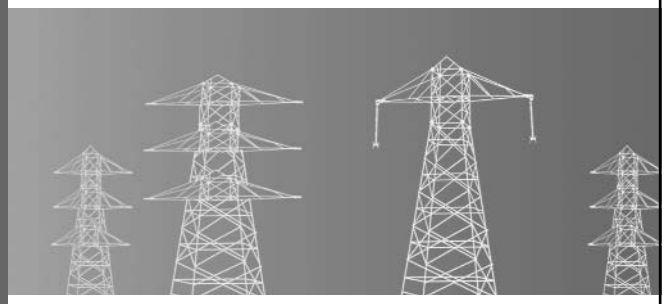
DMWH 300
DMWH 250
DMWH 200

User Manual

- Installation
- Operation
- Programming



➠ Solid State Digital Triple Display
Power Monitoring System

DMWH 300
DMWH 250
DMWH 200

Electro Industries/GaugeTech
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ELECTRO INDUSTRIES
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DMWH 300
DMWH 250
DMWH 200

SOLID STATE DIGITAL TRIPLE DISPLAY POWER MONITORING SYSTEM

USER'S INSTALLATION & OPERATION MANUAL AND USER'S PROGRAMMING MANUAL

Document# E104707 Version 1.4/12-17-2008

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CHAPTER 1
AC POWER MEASUREMENT

The economics of electric power distribution networking dictated several configurations of AC power transmission. These configurations are characterized by the number of phases and voltage levels.

1.1 SINGLE PHASE SYSTEM

SINGLE PHASE SYSTEM: A basic two wire system used in low power distribution applications, such as residential communities or offices. Typically, the voltage is 120V AC.

For higher power requirements, such as residential houses or small commercial facilities, the typical power configuration is two lines of 120V AC opposite in phase (See figure **1.1 B**).

This system produces 120 volts from line to neutral for lighting and small appliances use. The line to line voltage is 240V AC, used for higher loads such as water heaters, electric dryers, ranges, and machinery.

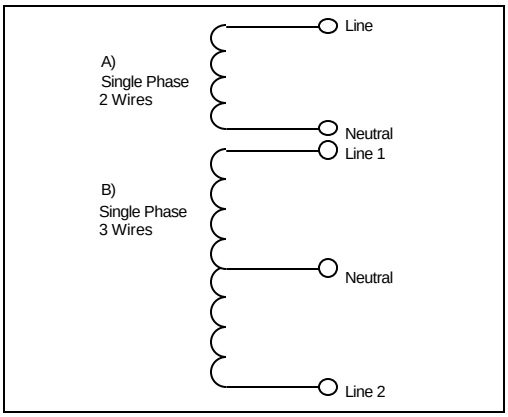


Figure 1.1
Single Phase System: (A) Two Wire
(B) Three Wire

The power (**W**) in a single phase system is: $W = E \cdot I \cdot \cos\Theta$
E = potential, **I** = current, and **cos Q** = phase difference between the potential and the current.

Power in a 120/240V AC system is: $W = (E_{Line1} \cdot I_{Line1} \cdot \cos\Theta) + (E_{Line2} \cdot I_{Line2} \cdot \cos\Theta)$

Phase differential between the potential and the current results from a non-resistive load, either reactive or capacitive.

Reactive power **VAR**: The additional power consumed, that does not produce any work, but must be delivered to the load: $VAR = E \cdot I \cdot \sin\Theta$. This is a measure of the inefficiency of the electrical system.

Apparent power **VA**: The total power delivered to the load, and the vector sum of real power and reactive power. Figure 1.2 shows a triangle which is a graphic representation of the relationships between apparent, real, and reactive power.

Power Factor **PF**: The ratio between real power and apparent power: $PF = \frac{W}{VA} = \frac{W}{\sqrt{W^2 + VAR^2}}$

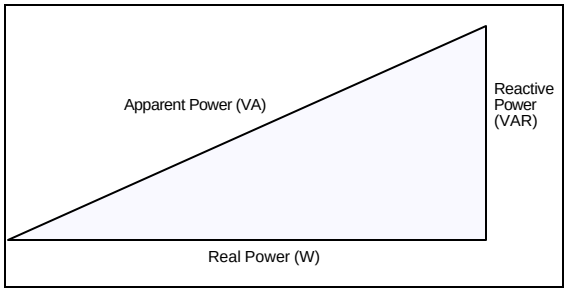


Figure 1.2

Ideal power distribution should have a PF of 1. This condition could be met only if there are no reactive power loads throughout the system. In real life applications, many loads are inductive loads. Often, corrective capacitors are installed to correct poor Power Factor.

1.2 THREE PHASE SYSTEM

THREE PHASE SYSTEM: Delivers higher levels of power for industrial and commercial applications; the three phases correspond to three potential lines. A 120° phase shift between the three potential lines.

A typical configuration has either a Delta connection or a Wye connection. (See in Figure 1.3).

$$E_{an} = E_{bn} = E_{cn} = \frac{E_{ab}}{\sqrt{3}} = \frac{E_{bc}}{\sqrt{3}} = \frac{E_{ac}}{\sqrt{3}}$$

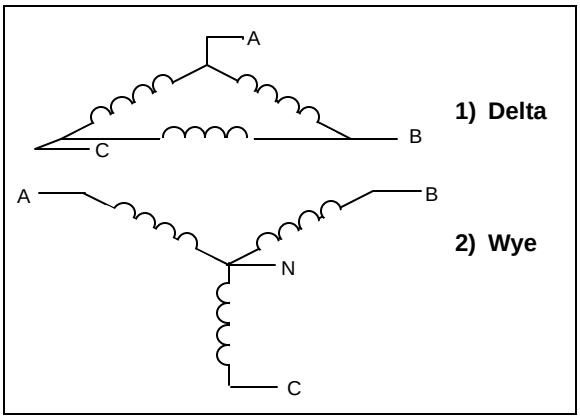


Figure 1.3
Three Phase System: 1) Delta
2) Wye

Voltages between the phases vary depending on loading factors and the quality of the distribution transformers. The three phase system is distributed in different voltage levels: 208V AC, 480V AC, 2400V AC, 4160V AC, 6900V AC, 13800V AC, and so on.

Power measurement in a poly phase system is governed by Blondel's Theorem. **BLONDEL'S THEOREM** states that in a power distribution network which has N conductors, the number of measurement elements required to determine power is N-1.

A typical configuration of poly phase system has either a Delta connection or a Wye connection. (See **Figure 1.4**).

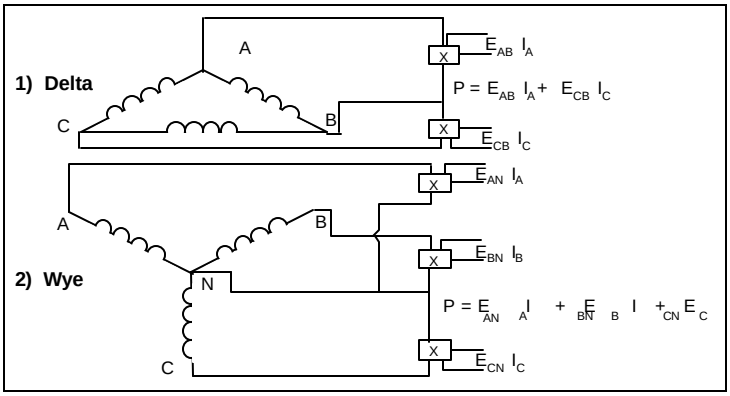


Figure 1.4
Poly Phase System: 1) Delta
2) Wye

1.3 CONSUMPTION, DEMAND, AND POWER FACTOR LOSSES

The total electric energy usage over a period of time is the consumption **WH**.

CONSUMPTION: $WH = W \cdot T$ **W** = instantaneous power **T** = time in hours

Typically, the unit in which consumption is specified is the kilowatt-hour (KWH). **KILOWATT-HOUR** : one thousand watts consumed over one hour. Utilities use the **WH** equation to determine the overall consumption in a billing period.

DEMAND: Average energy consumed over a specified time interval. The interval is determined by the utility; typically, 15 or 30 minutes. The utility measures the maximum demand over a billing period. This measurement exhibits a deviation from average consumption that may force the utility to provide generating capacity to satisfy a high maximum consumption demand. The highest average demand is retained in the metering until the demand level is reset.

POOR POWER FACTOR: Results in reactive power consumption. Transferring reactive power over a distribution network causes energy loss. To force consumers to correct their Power Factor, utilities monitor reactive power consumption and penalize the user for poor Power Factor. This is becoming an increasing problem.

1.4 WAVEFORM AND HARMONICS

Ideal power distribution has sinusoidal wave forms on voltages and currents. In real life application, where inverters, computers, and motor controls are used, distorted wave forms are generated. Those distortions consist of harmonics of the fundamental frequency.

SINUSOIDAL WAVEFORM: $A \cdot \sin(\omega \cdot t)$

DISTORTED WAVEFORM: $A \cdot \sin(\omega \cdot t) + A_1 \cdot \sin(\omega_1 \cdot t) + A_2 \cdot \sin(\omega_2 \cdot t) + A_3 \cdot \sin(\omega_3 \cdot t) + \cdots$

TOTAL HARMONIC DISTORTION (THD):

$$\%\ of\ THD = \frac{RMS\ of\ Total\ Harmonic\ Distortion\ Signal}{RMS\ of\ the\ Fundamental\ Signal} \times 100$$

HARMONIC DISTORTION: A destructive force in power distribution systems. It creates safety problems, shortens the life span of distribution transformers, and interferes with the operation of electronic devices.

CHAPTER 2
MECHANICAL INSTALLATION

2.1: Explanation of Symbols:

CAUTION, RISK OF DANGER. DOCUMENTATION MUST BE CONSULTED IN ALL CASES WHERE THIS SYMBOL IS MARKED.

CAUTION, RISK OF ELECTRIC SHOCK.

PROTECTIVE CONDUCTOR TERMINAL.

ALTERNATING CURRENT.

BOTH DIRECT AND ALTERNATING CURRENT.

DIRECT CURRENT.

2.2: Mechanical Installation

METER NOTES:

- To clean the meter, wipe it with a clean, dry cloth.
- Meter's environmental conditions:
  - Operating Temperature: -20°C to +70°C/-4.0°F to +158°F
  - Storage Temperature: -30°C to +80°C/-22°F to +176°F
  - Relative Humidity: 90% non-condensing
  - Ventilation requirement: Natural convection cooling is adequate. Allow unobstructed airflow around the unit and monitor for a rise in temperature when the meter is installed in an enclosed cabinet.
  - The meter has no specific protection against ingress of water.
  - The rating of this meter requires all input and output terminals to be connected permanently: modification and maintenance of any kind should be performed **only** by qualified personnel.
  - Rated Altitude: 2,000 meters maximum

These diagrams display the various possible DMWH 300 mechanical installations and Communication Converter installation.

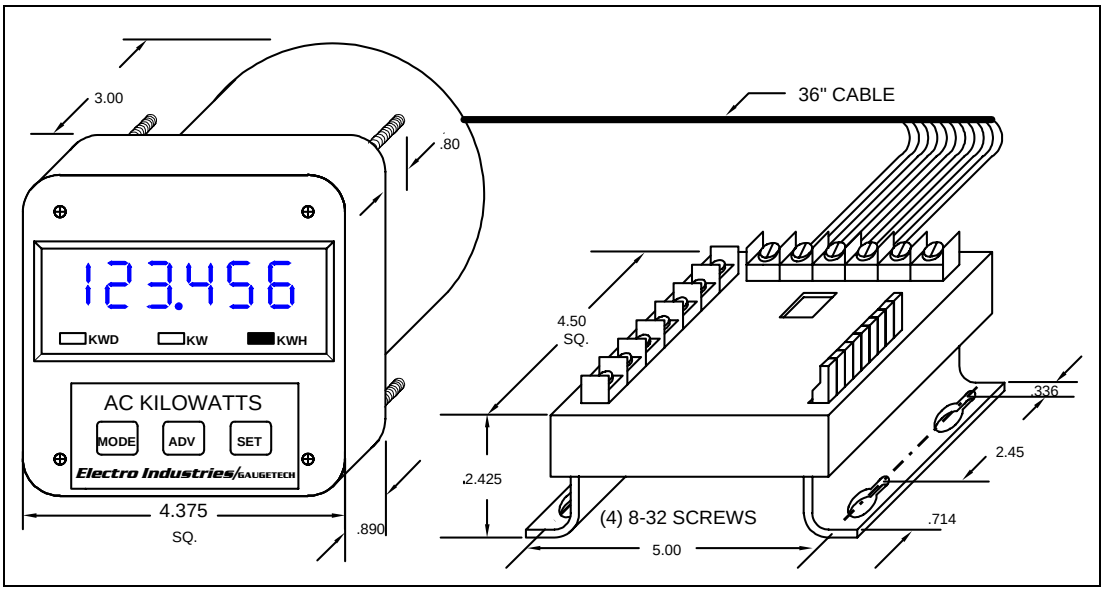


Diagram 2.1 Installation of the DMWH with K-110 Option for limited space conditions.

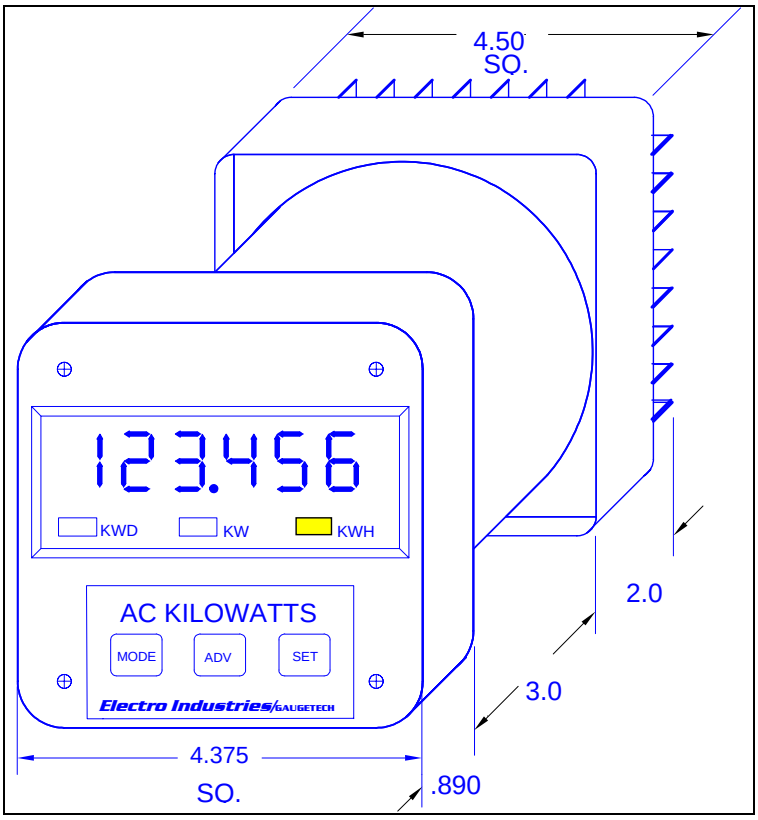


Diagram 2.2 Standard Installation of the DMWH.

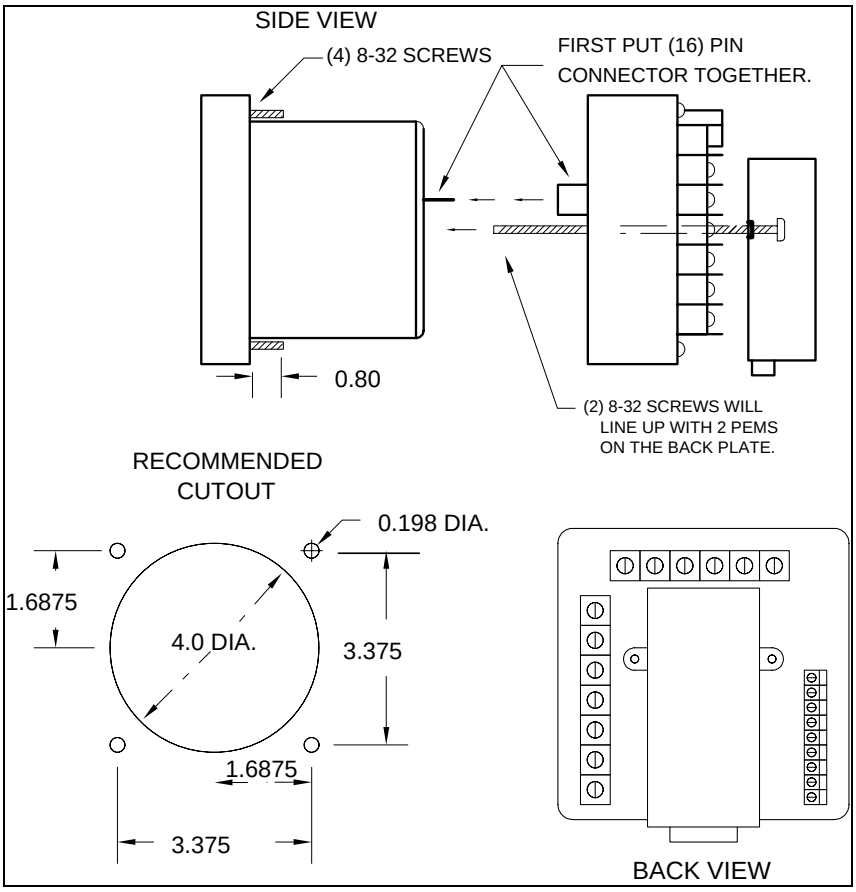


Diagram 2.3 Standard cutout for DMWH.

