at one-year intervals, or as recommended by our applications engineers for your particular application.The probe measures the water vapor pressure in its immediate vicinity; therefore, readings will be influenced by its proximity to the system walls, materials of construction, and other environmental factors. The sensor can be operated under vacuum or pressure, flowing or static conditions. Observe the following environmental precautions.

a. **Temperature Range:** The standard probe is operable from –110 to +70°C (–166 to 158°F).

b. **Moisture Condensation:** Be sure the process/ambient temperature is at least 10°C higher than the dew/frost point temperature. If this condition is not maintained, moisture condensation could occur on the sensor or in the sample system, which will cause reading errors.

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2.3 Precautions for Moisture Probes (cont.)

c. **Static or Dynamic Use:** The sensor performs equally well in still air or where considerable flow occurs. Its small size makes it ideal for measuring moisture conditions within completely sealed containers or dry boxes. It also performs well at gas flow rates as high as 10,000 cm/sec, and liquid flow rates up to 10 cm/sec.

d. **Pressure:** The moisture probe always senses the existing water vapor pressure, regardless of the total ambient pressure. The moisture sensor measures water vapor under vacuum or high pressure conditions from as little as 5 microns of Hg to as high as 5,000 psi total pressure.

e. **Long-Term Storage & Operational Stability:** Sensors are not affected by continuous abrupt humidity changes or damaged by exposure to saturation conditions, even when stored.

f. **Freedom from Interference:** The sensor is completely unaffected by the presence of a wide variety of gases or organic liquids. Large concentrations of hydrocarbon gases, Freon™, carbon dioxide, carbon monoxide, and hydrogen have no effect on sensor water vapor indications. The sensor operates properly in a multitude of gaseous or non-conductive liquid environments.

g. **Corrosive Materials:** Avoid all materials that are corrosive or otherwise damaging to aluminum or aluminum oxide. These include strongly acidic or basic materials and primary amines.

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2.4 Sample System Guidelines

A sample system, although not mandatory, is highly recommended for moisture measurement. The purpose of a sample system is to condition or control a sample stream to within the specifications of the probe. The application requirements determine the design of the sample system. GE applications engineers will make recommendations based on the following general guidelines.

Typically, sample systems should be kept very simple.They should contain as few components as possible and all or most of those components should be located downstream of the measurement probe. Figure 3 on page 9 shows a simple sample system consisting of a general-purpose sample cell, a filter, and two shut-off valves, one at the inlet and one at the outlet.

The sample system components should not be made of any material that will affect measurements. A sample system may include a filter to remove particulates from the sample stream or a pressure regulator to reduce or control the pressure of the stream. However, most common filters and pressure regulators are not suitable for sample systems because they have wetted parts that may absorb or release components (such as moisture) into the sample stream. They may also allow ambient contamination to enter the sample stream In general, you should use stainless steel material for all wetted parts.

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2.4 Sample System Guidelines (cont.)

Note: *The actual sample system design is dependent on the application requirements.*

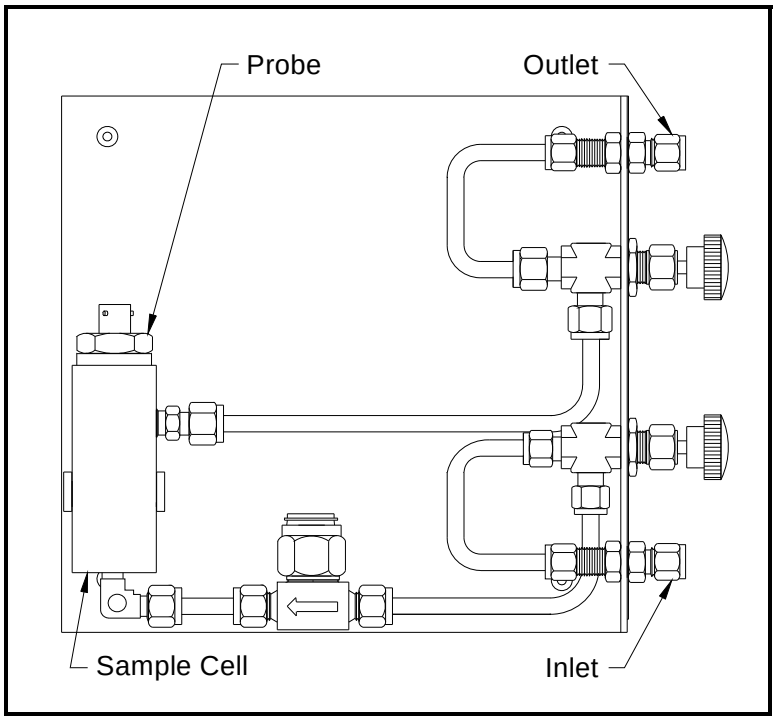


Figure 3: Typical Moisture Sample System

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2.5 Installing the Sample System

The sample system is usually fastened to a metal plate that has four mounting holes. GE also provides the sample system in an enclosure if requested. Outline and dimension drawings are included with all GE sample systems.

Follow the steps below to mount the external sample system and connect it to the process:

1. Mount the sample system plate or enclosure with four bolts, one in each corner.
2. Connect the process supply and return lines to the sample system inlet and outlet using the appropriate stainless steel fittings and tubing.

CAUTION! Do not start flow through the sample system until the probe has been properly installed.

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2.6 Installing a Probe in the Sample System

The sample system protects the probe from any damaging elements in the process. The probe must be inserted into the cylindrical shaped container called the sample cell that is included as part of the sample system.

M2 probes have 3/4-16 straight threads with an o-ring seal to secure the probe either into the sample system or directly into the process line. Other mounts are available for special applications.

CAUTION! If mounting the probe directly into the process line, consult GE for proper installation instructions and precautions.

Follow the steps below to install the probe into the external sample cell.

1. Insert the probe into the sample cell so it is perpendicular to the sample inlet.
2. Screw the probe into the receptacle fitting, making sure not to cross the threads.
3. Tighten the probe securely.

Note: *Do not over-tighten the probe, or the o-ring seal may be damaged.*

Figure 4 on page 12 shows a typical probe installation, with the probe mounted in a sample cell.

Note: *For maximum protection of the aluminum oxide moisture sensor, the protective shield should always be left in place.*

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2.6 Installing a Probe in the Sample System (cont.)

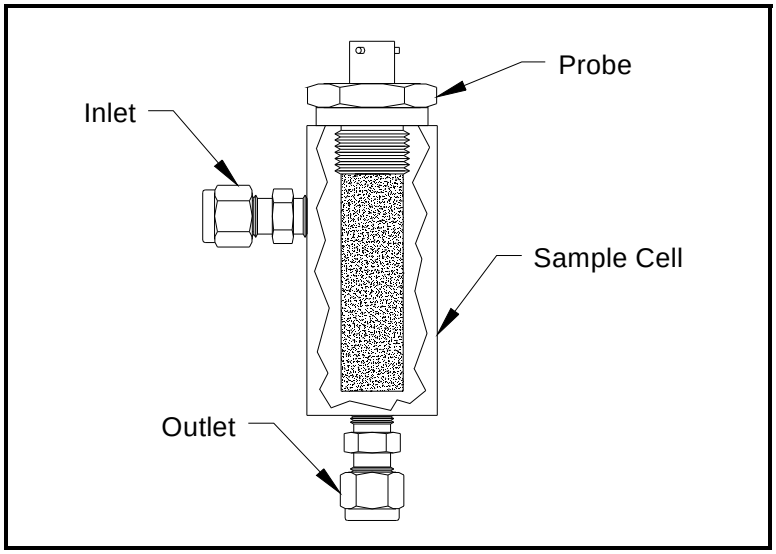


Figure 4: A Typical Probe Installation

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2.7 Mounting the Electronics Unit

The rack mount Series 35 may be mounted into a standard 19” rack, the panel mount Series 35 may be mounted into a rectangular cutout on most instrument panels, and the weatherproof Series 35 may be mounted on any vertical wall. See Appendix A, *Outline and Installation Drawings*, for details.

To install the panel-mount unit:

1. Remove the nuts and washers from the four mounting screws on the front panel of the unit.
2. Slide the unit into the panel cutout.
3. Install the washers and nuts on the mounting bolts, and tighten them securely.

To install the rack-mount unit:

1. Insert four mounting screws into the front panel of the unit.
2. Slide the unit into the rack.
3. From behind the rack, install the washers and nuts on the mounting screws and tighten them securely.

To install the weatherproof unit:

1. Position the unit against a flat, vertical mounting surface (i.e., a structure wall). Mark and drill appropriate size holes to accommodate the mounting bolts.
2. Insert the four mounting bolts into the four mounting holes of the weatherproof enclosure.
3. Place the enclosure against the mounting surface so that the four bolts enter the pre-drilled holes. From behind the mounting surface, install washers and nuts on the mounting bolts and tighten them securely.

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2.8 Making Wiring Connections to the Electronics Unit

This section covers the following topics:

- precautions for modified or non-GE cables
- connecting the probe
- connecting the alarms
- connecting a recorder output device
- connecting an auxiliary input
- connecting power to the unit
- performing an MH/calibration test adjustment

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

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2.8.1 Modified or Non-GE Cables

Many customers must use pre-existing cables, or in some cases, modify the standard GE-supplied moisture cable to meet special needs. If you prefer to use your own cables or to modify our cables, observe the precautions listed below. In addition, after connecting the moisture probe, you must perform a calibration adjustment as described on page 24 to compensate for any electrical offsets.

IMPORTANT: *GE cannot guarantee operation to the specified accuracy of the Series 35 unless you use GE-supplied hygrometer cables.*

- Use cable that matches the electrical characteristics of the GE cable (contact the factory for specific information on cable characteristics). The cable must have individually shielded wire pairs. A single overall shield is incorrect.
- If possible, avoid all splices. Splices impair performance. When possible, instead of splicing, coil the excess cable.
- If you must splice cables, be sure the splice introduces minimum resistive leakage or capacitive coupling between conductors.
- Carry the shield through any splice. A common mistake is to not connect the shields over the splice. If you are modifying a GE cable, the shield will not be accessible without cutting back the cable insulation. Also, do not ground the shield at both ends. Only ground the shield at the hygrometer end of the cable.

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2.8.2 Connecting the Probe

The moisture probe must be connected to the Series 35 electronics with a continuous run of GE two-wire shielded cable (see Figure 5).

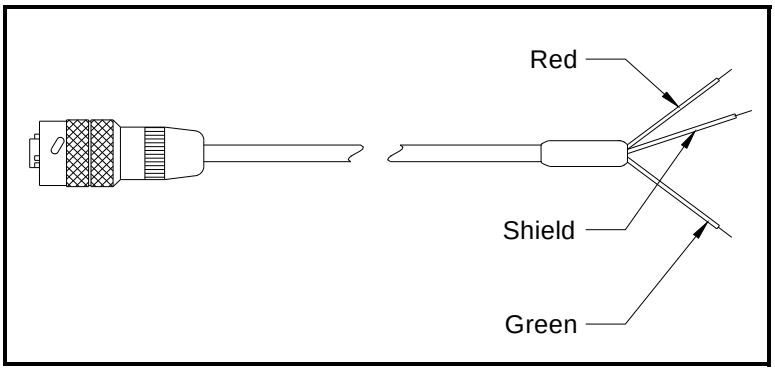


Figure 5: Two-Wire Shielded Cable

Be sure to protect cables from excessive strain (bending, pulling, etc.) Do not subject cables to temperatures above +105°C (221°F) or below –40°C (–40°F). Standard cable assemblies (including connectors) can be ordered from GE in any length up to 600 meters (2,000 feet).

Follow the steps below to connect the probe to the electronics:

1. Make sure the power is disconnected from the Series 35.
2. Connect the probe cable to the terminal block on the Series 35 electronics, as shown in Table 1 on page 17 and the interconnection diagrams in Appendix A.
3. Connect the cable to the probe by inserting the bayonet-type connector onto the probe and twisting the shell clockwise until it snaps into a locked position.

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2.8.2 Connecting the Probe (cont.)

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

Table 1: Probe Connections

Connect:	To PROBE Terminal Block:
Red (H2) wire	pin #1
Shield	pin #2
Green (H1) wire	pin #3

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2.8.3 Connecting the Alarms

The Series 35 has one fault alarm, and two optional alarms that can be configured as high or low; that is, the contacts can be programmed to trip when the measured reading is over or under the alarm setpoint. The fault alarm, if enabled, will trip when there is a power failure, when a calibration error or a range error occurs, when there is a signal fault, or when the system is reset by the watchdog function.

Note: *The Watchdog Function is a supervisory circuit that automatically resets the* User Program *in the event of a system error (see* Setting Up Alarm Relays *in Chapter 3).*

2.8.3a Connecting the High and Low Alarms

The Series 35 has optional dual alarm relays available. Hermetically-sealed alarm relays are also optionally available. Each alarm relay is a single-pole, double throw contact set that has the following contacts:

- Normally Open (NO)
- Armature Contact (A)
- Normally Closed (NC)

Make connections to Alarm relays A and B using the terminal block on the Series 35, as shown in Table 2 on page 19 and the interconnection diagrams in Appendix A.

Note: *For European applications, the voltage levels at the alarm contacts must be less than 100 VRMS.*

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

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2.8.3a Connecting the High and Low Alarms (cont.)

Table 2: High & Low Alarm Connections

Connect Alarm A:	To ALARM A Terminal Block:
NC Contact	pin #4
NO Contact	pin #5
A Contact	pin #6
Connect Alarm B:	**To ALARM B Terminal Block:**
NC Contact	pin #7
NO Contact	pin #8
A Contact	pin #9

2.8.3b Connecting the Fault Alarm

The fault alarm connections are on the "OUT" connector, pins 1, 2, and 3. Pins 1 and 3 provide a "normally closed" contact. When the Series 35 is operating in a non-fault state, the contact between pins 1 and 3 is energized (open) to remain open. When a fault occurs or power is lost, the contact between pins 1 and 3 is de-energized (closed). Pins 2 and 3 work in the opposite way. (Refer to Chapter 3, *Operating the Series 35*, to enable the fault alarm.)

Make connections to the fault alarm relay using the terminal block on the back of the Series 35 (or on the side of a bench-mount unit), as shown in Table 3 and the interconnection diagrams in Appendix A.

Table 3: Fault Alarm Connections

Connect Fault Alarm:	To FAULT ALARM Terminal Block:
NC Contact	pin #1
NO Contact	pin #2
A Contact	pin #3

Note: *For European applications, the voltage levels at the alarm contacts must be less than 100 VRMS.*

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2.8.4 Connecting a Recorder Output Device

IMPORTANT: *The following instructions apply to Series 35 models with Output Board 703-1175. For models with Output Board 703-1180, see Appendix E.*

The Series 35 has one recorder output, which is isolated. This output provides either a current or voltage signal, which is set using switch S1 on the output circuit board (see Figure 6 on page 21 for the location of S1).

Although this switch is normally set at the factory to provide a current output signal, the setting should be checked before making any recorder output connections.

Use the following sections to check or reset the S1 setting and connect an output device.

2.8.4a Checking or Resetting Switch S1

1. Turn off the Series 35 and disconnect power before opening the unit.

WARNING! You must turn off and unplug the Series 35 before you continue with the following steps.