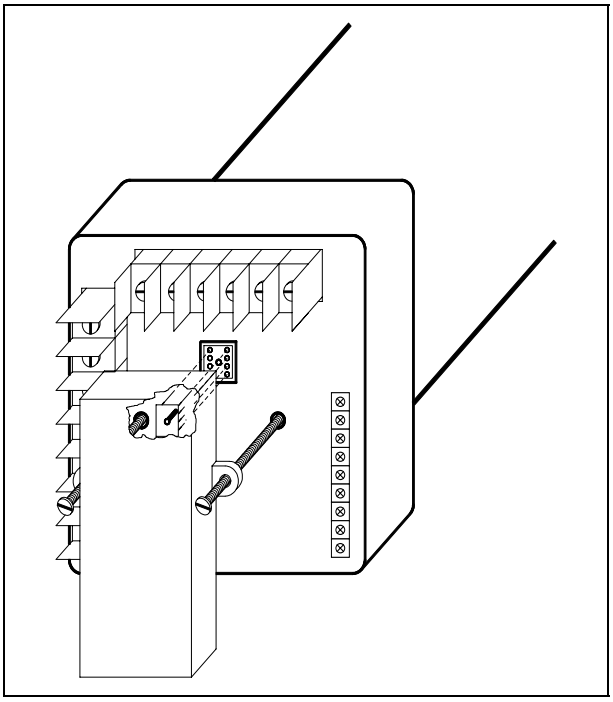


Diagram 2.4 Optional Communication Converter Installation or DC Output Module Installation.
NOTE: CAREFULLY LINE UP THE GUIDE SCREW AND EIGHT PIN PORT CONNECTOR TO PREVENT PINS FROM BREAKING**.**

CHAPTER 3
ELECTRICAL INSTALLATION

3.1: Important Considerations When Installing Meters

Please read the following sections carefully for important safety information regarding installation and hookup of the meter.

- This meter is rated as "permanently installed equipment" and must be installed in non-accessible areas only, e.g. control panels, switchgear enclosures, etc.

- Installation of the meter must be performed only by qualified personnel who follow standard safety precautions during all procedures. Those personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses and protective clothing are recommended.

- During normal operation of the meter, dangerous voltages flow through many parts of the meter, including: Terminals and any connected CTs (Current Transformers) and PTs (Potential Transformers), all I/O Modules (Inputs and Outputs) and their circuits. All Primary and Secondary circuits can, at times, produce lethal voltages and currents. Avoid contact with any current-carrying surfaces.

- Do not use the meter for primary protection or in an energy-limiting capacity. The meter can only be used as secondary protection. Do not use the meter for applications where failure of the meter may cause harm or death. Do not use the meter for any application where there may be a risk of fire.

- All meter terminals should be inaccessible after installation.

- Do not apply more than the maximum voltage the meter or any attached device can withstand. Refer to meter and/or device labels and to the Specifications for all devices before applying voltages. Do not HIPOT/Dielectric test any Outputs, Inputs or Communications terminals.

- EIG recommends the use of Shorting Blocks and Fuses for voltage leads and power supply to prevent hazardous voltage conditions or damage to CTs, if the meter needs to be removed from service. CT grounding is optional.

- The UL Measurement Category of the meter is Category III, Pollution Degree II.

- Refer to additional safety notes on the next page.

NOTES:

- IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.

- THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.

- **DISCONNECT DEVICE**: THE FOLLOWING PART IS CONSIDERED THE EQUIPMENT DISCONNECTING DEVICE. A SWITCH OR CIRCUIT-BREAKER SHALL BE INCLUDED IN THE END-USE EQUIPMENT OR BUILDING INSTALLATION. THE SWITCH SHALL BE IN CLOSE PROXIMITY TO THEEQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

3.1.1: Measurement Inputs Rating:

UL Classification: Measurement Category III, Pollution Degree II.

Current Inputs: 10A max.

Voltage Inputs[1]: 150V L-N, 300V L-L

Frequency: (45 to 75) Hz

[1] Suffix - G extends the maximum direct voltage to 300V phase to neutral, 600 volt phase to phase. Models with suffix - G are not UL rated.

3.2: Connecting the Current Circuit

Install the wiring for the current at 600V AC insulation as a minimum. The cable connector should be rated for 6 Amps or greater and have a cross-sectional area of 16 AWG minimum.

Mount the current transformers (CTs) as close as possible to the meter for best accuracy. The following table illustrates the maximum recommended distances for various CT sizes, assuming the connection is via 16 AWG cable.

CT Size	**Maximum Distance** (CT to Meter)
2.5 VA	10 FEET
5.0 VA	15 FEET
7.5 VA	30 FEET
10.0 VA	40 FEET
15.0 VA	60 FEET
30.0 VA	120 FEET

Table 3.1: CT Size and Maximum Distance

WARNING:
DO NOT leave secondary of the CT open when primary current is flowing. This causes high voltage that will overheat the secondary of the CT. Use a shorting block on the secondary of the CT.

3.3: CT Connection

When the meter is connected using the CTs, you must maintain the correct CT polarities. CT polarities are dependent upon correct connections of CT leads, and upon the direction the CTs are facing when clamped around conductors. The dot on the CT must face the line side; the corresponding secondary connection must connect to the appropriate input on the meter. Failure to connect CTs properly results in inaccurate power readings. If your meter is not reading power properly, it is more than likely the CT is incorrectly wired.

***Note**: CTs are shorted if connected to the terminal block model DSP2 or 3, even if it is detached from the meter.*

HELPFUL DEBUGGING TOOLS

OPTION 1: ISOLATING A CT CONNECTION REVERSAL POWER READING

If your meter does not read the correct watts after installation, it almost always means that the CT's have been wired in the wrong polarity. To check the polarity of the CT after the monitor has been installed, look at the single phase WATT readings to see that each of the readings are positive (assuming you are consuming power). If one of the WATT readings is negative, that particular phase CT is reversed.
To check the single phase WATT reading, press the Power button twice while the annunciator is positioned to WATTS. Then press the Phase/Next button to cycle through the phases. After connecting the polarity of the CTs, the WATT and VAR readings should be correct.

OPTION 2: ISOLATING A CT CONNECTION REVERSAL USING VOLTAGE READINGS

- ⇨ Remove potential connections to terminals 6 and 7. Observe the KW reading. It should be positive.
- ⇨ If negative, reverse the CT wires on terminals 8 and 9.

Connect terminal number 6 potential. If KW decreases to about zero, reverse CT wires on terminals 10 and 11.

Connect terminal number 7 potential. If KW is one-third of expected reading, reverse CT wires to terminals 12 and 13.

3.4: Connecting the Voltage Circuit

For proper meter operation, the voltage connection *must* be maintained. The voltage must correspond to the correct terminal.

The cable required to terminate the voltage sense circuit should have an insulation rating greater than 600V AC and a current rating greater than 0.1 A.

3.5: Selecting the Voltage Fuses

We strongly recommend using fuses on each of the sense voltages and the control power, although connection diagrams do not show them. Use a 1 Amp fuse on each voltage input.

3.6: Connection to the Main Power Supply

The meter requires separate control power to operate. Listed are the four different power supply options and corresponding suffixes. The maximum power consumption is 10VA or 7W. AC unit's frequency rating is 50/60Hz.

CONTROL POWER	OPTION SUFFIX
120V AC	115 A
230V AC/DC	230 A
24-48V DC	D
125V AC/DC (universal)	D2

Table 3.2: Control Power and Current

***Note*: For DC-powered units, polarity should be observed. Connect the negative terminal to L and positive terminal to L1. An earth ground connection to chassis is mandatory for normal operation (terminal three). Do not ground the unit through the negative of the DC supply.**

***Note*: Externally fuse power supply with a slow-blow 3 Amp fuse.**

3.7: Electrical Connection Installation

LISTING OF CONNECTION DIAGRAMS

I Three-Phase, Three-Wire System Delta with Direct Voltage and CTs.

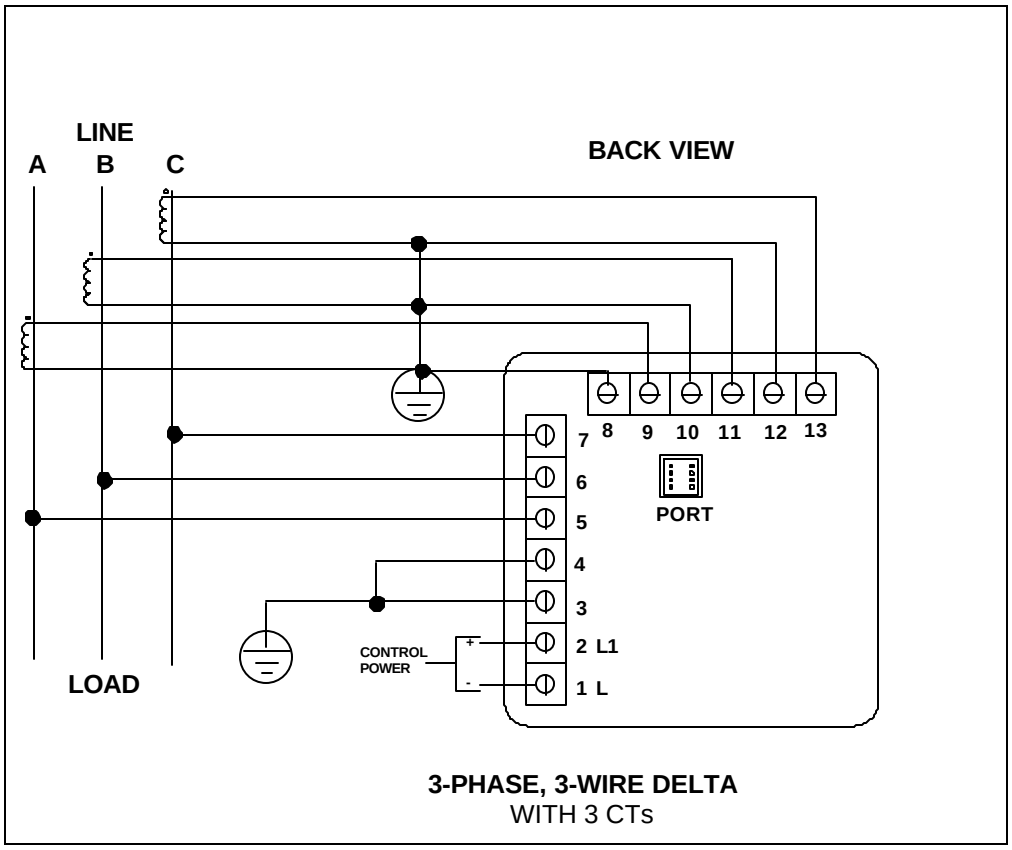
II Three-Phase, Three-Wire Open Delta with two CTs and two PTs.
(Open Delta System should only be used if the electrical system is a 3-wire OPEN DELTA. Open Delta can be enabled or disabled in Programming Group 0, Function 3.)

III Three-Phase, Three-Wire Open Delta with three CTs and two PTs.

IV Three-Phase, Four-Wire System Wye with Direct Voltage and CTs.

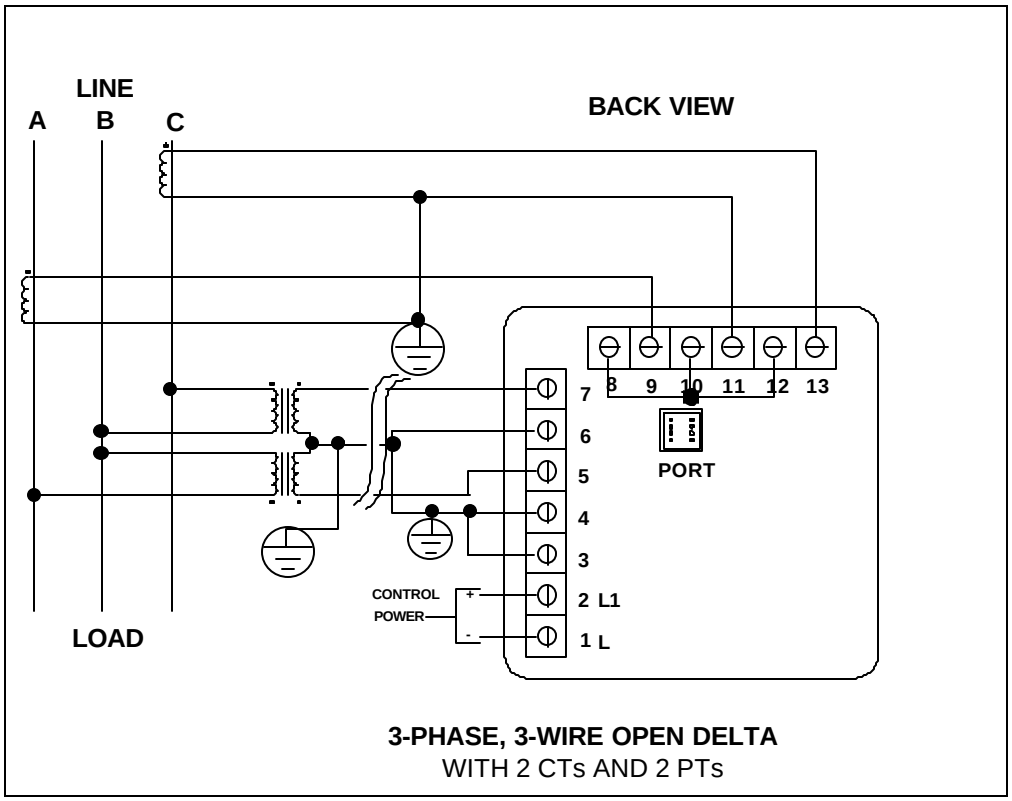
V Three-Phase, Four-Wire System Wye with CTs and PTs.

VI Three-Phase, Four-Wire System Wye 2½ Element with CTs and PTs.