2. To access the output circuit board, remove the screws from the Series 35 enclosure and remove the cover.
3. Locate switch S1 on the output circuit board (see Figure 6 on page 21).
4. Set switch S1 to the appropriate position: “I” for current output or “V” for voltage output.
5. Replace the enclosure cover and install the screws.

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2.8.4 Connecting a Recorder Output Device (cont.)

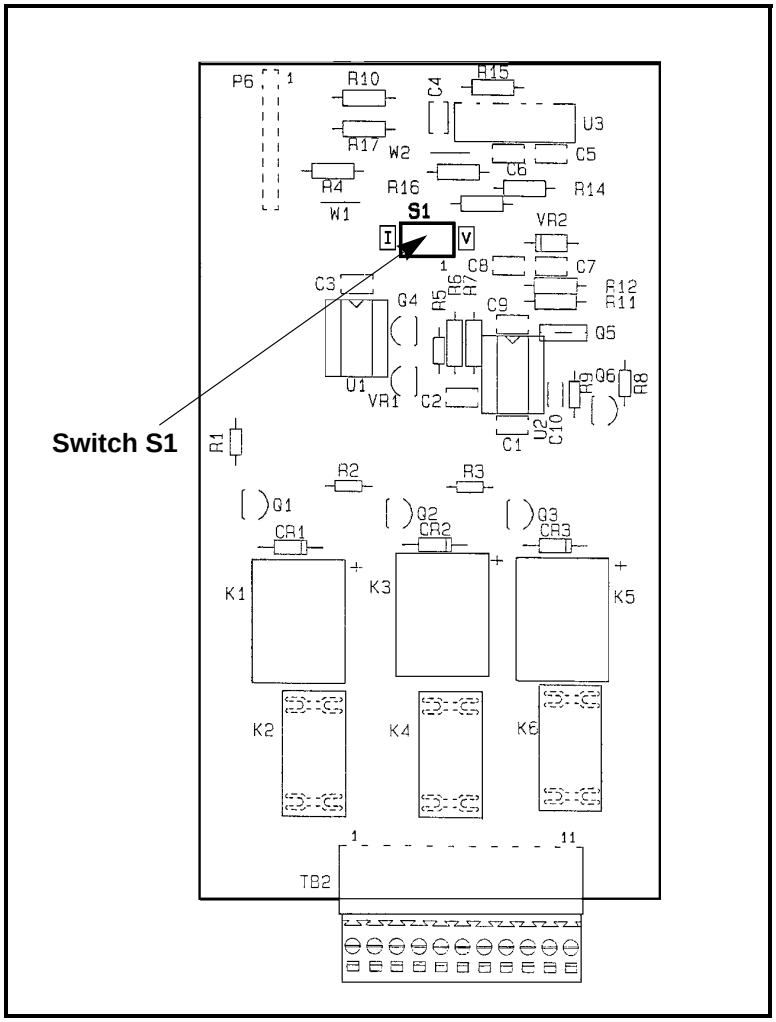


Figure 6: S1 Location on 703-1175 Output Board

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2.8.4 Connecting a Recorder Output Device (cont.)

IMPORTANT: *To maintain good contact at each terminal block and to avoid damaging the pins on the connector, pull the connector straight off (not at an angle), make cable connections while the connector is away from the unit, and push the connector straight on (not at an angle) when the wiring is complete.*

2.8.4b Connecting an Output Device

After you check or reset the switch S1 setting, you can connect a recorder, computer, or other suitable device to the terminal block on the back of the Series 35 (or on the side of a bench-mount unit), as shown in Table 4 and the interconnection diagrams in Appendix A.

Table 4: Recorder Output Connections

Connect:	To REC OUT Terminal Block:
Out (+)	pin #10
Return (-)	pin #11

2.8.4c Connecting an Auxiliary Input

The Series 35 can accept one auxiliary input. Connect the input to the IN terminal block as shown in Table 5 and the interconnection diagrams in Appendix A.

Table 5: Auxiliary Input Connections

Connect:	To IN Terminal Block:
Out (+)	pin #7
Return (-)	pin #8
Power (+V)	pin #9

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2.8.5 Connecting Power to the Unit

GE supplies a molded plug and cord for AC power connections in rack, bench and panel mount units; however, you must supply the power cable for 24 VDC units and weatherproof units.

Refer to the interconnection diagrams in Appendix A to make AC and DC power connections to the Series 35 electronics.

After you make power connections to the electronics unit, connect the power cord to an appropriate source, and turn the power on. The Series 35 displays “Loading....” while it initializes, then returns to whatever it displayed when it was last turned off.

WARNING! If you have a Division 2 unit, do not make or break electrical connections in a hazardous environment.

IMPORTANT: *For compliance with the European Union’s Low Voltage Directive (IEC 61010), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible, and located within 1.8 m (6 ft.) of the MMS 35. The power cord is the main disconnect device.*

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2.8.6 Performing an MH Calibration/Test Adjustment

If you modify the supplied cables or do not use standard GE-supplied cables, you must perform a calibration test/adjustment to test the cable and, if necessary, compensate for any error or offset introduced by splicing or long cable lengths. This procedure is also recommended for testing the installation of GE cables.

Use the following steps to perform a calibration adjustment:

2.8.6a Preliminary Steps:

1. Power up the Series 35.
2. Set up the screen to display MH.
3. Make sure high, low and zero reference values are recorded on the sticker located on the inside chassis of the Series 35, or on the *Data Information Sheet* provided in Appendix C.

2.8.6b Calibration Procedure:

1. Disconnect the probe from the cable (leave the probe cable connected to the Series 35) and verify that the displayed MH value equals the zero reference value within ±0.0003 MH.
   a. If this reading is within specification, no further testing is necessary.
   b. If the reading is less than the specified reading (previous recorded zero reference value ±0.0003 on sticker), add this difference to the low reference value.
   c. If the reading is greater than the specified reading (previous recorded zero reference value ±0.0003 on sticker), subtract this difference from the low reference value.
2. Note the final corrected low reference value and record it

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2.8.6b Calibration Procedure (cont.)

3. Reprogram the Series 35 with the new (corrected) low reference value (if required), as described in *Entering High and Low Reference Values on* page 37.
4. Verify that the probe cable is not connected to the probe.
5. Note the zero reference readings and verify that the readings are now within ±0.0003 MH.
6. Fill out a new high and low reference sticker with the final low reference value and/or record the information on the *Data Information Sheet* provided in Appendix C. Make sure you record the information below:

HIGH REF = ORIGINAL VALUE
LOW REF = NEW CORRECTED VALUE
ZERO REF=ORIGINAL RECORDED VALUE

7. Reconnect the cable to the probe.

Note: *If the cables are ever changed in any way, repeat this procedure for maximum accuracy.*

The Series 35 is now ready for operation. Proceed to Chapter 3, *Operating the Series 35*, for instructions.

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Chapter 3. Operation

3.1 Introduction

The Series 35 has been factory-programmed and set up to begin taking measurements as soon as it is powered on. This chapter describes starting the unit and beginning operation of the unit as quickly as possible. In addition, setting up the alarm relays, a recorder, and the user-defined functions are covered.

This chapter explains the following specific procedures. Proceed to the appropriate section to operate the Series 35.

- *Getting Started* - Use this section to get the Series 35 operating as quickly as possible.
- *Changing the Measurement Display* - Use this section to set up the display screen for the desired measurement.
- *Setting Up Alarm Relays* - Use this section to enable the fault alarm or to set up the optional high and low alarm relays.
- *Setting Up a Recorder* - Use this section to set up a recorder output device.
- *Setting Up User-Defined Functions* - Use this section to define and set up a variety of program functions to enhance the usability of the Series 35.

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3.2 Getting Started

Since the calibration data has already been set up at the factory, you can begin taking measurements as soon as you power up the Series 35. Proceed to the appropriate section to power up your unit and verify that it is working correctly:

- Powering up the Series 35
- Entering Data into the *User Program*
- Verifying and Changing Factory Setup Data

To set up alarms, set up a recorder device, change the setup data, or configure the display, see the instructions on page 29 to learn how to use the Series 35 keypad for entering data into the *User Program*.

3.2.1 Powering Up

After making the power connections to the electronics unit as described in Chapter 2, *Installation*, connect the power cord to an appropriate power source. To power up the Series 35, flip the POWER switch, located on the left side of the front panel, to the ON position.

IMPORTANT: *Weatherproof MMS 35 units have no power switch, and the power switch on Division 2 modified units is disabled. Both units power up as soon as line power is applied.*

WARNING! If you have a Division 2 unit, do not make or break electrical connections in a hazardous environment.

Immediately after the power is applied, the Series 35 displays the "Loading..." message to indicate that the system is loading calibration and reference data. After this data is loaded, the Series 35 automatically calibrates (Autocal) the moisture circuitry. After the Autocal finishes, the Series 35 display returns to whatever it displayed when it was last powered down.

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3.2.2 Entering Data into the User Program

The Series 35 *User Program* allows you to change factory set-up data, set up alarms and a recorder output device, and set up user-defined program functions. In order to enter and exit the *User Program*, move through the main menus, and enter numeric data into the *User Program*, you must first learn how to use the programming keys located on the front panel of the Series 35.

Use the appropriate sections that follow to learn how to enter data into the *User Program*.

3.2.2a Using the Programming Keys

The front panel of the Series 35 contains the following four keys for entering data into the *User Program*:

- ENTER - Use this key to select a menu option, to switch from viewing to editing data, to move to the next digit position during numeric entry, and to confirm an entry.
- ESC - Use this key to cancel an entry and to back out of a menu option.
- △ - Use this key to scroll upward through the menu options, and to increase the value during numeric entry.
- ▽ - Use this key to scroll downward through the menu options, and to decrease the value during numeric entry.

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3.2.2b Entering and Exiting the User Program

This section describes how to use the [ENTER] and [ESC] keys to enter and exit the *User Program*. Refer to Table 6 for the key sequence for entering the *User Program* main menu.

Note: *The first two steps must be performed within 5 seconds of each other or the unit will time out and return to displaying measurements.*

Table 6: Entering the User Program

Press These Keys:	To Display:
1. [ESC]	ESC
2. [ENTER], [ESC]	PROGRAM MENU displays for 1 sec, then: DP RANGE

To exit the *User Program*, press the [ESC] key until RUN? displays. Then press the [ENTER] key to return to displaying measurements.

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3.2.2c Moving Through the User Program

Use the *arrow keys* to scroll through the eight *Main Menu* options as follows (refer to the *menu maps* in *Appendix B* as a guide):

- **DP RANGE** - use to enter high and low dew points for the calibration curve
- **CURVE** - use to enter a value for each point on the calibration curve
- **REFERENCE** - use to enter high and low reference values for moisture measurement
- **ALARMS** - use to set up the high, low, and fault alarms
- **RECORDER** - use to set up the recorder output range, measurement mode, and zero/span values
- **TEST** - use to test and adjust the alarms and the recorder output (see Chapter 4, *Troubleshooting*, for details)
- **USER** - use to set up user-defined program functions, such as offset value, constant pressure, PPMv constant multiplier, Autocal interval, computer enhanced response, backlight, range and calibration error handling
- **FACTORY SETUP** - for factory use only

Note: *While in programming mode, the Series 35 suspends taking measurements.*

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3.2.2d Entering Numeric Data

To enter numbers one digit at a time, use the arrow keys to scroll to the desired number (0 to 9 or the decimal point), then press the [ENTER] key to move to the next digit position. Repeat this procedure until all numbers are entered.

Note: *From the programming mode, once an arrow key is pressed, you are in* edit mode. *Pressing* [ESC] *terminates the edit mode. While in edit mode, check all characters before pressing the* [ENTER] *key to move on to the next digit position.*

Refer to the sections that follow to enter data into the *User Program's* main menu options.

3.2.3 Verifying and Changing Factory Setup Data

Use this section to make sure factory setup data is correct and to make any necessary changes to the setup data.

Note: *Record all calibration data on the* Data Information Sheet *in* Appendix C.

In order for the Series 35 to take accurate measurements, it must have the correct moisture calibration data entered into its memory. All of the necessary data has been entered into your Series 35 at the factory; however, the data should be checked for accuracy.

To verify data, check the following:

- dew point range
- calibration data
- high and low reference values

Use the appropriate sections that follow to verify and/or change the moisture calibration data.

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3.2.3a Entering the Dew Point Range

The **DP Range** is used to enter high and low dew point values. This range is used by the Series 35 to determine the number of points on the calibration curve.

Note: *The high and low dew points are listed on the* Moisture Probe Calibration Data Sheet *located in the probe box. Changing the* DP Range *affects the calibration data.*

The default values are: Low: –110, High: +20

DP RANGE	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
Hi DP	Use the arrow keys to scroll to Hi DP, then press [ENTER].
Hi DP+20°C	Use the arrow keys to scroll to the desired dew point value, then press [ENTER].

Repeat this procedure to enter the low dew point value, then press the [ESC] key until you return to the main menu.

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3.2.3b Entering Calibration Data

After entering the high and low dew point values, use the CURVE option to enter calibration data for the moisture probe or the auxiliary input. Refer to the appropriate section that follows to program the Series 35.

To Enter Moisture Probe Calibration Data:

Moisture probe calibration data is always taken at fixed dew point values in 10ºC intervals. After entering the high and low dew point values, the Series 35 determines the appropriate number of data points for the moisture probe, so only the MH (raw data) values need be entered. The Series 35 automatically requests the MH value for the minimum dew point and keeps requesting data in 10ºC increments until the maximum dew point is reached. The MH values are found on the *Calibration Data Sheet* supplied with the moisture probe.

CURVE	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
MH CURVE	Use the arrow keys to scroll to MH CURVE and press [ENTER].
ENTER MH CURVE ENTER PROBE S/N	Use the arrow keys to scroll to either ENTER MH CURVE or ENTER PROBE S/N. Press [ENTER] at your choice.

If you select ENTER MH CURVE:

–110°CMH 0.1890	To view the curve, press the arrow keys to scroll through the values. To edit a value, press [ENTER], then either arrow key to delete the present value. Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

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To Enter Probe Calibration Data (cont.)

Note: *To abort the editing function without changing the value, press the* [ESC] *key.*

Repeat this procedure for each point on the MH Curve, then press [ESC] until you return to the CURVE menu.

If you select ENTER PROBE S/N:

xxxxxx S/N	The unit displays the current serial number. To edit the number, press an arrow key. A blinking cursor appears at the left-most digit. Use the arrow keys to scroll to the desired value, and the [ENTER] keys to move the cursor to the next digit. Repeat until you have entered all six serial number digits. Then press [ENTER] to confirm the change or [ESC] to cancel the change.

To Enter Auxiliary Input Calibration Data:

The Series 35 can have up to ten (10) calibration data points for its *Auxiliary* input. Each data point requires an electrical current value (0-20 mA) with a corresponding scale value.

CURVE	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
AUX CURVE	Use the arrow keys to scroll to AUX CURVE and then press the [ENTER] key.
#Aux Pts = 3	Use the arrow keys to scroll to the desired number of points, then press the [ENTER] key.
AxUnit#DecPlc 3	Use the arrow keys to scroll to the desired number of decimal places for the scale value, then press the [ENTER] key.

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To Enter Auxiliary Input Calibration Data: (cont.)

Edit Pt# 1	Use the arrow keys to scroll to the desired point, then press the [ENTER] key.
#1mA = 4.000	Press either arrow key to delete the present mA value and enter edit mode. Use the arrow and [ENTER] keys to enter a new value, one digit at a time, then press [ENTER] twice.
#1F = +0.00	Press either arrow key to delete the present scale value and enter edit mode. Use the arrow and [ENTER] keys to enter a new value, one digit at a time, then press [ENTER] twice to proceed to the next data point.

Repeat the above procedure for each point on the Auxiliary Curve, then press [ESC] until you return to the main menu.

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3.2.3c Entering High and Low Reference Values

IMPORTANT: *Do not change these reference values unless instructed to do so by GE.*

The Series 35 requires high and low reference values for its moisture measurement circuitry. These references are factory calibration values that are specific to each unit. They are listed on a label located on the inside of the Series 35.

REFERENCE	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
HYGRO REF	Press the [ENTER] key again.
High REF	Press either arrow key to scroll to the High REF edit mode, then press [ENTER].
H2.9999	Use the arrow and [ENTER] keys to change the value, one digit at a time, then press [ENTER] twice.
Low REF	Press either arrow key to scroll to the Low REF edit mode, then press the [ENTER] key.
L0.1790	Use the arrow and [ENTER] keys to change the value, one digit at a time, then press the [ENTER] key twice.

Note: *To abort the editing function without changing the value, press the* [ESC] *key.*

Press [ESC] until you return to the main menu.

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3.3 Changing the Measurement Display

Use this section to set up the Series 35 display screen for the measurement modes you want to display. The front panel of the Series 35 contains four (4) display keys that let you quickly change the measurement display during operation.

The four display keys are as follows:

- **HYGRO** - press this key to display and scroll through all of the available moisture measurement units (DP/C, DP/F, PMv, MH)
- **Pconst** - press this key to display and scroll through all of the available constant pressure units (PSG, Bar, KPAg, Kcmg)
- **ALARM** - press this key to display and scroll through the status and set points of alarm relays A and B, as well as the status of the fault alarm relay
- **AUX IN** - press this key to display the auxiliary input measurement in either milliamps (mA) or a user-defined function (XF - Auxiliary Function)

Once you select a specific display mode, that display remains on the screen until another display mode is chosen, or until you enter programming mode. Upon exiting programming mode and returning to RUN mode, the screen automatically returns to the display mode previously selected.

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3.4 Setting Up the Alarm Relays

The Series 35 has one fault alarm and two optional high/low alarms. Use this section to enable the fault alarm or to set up the optional high/low alarm relays. (Refer to Table 7 on page 40 for a list of possible alarm conditions.)

High/Low Alarms:

these alarm relays can be programmed to trip when the measured reading is over (high) or under (low) the alarm setpoint. To set up a high or low alarm, do the following:

- enable or disable the alarms
- set the alarm measurement mode
- set the alarm units
- configure the alarm as high or low
- set the alarm units and enter the setpoint

Fault Alarm:

To ensure failsafe operation during a power loss, the behavior of the fault alarm relay is the opposite of the high/low alarm relays. The fault alarm relay is energized under non-fault conditions, and de-energized under fault conditions.

When the Series 35 is operating in a non-fault state, the normally closed (NC) contact between pins 1 and 3 is energized to remain open. When a fault occurs or power is lost, the contact between pins 1 and 3 is de-energized and closes. The normally-open (NO) contact between pins 2 and 3 is energized closed in a non-fault state, and de-energized open when a fault occurs or power is lost.

The fault alarm, if enabled, trips during the following conditions:

- when there is a power failure
- when a calibration error or a range error occurs

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Fault Alarm (cont.):

- when there is a signal fault
- when the system is reset by the watchdog function.

Note: *The Watchdog Function is a supervisory circuit that automatically resets the* User Program *in the event of a system error.*

Table 7: Alarm Conditions

Alarm Type	Fault Conditions		Non-Fault Conditions		Loss of Power	
Cont:	**NC**	**NO**	**NC**	**NO**	**NC**	**NO**
Alarm A	open	closed	closed	open	closed	open
	Energized		De-Energized		De-Energized	
Alarm B	open	closed	closed	open	closed	open
	Energized		De-Energized		De-Energized	
Fault Alarm	closed	open	open	closed	closed	open
	De-Energized		Energized		De-Energized	

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3.4.1 Enabling or Disabling the Alarms

If alarm A or alarm B is disabled, the display returns to the alarm menu; if alarm A or alarm B is enabled, the alarm mode options are displayed. The fault alarm options are limited to the *"Enable"* or *"Disable"* choices. After the fault alarm is enabled or disabled, the display returns to the alarm menu.

Note: *Be sure to record all entered output data in the* Data Information Sheet *in* Appendix C.

ALARMS	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
Alarm A	Use the arrow keys to scroll to the desired alarm, then press [ENTER].
Enable Alarm	Use the arrow keys to scroll to the desired choice, then press [ENTER].

3.4.2 Selecting the Measurement Mode

Select "ALM HYG" if you want the alarm to respond to measurements taken from the *probe* input connection; select "ALM AUX" if you want the alarm to respond to measurements taken from the *auxiliary* input connection.

ALM HYG	Use the arrow keys to scroll to the desired measurement option, then press [ENTER].
ALM AUX	

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3.4.3 Selecting the Measurement Units

The next set of prompts that appears depends on the alarm mode selected. Choose the units to which you want the alarm to respond. Refer to the appropriate section below and to Table 8 for a list of the available units.

If you selected “ALM HYG” the following prompts appear:

ALM HYGDP/°F
ALM HYGDP/°C
ALM HYGDVM
ALM HYGMH
ALM HYGPMv

Use the arrow keys to scroll to the desired measurement unit, then press [ENTER].

If you selected “ALM AUX” you can choose either a mA (milliamp) value or a user-defined XF (Auxiliary Function) value.

ALM AUXmA
ALM AUXXF

Use the arrow keys to scroll to the desired value type, then press [ENTER].

Table 8: Alarm/Recorder Measurement Units

Measurement Mode	Units
Hyg - Hygrometry	DP/°F - dew point in °F DP/°C - dew point in °C DVM - internal voltage signal MH - raw signal from sensor PMv - parts per million by volume
Aux - Auxiliary	mA - milliamps XF - user-defined units

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3.4.4 Configuring the Alarm

After selecting the desired measurement units, the following set of prompts appears:

Low Alarm Hi Alarm	Use the arrow keys to choose a high or low alarm, then press [ENTER]. (A high alarm trips when a reading is above the setpoint, while a low alarm trips when a reading is below the setpoint.)

Note: *The next prompts that appear depend on the selected alarm measurement mode, alarm measurement units, and alarm configuration (high or low).*

AL:+1.0 DP/°C	Press either arrow key to delete the current value and enter edit mode.
AL:+5.0 DP/°C	Enter the alarm setpoint. Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

If necessary, repeat the above procedure to set up the other alarm; then press [ESC] until you return to the main menu.

Note: *Be sure to record all entered data in the* Data Information Sheet *in* Appendix C.

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3.5 Setting Up a Recorder

Use this section to set up the one Series 35 recorder output. To configure the recorder output signal, do the following:

- select the output signal in milliamps or volts
- select the recorder measurement mode and units
- set the zero and span values

Note: *Be sure to record all entered output data in the* Data Information Sheet *in* Appendix C.

3.5.1 Selecting the Output Signal

Note: *Be sure the output signal selected (mA or V) agrees with the Series 35 recorder switch setting (see* Making Recorder Connections *in Chapter 2).*

RECORDER	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
0-20 mA 4-20 mA 0-2 V	Use the arrow keys to scroll to the desired output range, then press [ENTER].

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3.5.2 Selecting the Measurement Mode and Units

3.5.2a Selecting the Measurement Mode

Select “RCD HYG” if you want the recorder to respond to measurements taken from the *probe* input connection; select “RCD AUX” if you want the recorder to respond to measurements taken from the *auxiliary* input connection.

RCD HYG
RCD AUX

Use the arrow keys to scroll to the desired measurement mode, then press [ENTER].

3.5.2b Selecting the Measurement Units

The next set of prompts that appear depends on the measurement mode selected above for the recorder output. To choose the desired recorder output measurement units, refer to the appropriate section below and Table 8 on page 42 for a list of the available measurement units.

If “RCD HYG” was selected above, the following prompts appear:

RCD HYGDP/°F
RCD HYGDP/°C
RCD HYGDVM
RCD HYGMH
RCD HYGPMv

Use the arrow keys to scroll to the desired measurement unit, then press [ENTER].

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3.5.2b Selecting the Measurement Units (cont.)

If "RCD AUX" was selected at the initial recorder prompt on page 45, either a mA (milliamp) output value or a user-defined XF (Auxiliary Function) output value may be chosen.

RCD AUXmA RCD AUXXF	Use the arrow keys to scroll to the desired output value, then press [ENTER].

3.5.3 Setting the Zero and Span Values

The next set of prompts that appears depends on the measurement mode and units previously selected for the recorder.

Ze:–80.0 DP/°C	Press either arrow key to delete the current zero value and enter edit mode.
Ze:–60.0 DP/°C	Use the arrow and [ENTER] keys to change the zero value one digit at a time, then press [ENTER] twice to proceed to the span value.
Sp:+20.0 DP/°C	Press either arrow key to delete the current span value and enter edit mode.
Sp:+9.0 DP/°C	Use the arrow and [ENTER] keys to change the span value one digit at a time, then press [ENTER] twice.

Press [ESC] until you return to the main menu.

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3.6 Setting Up User-Defined Functions

Use this section to set up and define a variety of program functions to enhance the usability of the Series 35.

The USER menu lets you set up the following program functions:

- Offset Value
- Constant Pressure
- Automatic Calibration Interval
- Backlight-On Time Interval
- Computer Enhanced Response (optional)
- Range Error Processing
- Calibration Error Processing
- Entering a PPMv Constant Multiplier

Use the appropriate sections that follow to set up the desired program functions.

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3.6.1 Entering an Offset Value

Use this option to adjust the displayed dew/frost point reading. A positive number increases the reading, while a negative number decreases the reading. The offset value is always displayed in dew/frost point °C.

Note: *Be sure to record all entered output data in the* Data Information Sheet *in* Appendix C.

USER	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
OFFSET	Use the arrow keys to scroll to "OFFSET," then press [ENTER].
OFFSET+5.0°C	Press either arrow key to delete the current value and enter edit mode.
OFFSET+10.0°C	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

After entering the offset value, press [ESC] until you return to the USER menu.

Note: *The maximum positive value for the offset is +15.0°C, and the maximum negative value is -15°C.*

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3.6.2 Entering a Constant Pressure

This option lets you enter a fixed value for the pressure of the sample gas at the moisture probe location. This value is used to calculate the moisture content in ppmv. Refer to Table 9 for a list of the available constant pressure units.

Table 9: Constant Pressure Units

Available Units	Description of Units
KP PSIg	pounds per square inch gauge
KP Bar	bars absolute
KP KPAg	kilopascals gauge
KP Kcmg	kilograms per square centimeter gauge

Note: *Be sure to record all entered output data in the* Data Information Sheet *in* Appendix C.

CONSTANT PRESSUR	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
KPPSIg	Use the arrow keys to scroll to the desired pressure units, then press [ENTER].
KP:+ PSG	Press either arrow key to delete the current value and enter edit mode.
KP:+500.00 PSG	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

After entering the constant pressure value, press [ESC] until you return to the USER menu.

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3.6.3 Entering an Automatic Calibration Interval

The Series 35 automatically calibrates itself at user-defined intervals, to compensate for any drift in the electronics. Normally, GE recommends setting the Autocal interval to 480 minutes (eight hours). However, a smaller Autocal interval is beneficial if the Series 35 is exposed to extreme temperature or weather conditions. Values between 0 and 1440 minutes (14 hours) may be specified for the Autocal interval.

Note: *Be sure to record all entered output data in the* Data Information Sheet *in* Appendix C.

AUTOCAL INTERVAL	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
ACAL (Mins)0	Press either arrow key to delete the current value and enter edit mode.
ACAL (Mins)3.0	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

After entering the Autocal interval, press [ESC] until you return to the USER menu.

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3.6.3 Entering an Automatic Calibration Interval (cont.)

After you confirm the Autocal interval and return to the main menu, the Series 35 immediately performs an Autocal. The next time the Autocal occurs depends on the length of the time interval setting.

The Series 35 determines the times of subsequent Autocals by establishing a fixed schedule, beginning at midnight, using the specified interval. For example, if you enter a 90-minute time interval, Autocal occurs 16 times per day

(1 day = 1440 minutes ÷ 90 minutes = 16).

The following fixed schedule applies:

1. 1:30 a.m.	**9.** 1:30 p.m.
2. 3:00 a.m.	**10.** 3:00 p.m.
3. 4:30 a.m.	**11.** 4:30 p.m.
4. 6:00 a.m.	**12.** 6:00 p.m.
5. 7:30 a.m.	**13.** 7:30 p.m.
6. 9:00 a.m.	**14.** 9:00 p.m.
7. 10:30 a.m.	**15.** 10:30 p.m.
8. 12:00 p.m.(noon)	**16.** 12:00 a.m.(midnight)

If you enter a time interval not evenly divisible into 1440 minutes, the Series 35 rounds up to the next acceptable interval. For example, if you set the 90-minute Autocal interval at 6:10 p.m., the next Autocal occurs at 7:30 p.m. (excluding the Autocal performed when you exit the Autocal menu).

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3.6.4 Entering a Backlight-On Time Interval

If your Series 35 is equipped with a backlight, you can program the backlight to turn off automatically after a predetermined time. If the display does not have the backlight, attempts to access this option results in an "Option Not Available" message; otherwise, the "Backlight" prompt appears. Values between 0 and 1440 minutes (24 hours) may be entered.

BACKLIGHT	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
BLITE (Mins)0	Press either arrow key to delete the current value and enter edit mode.
BLITE (Mins)0	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

After entering the Backlight interval, press [ESC] until you return to the USER menu.

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3.6.5 Setting Up Computer Enhanced Response

Note: *This option may not be installed on your Series 35.*

Computer Enhanced Response uses a dynamic moisture calibration technique to extrapolate the moisture level to the end point, when making measurements in abrupt "dry down" conditions. The system response time depends on the relative change in dew point. For a change from ambient moisture levels to trace levels, the Series 35 can respond in under one minute.

A reasonably constant final dew point and flow rate are needed to use the computer enhanced response option. The minimum flow rate is 1 SCFH (500 cc/min).

If your Series 35 is equipped with *Computer Enhanced Response*, use this function to enable or disable the feature. If the enhanced response option is not available, the display will read "Option Not Avail." Otherwise, the Enhance Response display appears.

Note: *Be sure to record all entered data in the* Data Information Sheet *in* Appendix C.

ENHANCE RESPONSE	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
ENHANCE OFF ENHANCE ON	Use the arrow keys to scroll to the desired status, then press [ENTER].

Press [ESC] until you return to the USER menu. After you activate *Computer Enhanced Response*, a reverse video "E" symbol appears on the left side of the display as part of the mode. When the Series 35 determines the final value, the reverse video "E" changes to a normal "E."

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3.6.6 Setting Up Range Error Processing

Range errors occur when an input signal that is within the capacity of the analyzer is outside the range of the probe calibration data. The Series 35 displays range errors with an OVER RANGE or UNDER RANGE message. The error condition extends to all displayed measurements of that mode. For example, if dew point displays OVER RANGE, then moisture in PPMv also displays OVER RANGE.