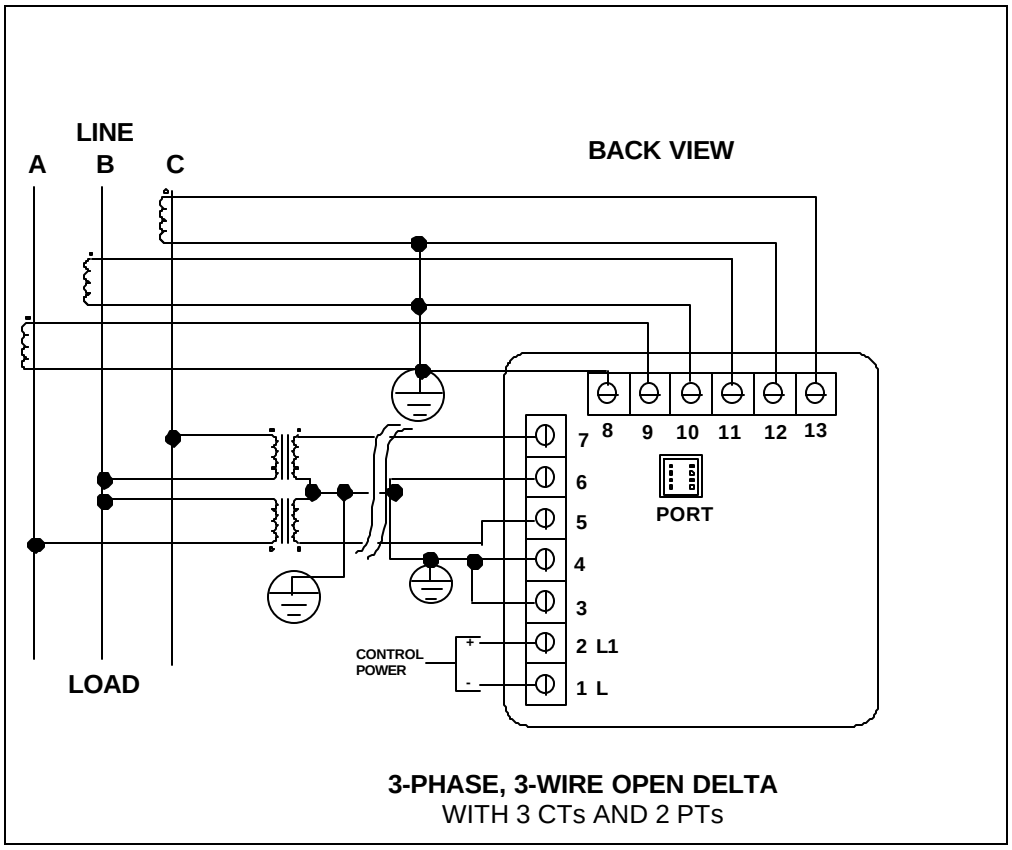
3-PHASE, 3-WIRE DELTA
WITH 3 CTs

I. Three Phase System



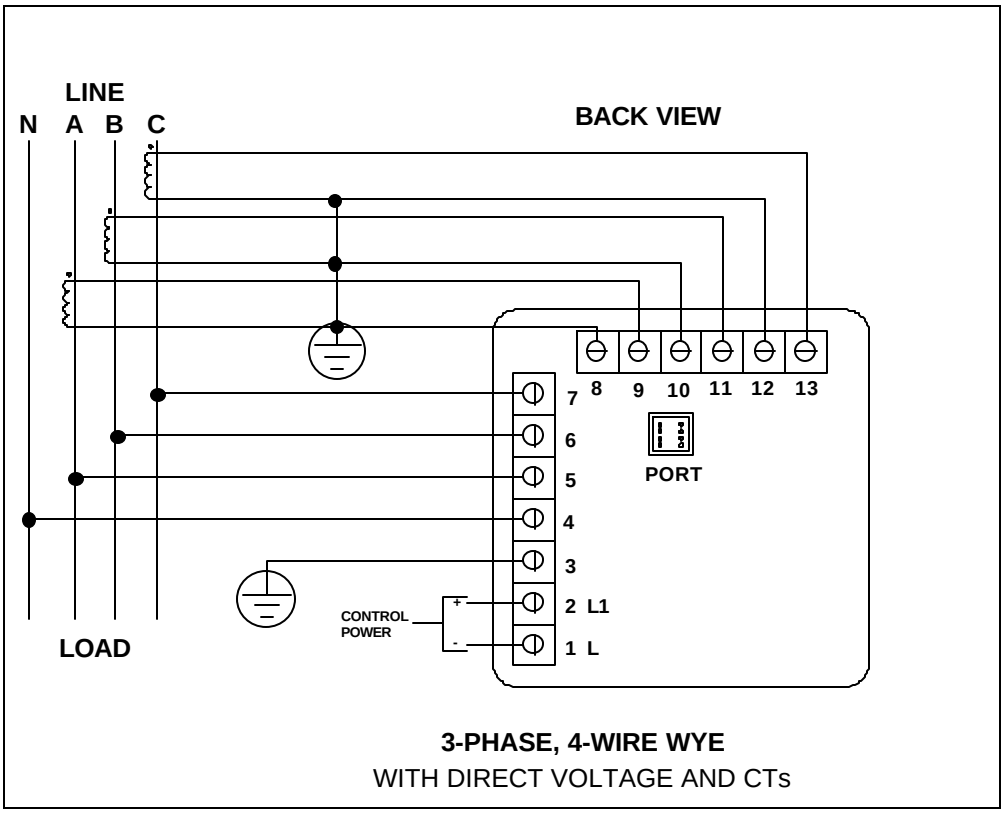
3-PHASE, 3-WIRE OPEN DELTA
WITH 2 CTs AND 2 PTs

II. Open Delta System Installation *Special programming required.*



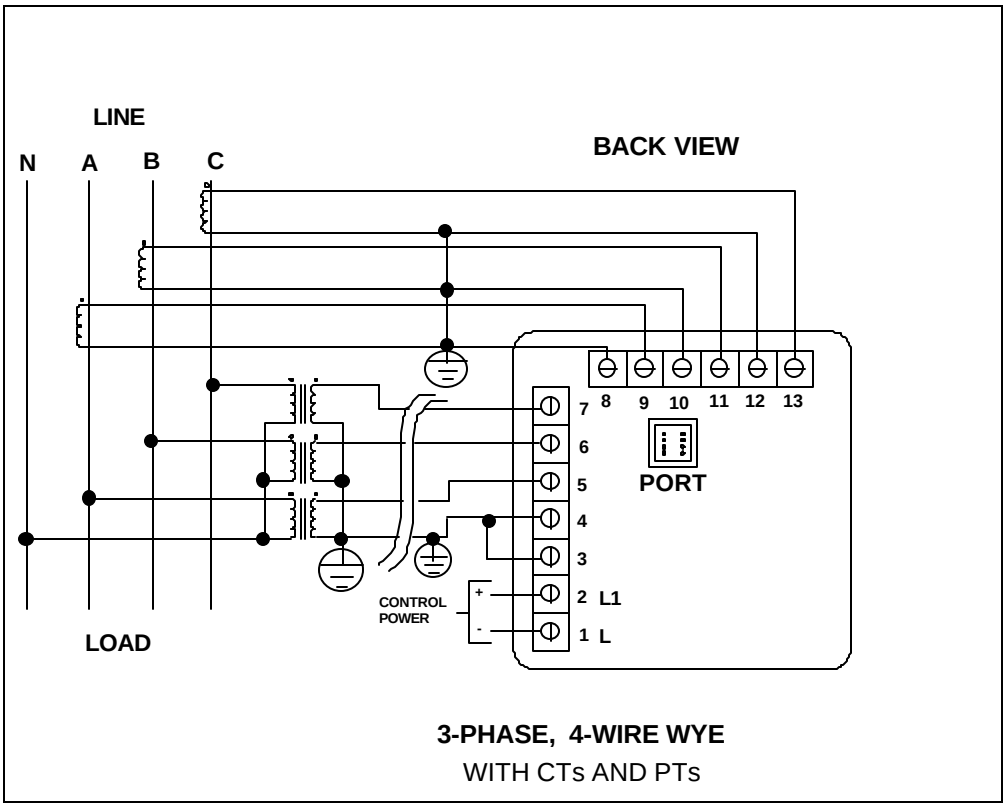
3-PHASE, 3-WIRE OPEN DELTA
WITH 3 CTs AND 2 PTs

III. Open Delta System Installation *Special programming required.*



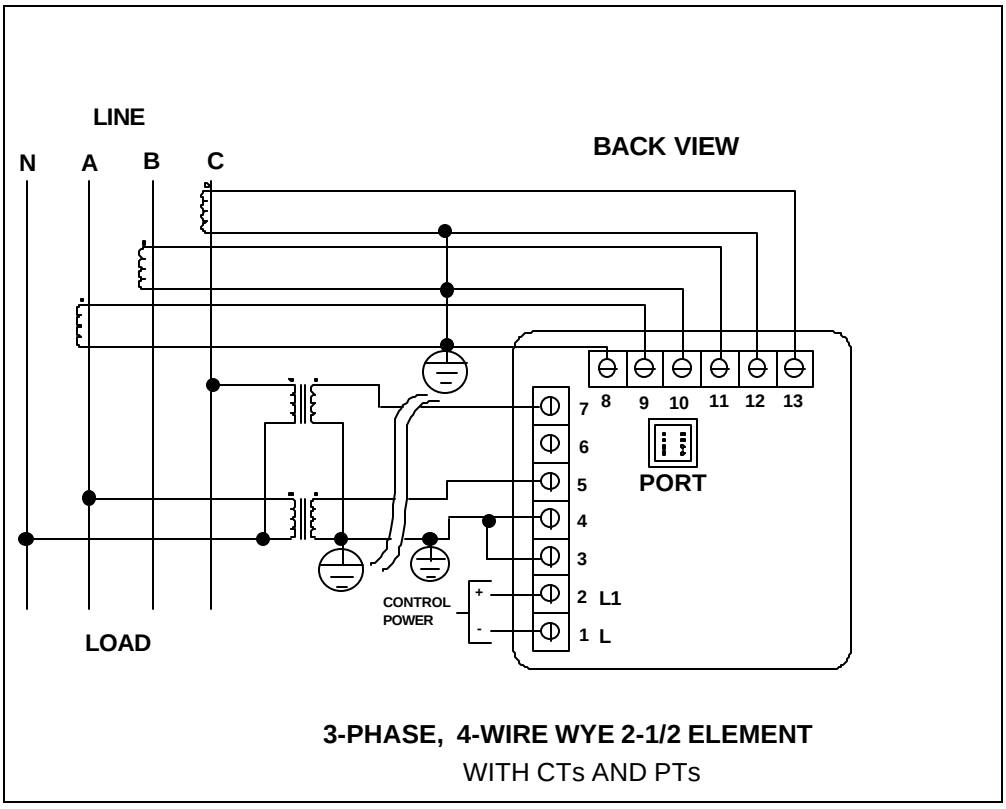
3-PHASE, 4-WIRE WYE
WITH DIRECT VOLTAGE AND CTs

IV. Three Phase System



3-PHASE, 4-WIRE WYE
WITH CTs AND PTs

V. Three Phase System



3-PHASE, 4-WIRE WYE 2-1/2 ELEMENT
WITH CTs AND PTs

VI. Three Phase System

3.7 RELAYS, PROTECTION AND PULSE OUTPUT

This section is applicable only if the -NL Relay Option was ordered.

The DMWH accesses a variety of relay options through the Programming Mode. The relay option package consists of two relays with two contacts. One is normally open and one is normally closed (either to alarm or communication, or both), and one is KYZ pulse output.

TIME DELAY: Sets the alarm off, alerting the user an out-of-limit condition occurred over the user-defined time limit. The time delay can be programmed for any desirable duration.

If the relays are dedicated to communication, there are two different modes:

- Lock ON Relay will not be affected by any alarm condition.
- Lock OFF Relay will not be affected by any alarm condition.

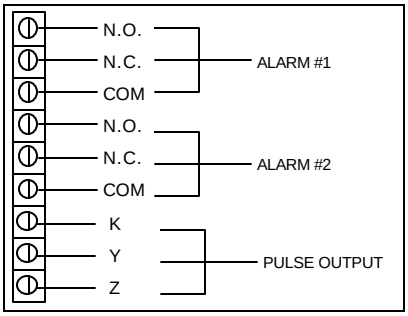
If the relays are used for communication and alarm, there are four different modes:

- Lock ON Relay stays on regardless of any alarm condition.
- Lock OFF Relay stays off regardless of any alarm condition.
- Free ON Relay turns on unless other conditions force it off.
- Free OFF Relay turns off unless other conditions force it on.

Relay connection (See **Figure 3.1**).

Form C relays, rated 250V, 5A, 2 each.

Figure 3.1
Close-up of the relays and KYZ pulse output on the rear panel. The relays shown are in the NOT energized state.



The DMWH can be programmed to detect two alarm levels for Over and Reverse Power.

KYZ RELAYS: Provides pulses for energy management systems or any other type of recording device. These pulses represent accumulated positive watt-hour, or negative watt-hour. Accomplish this assignment through Programming Mode. The pulse value is determined by the decimal increment of the power function assigned to the pulse.

kW Meter The scale factor for wattage (selectable in Programming Mode Group 0, Function 3, Pack 1) is set on kW. Follow the Decimal Point Placement corresponding to the Change in Level.

DECIMAL POINT PLACEMENT (KW)	CHANGE IN LEVEL
9999.	1 kW Per Pulse
999.9	0.1 kW Per Pulse
99.99	0.01 kW Per Pulse
9.999	0.001 kW Per Pulse

MW Meter The scale factor for wattage (selectable in Programming Mode Group 0, Function 3, Pack 1) is set on MW. Follow the Decimal Point Placement corresponding to the Change in Level.

DECIMAL POINT PLACEMENT (MW)	CHANGE IN LEVEL
9999.	1 MW Per Pulse
999.9	0.1 MW Per Pulse
99.99	0.01 MW Per Pulse
9.999	0.001 MW Per Pulse

4.1 RS232C

All DMWH instruments can be equipped with: the RS232C or the RS485.

RS232C communication links a single instrument with a computer or device such as RTU or PLC. Its capability is up to 100 feet. A standard 9-pin female serial port connector mounts on the instrument for direct connection to a computer with a 9-pin cable.

NOTE: Only three pins are used in RS232C. (See Figure 4.1).

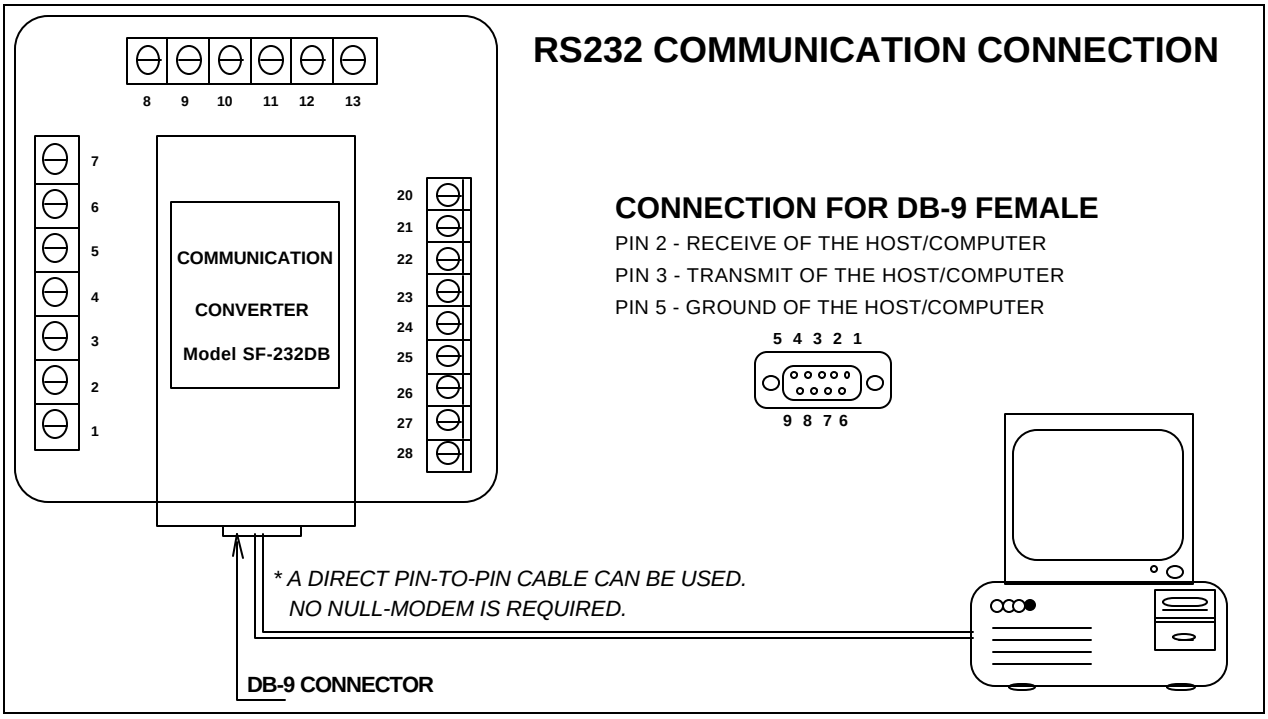


Figure 4.1 RS232C Communication Connection Installation

NOTE: TO AVOID GROUND LOOP, THE NEUTRAL AND SAFETY GROUND (PIN 3) SHOULD BE CONNECTED TOGETHER AT ONLY ONE POINT.

4.2 RS485

Each DMWH instrument has an unique address up to four digits. This allows the user to communicate with up to 10,000 instruments. Available standard baud rates are available up to 2400 baud. To select the proper baud rate, apply the following rules:

For a smaller number of instruments over a long distance, use a lower baud rate. Optimal recommended baud rate is 1200 baud if noisy conditions exist.

RS-485 parallels multiple instruments on the same link. Its operating capability is up to 4000 feet.
When using only 2 wires (on the RS485), the link includes up to 30 instruments (Figure 4.2).
When using all four wires, the link includes up to 60 instruments (Figure 4.3).