The *User Program* permits the selection of the manner in which errors are handled by the Series 35. To monitor the unit for error conditions, the fault alarm and/or the recorder output may be used as external indicators.

Refer to Table 10 on page 55 for a description of each RANGE ERROR option and the corresponding response of the Series 35.

Note: *Be sure to record all entered data in the* Data Information Sheet *in* Appendix C.

RANGE ERROR	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
R_ERR = No Response R_ERR = Display R_ERR = Hi/Lo RCD R_ERR = Hi/Hi RCD	Use the arrow keys to scroll to the desired error response mode, then press [ENTER].

Press [ESC] until you return to the USER menu.

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3.6.6 Setting Up Range Error Processing (cont.)

Table 10: Range Error Processing Options

Option	Display	Alarm/Recorder
No Action	none	range error disabled
Display	error displayed	fault alarm tripped
Hi/Lo RCD	error displayed	fault alarm tripped, recorder output high for over-range errors, recorder output low for under-range errors
Hi/Hi RCD	error displayed	fault alarm tripped, recorder output high for over-range errors, recorder output high for under-range errors

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3.6.7 Setting Up Calibration Error Processing

A *Calibration Error* indicates a failure during measurement of the internal moisture references. During Autocal, internal references are read repeatedly, and the values measured are compared to a table of acceptable factory calibration values. Any deviation from the factory values is calculated and corrected. Should a reference value fall outside the acceptable range, a CAL ERROR message appears.

You can select whether the recorder output will be forced low (zero value) or high (span value) upon detection of a calibration error. When a calibration error is detected, the recorder output remains at the selected limit (low or high) until the error condition is corrected. Then, an Autocal is then executed or the system is restarted.

If you attempt to display data while a calibration error is in effect, the "CAL ERROR DP/°C" display appears.

Note: *Be sure to record all entered data in the* Data Information Sheet *in* Appendix C.

CAL ERROR	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
CAL_ERR = Lo Output CAL_ERR = Hi Output	Use the arrow keys to scroll to the desired selection, then press [ENTER].

Press [ESC] until you return to the USER menu.

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3.6.8 Entering a PPMv Constant Multiplier

Use this option to apply a user-defined constant multiplier to the PPMv value. Values up to 999.9999 may be entered.

PPMv MULTIPLIER	In the USER menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
KPPMv1.0000	Press either arrow key to delete the current value and enter edit mode.
KPPMv2.0000	Use the arrow and [ENTER] keys to change the value one digit at a time, then press [ENTER] twice.

Note: *Be sure to record all entered data in the* Data Information Sheet *in* Appendix C.

After entering the PPMv constant multiplier, press [ESC] until you return to the USER menu.

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[no content intended for this page]

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Chapter 4. Troubleshooting and Maintenance

4.1 Introduction

The Moisture Monitor Series 35 is designed to be maintenance and trouble free. Due to process conditions and other factors, however, minor problems may occur. This chapter discusses some of the most commonly encountered problems and the procedures for correcting them. If you cannot find the information you need in this chapter, contact GE.

CAUTION! Do not attempt to troubleshoot the Series 35 beyond the instructions in this chapter. If you do, you may damage the unit and void the warranty.

This section includes the following information:

- Common Problems
- Screen Messages
- Replacing the *User Program*
- Replacing and Recalibrating the Moisture Probes
- Testing the Alarm Relays and Recorder Output
- Adjusting the Recorder Output Zero and Span Values

4.2 Common Problems

If the Series 35 measurement readings seem incorrect, there may be a problem with the probe or another system component. Table 11 on page 60 contains some of the most common measurement problems and suggested ways to resolve them.

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Table 11: Solutions to Common Problems

Symptom	Possible Cause	System Response	Action
Accuracy of moisture sensor is questioned	Insufficient time for system to equilibrate.	Probe reads too wet during dry down, or too dry in wet up conditions.	Change the flow rate. A change in dew point indicates the sample system is not at equilibrium, or there is a leak. Allow sufficient time for sample system to equilibrate and moisture reading to become steady. Check for leaks
	The dew point at the sampling point is different than the dew point of the main stream.	Probe reads too wet or too dry.	Readings may be correct if the sampling point and main stream do not run under the same process conditions. The different process conditions cause readings to vary. If sampling point and main stream conditions are the same, check sample system pipes, and any pipe between the sample system and main stream for leaks. Also, check sample system for adsorbing water surfaces, such as rubber or plastic tubing, paper-type filters, or condensed water traps. Remove or replace contaminating parts with stainless steel parts.
	Sensor or sensor shield affected by process contaminant.	Probe reads too wet or too dry.	Clean the sensor and the sensor shield. Then reinstall the sensor.
	Sensor is contaminated with conductive particles.	Probe reads high dew point.	Clean the sensor and the sensor shield, then reinstall the sensor. Also, install a proper filter (i.e. sintered or coalescing element).
	Sensor is corroded.	Probe reads too wet or too dry.	Return the probe to the factory for evaluation.
	Sensor temperature is greater than 70°C (158°F).	Probe reads too dry.	Return the probe to the factory for evaluation.
	Stream particles are causing abrasion.	Probe reads too wet or too dry.	Return the probe to the factory for evaluation.

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Table 11: Solutions to Common Problems

Symptom	Possible Cause	System Response	Action
Slow response.	Slow outgassing of system.		Replace the system components with stainless steel or electro-polished stainless steel.
	Sensor is contaminated with non-conductive particles		Clean the sensor and the sensor shield. Then reinstall the sensor.
Screen always reads the wettest (highest) moisture calibration value while displaying dew/frost point.	Probe is saturated. Liquid water is present on sensor surface and/or across electrical connections.		Clean the sensor and the sensor shield. Then reinstall the sensor.
	Shorted circuit on sensor.		Run “dry gas” over sensor surface. If high reading persists, then probe is probably shorted and should be returned to the factory for evaluation.
	Sensor is contaminated with conductive particles.		Clean the sensor and the sensor shield. Then reinstall the sensor.
	Improper cable connection.		Check the cable connections to both the probe and the Series 35.
Screen always reads the driest (lowest) moisture calibration value while displaying the dew/frost point.	Open circuit on the sensor.		Return the probe to the factory for evaluation.
	Non-conductive material is trapped under the contact arm of the sensor.		Clean the sensor and the sensor shield. Then reinstall the sensor. If the low reading persists, return the probe to the factory for evaluation.
	Improper cable connection.		Check the cable connections to both the probe and the Series 35.

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4.3 Screen Messages

The Series 35 may display several screen messages during operation. Refer to Table 12 for a list of these messages and their possible causes and solutions.

Table 12: Screen Messages

Display	Possible Cause	System Response	Action
(None)	Loss of Power	System Shutdown	Be sure power connections are tight and unit is plugged in. Check electrical outlet.
"Loading..." (reinitializes) "Autocal..." (displays measure-ment)	Watchdog Reset (see Chapter 3)	System resets because watchdog signal is not generated within 1.6 seconds. Fault alarm is on for approximately 20 seconds.	Call GE if this happens more than 5 times within ten minutes.
"CAL ERROR"	Internal reference components may be out of specifications. (Occurs only when unit is set to measure DP/°C, DP/°F, ppm_v.)	Measurement stops for affected modes. Recorder responds as programmed (see *Cal Error Processing* in Chapter 3.)	Check wiring. Call GE.
(Reads over or under range.)	Signal received is lower or higher than calibration data supplied with probe.	System defaults to lowest or highest dew point found in calibration data. Recorder responds as programmed (refer to *Range Error Processing* in Chapter 3).	Check probe for open circuit or shorts if probe is not subjected to extreme dry or wet conditions. Contact GE regarding a higher calibrated probe.

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4.4 Replacing the User Program

The *User Program* is stored on an EPROM (Erasable Programmable Read Only Memory) chip. The EPROM is located on the main circuit board (part #703-1245), which is mounted inside the Series 35 electronics unit. If your Series 35 has a part #703-1180 circuit board, also see Appendix E.

For a **bench-mount** unit, complete the following steps to replace the *User Program*:

- remove the circuit board
- remove and replace the EPROM

For a **rack-mount, panel-mount, or weatherproof** unit, complete the following steps to replace the *User Program*:

- remove the unit from its location
- remove and replace the EPROM

Refer to the appropriate sections that follow to replace the *User Program*.

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4.4.1 Removing the Circuit Board (Bench-Mount Only)

Note: *The circuit board for the bench-mount unit is mounted on the inside of the electronics cover.*

1. Turn the power OFF and, if applicable, unplug the unit.

WARNING! You must turn off and unplug the Series 35 before continuing with the following steps.

2. Discharge any static electricity from your body before touching the Series 35 enclosure.

CAUTION! EPROMs can be damaged by static electricity.

3. Open the Series 35 enclosure by loosening the two quarter-turn screws on the back of the unit and gently lifting the cover off, from back to front.
4. Disconnect the OUT/IN terminal block connections from the inside of the unit.
5. Remove the circuit board by unscrewing the six screws from the bracket that holds the circuit board in place.
6. Turn the circuit board over to access the EPROM.

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4.4.2 Removing and Replacing the EPROM (All Units)

1. Refer to Figure 7 on page 66 to locate the EPROM (labeled U28) on the #703-1245 circuit board.
2. Use a chip puller to remove the EPROM. If you do not have a chip puller, use a small screwdriver to carefully wedge the chip out of its mounting. Be sure none of the EPROM's legs get stuck in the socket.

CAUTION! EPROMs can be damaged by static electricity. Take anti-static precautions when handling EPROMs.

3. Place the new EPROM in the socket labeled U28, making sure the notch on the EPROM matches the notch on the socket (see Figure 7 on page 66).
4. If the EPROM's legs do not enter the socket, gently remove the EPROM and place it on its side, with its legs against a flat surface. Then, gently tilt the EPROM to bend the legs slightly inward.

CAUTION! Do not bend the EPROM legs too much. They are very delicate and may snap off if bent too far or too many times.

5. Repeat Step 4 on the opposite side of the EPROM. Then, place the EPROM back in the socket, making sure the EPROM's notch matches the socket's notch.
6. Gently press the EPROM into place, making sure not to bend or break any of its legs. **DO NOT FORCE THE EPROM INTO THE SOCKET.** Repeat Steps 4 and 5 if necessary.

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4.4.3 Replacing the Circuit Board (Bench-Mount Only)

1. Replace the #703-1245 circuit board by turning it over and remounting the bracket that holds the circuit board to the inside of the Series 35 cover.
2. Insert and tighten the six bracket screws.

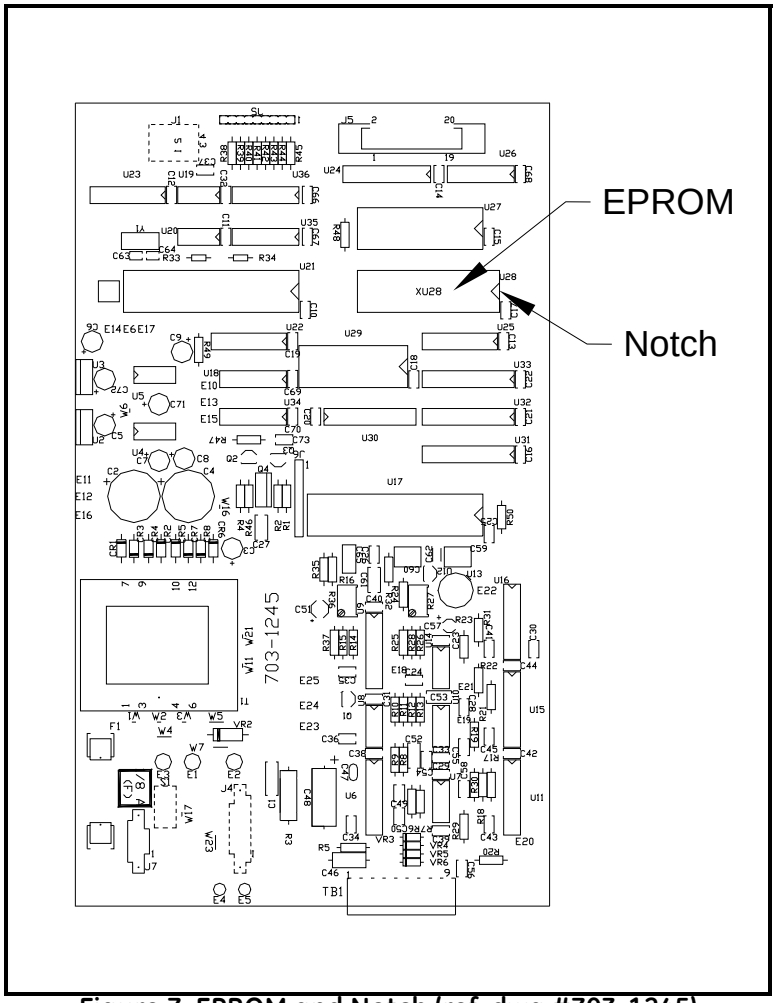


Figure 7: EPROM and Notch (ref. dwg #703-1245)

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4.4.3 Replacing the Circuit Board (Bench-Mount Only) (cont.)

3. Reconnect the OUT/IN terminal block connections on the inside of the unit.
4. Replace the Series 35 cover by attaching it to the unit, from front to back.
5. Tighten the two quarter-turn screws on the back of the unit.

4.5 Replacing and Recalibrating the Moisture Probes

For maximum accuracy you should send probes back to the factory for recalibration every six months to one year, depending on the application. Under severe conditions you should send the probes back for recalibration more frequently. Contact a GE applications engineer for the recommended calibration frequency for your application.

When you receive new or recalibrated probes, install and connect them as described in *Installing a Probe in the Sample System* in Chapter 2. Once you have installed and connected the probes, enter the calibration data as described in *Entering Data into the User Program* in Chapter 3. Note that each probe has its own *Calibration Data Sheet* with the corresponding probe serial number printed on it.

4.6 Testing the Alarm Relays and Recorder Output

Use this menu option to test the alarm relays and the recorder output, and also to adjust the recorder output if necessary.

Note: *Refer to Chapter 3 for instructions on how to enter and exit the* User Program *and scroll to the* Test Menu.

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4.6.1 Testing the Alarm Relays

This test lets you manually trip and reset the alarm relays for testing purposes.

TEST	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
TEST ALARM	Use the arrow keys to scroll to TEST ALARM, then press the [ENTER] key.
AlarmA ON AlarmA OFF AlarmB ON AlarmB OFF Fault Alarm ON Fault Alarm OFF	Use the arrow keys to scroll to the options to trip and reset the various alarms.

As you scroll through the options, you should hear an audible click as the alarm relays change state from on to off. If an alarm or other device is connected to the alarm relay terminals, that device should also change state.

Note: *If an alarm does not trip or reset, check to see if it is wired correctly.*

After testing and resetting the desired alarm(s), press [ESC] to return to the TEST menu.

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4.6.2 Testing the Recorder Output

This option lets you test the recorder output to make sure it is operating properly. You can test four percentages of the full-scale recorder range: 125%, 100%, 50%,and 0%.

TEST	In the main menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
TEST RECORDER	Use the arrow keys to scroll to TEST RECORDER, then press the [ENTER] key.
RCD at 125% RCD at 100% RCD at 50% RCD at 0%	Use the arrow keys to scroll to the output scale options.

As you scroll through the options, the recorder pen should swing to the appropriate output value. The Series 35 automatically outputs the % of span displayed on the screen to the recorder.