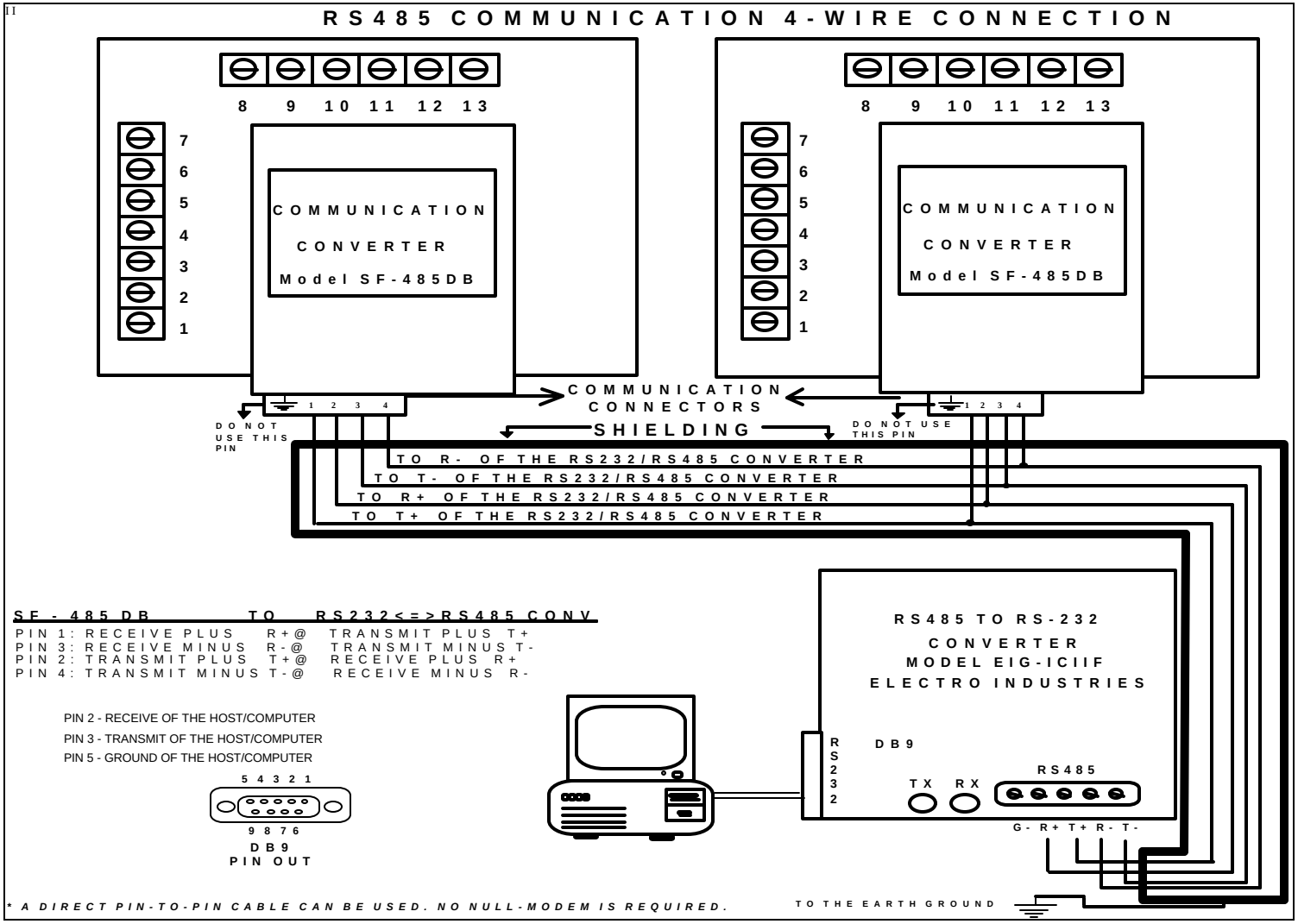


Figure 4.3 *4-Wire RS485 Communication Connection Installation*

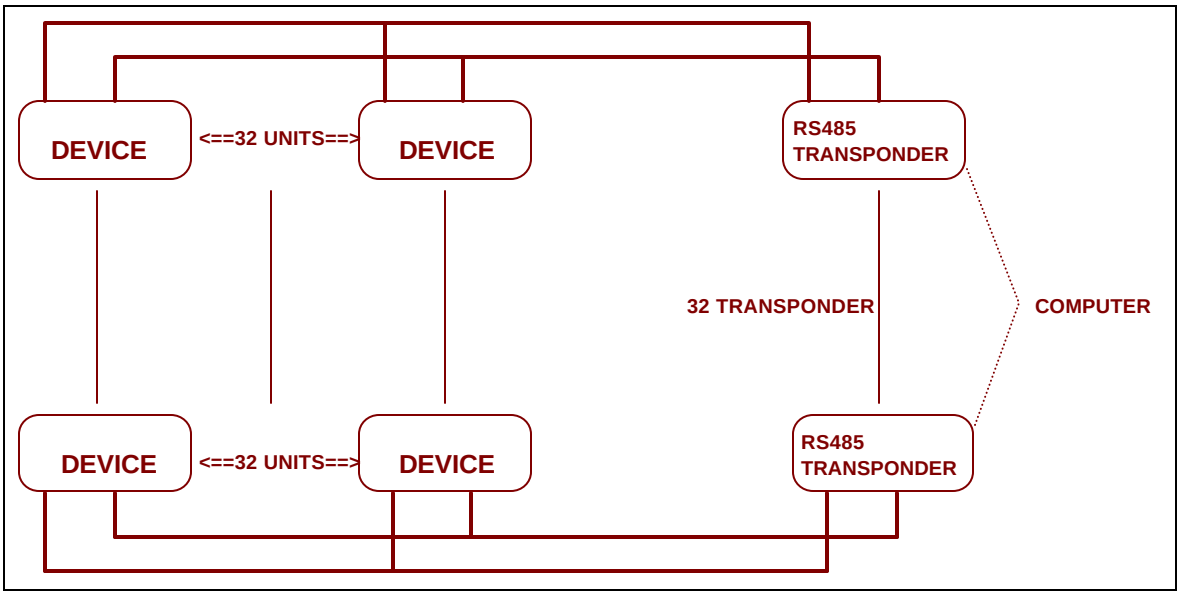


Figure 4.4 2-Wire RS485 Communication Installation Connection with Transponder

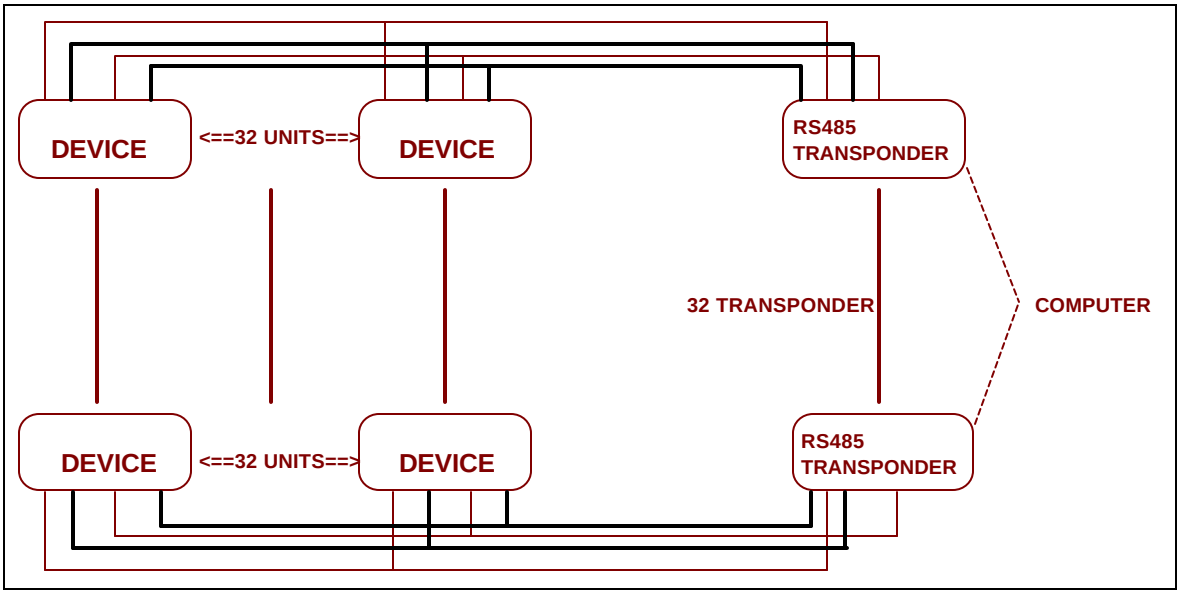


Figure 4.5 4-Wire RS485 Communication Installation Connection with Transponder

4.3 NETWORK OF INSTRUMENTS AND LONG DISTANCE COMMUNICATION

The RS485 Transponder is required for a large network of instruments.

- In a two-wire connection, a maximum of 900 instruments can be included in the same network, (Figure 4.4).
- In a four-wire connection, a maximum of 3600 instruments can be included in the same link, (Figure 4.5).

Use modems (dedicated or dial-up) when the instruments are located at great distances. However, set the modem to auto answer at the recommended value of 1200 baud rate if noise conditions exist. Also, flow control must be disabled.

I. MODEM CONNECTED TO COMPUTER (ORIGINATE MODEM)

PROGRAMMING THE MODEM

⇨ Complying with the Modem Manual for the users own modem, follow these instructions:

RESTORE MODEM TO FACTORY SETTINGS:

- This procedure erases all previously programmed settings.

SET MODEM TO DISPLAY RESULT CODES:

- The device uses the result codes.

SET MODEM TO VERBAL RESULT CODE:

- The device uses the verbal codes.

SET MODEM TO IGNORE DTR SIGNAL:

- Necessary for the device to ensure connection with originate modem.

SET MODEM TO DISABLE FLOW CONTROL:

- Necessary to communicate with remote modem connected to device.

TELL MODEM TO WRITE THE NEW SETTINGS TO ACTIVATE PROFILE:

- Place these settings into nonvolatile memory and the settings take effect after the modem powers up.

II. MODEM CONNECTED TO THE DEVICE (REMOTE MODEM)

PROGRAMMING THE MODEM

⇨ Complying with the Modem Manual for the users own modem, follow these instructions:

RESTORE MODEM TO FACTORY SETTINGS:

- This procedure erases all previously programmed settings.

SET MODEM TO AUTO ANSWER ON **N** RINGS:

- Set the remote modem to answer the call after **n** rings.

SET THE MODEM TO AUTO NEGOTIATE MODE:

- Set the remote to auto negotiate to communicate successfully with DMWH 300 and other devices in the modem.

SET MODEM TO RETURN NUMERIC RESULT CODES:

- This procedure increases speed connection with DMWH 300.

SET MODEM TO IGNORE DTR SIGNAL:

- Necessary for device to ensure connection with originate modem.

SET MODEM TO DISABLE FLOW CONTROL:

- Necessary to communicate with remote modem connected to DMWH 300.

TELL THE MODEM TO WRITE THE NEW SETTINGS TO ACTIVATE PROFILE:

- Place new settings into nonvolatile memory and setting effect after the modem powers up.

CHAPTER 5
DMWH OVERVIEW

The DMWH monitors Kilowatt, Kilowatt Demand and Kilowatt-Hour readings.

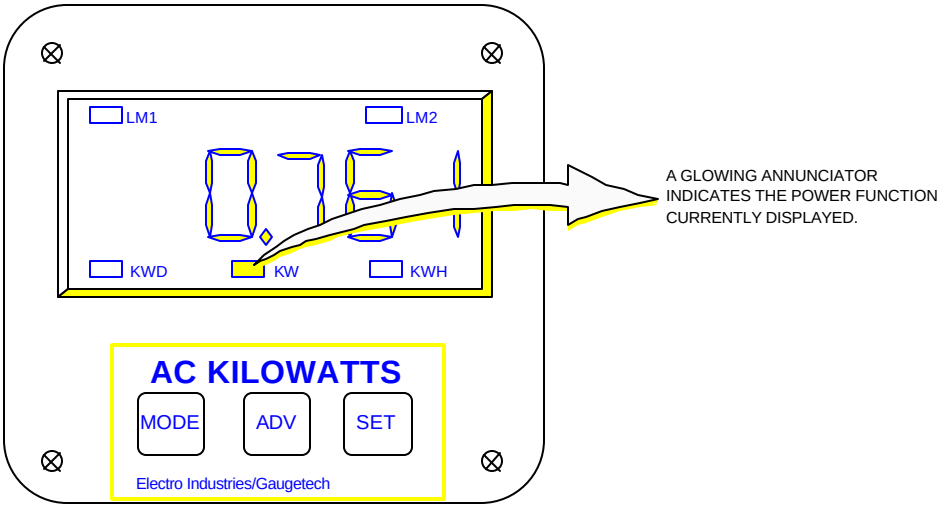
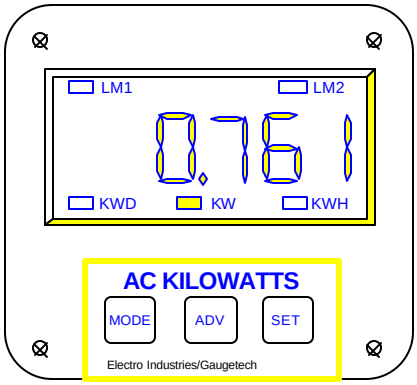
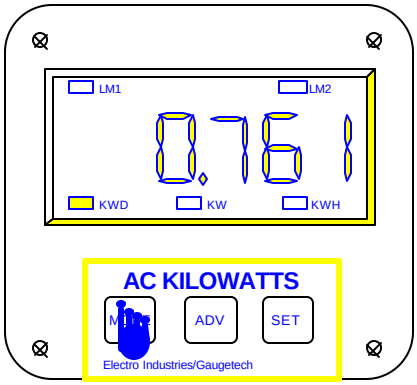


Figure 5.1 *The DMWH front panel with display and keypad.*

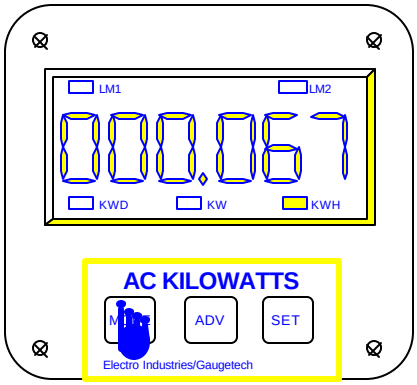
5.1 ACCESSING KW, KWD, KWH



⇨Upon power up, the DMWH monitors instantaneous kilowatts and KW glows.



Step 1:
a. To access the kilowatt demand reading, press ***MODE*** once and KWD glows.



Step 2:
a. Press ***MODE*** once more to access kilowatt hour reading and KWH glows.

5.2 RESETTING KWD/KWH READINGS

Use the reset function if a new value is desired. It is available in two different modes.

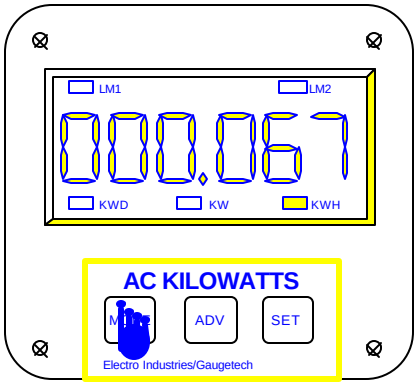
1. **UNPROTECTED MODE** - Allows quick and easy resetting of kilowatt-demand and Kilowatt-Hour readings
2. **PROTECTED MODE** - Prevents unauthorized personnel from resetting the kilowatt-demand and Kilowatt-Hour readings.

Select Unprotected Reset or Protected Reset in Programming Mode in Group 0, Function 3, Pack 1, Switch B. Set to Disable for Unprotected Reset. Set to Enable for Protected Reset. (See Programming Section for Reset Protection procedure).

❑ **UNPROTECTED RESET**

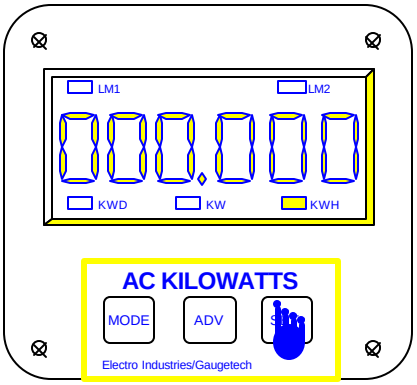
Select KWD or KWH by pressing ***MODE***. To reset in the unprotected mode, press ***SET***. The reading resets.

To **reset the KWH reading in Unprotected Mode**, follow these steps:



Step 1:

a. Press ***MODE*** to access Kilowatt-Hour readings.



Step 2:

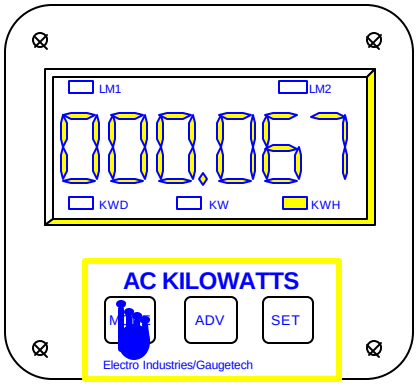
a. Press ***SET*** to reset.

⇨The display blanks and the KWH reading resets to *000.000*.

❑ **PROTECTED RESET**

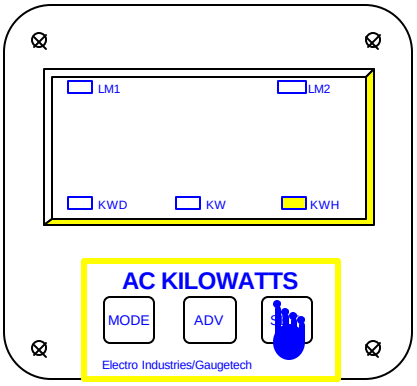
If the has a protected reset, the user must enter a password before resetting the readings. The password ***005***.

To **reset KWH reading in the Protected Mode**, follow these steps:



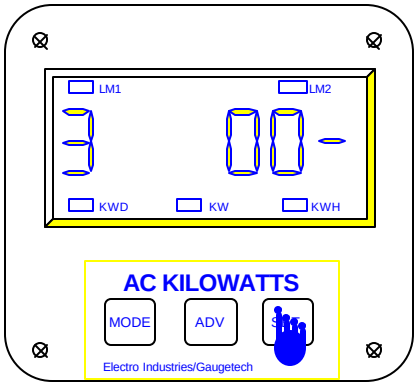
Step 1:

a. Press ***MODE*** to access Kilowatt-Hour readings.



Step 2:

a. Press ***SET*** to start the reset procedure.



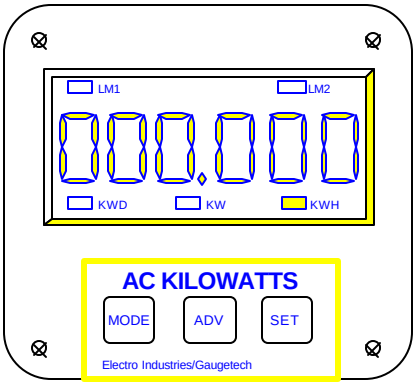
Step 3:

⇨ Three dashes appear on the right side.

⇨ A single digit begins scrolling on the left side.

a. Press ***SET*** to select the appropriate digits.

⇨ The selection is ***005***.



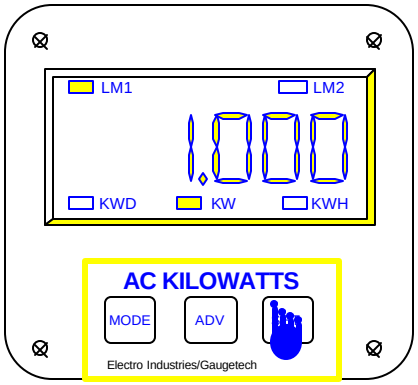
⇨ After entering the correct password, the display blanks and the KWH reading resets to *000.000*.

5.3 ACCESSING THE LM1/LM2 SET LIMITS FOR KW

The DMWH has two manual set limits that monitor the instantaneous readings, warning the user of any abnormal conditions. Each limit detects readings either above or below the set level. **SET LIMITS**: The point when the relay changes position if the DMWH is equipped with the Relay Option Package (Suffix -NL).

If a limit is exceeded, the LM1 or LM2 annunciator indicator glows and the display flashes, alternating between the instantaneous reading, and the limit (LM1 or LM2).

To **view the LM1/LM2 set limits**, follow these steps:



Step 1:

a. Press ***SET***:

- once to access positive LM1 limit
- twice times for the positive LM2 limit
- three times for the negative LM1 limit
- four times for the negative LM2 limit

⇨ The set limits appear momentarily.

⇨ LM1 and LM2 are available *only* for KW.

ACCESS MODE - Sections 5.4, 5.5, and 5.6 allow the user to access specific operation tasks (see Table 4-1).

TABLE 4-1

ACCESS	OPERATION
1	Print Programming Data
2	Print Operating Data
3	Enter Programming Mode (See Programming Manual)
4	Firmware Version/LED. Test

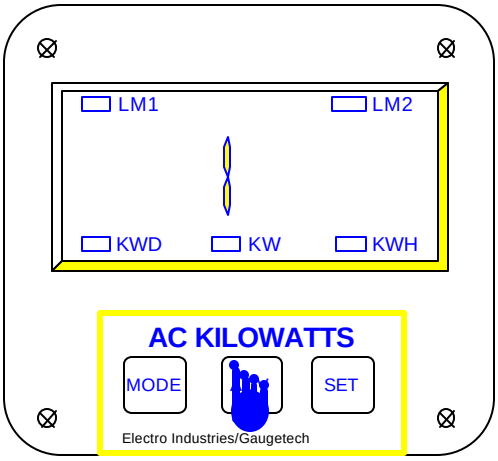
NOTE: PRINT COMMANDS 1 AND 2 ARE ONLY AVAILABLE IF ENABLED IN THE PROGRAMMING MODE AND ARE NOT RECOMMENDED WHEN USING THE RS485 MULTIMETER CONNECTION.

5.4 PRINTING OPERATING DATA

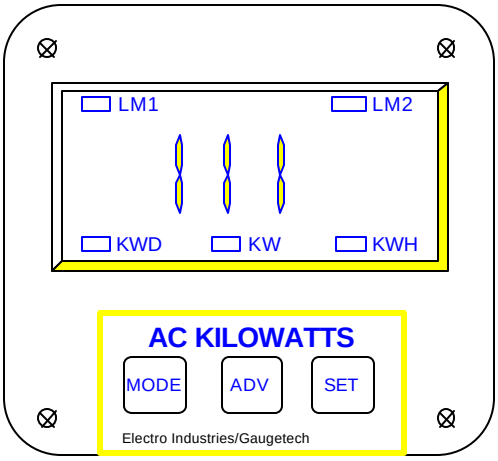
This function applies only if a serial printer is connected to the DMWH via an RS232C Communication Converter.

This function sends the data to a serial printer. This allows a hard copy of the instantaneous data for KW, KWD and KWH to compile without manually copying the data.

To **print the operating data**, follow these steps:



Step 1:
a. Press ***ADV*** until ***1*** appears.



Step 2:
a. Press ***SET*** to print Operating Data.

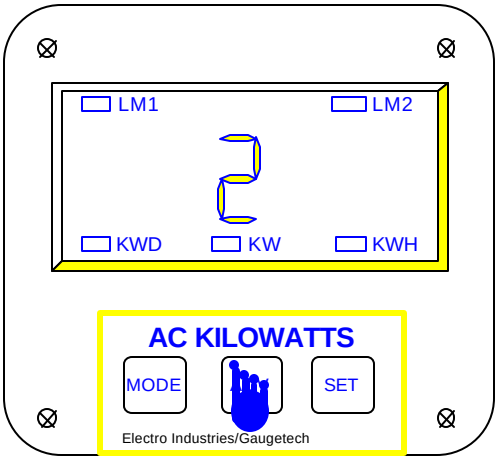
⇨ ***111*** appears momentarily, confirming printing.

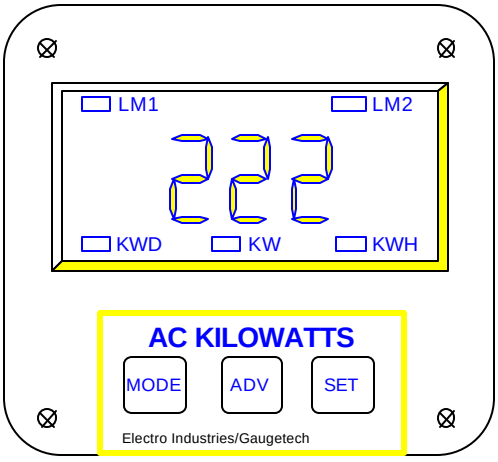
5.5 PRINTING PROGRAMMING DATA

This function applies only if a serial printer is connected to the DMWH via an RS232C Communication Converter.

This function sends the programming data (or meter setup) to a serial printer for quick reference and verification.

To **print the programming data**, follow these steps:





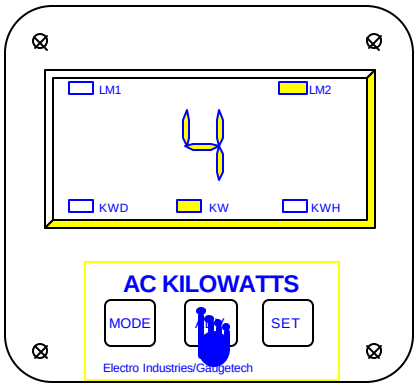
Step 1:
a. Press ***ADV*** until ***2*** appears.

Step 2:
a. Press ***SET*** to print the Programming data.

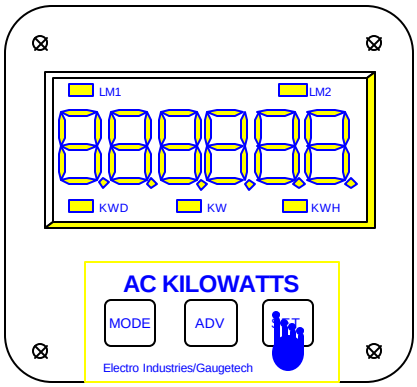
⇨ ***222*** appears momentarily to confirm printing.

5.6 FIRMWARE VERSION/LED. TEST

The DMWH accesses the firmware version number of the analog and digital microprocessors. Also, the LED test checks if the LED's and annunciators are functioning properly.

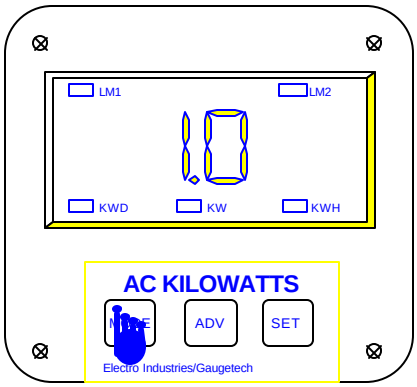


Step 1:
a. Press ***ADV*** until ***4*** appears.



Step 2:
a. Press ***SET*** to activate LED test.

⇨ All LEDs glow twice.



Step 3:
a. Press ***MODE*** to view the Firmware Version.

PROGRAMMING YOUR DMWH 300

CHAPTER 1
GENERAL PROCEDURE OVERVIEW

1.1 HOW TO USE THIS PORTION OF THE MANUAL

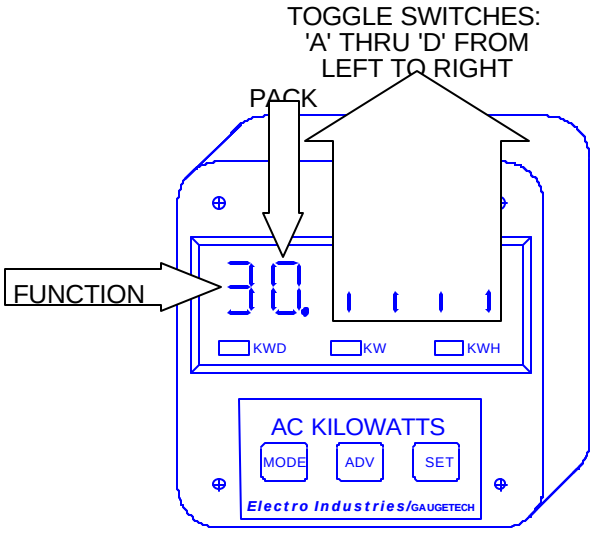
This manual contains programming for the basic operation, available options and parameters. Using the table of contents, find the programming feature location and read that chapter.

Programming tasks are arranged into seven GROUPS. Within each GROUP are the specific meter FUNCTIONS. Outlined is the general approach to alter programming mode values.

1. Enter the Programming Mode.
2. Select the desired GROUP.
3. Once the desired GROUP is selected, select a FUNCTION within the GROUP.
4. After the FUNCTION selection, proceed with DATA ENTRY of the new value of the desired parameter.
5. Proceed to program another location and/or exit the programming mode.

IMPORTANT: The full exiting procedure must be followed to store any new programming.

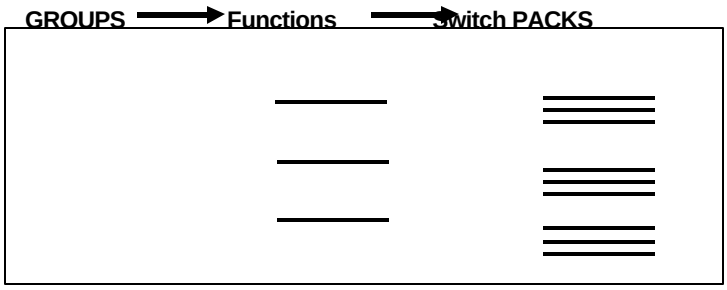
1.2 SWITCH PACKS



GROUPS, Functions, and Switch PACKS

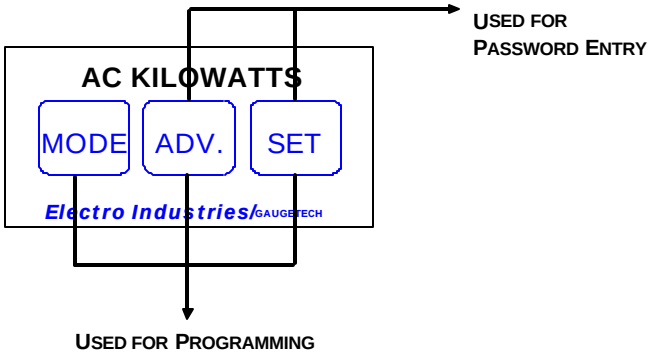
- GROUPS are the main category.
- Functions are sub categories of GROUPS.
- Switch PACKS are sub categories of FUNCTIONS.

The diagram below illustrates the arrangement of the three categories:



1.3 PROGRAMMING MODE DATA ENTRY

The DMWH 300 programming mode utilizes all three keypad buttons.



BUTTON	FUNCTION	DESCRIPTION
MODE	ADVANCES	Scrolls groups, functions, and advances to exit point from function and group level.
ADV	CHANGE VALUE	Scrolls packs, digit counters, and changes switch pack position UP or DOWN.
SET	STORE	Activates new data entry and enters or exits from group or function level.

1.4 STANDARD NUMERIC DATA ENTRY

Programmable FUNCTION values are always four digit numeric fields designed to accept any value between 0000 and 9999. When entering the value of a function, enter all four digits, leading zero's included. For instance, to enter the number 25, enter 0025.

CHAPTER 2
ENTERING THE PROGRAMMING MODE

2.1 PASSWORD ENTRY

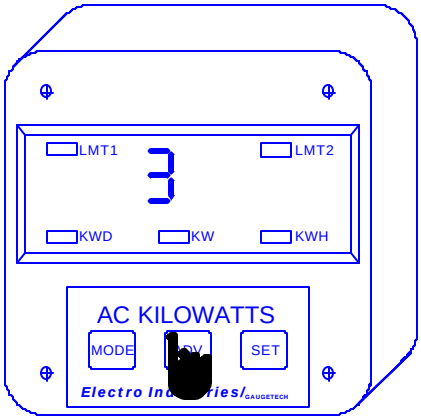
NOTE: TO ENTER THE PROGRAMMING MODE THE DMWH MUST BE IN THE KW MODE.

The DMWH 300 is password protected. To enter the Programming Mode, key in the following password. The password is 555.

The password entry may seem awkward at first. It is designed initially be difficult to use. This secures unauthorized tampering. After the user becomes familiar with password entry, it will be quick and easy to enter.

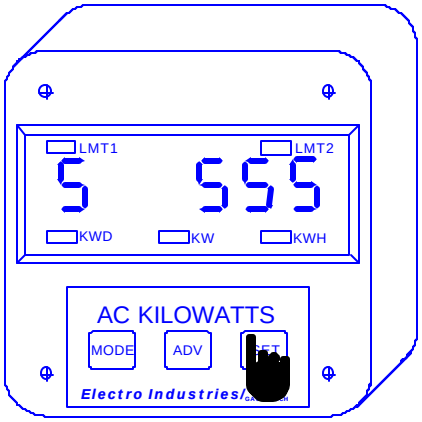
NOTE: THE METER WILL NOT STORE ANY PROGRAMMING UNLESS PROPERLY EXITED. (SEE CHAPTER 8 TO EXIT).