Note: *If the recorder needs to be adjusted, refer to the following section.*

After testing the recorder, press [ESC] to return to the TEST menu.

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4.7 Adjusting the Recorder Zero/Span Values

The measured value of the recorder output can vary from the programmed value due to resistance caused by the load (e.g., chart recorder, display, etc.) or by long wire runs or small gauge connecting wire. This menu option lets you adjust the recorder zero and span values to compensate for such variations. To accurately adjust the recorder out, you need a digital multimeter capable of measuring 0-2 volts with a resolution of ± 0.0001 VDC or 0-20 mA with a resolution of ± 0.01 mA.

4.7.1 Adjusting the Recorder Zero

Note: *The zero adjustment is an offset adjustment, while the span adjustment is a slope adjustment. As a result, the zero and span adjustments affect each other. Therefore, after you adjust one value you should re-adjust the other.*

1. Make sure that switch S1 on the output circuit board is set to the appropriate position for the recorder output: "I" for current or "V" for voltage (see *Connecting a Recorder Output Device* in Chapter 2).
2. Connect the multimeter in series with the recorder terminals for a current output or in parallel with the recorder terminals for a voltage output.
3. Perform the following programming operations:

ADJUST RECORDER	In the TEST menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
ADJ RCD ZERO	Use the arrow keys to scroll to ADJ RCD ZERO, then press the [ENTER] key.

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4.7.1 Adjusting the Recorder Zero (cont.)

Note: *The recorder output cannot be adjusted to a value of 0.00 mA or 0.000 V due to limits imposed by electronic noise. The recorder output typically is 0.01 mA at a zero reading. Therefore, when checking for the zero value, the* MMS35 *automatically uses 5% of span for ranges of 0-20 mA and 0-2V (see Table 13).*

4. Check the multimeter reading. It should display one of the following:

Table 13: Recorder Zero Reading per Output Range

Recorder Output Range	Desired Meter Reading
0-20 mA	1 mA
4-20 mA	4 mA
0-2 V	0.1 V

5. Adjust the recorder zero point to achieve the desired reading by performing the following operations.

ADJ RCDZ +	Press either arrow key to delete the current *Recorder Adjustment Value* and enter edit mode.
ADJ RCDZ -60	Use the arrow and [ENTER] keys to change the value one digit at a time; then press [ENTER].

Any *Recorder Adjustment Value* (RAV) between –150 and +150 is acceptable. Each increment of the RAV adjusts the recorder output by about 0.005 mA for 0-20 and 4-20 mA outputs, or 0.0005 volts for a 0-2 V output.

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4.7.1 Adjusting the Recorder Zero (cont.)

Example:

A test of a 0-20 mA output results in a meter reading of 1.3 mA. This is 0.3 mA higher than the desired meter reading (1 mA) shown in Table 13 on page 71. Calculate the RAV that adjusts the meter reading by –0.3 mA as follows:

$$RAV = (–0.3\ mA)\ (0.005\ mA) = –60$$

Enter –60 as the new Recorder Adjustment Value (RAV).

6. Re-check the multimeter reading and, if necessary, repeat the procedure until the correct output reading is obtained.

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4.7.2 Adjusting the Recorder Span

Note: *The zero adjustment is an offset adjustment, while the span adjustment is a slope adjustment. As a result, the zero and span adjustments affect each other. Therefore, after you adjust one value you should re-adjust the other.*

1. Make sure that switch S1 on the output circuit board is set to the appropriate position for the recorder output: "I" for current or "V" for voltage (see *Connecting a Recorder Output Device* in Chapter 2).
2. Connect the multimeter in series with the recorder terminals for a current output or in parallel with the recorder terminals for a voltage output.
3. Perform the following programming operations:

ADJUST RECORDER	In the TEST menu, use the arrow keys to scroll to this prompt, then press the [ENTER] key.
ADJ RCD SPAN	Use the arrow keys to scroll to ADJ RCD SPAN, then press the [ENTER] key.

4. Check the multimeter reading. It should display one of the following (see Table 14):

Table 14: Recorder Span Reading per Output Range

Recorder Output Range	Desired Meter Reading
0-20 mA	20 mA
4-20 mA	20 mA
0-2 V	2 V

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4.7.2 Adjusting the Recorder Span (cont.)

5. Adjust the recorder span point to achieve the desired reading by performing the following operations.

ADJ RCDS +	Press either arrow key to delete the current *Recorder Adjustment Value* and enter edit mode.
ADJ RCDS +40	Use the arrow and [ENTER] keys to change the value one digit at a time; then press [ENTER].

Any *Recorder Adjustment Value* (RAV) between –150 and +150 is acceptable. Each increment of the RAV adjusts the recorder output by about 0.005 mA for 0-20 and 4-20 mA outputs, or 0.0005 volts for a 0-2 V output.

Example:

A test of a 0-20 mA output results in a meter reading of 19.8 mA. This is 0.2 mA lower than the desired meter reading (20 mA) shown in Table 14 on page 73. Calculate the RAV that adjusts the meter reading by +0.2 mA as follows:

$$RAV = (+0.2\ mA)\ (0.005\ mA) = +40$$

Enter +40 as the new Recorder Adjustment Value (RAV).

6. Re-check the multimeter reading and, if necessary, repeat the procedure until the correct output reading is obtained.

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Chapter 5. Specifications

5.1 Electronics

Functions:

Dew Point

PPMv in gases at constant pressure

(pressure by programmable constant)

Inputs:

Moisture:

Single input via M-Series probe connected to a terminal strip. Probe may be remotely located up to 600 m (2,000 ft) from electronic console.

Auxiliary:

4 to 20 mA input.

Intrinsic Safety:

Intrinsically safe probe and cable when used with appropriate external zener barriers. Consult GE for more information.

Recorder Output:

0 to 20-mA, 4 to 20-mA or 0 to 2-V analog, linear in parameter chosen.

Maximum Load:

Current Output:

500 ohms, maximum for AC units

Voltage Output:

10K ohms, minimum

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5.1 Electronics (cont.)

Computer-Enhanced Response:

Optional.

Alarm Relays:

Fault alarm

Optional Form C:	**Standard**	**Hermetically Sealed**
	8A @ 250VAC	0.3A @ 115VAC
	8A @ 30VDC	2A @ 28VDC

Note: *To maintain Low Voltage Directive Compliance, EN Standard EN61010, the following rating applies: 2A @ 28VDC*

Display Units:

Dew/frost point temperature: ºC, ºF
PPMv
Pressure: psi(g), bar, kPa(g), kg/cm2(g)
MH: raw signal.

Power Requirements:

AC power supply: Specify as 100, 120, 220, or 240 VAC, 50/60 Hz
Optional DC power supply: 24 VDC
Input power: 12 watts, maximum.

Temperature:

Operating: 0° to 60°C (32º to 140ºF)
Storage: -20° to 70°C (-22º to 158ºF)

Configurations:

Rack-, Bench- and Panel-Mount, NEMA-4X Weatherproof

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5.1 Electronics (cont.)

Dew/Frost Point Temperature:

Overall Range Capability:
–110 to 60°C (–166 to 140ºF).

Available Range Options:
Standard: –80° to 20°C (–112° to 68°F) with data to -110°C (–166°F)
High Range Data: –80° to 60°C (–112° to 140°F)

Calibrated Accuracy at 25°C (77°F):
±2°C (3.6°F) from –65° to 10°C (–85° to 50ºF)
±3°C (5.4°F) from –80° to 66°C (–112° to 87ºF)

Repeatability:
±0.5°C (0.9°F) from –65° to 10°C (–85° to 50ºF)
±1.0°C (1.8°F) from –80° to –66°C (–112° to –87ºF)

Gas Flow Range:

From static to 10,000 cm/sec linear velocity at 1 atm

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5.2 Moisture Measurement

Sensor Type:

GE M-Series thin-film aluminum oxide

Traceability:

Each sensor is individually computer-calibrated against known moisture concentrations. Calibrations are traceable to National Institute of Standards and Technology (NIST) standard or National Physical Lab, U.K. (NPL) as accredited by Irish National Accreditation Board (INAB).

Temperature:

Operating and Storage: –110 to +70ºC (-166 to 158ºF)

Pressure:

Operating: 5 microns Hg to 5,000 psig

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Appendix A. Outline and Installation Drawings

This appendix contains the following drawings for the MMS 35:

- Rack Mount Dimensions (ref. dwg #712-930), page 81
- Bench Mount Dimensions (ref. dwg #712-1006), page 82
- Panel Mount Dimensions (ref. dwg #712-931), page 83
- Weatherproof Unit Dimensions (ref. dwg #712-932), page 84
- Rack and Panel Mount Wiring (ref. dwg #702-176), page 85
- Bench Mount Wiring (ref. dwg #702-177), page 86
- Weatherproof Unit Wiring (ref. dwg #702-189), page 87

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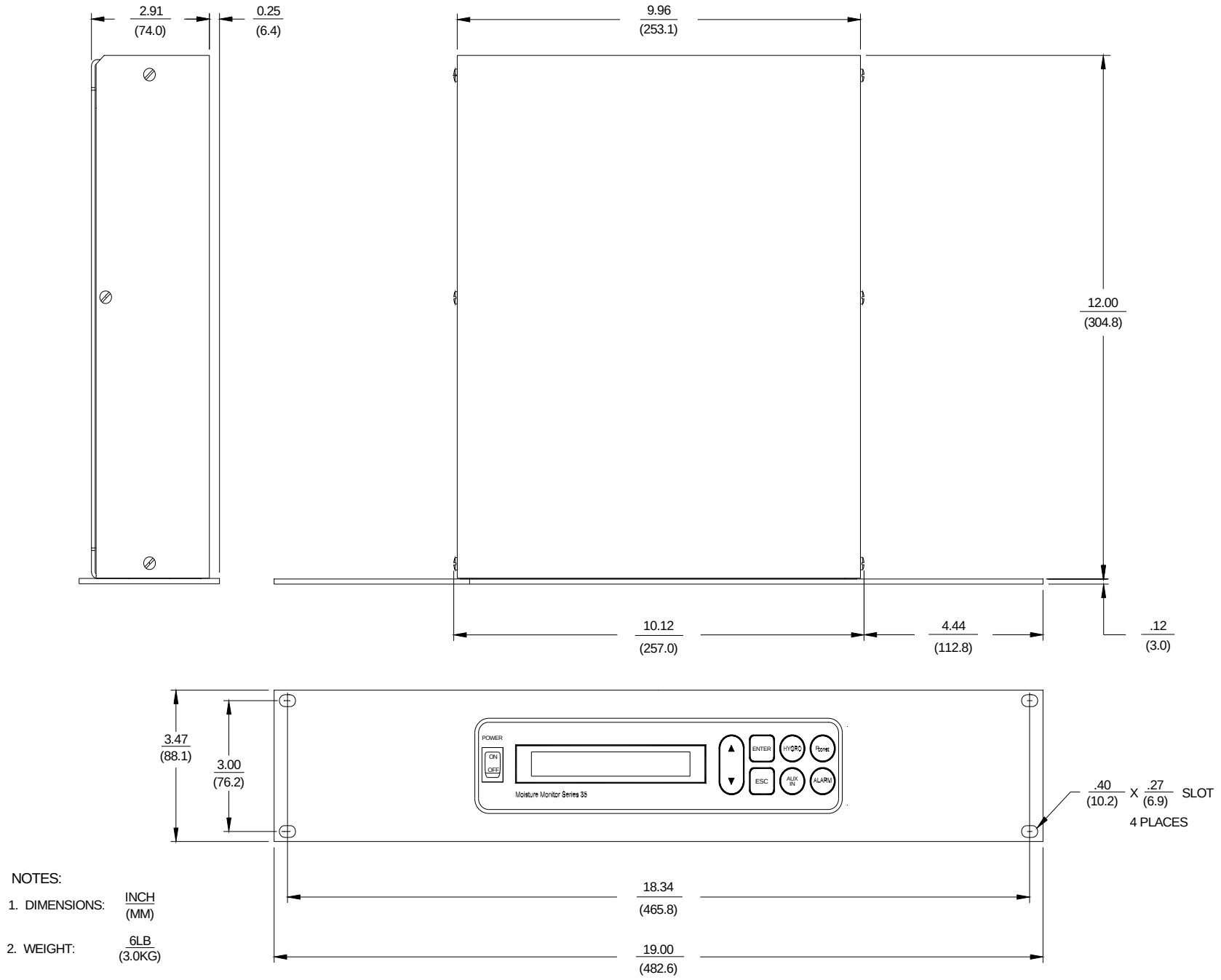
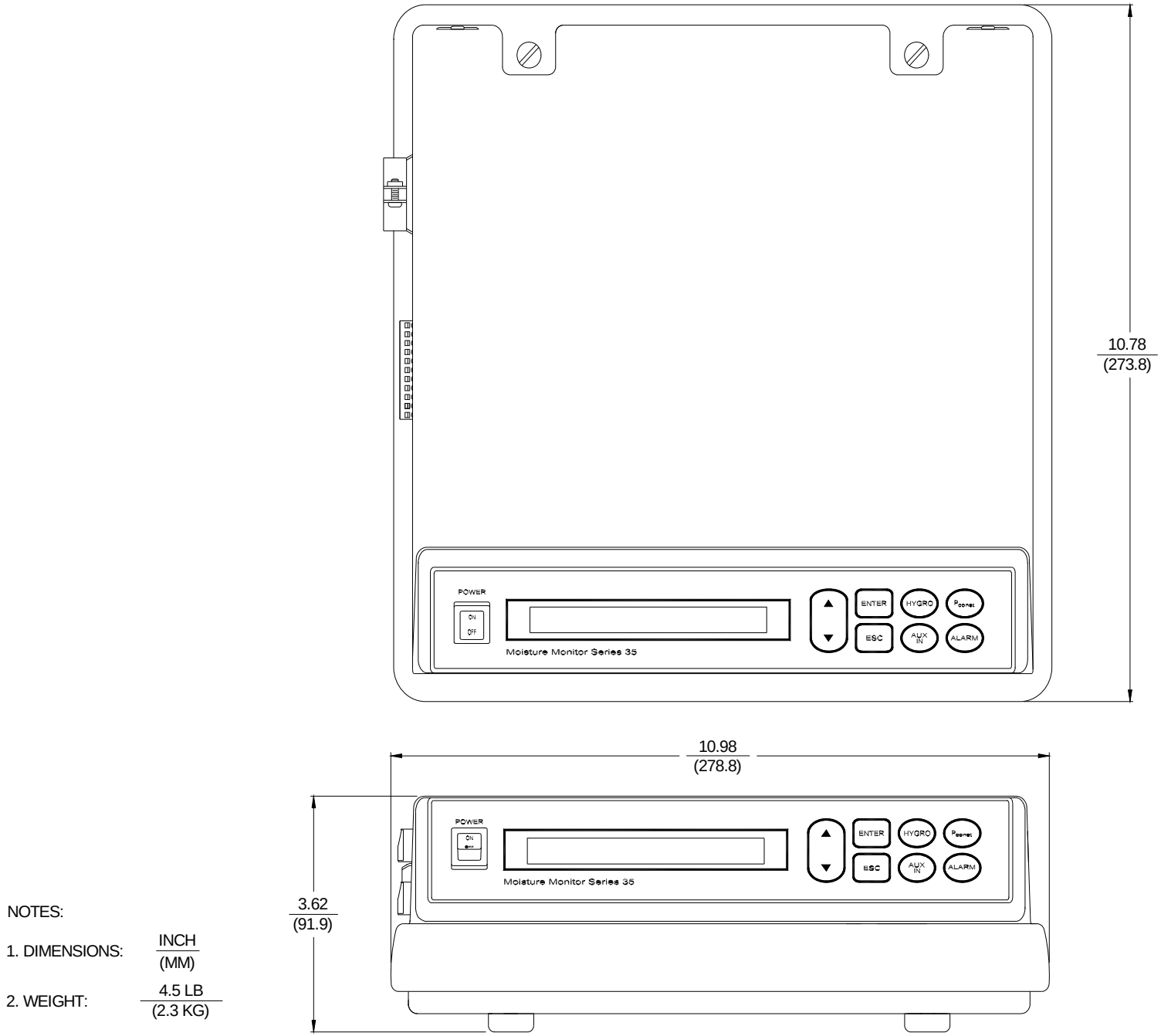


Figure 8: Rack Mount Dimensions (ref. dwg #712-930)

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NOTES:

1. DIMENSIONS: INCH / (MM)

2. WEIGHT: 4.5 LB / (2.3 KG)

Figure 9: Bench Mount Dimensions (ref. dwg #712-1006)

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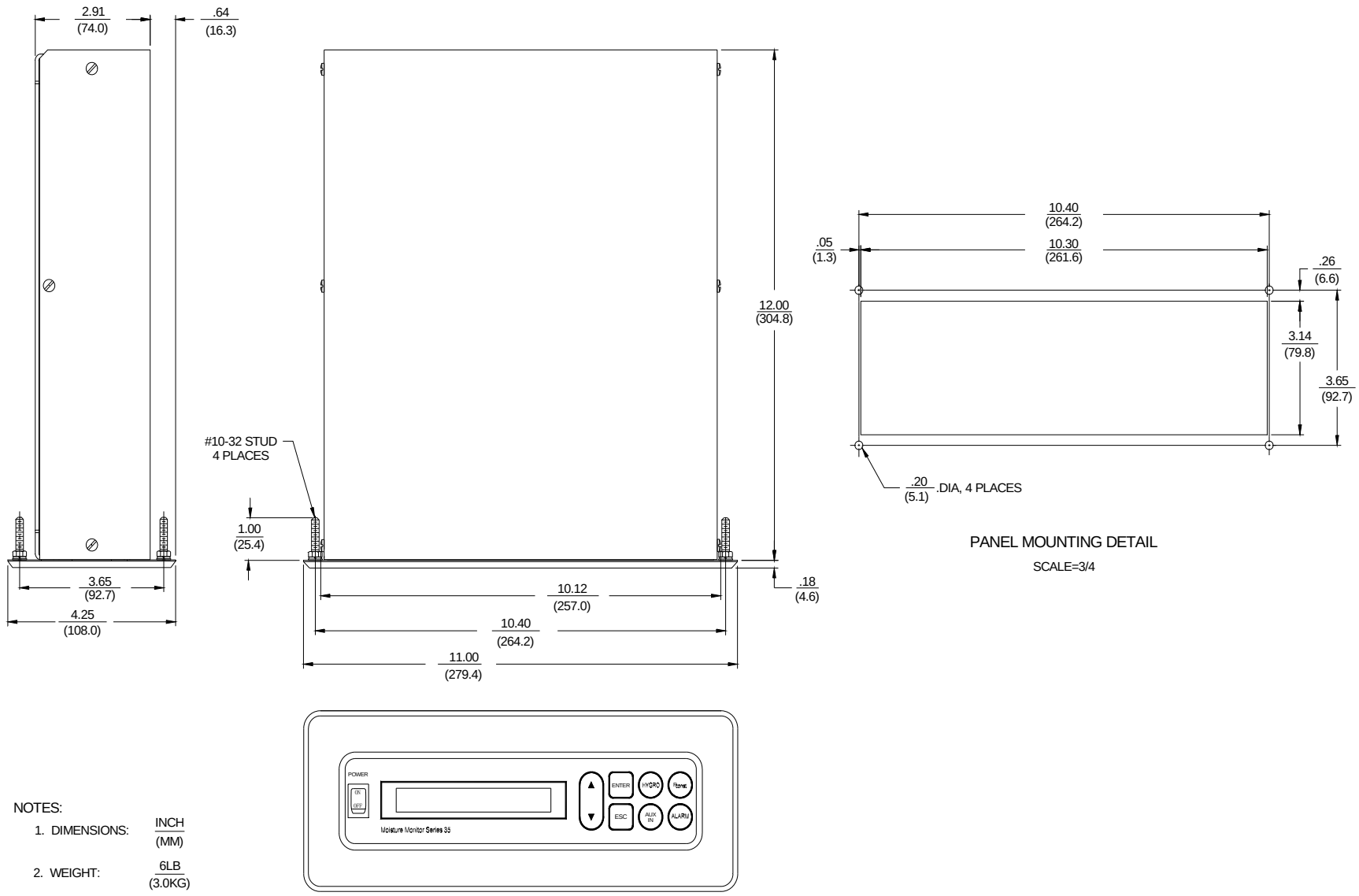


Figure 10: Panel Mount Dimensions (ref. dwg #712-931)

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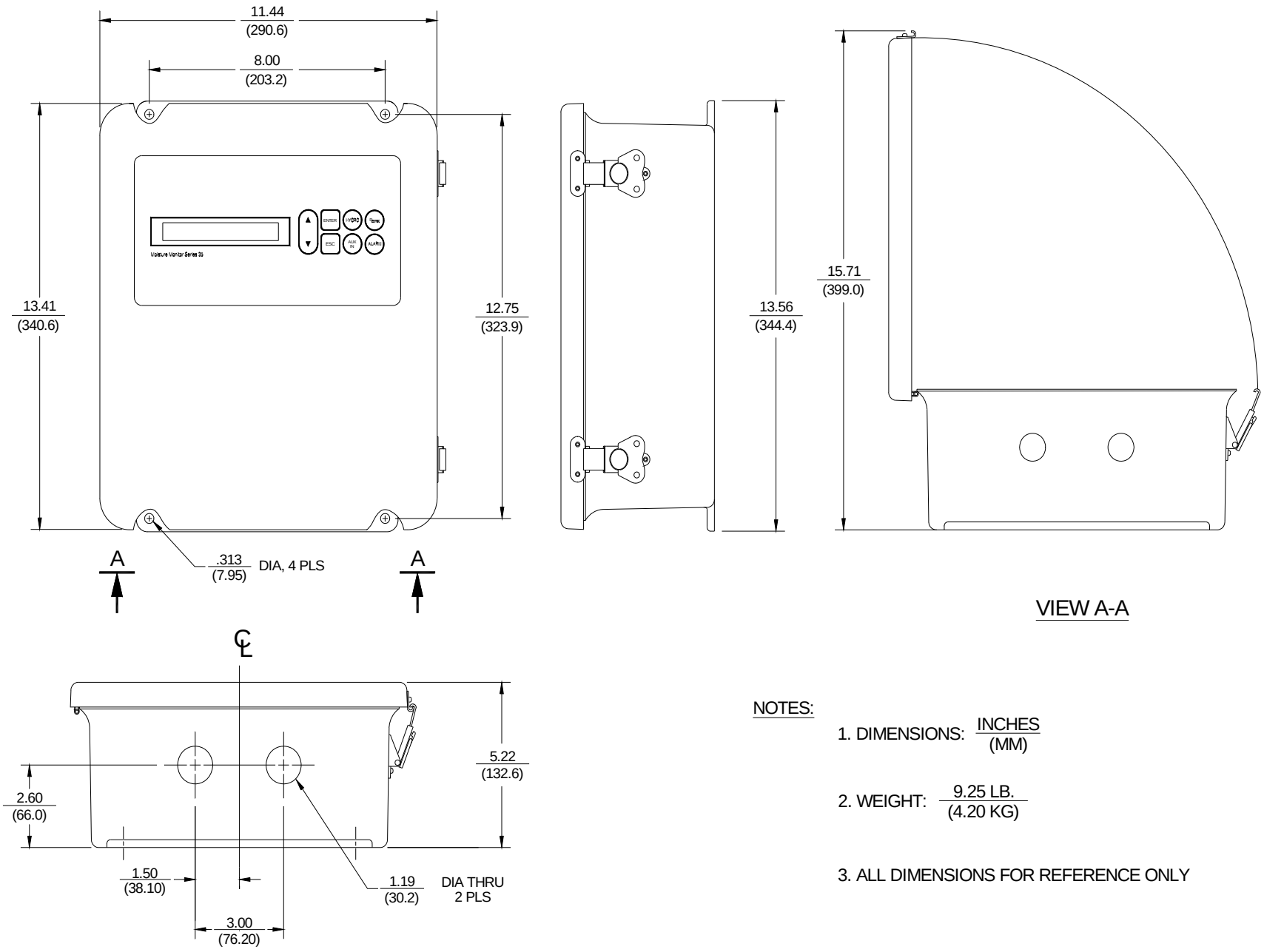
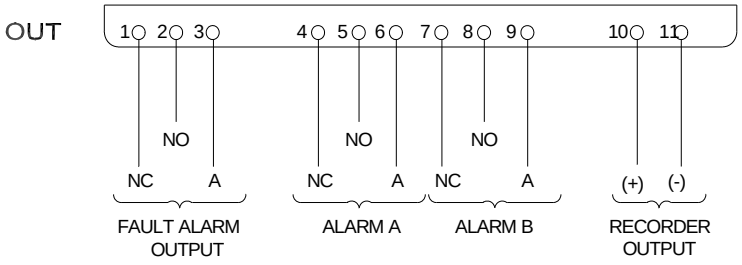
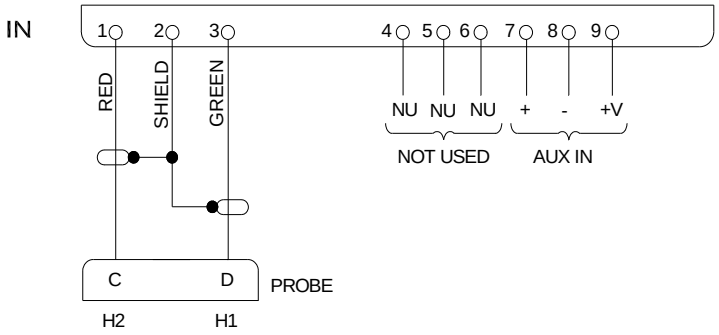
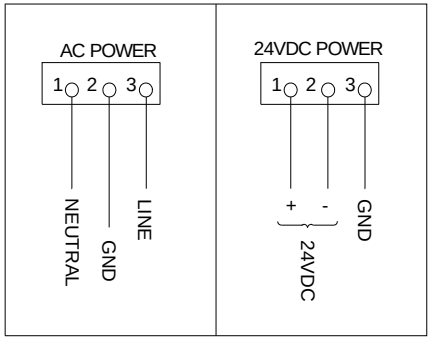


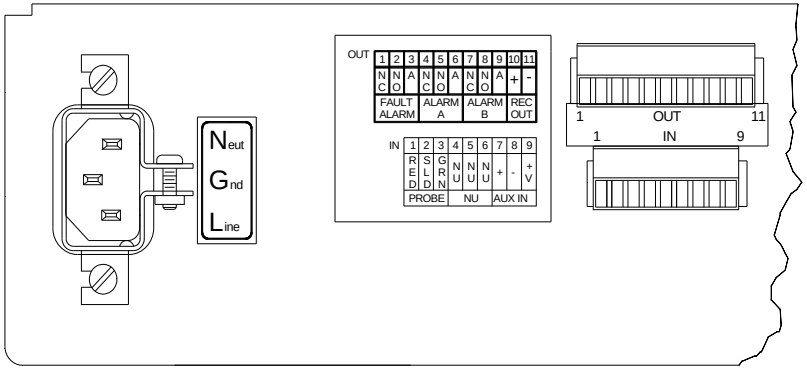
Figure 11: Weatherproof Unit Dimensions (ref. dwg #712-932)

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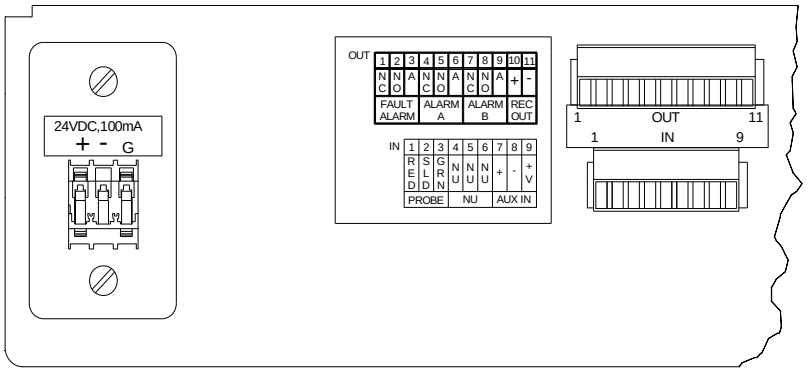
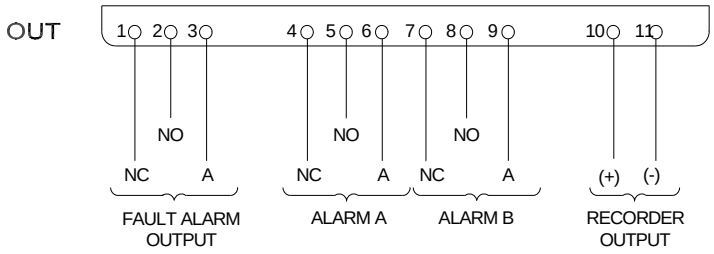
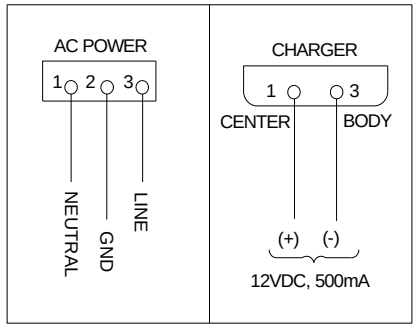
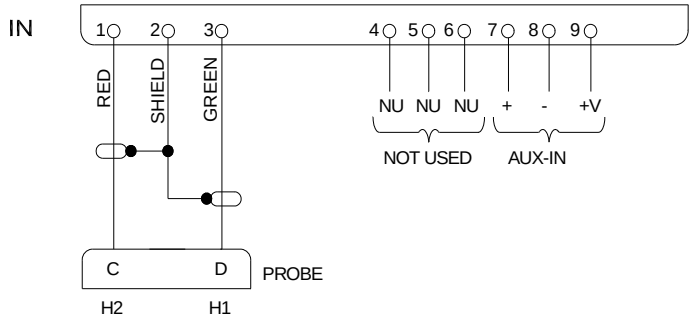


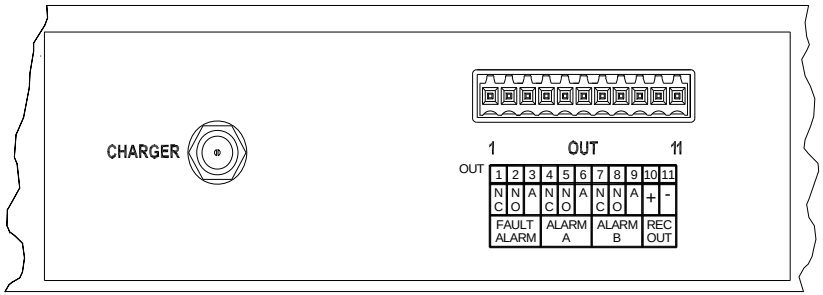
Figure 12: Rack and Panel Mount Wiring (ref. dwg #702-176)