⇨ ENTERING THE PROGRAMMING MODE:



Step 1:
a. Press ***ADV.*** until ***3*** appears.

b. Press ***SET*** to select and ***333*** flashes momentarily.

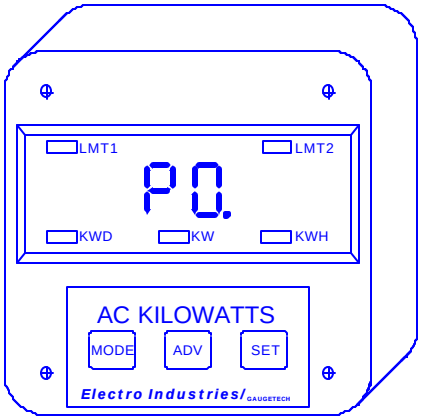


Step 2:
⇨ Three dashes appear to the right and digits begin scrolling to the left.

⇨ The password is **555**.

a. Press ***SET*** each time ***5*** appears.

⇨ Selected digits appear.



⇨ Display blanks and ***PPP*** flashes, confirming a correctly entered password.

⇨ ***PPP*** is replaced by ***P0.*** and the meter is now in the Programming Mode, GROUP 0.

CHAPTER 3
PROGRAMMING GROUP 0: GLOBAL METER SETUP

The Global Meter Setup includes functions *0* through *5* that control configuration and basic operation.

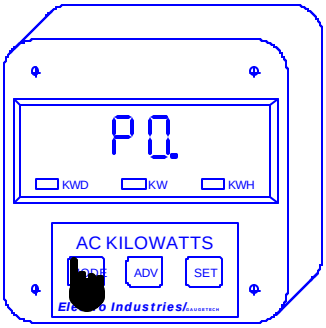
TABLE 3-1: GROUP *0* PROGRAMMING FORMAT

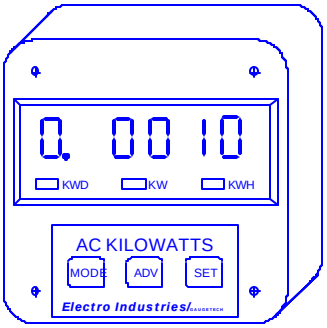
FUNCTION NUMBER	FUNCTION
0.	Interval
1.	Meter Address for Communication
2.	Baud Rate for Communication
3.	System Configuration
4.	Delay Time in Seconds for Relay 1
5.	Delay Time in Seconds for Relay 2
E.	Exit Programming Group 0

3.1 GROUP *0*, FUNCTION *0* - THE INTEGRATION INTERVAL

INTEGRATION INTERVAL: Time which all instantaneous readings are averaged to obtain a max and min demand. The Integration Interval is entered in seconds. When entering 15 minutes, enter 0900 seconds.

To **change the Integration Interval**, follow these steps:





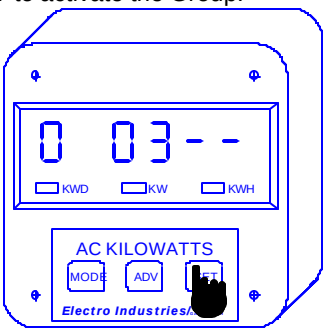
Step 1:

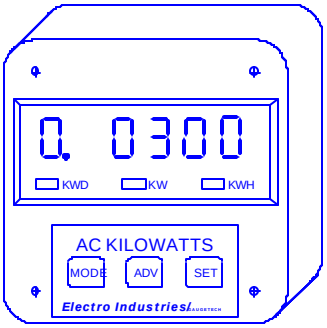
a. Enter Group Level of Programming Mode, (See Chp. 2)

⇨ Function ***0.*** appears to the left and the current setting appears to the right.

b. Press ***MODE*** until ***P0.*** appears.

c. Press ***SET*** to activate the Group.





Step 2:

a. Press ***SET*** once to begin the data entry sequence.

⇨ The previous value is replaced with four dashes.

b. Press ***ADV.*** for desired number

c. Press ***SET*** to store.

⇨ Repeat this procedure until the desired value is entered.

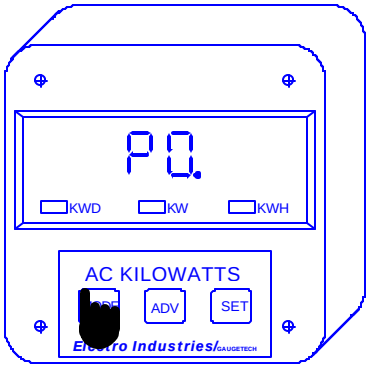
⇨ When complete, a decimal appears next to the function number and the new Integration Interval appears to the right.

See Chapter 8 to Exit.

3.2 GROUP *0*, FUNCTION *1* - THE METER ADDRESS

METER ADDRESS: Identifies the meter when communicating with digital communications. When numerous meters at one site, it is essential that each meter have its own address.

To **change the Meter Address**, follow these steps:

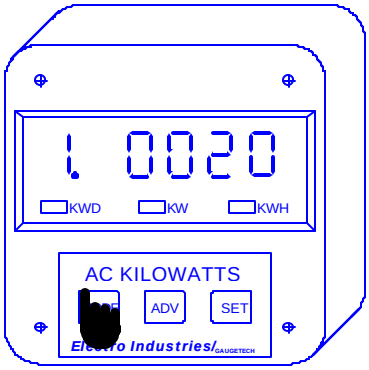


Step 1:

a. Enter Group Level of Programming Mode, (See Chp. 2).

b. Press ***MODE*** until ***P0.*** appears.

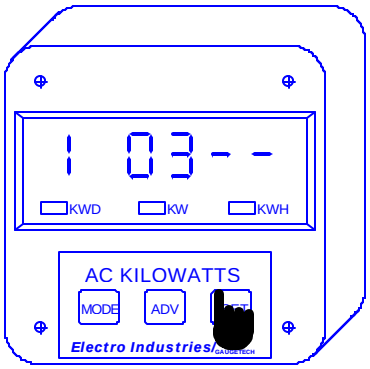
c. Press ***SET*** to activate the Group.



Step 2:

a. Press ***MODE*** until Function ***1.*** appears.

⇨ The current meter address appears to the right of the function number.



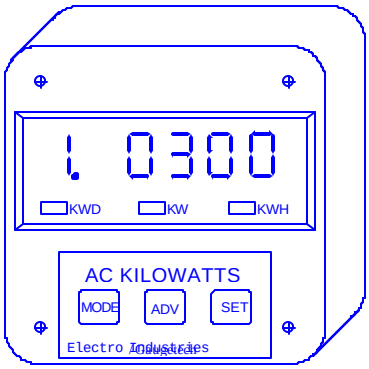
Step 3:

a. Press ***SET*** once to begin Data Entry Sequence.

⇨ The previous value is replaced by four dashes.

b. Press ***ADV.*** until the desired number appears.

c. Press ***SET*** to store.



⇨ Repeat this procedure until new Address is entered.

⇨ Once complete, a decimal appears next to the function number and the new Address appears to the right.

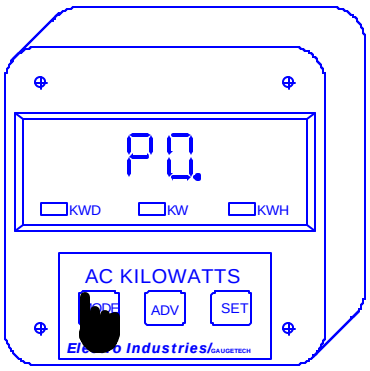
See Chapter 8 to Exit.

3.3 GROUP *0*, FUNCTION *2* - THE COMMUNICATION BAUD RATE

BAUD RATE: Speed at which data is transmitted between meter and remote computer or serial printer. The rate programmed into the meter must match the rate used by the remote device. Valid Baud Rates are 110, 150, 300, 600, 1200, 2400, 4800 and 9600.

To **change the Communication Baud Rate**, follow these steps:

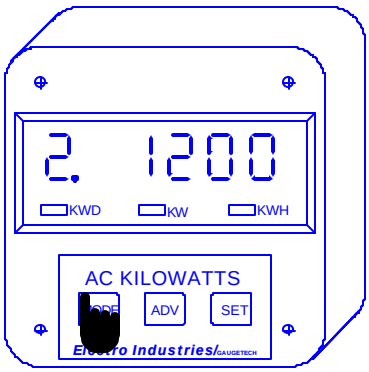
NOTE: WHEN ENTERING THE COMMUNICATION BAUD RATE REMEMBER TO INCLUDE LEADING ZERO'S FOR A FOUR DIGIT ENTRY.



Step 1:
a. Enter Group Level of Programming Mode, (See Chp. 2).

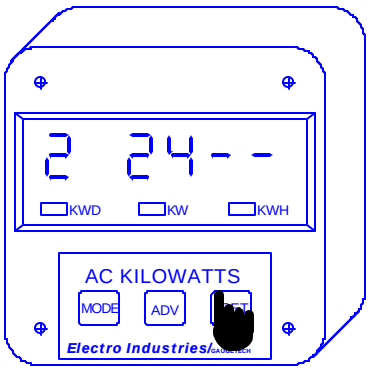
b. Press ***MODE*** until ***P0.*** appears.

c. Press ***SET*** to activate the Group.



Step 2:
a. Press ***MODE*** until Function ***2.*** appears.

⇨The current Baud Rate appears to the right of the function number.

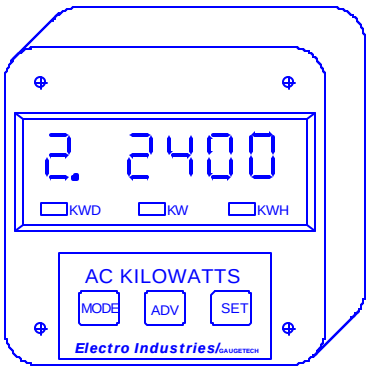


Step 3:
a. Press ***SET*** once to begin Data Entry Sequence.

⇨The previous value is replaced with four dashes.

b. Press ***ADV.*** for desired number.

c. Press ***SET*** to store.



⇨Repeat this procedure until new Baud Rate is entered.

⇨When complete, a decimal appears next to the function number and new Baud Rate appears to the right.

See Chapter 8 to Exit.

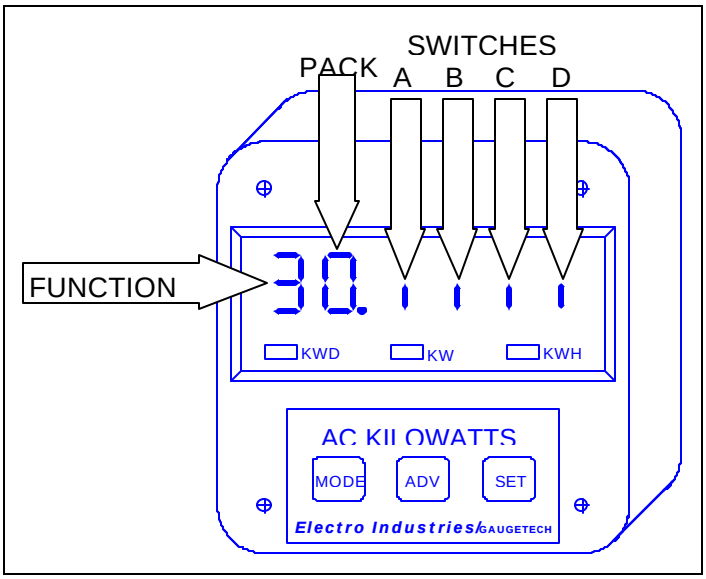
3.4 GROUP *0*, FUNCTION *3* - SYSTEM CONFIGURATION

The System Configuration sets the DMWH's basic operational parameters. This Function utilizes Switch PACKS (See SWITCH PACKS).

Function *3* contains four separate Switch PACKS: 0 - 3. Each PACK contains four individual UP/DOWN segments.

- Toggling the segment between UP and DOWN, toggles the switch ON or OFF, or choose between two options.

The meter displays one Switch PACK at a time. Press ***ADV.*** to scroll from PACK to PACK.



PRINTING OPTION

To print, Access Mode 1 and Mode 2 (See Installation and Operation section). Disable printing serial options when using a multimeter communications connection RS-485.

Disabling prevents:

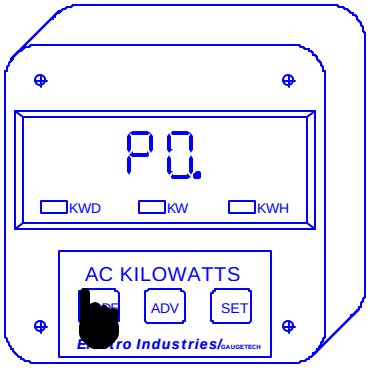
1. Printing through the keypad.
2. Corrupting data at a computer terminal while multiple meters poll.
3. Corrupting printing commands through communications.

TABLE 3-2: SYSTEM CONFIGURATION - SWITCH FEATURES

PACK	SWITCH	FEATURE	SEGMENT POSITION
0	A	Reserved	-
	B	Reserved	-
	C	Reserved	-
	D	Reserved	-
1	A	Non-significant Blank Leading Zero	UP➪Enable DOWN➪Disable
	B	Reset Protection (Refer to Installation and Operation Section)	UP➪Enable DOWN➪Disable
	C	Reserved	-
	D	Open Delta Installation (Refer to Installation and Operation Section)	UP➪Enable DOWN➪Disable
2	A	KYZ Output for Positive WH	UP➪Enable DOWN➪Disable
	B	KYZ Output for Negative WH	UP➪Enable DOWN➪Disable
	C	Reserved	-
	D	Reserved	-
3	A	Trip Relay Computer Control (Relay Control 1 and 2 apply only if Relay Option -NL was ordered)	UP➪Enable DOWN➪Disable
	B	Trip Relay Computer Control 2	UP➪Enable[5] DOWN➪Disable
	C	Communications	UP➪Enable DOWN➪Disable

	D	DC Output (To operate DC Output, disable Pack 3, Switch C) Print Operating and Programming Data (To print, set Pack 3, Switches C and D to UP position)	UP⇨Enable DOWN⇨Disable

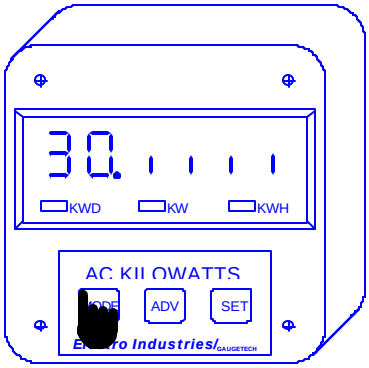
To **change the System Configuration Switch Setting**, follow these steps:



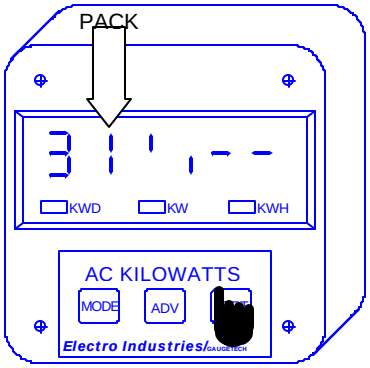
Step 1:
a. Enter Group Level of the Programming Mode, (See Chp 2).

b. Press ***MODE*** until ***P0.*** appears.

c. Press ***SET*** to activate the Group.



Step 2:
a. Press ***MODE*** until ***30.*** appears to the left, followed by the current setting for PACK 0.

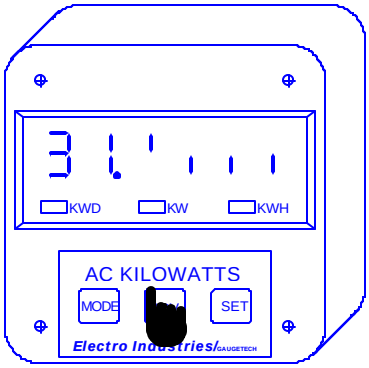


Step 3:
a. Press ***ADV.*** for the desired PACK.

⇨The current setting appears to the right of the Function and PACK numbers.

b. Press ***SET*** to activate Data Entry Sequence.

⇨The previous setting is replaced by four dashes.



Step 4:
a. Press ***ADV.*** to toggle segments for the desired settings.

b. Press ***SET*** to store.

⇨A decimal appears next to the PACK number and the new setting appears to the right.

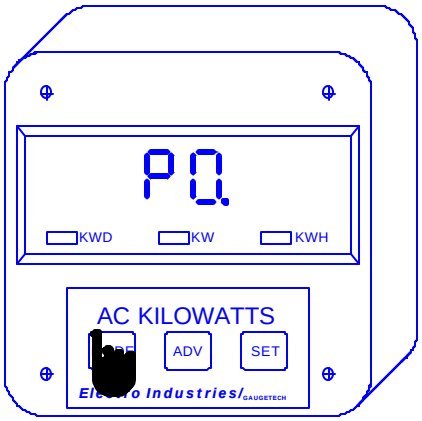
See Chapter 8 to Exit.

3.5 GROUP *0*, FUNCTIONS *4-5* - TIME DELAY FOR RELAYS 1 & 2 (OPTION -NL)

GROUP *0*, FUNCTIONS *4-5* sets the time delay for Relays 1 and 2 between 0 - 255 seconds. This allows conditions (example below) to exist for a user specified time period before the relay or alarm activates. If a time greater than 255 seconds is entered, the meter defaults to the maximum value of 255 seconds.

EXAMPLE: If Relay 1 is set for 500 Watts and the Watts increase to 501, the relay trips only after the time delay period. If the meter then measures 499 Watts, the relay returns to its original position.

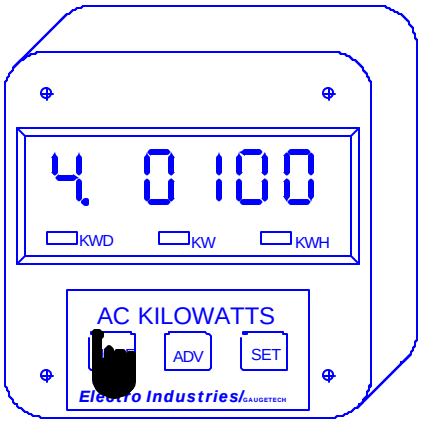
To **program Time Delay for Relay 1 and 2**, follow these steps:



Step 1:
a. Enter Group Level of Programming Mode, (See Chp. 2).

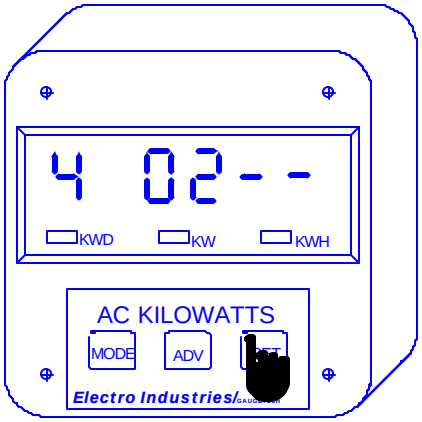
b. Press ***MODE*** until ***P0.*** appears.

c. Press ***SET*** to activate the Group.



Step 2:
a. Press ***MODE*** until Function ***4.*** appears.

⇨The current Delay Time appears to the right of the function number.

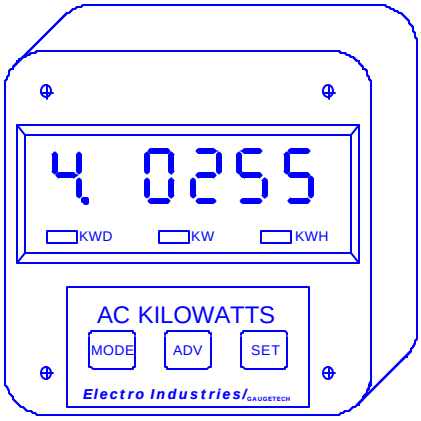


Step 3:
a. Press ***SET*** once to begin Data Entry Sequence.

⇨The previous value shifts and is replaced with four dashes.

b. Press ***ADV.*** for the desired number.

c. Press ***SET*** to store.



⇨Repeat until the desired value is entered.

⇨When complete, a decimal appears next to the function number and the new Delay Time appears to the right.

CHAPTER 4

PROGRAMMING GROUP 1: FULL SCALE SETTINGS FOR WATTS

Programming Group 1 provides Full Scale Settings for Watts. The site technician has a choice of Scale Selection between Kilowatts and Megawatts.

TABLE 4-1: GROUP 1 PROGRAMMING FORMAT

FUNCTION NUMBER	FUNCTION
0.	Full Scale Selection for Watts
E.	Exit Programming Group 1

4.1 GROUP 1, FUNCTION 0 - FULL SCALE SETTINGS AND DECIMAL POINT PLACEMENT FOR WATTS

Programming Group 1, Function 0 provides decimal point positioning for maximum resolution.

EXAMPLE 1:
Full Scale Voltage (FSV) = 120 V
Full Scale Amperage (FSA) = 5.00 A

Full Scale Wattage (FSW) is the product of FSV and FSA. For the FSW for two and a half or three element multiply the FSW by 3. For two element multiply the FSW by 2.

FSW (one element) = 120 V · 5.00 A
FSW (one element) = 600 W
FSW (three element) = 600 W ·3 = 1,800 W

Here the FSW is too small a value for a Megawatt meter. FSW in the Kilowatt meter equals 1.800 KW. In Function *2*, place the decimal point after the first digit from the left.

EXAMPLE 2: 480/120, 1000/5 CT
FSV = 480 V
FSA = 1000 A
FSW (one element) = 480 V · 1000 A
FSW (one element) = 480,000 W
FSW (three element) = 480,000 W · 3 = 1,440,000 W

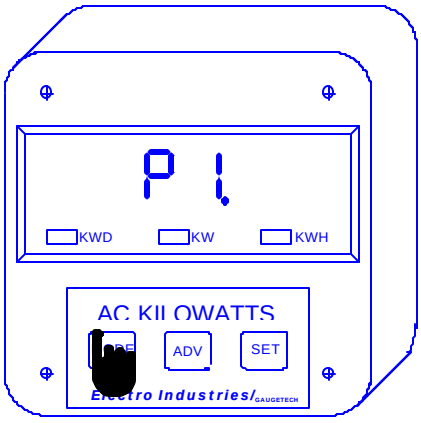
FSW for Kilowatt a meter equals 1440. KW. FSW for a Megawatt meter equals 1.440 MW. In Function 2 place the decimal point after the last digit for a Kilowatt meter and after the first digit for a Megawatt meter.

EXAMPLE 3:
FSV = 1.440 KV
FSA = 1000 A
FSW (one element) = 1440 V · 1000 A
FSW (one element) = 1,440,000 W
FSW (three element) = 1,440, 000 W · 3 = 4,320,000 W

FSW for a Kilowatt meter equals 4320 KW. Here the FSW is too large a value for a Kilowatt meter (the range is 0 - 1000). FSW for a Megawatt meter equals 04.32 MW. In Function *2*, place the decimal point after the second digit.

EXAMPLE 4: 277/480 DELTA, NO PT
FSV = 300 V
FSA = 1000 A
FSW (one element) = 300 V · 1000 A
FSW (one element) = 300,000 W
FSW (three element) = 300, 000 W · 3 = 900,000 W
(or 900 KW)

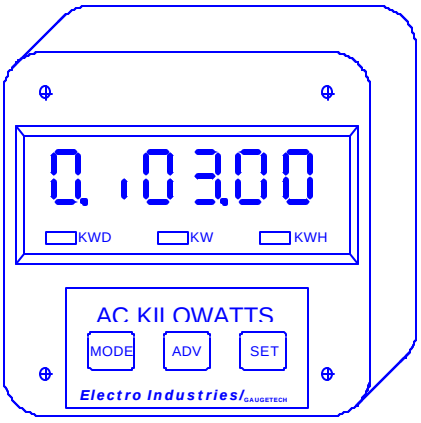
FSW enter 0900 KW.
To **change the Full Scale Setting and Decimal Point Placement for Watts**, follow these steps:



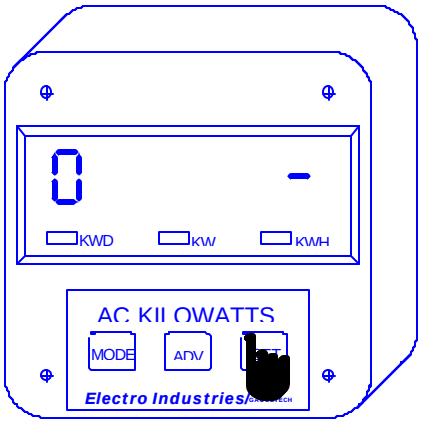
Step 1:
a. Enter Group Level of the Programming Mode, (See Chp. 2).

b. Press ***MODE*** until ***P1.*** appears.

c. Press ***SET*** to activate the Group.



Step 2:
⇨ ***0.*** appears to the left, followed by the current Scale Factor, Full Scale, and Decimal Point Placement Settings.



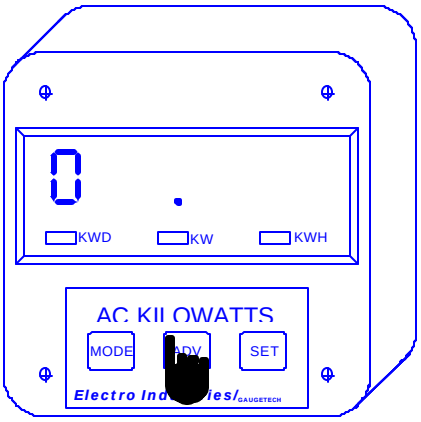
ENTERING THE SCALE FACTOR
Step 3:
a. Press ***SET*** to begin Data Entry.

⇨ The current setting is replaced by a single dash to the far right.

⇨ The Function Number remains on the far left.

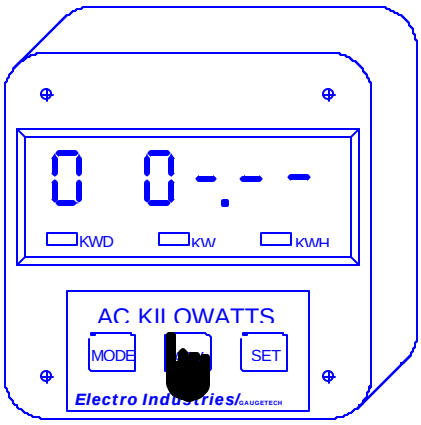
b. Press ***ADV.*** to toggle.
UP - Megawatts
DOWN - Kilowatts

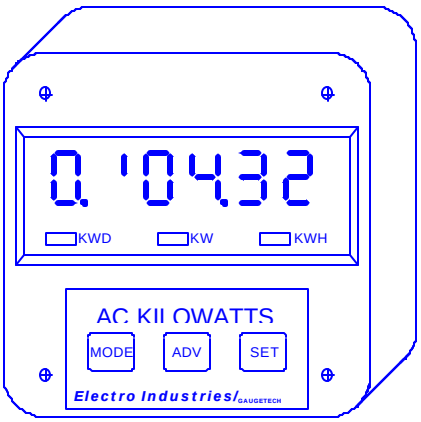
c. Press ***SET*** to store.



DECIMAL POINT SELECTION
Step 4:
a. Press ***ADV.*** to move the decimal point to desired position.

b. Press ***SET*** to store.





Step 5:

a. Press ***ADV.*** for desired digits.

b. Press ***SET*** to select.

⇨Repeat this procedure until entire Full Scale is entered.

⇨When complete, a decimal appears next to the Function number.

⇨To the right the new Scale Factor, Full Scale and Decimal Point Placement Settings appear.

See Chapter 8 to Exit.

CHAPTER 5

PROGRAMMING GROUP 2: METER CALIBRATION

WARNING - READ THIS SECTION CAREFULLY BEFORE PROCEEDING:

- The calibration procedure requires highly accurate and stable input signals. Incorrect readings result from improper calibration procedures. If unsure, return unit to the factory for calibration.
- BEFORE calibrating any channel, make a note of its Full Scale Setting (See Chapter 4). Set the Full Scale in accordance with **Table 5-2** for calibration. Restore original Full Scale Setting when calibration is completed.
- The first function in Group *2* (STD.CORR) is ***NOT*** to be changed by the user. Please make a note of the value here (□□□□) before using any *other* function in this group. If the STD.CORR value is inadvertently lost or changed, contact the factory for assistance.

All sensitive electronic measuring devices may *drift* slightly over time and require periodic calibration. We recommend returning the meter to the factory on a yearly basis for proper calibration. However, if the drift in calibration is not significant, the meter does not need yearly calibration.

TABLE 5-1: GROUP 2 PROGRAMMING FORMAT

FUNCTION NUMBER	FUNCTION
P.	Standard Correction - Factory Procedure only.
0.	High End Calibration for Watts
1.	Low End Calibration for Watts
E.	Exit Programming Group 2

5.1 CALIBRATION REQUIREMENTS

Calibration on the DMWH requires precise inputs of 120 Volts, and 5 Amps. The DMWH Suffix -G model requires precise inputs of 300 Volts and 5 amps. If this equipment is unavailable contact, the factory for assistance.

The power supply phase shift must be adjusted to achieve unity (Power Factor must equal 1). The Watts input must equal the calibration value. If PT and CT ratios are supplied, the calibration value is equal to the full scale value.

NOTE: THE METER MAY BE RESCALED BY CHANGING THE FULL SCALE ONLY WITHOUT CALIBRATING.

TABLE 5-2: CALIBRATION VALUES FOR DMWH-300 AND DMWH-250

MODEL	VOLTS / AMPS	CALIBRATION VALUE
Suffix L	75 V • 5 A • 3 or 2-1/2 Elements	1.125 KW
Standard	120 V • 5 A • 3 or 2-1/2 Elements	01.80 KW
Suffix G	300 V • 5 A • 3 or 2-1/2 Elements	04.50 KW

TABLE 5-3: CALIBRATION VALUES FOR DMWH-200

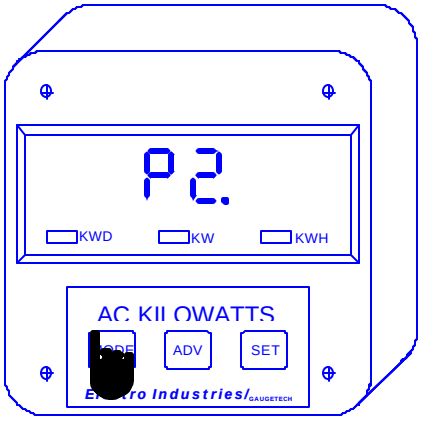
MODEL	VOLTS / AMPS	CALIBRATION VALUE
Suffix L	75 V • 5 A • 2 Elements	0750 KW
Standard	120 V • 5 A • 2 Elements	1200 KW
Suffix G	300 V • 5 A • 2 Elements	0.300 MW

Full Scale Watts is the product of Full Scale Volts and Full Scale Amps:

V • I • 3 = FSW *or* **PT • CT • 3 = FSW**

5.2 GROUP 2, FUNCTIONS 0-1 - HIGH AND LOW END CALIBRATION FOR WATTS

To **change the calibration**, follow these steps:



Step 1:

a. Enter Group Level of Programming Mode, (See Chp. 2).

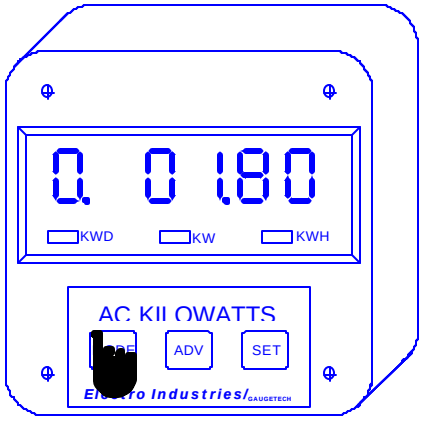
b. Press ***MODE*** until ***P2.*** appears.

c. Press ***SET*** to activate the Group.

⇨ A one digit password is required to continue.

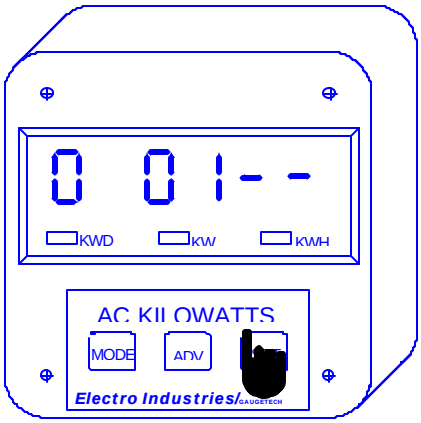
d. Press ***ADV.*** until ***5*** appears.