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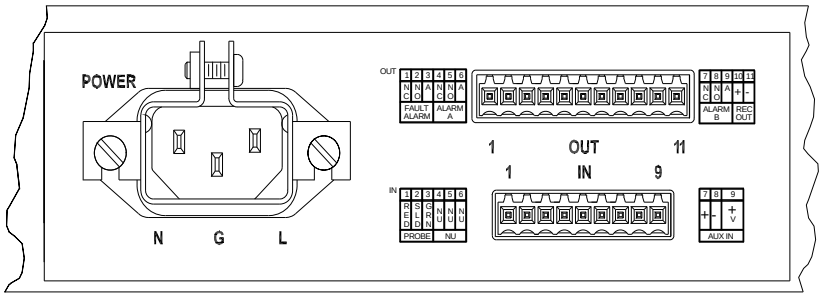




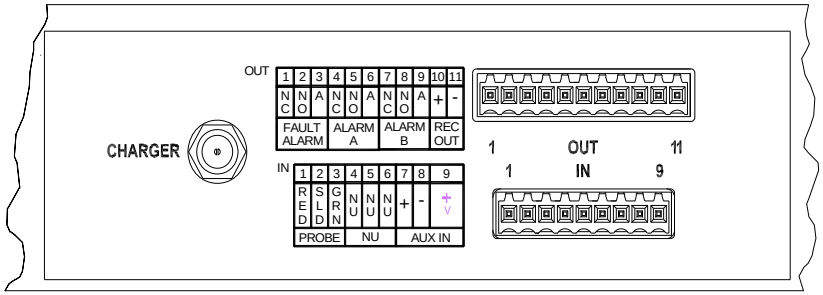




PORTABLE W/ SAMPLE SYSTEM



BENCH



PORTABLE W/O SAMPLE SYSTEM

Figure 13: Bench Mount Wiring (ref. dwg #702-177)

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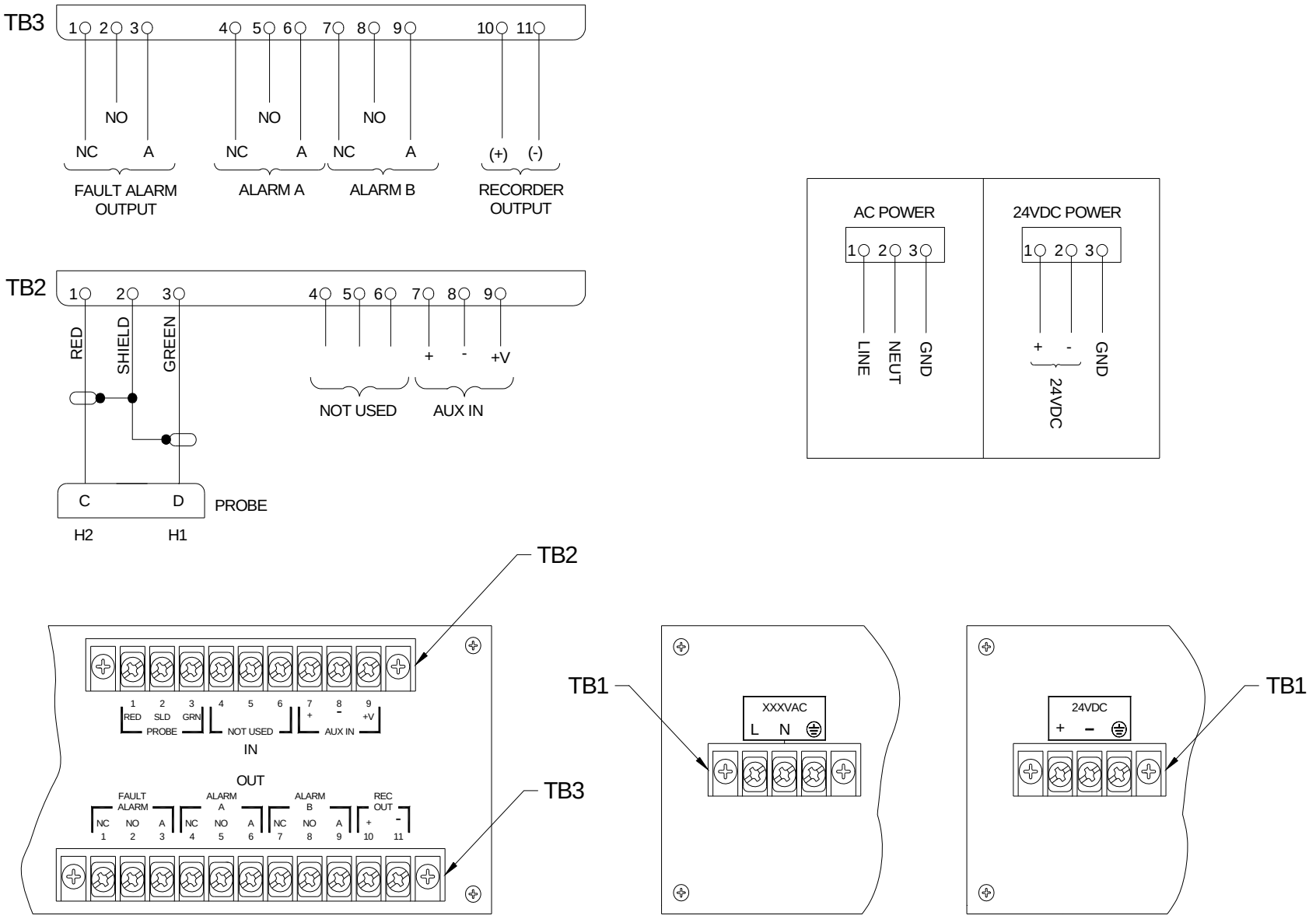


Figure 14: Weatherproof Unit Wiring (ref. dwg #702-189)

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Appendix B. Menu Maps

The following figures are complete diagrams of the Series 35 menu structure. Once you are familiar with how the Series 35 operates, use these diagrams as a reference for moving through the *User Program*.

To enter the programming mode, perform the following sequence within five (5) seconds, or the Series 35 will time out and return to the measurement mode.

xx.x°C	While in run mode, press the [ESC] key.
ESC	Within 5 seconds of the appearance of this display, press the [ENTER] key followed by the [ESC] key.
PROGRAM MENU	This will display for 1 second.
DP RANGE	You are now in the *User Program* main menu.

From the main menu, use the arrow keys to scroll through the options to your selection. Use the [ENTER] key to confirm your selection or the [ESC] key to cancel your selection.

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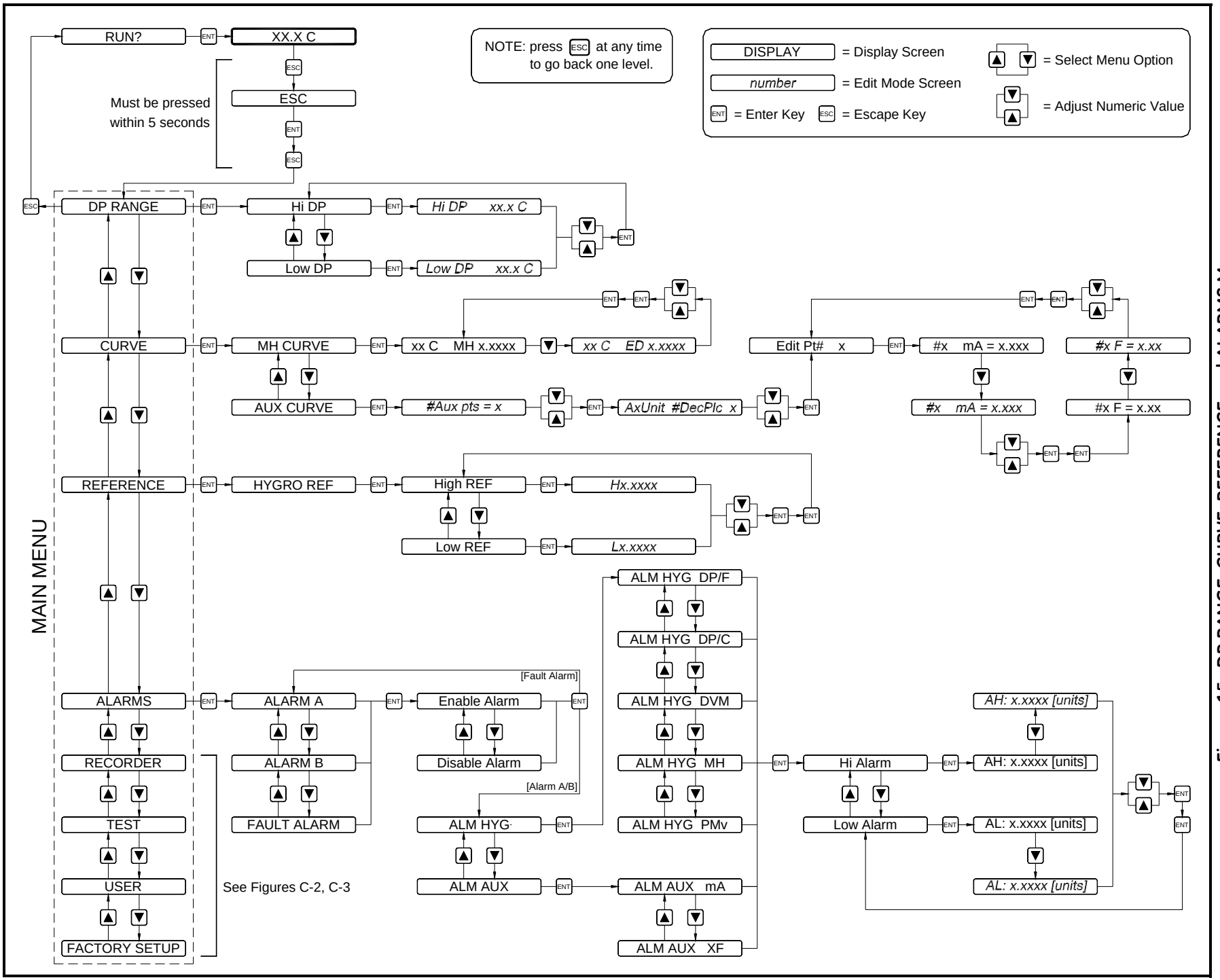


Figure 15: DP RANGE, CURVE, REFERENCE and ALARMS Menus

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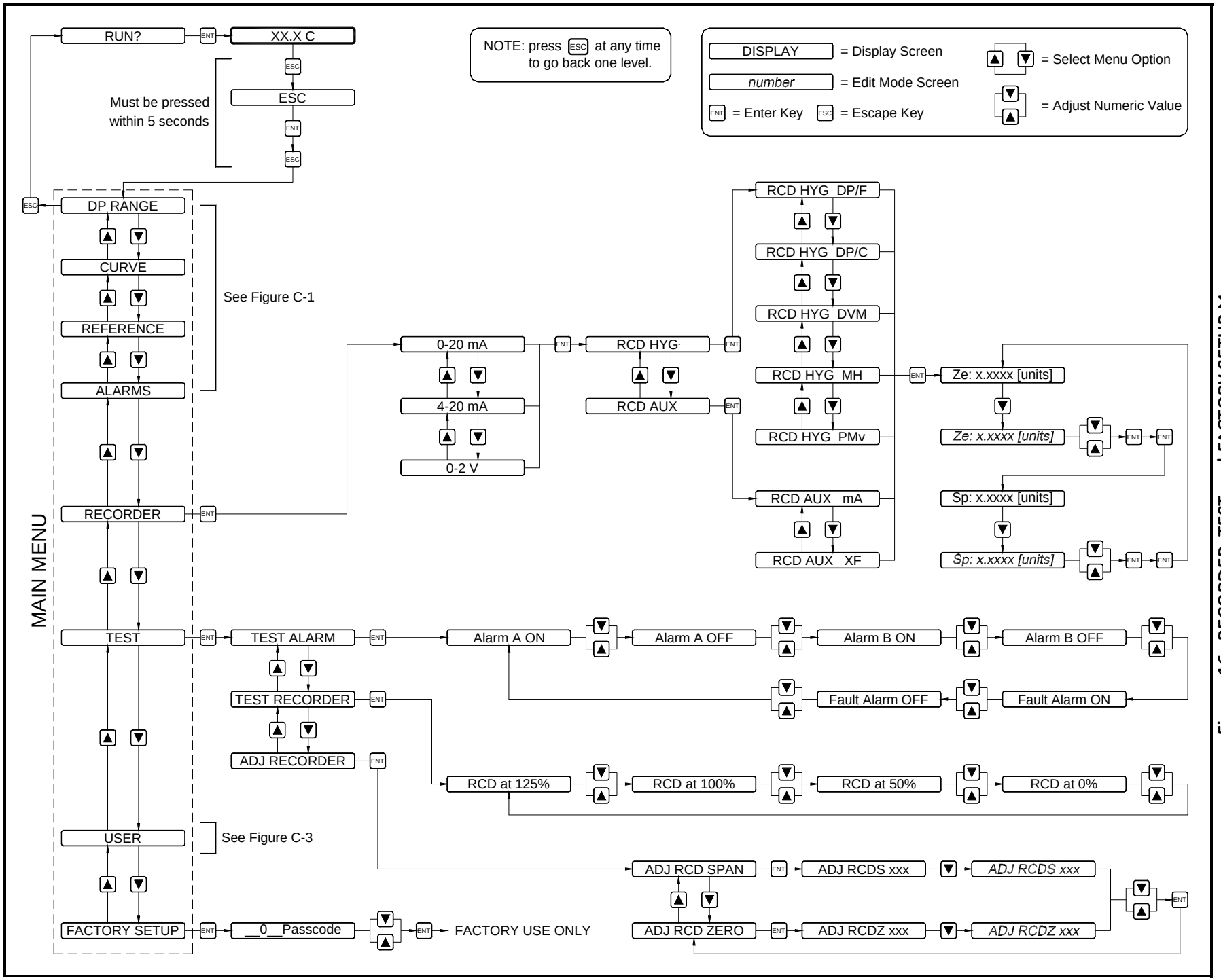


Figure 16: RECORDER, TEST and FACTORY SETUP Menus

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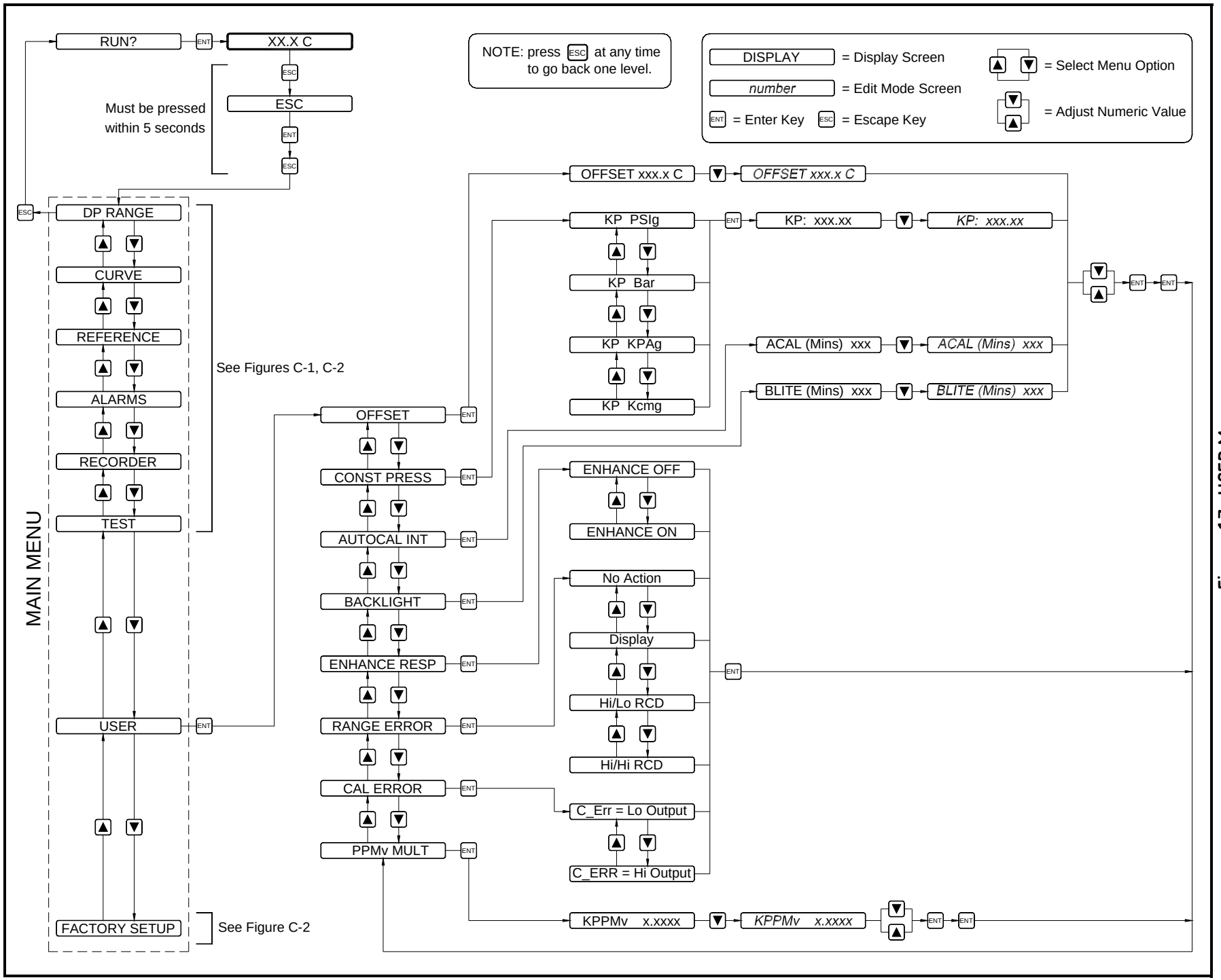


Figure 17: USER Menu

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Appendix C. Data Information Sheet

Use this sheet to record all of the data that you enter into the *User Program*. If data is lost for any reason, use this sheet to re-program your unit. Store this sheet and any other related documents in a safe place for future reference.

Tables are provided for entry of the following information:

- Dew Point Measurement Range [Table 15 on page 96]
- Calibration Data for Moisture [Table 16 on page 96]
- Calibration Data for Auxiliary Input [Table 17 on page 97]
- Probe Serial Number [Table 18 on page 97]
- MH Reference Values for Moisture [Table 19 on page 97]
- Alarm Output Settings [Table 20 on page 97]
- Recorder Output Settings [Table 21 on page 98]
- User-Defined Functions [Table 22 on page 98]

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Notes:

Date:

Unit Serial Number:

Application Description:

Table 15: Dew Point Measurement Range

High	Low

Table 16: Calibration Data for Moisture

Point #	MH Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

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Table 17: Calibration Data for Auxiliary Input

Point #	Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Table 18: Probe Serial Number

__ __ __ __ __ __

Table 19: MH Reference Values for Moisture

High	Low	Zero

Table 20: Alarm Output Settings

Alarm A		Alarm B	
Mode:		Mode:	
Low:		Low:	
High:		High:	

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Table 21: Recorder Output Settings

Recorder A		Recorder B	
Range:		Range:	
Mode:		Mode:	
Zero:		Zero:	
Span:		Span:	

Table 22: User-Defined Functions

Function	Setting
Offset Value	
Constant Pressure	
Auto-Cal Interval	
Backlight Interval	
Computer-Enhanced Response	
Range Error Processing	
Calibration Error Processing	
PPMv Constant Multiplier	

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Appendix D. Spare Parts List

Spare parts for the Moisture Monitor Series 35 are available directly from GE. Table 23 and Table 24 list the ordering information for the most commonly needed spare parts. If you require parts that are not listed here, contact GE for assistance.

Table 23: Rack-, Bench-, and Panel-Mount

P/N	Qty	Note*	Description
703-1092-02	1		Display PCB
193-018	1	A, B	Fuse, 1/8 Amp
193-025	1	C	Fuse, 1/4 Amp
M2L	1	A	Moisture Probe
213-198-09	1		9-pin Terminal Plug
213-198-11	1		11-pin terminal Plug
*A = 0-2 yrs operation, B = AC units only, C = DC units only			

Table 24: Weatherproof Unit

P/N	Qty	Note*	Description
703-1092-03	1		Backlit Display PCB
193-018	1	A, B	Fuse, 1/8 Amp
193-025	1	C	Fuse, 1/4 Amp
M2L	1	A	Moisture Probe
*A = 0-2 yrs operation, B = AC units only, C = DC units only			

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Appendix E. Older Version Circuit Boards

If your Series 35 main circuit board is numbered 703-1180, use the instructions and figures in this appendix where they are referenced in the *User's Manual*.

E.1 Replacing the User Program

The *User Program* is stored on an EPROM (Erasable Programmable Read Only Memory) chip. The EPROM is located on the main circuit board, which is mounted inside the Series 35 electronics unit.

Follow the instructions in *Replacing the User Program* (starting on page 63). If your unit's main circuit board is numbered 703-1180, use Figure 18 on page 102 to locate the EPROM.

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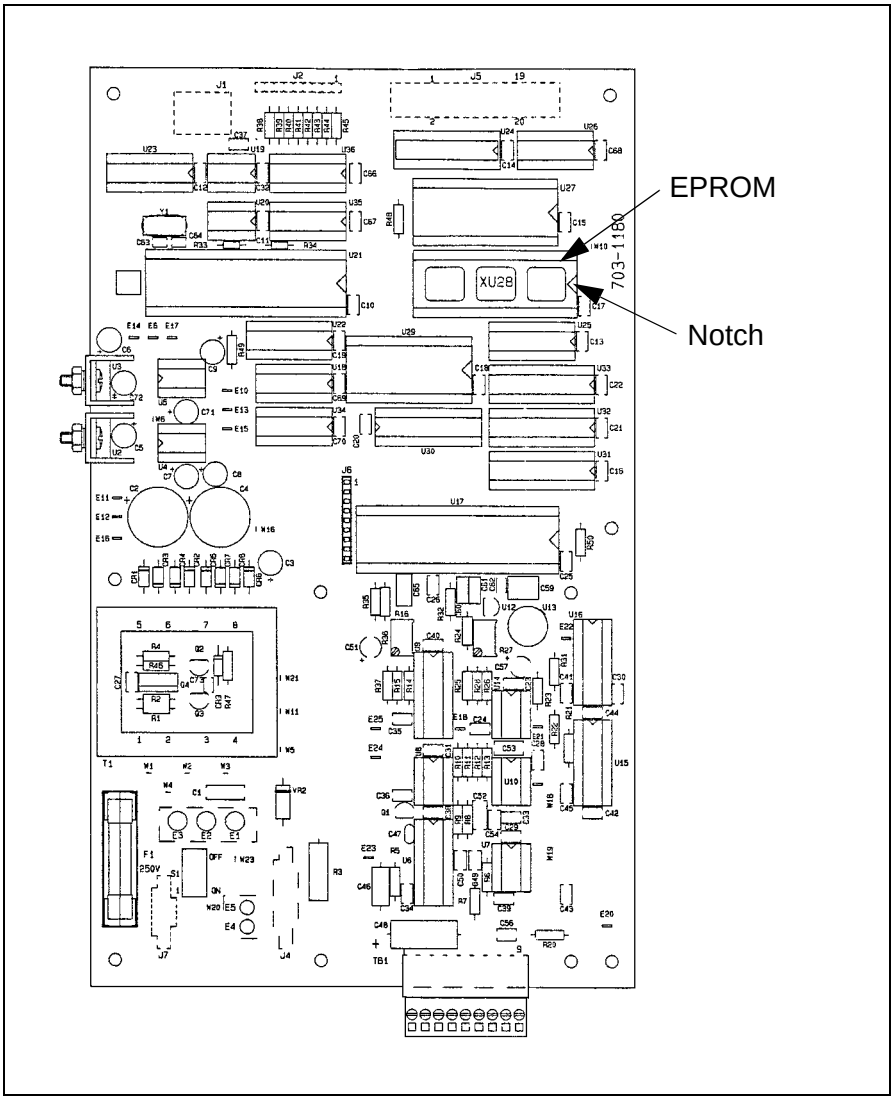


Figure 18: EPROM and Notch (ref. dwg #703-1180)

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A

Alarms
- Configuring . . . 43
- Enabling/Disabling . . . 41
- Fault . . . 19
- High and Low . . . 18
- Measurement Mode . . . 41
- Measurment Units . . . 42
- Setting Up . . . 39
- Testing . . . 67
- Wiring . . . 18

Autocal Interval . . . 50
Auxiliary Input
- Specifications . . . 75
- Wiring . . . 22

B

Backlight Interval . . . 52

C

Cable
- Moisture Probe . . . 5
- Non-Standard . . . 15

Calibration
- MH . . . 24
- MH Values . . . 24, 25

Calibration Data
- Auxiliary Input . . . 35
- Moisture Probe . . . 34

Calibration Error Processing . . . 56
Circuit Board
- Current . . . 63
- Older Version . . . 101
- Replacing . . . 66

Computer-Enhanced Response . . . 53
Constant Multiplier . . . 57
Constant Pressure . . . 49

D

Drawings, Outline & Installation . . . 79

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E

Electronics Unit
- Configurations 1
- Mounting 13
- Wiring 14

EPROM 63

F

Factory Setup Menu 31
Flow Rates 77

I

Information Paragraphs vii
Intrinsic Safety 75

K

Keypad 29

L

LCD Display 1
- Configuring 38
- Messages 62

LVD Statement 23

M

M Series Probes 2
Main Menu 2, 31
Menus
- Alarms 41
- Curve 34
- DP Range 33
- Factory Setup 31
- Recorder 44
- Reference 37
- Test 67
- User 47

MH Calibration 24
Moisture Probe 2
- Wiring 16

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N

Numeric Data, Entering 32

O

Offset Value 48
Output Device 22

P

Power
    Connecting 23
    Specifications 75
Powering Up 28
Pressure
    Constant 49
Probe
    Cable 5
    Connections 17
    Installing in Sample System 11
    Moisture 2
    Precautions 6
    Recalibrating 67
    Replacing 67
    Specifications 78
    Temperature Range 6
Programming Keys 29

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R

Range Error Processing. 54
Recorder
- Adjusting. 70
- Measurement Mode. 45
- Measurement Units 45
- Output Signal 44
- Span Adjustment 73
- Specifications 75
- Testing 69
- Wiring 20
- Zero Adjustment. 70
- Zero/Span Values. 46

Reference Values. 37
Response Time 77
Return Policy 110

S

Safety
- Auxiliary Equipment viii
- General Issues vii
- Personal Equipment. viii

Sample System 2
- Guidelines 8
- Installing 10
- Installing Probe 11

Screen Messages 62
Setup Data, Factory 32
Site Selection 4
Spare Parts List 99
Specifications 75
- Electronic 75
- Probe. 78
- Temperature. 76

Switch S1 20

T

Troubleshooting and Maintenance 59

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U

Units, Display 76
User Functions
- Autocal Interval 50
- Backlight Interval 52
- Calibration Error Processing 56
- Computer-Enhanced Response. 53
- Constant Multiplier 57
- Constant Pressure 49
- Offset Value 48
- Range Error Processing 54

User Program. 2
- Entering. 30, 89
- Entering Data 29
- Exiting 30
- Replacing 63, 101

W

Warranty 109
Watchdog Function. 18
Wiring
- Alarms. 18
- Auxiliary Input. 22
- Electronics Unit. 14
- Moisture Probe 16
- Output Device. 22
- Power 23
- Recorder 20

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Warranty

Each instrument manufactured by GE Sensing is warranted to be free from defects in material and workmanship. Liability under this warranty is limited to restoring the instrument to normal operation or replacing the instrument, at the sole discretion of GE Sensing. Fuses and batteries are specifically excluded from any liability. This warranty is effective from the date of delivery to the original purchaser. If GE Sensing determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If GE Sensing determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified by GE Sensing, the repairs are not covered under this warranty.

The warranties set forth herein are exclusive and are in lieu of all other warranties whether statutory, express or implied (including warranties or merchantability and fitness for a particular purpose, and warranties arising from course of dealing or usage or trade).

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Return Policy

If a GE Sensing instrument malfunctions within the warranty period, the following procedure must be completed:

1. Notify GE Sensing, giving full details of the problem, and provide the model number and serial number of the instrument. If the nature of the problem indicates the need for factory service, GE Sensing will issue a RETURN AUTHORIZATION NUMBER (RAN), and shipping instructions for the return of the instrument to a service center will be provided.
2. If GE Sensing instructs you to send your instrument to a service center, it must be shipped prepaid to the authorized repair station indicated in the shipping instructions.
3. Upon receipt, GE Sensing will evaluate the instrument to determine the cause of the malfunction.

Then, one of the following courses of action will then be taken:

- If the damage is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
- If GE Sensing determines that the damage is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs at standard rates will be provided. Upon receipt of the owner's approval to proceed, the instrument will be repaired and returned.

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GE
Sensing

DECLARATION OF CONFORMITY

DOC-0019, Rev. A

We,

GE Sensing
1100 Technology Park Drive
Billerica, MA 01821
USA

declare under our sole responsibility that the

Moisture Monitor™ Series 35 Hygrometer

to which this declaration relates, is in conformity with the following standards:

- EN 61326-1: 2006, Class A, Table 2, Industrial Locations
  (For EN 61010-4-3, the MMS35 meets performance criteria A and, in a limited number of frequencies, performance criteria B per EN 61326)
- EN 61326-2-3: 2006
- EN 61010-1: 2001, Overvoltage Category II, Pollution Degree 2

following the provisions of the 2004/108/EC EMC and 2006/95/EC Low Voltage Directives.

The unit listed above and any ancillary equipment supplied with it do not bear CE marking for the Pressure Equipment Directive, as they are supplied in accordance with Article 3, Section 3 (sound engineering practices and codes of good workmanship) of the Pressure Equipment Directive 97/23/EC for DN<25.

Billerica - August 2010
Issued

Mr. Gary Kozinski
Certification & Standards, Lead Engineer

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978 437 1000
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E-mail: gesensingsnnservices@ge.com

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