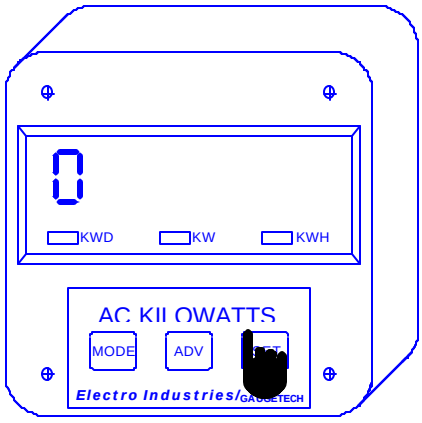
e. Press ***SET*** to select.



Step 2:

a. Press ***MODE*** until Function ***0*** appears to perform High End Calibration for Watts.





Step 3:
⇨ *At this time the calibration source should be applied to the appropriate channel.*

a. Press ***SET*** to enter the Full Scale Value.

⇨ The current value is replaced with four dashes.

b. Press ***ADV.*** for the desired digit.

c. Press ***SET*** to select.

Step 4:
⇨ Repeat this procedure until the new value is entered.

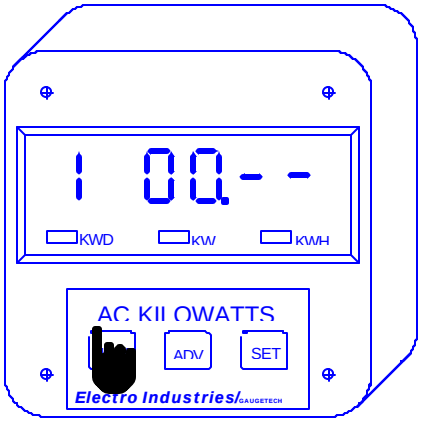
⇨ When complete, the new value blanks and after 10-15 seconds the instantaneous reading appears.

⇨ Make any necessary adjustments to watts input.

a. Press ***SET*** to store.

If the calibrated reading is unacceptable, repeat the entire procedure after checking all connections and calibration inputs.

To **perform Low End Calibration for Watts**, follow these steps:



Step 1:

⇨ *Reduce the watts input to one-half the Full Scale.*

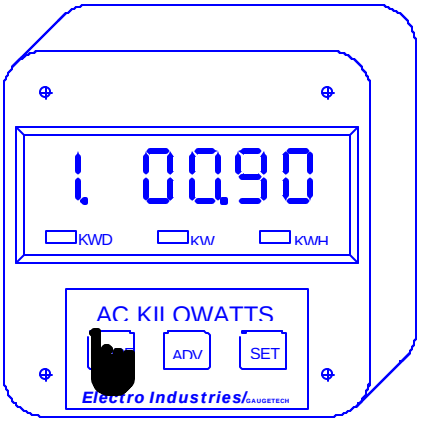
a. Press ***MODE*** until Function ***1*** appears.

b. Press ***SET*** to enter 1/2 Full Scale Value.

c. Press ***MODE*** to begin Data entry Sequence.

d. Press ***ADV.*** for desired digits.

e. Press ***SET*** to store.



Step 2:

⇨ Repeat this procedure until entire value is entered.

⇨ When complete, the display blanks.

⇨ After 10-15 seconds a number appears.

⇨ Make any necessary adjustments to input.

a. Press ***MODE*** to store.

You cannot cancel at this time.

See Chapter 8 to Exit.

CHAPTER 6
PROGRAMMING GROUP 3

The DMWH is constructed with two separate modules, joined by a connector and secured with two screws. The front module *(meter module)* contains the microprocessors, displays, and related circuitry. The rear *(input module)* supports all incoming signal connections. The sections can be easily separated, allowing the meter module to move or serviced off-site without interrupting service loops or removing meter connections.

The input module does contain some step down circuitry. Due to normal CT tolerance and resistance limitations, small channel offsets, unique to each input module can be seen. *They are measured at the factory and printed on the face of the input (rear) module, referred to as* **CORRECTION RATIOS***.*

The Programming Mode enables the user to enter the CORRECTION RATIO of any input module. This allows a site technician to move a meter to a different input module, re-program the correction ratio and resume accurate power metering.

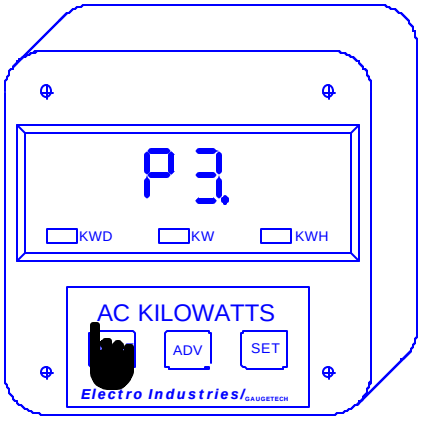
WARNING: AN INCORRECT CORRECTION RATIO ENTRY RESULTS IN FALSE READINGS.

TABLE 6-1: GROUP 3 PROGRAMMING FORMAT

FUNCTION NUMBER	FUNCTION
0.	High End Correction Ratio for Kilowatts
1.	Low End Correction Ratio for Kilowatts
E.	Exit Programming Group 3

6.1 GROUP *3*, FUNCTION *0-1*, HIGH AND LOW CORRECTION RATIOS

To **change a correction ratio for Functions *0* and *1***, follow these steps:



Step 1:

a. Enter Group Level of Programming Mode, (See Chp. 2).

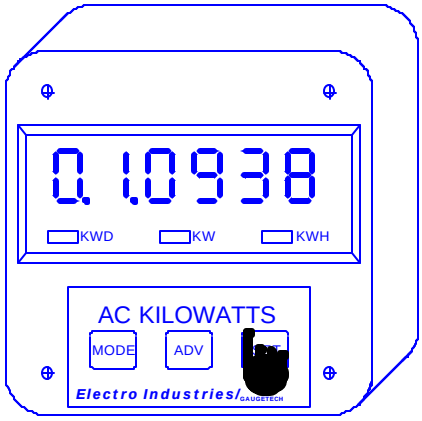
b. Press ***MODE*** until ***P3.*** appears.

c. Press ***SET*** to activate the Group.

⇨ A one digit password is required to continue.

d. Press ***ADV.*** until ***5*** appears.

e. Press ***SET*** to select.

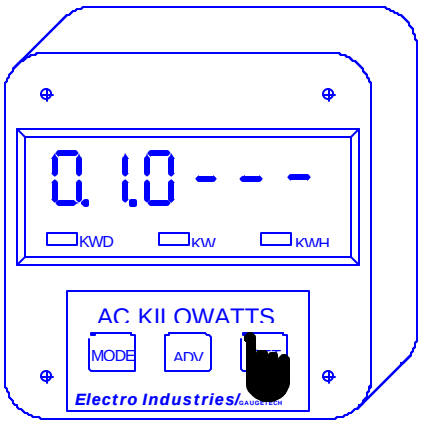


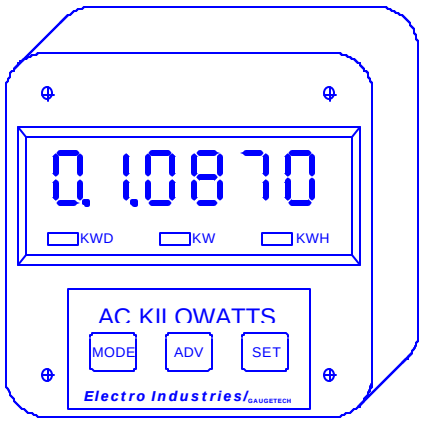
Step 2:

⇨ Function number ***0.*** appears, followed by the current Correction Ratio.

a. To begin entry of new Correction Ratio, press ***SET*** once.

⇨ The current Correction Ratio is replaced by five dashes.





Step 3:

a. Press ***ADV.*** for the desires digits.

b. Press ***SET*** to select.

⇨Repeat this procedure until the new Correction Ratio is entered.

⇨When complete, a decimal appears next to the Group number and the new Correction Ratio appears to the right.

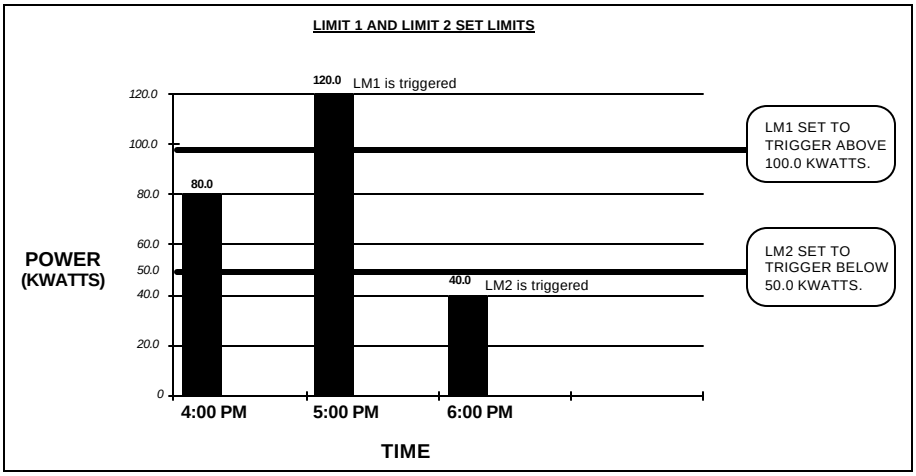
See Chapter 8 to Exit.

CHAPTER 7
PROGRAMMING GROUP 5

Set Limits alert the user when a particular power level changes. The Set Limits on the DMWH are LMT1 and LMT2. Each limit can be set at any desired level.

Group *5* contains LMT1 and LMT2 Set Limit Values for Watts. The user can program the limits for positive and negative Watts.

GRAPH 7-1: EXAMPLE OF LMT1/LMT2 SET LIMITS



7.1 TRIP RELAY

NOTE: ALL INFORMATION PERTAINING TO TRIP RELAYS 1 AND 2 APPLIES TO THE DMWH-300-NL ONLY.

The unit has two relays linked through the program to LMT1 and LMT2 Set Limits. The relay outputs can be programmed individually to close when LMT1 and/or LMT2 is triggered. Each relay has provisions for a separate delay time (see Chapter 4).

① ABOVE/BELOW Whether to trip on a signal ABOVE, or BELOW, to the selected level.
② TRIP RELAY 1 Whether to trip relay 1.
③ TRIP RELAY 2 Whether to trip relay 2.
④ LEVEL The level at which the warning mechanism trips.

TABLE 7-1: GROUP 5 PROGRAMMING FORMAT

FUNCTION NUMBER	FUNCTION
0.	LMT1/LMT2 Set Limits for Positive Watts
1.	LMT1/LMT2 Set Limits for Negative Watts
E.	Exit Programming Group 5

7.2 GROUP *5*, FUNCTIONS *0-1*, LMT1/LMT2 SET LIMITS

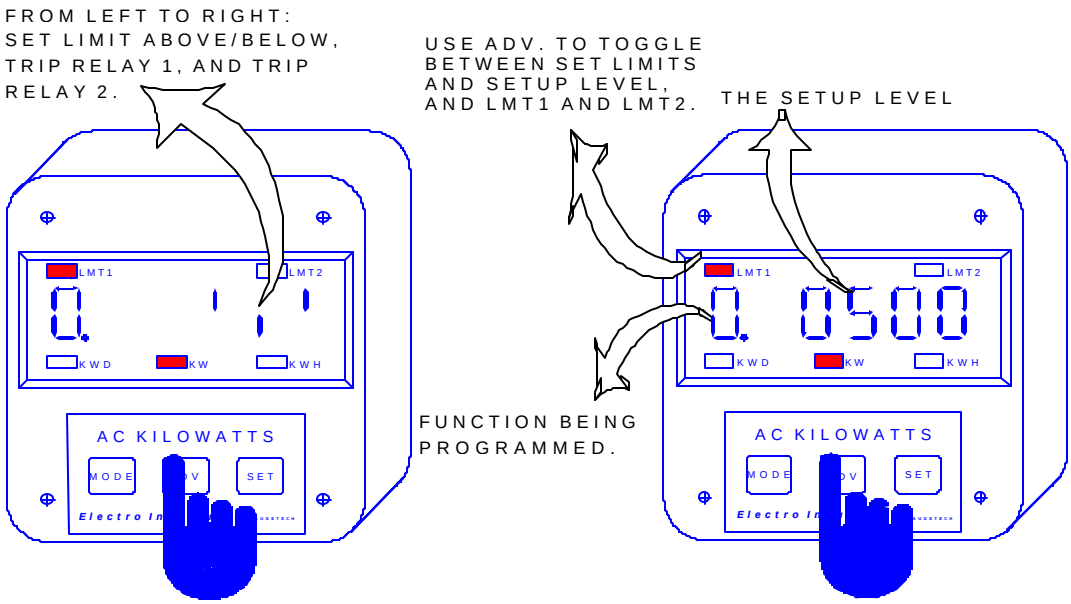


Diagram 8-1
Programming Group 5, LMT1/LMT2 Set Limits

TABLE 7-2: FUNCTIONS *0 &1*

	ABOVE/ BELOW	RELAY 1	RELAY 2	LEVEL
LMT 1	Digit Up-trigger above level Digit Down-trigger below level	Digit Up-enabled Digit Down-disabled	Digit Up-enabled Digit Down-disabled	0-9999 0-9999
LMT 2	Digit Up-trigger above level Digit Down-trigger below level	Digit Up-enabled Digit Down-disabled	Digit Up-enabled Digit Down-disabled	0-9999 0-9999

Enabled means the relays will work off of LMT1 or LMT2

TABLE 7-3: EXAMPLE FOR FUNCTION *0*

LMT 1	Digit Up	Digit Up	Digit Down	0120
LMT 2	Digit Down	Digit Down	Digit Up	0090

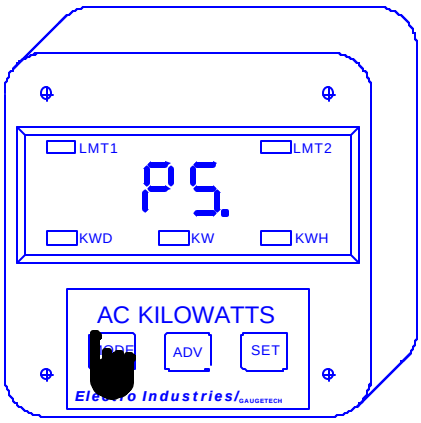
EXAMPLE:
If Kilowatts exceed 120W, LMT1 is triggered and Relay 1 is enabled. If the Kilowatts do not exceed 90W, LMT2 is triggered and Relay 2 is enabled.

- OR -

Relay 1 is enabled when LMT1 exceeds +120W. Relay 2 is to enabled when LMT 2 is below +90W.

Programming procedure for Group 5 contains four separate parts: Limit 1 Set Limits and Setup Level, and Limit 2 Set Limits and Setup Level.

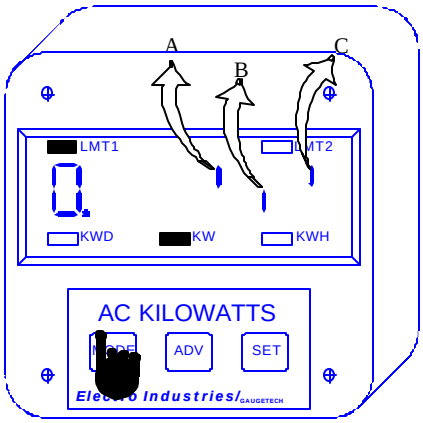
To **begin programming**, follow these steps:



Step 1:
a. Enter Group Level of Programming Mode, (see Chp. 2).

b. Press ***MODE*** until ***P5.*** appears.

c. Press ***SET*** to activate the Group.

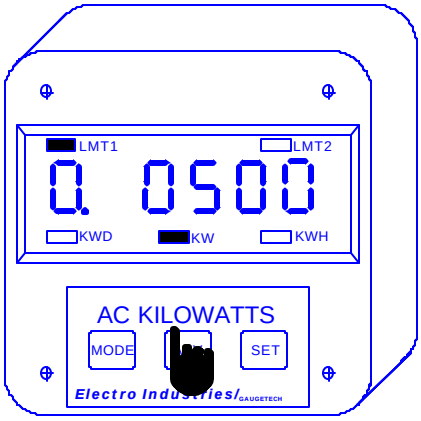


Step 2:
⇨ Function number ***0.*** appears followed by (from Left to Right) the Above/Below segment A, Trip Relay 1 segment B and Trip Relay 2 segment C.

See table 7-2

a. Press ***MODE*** to select Function 0 or 1.

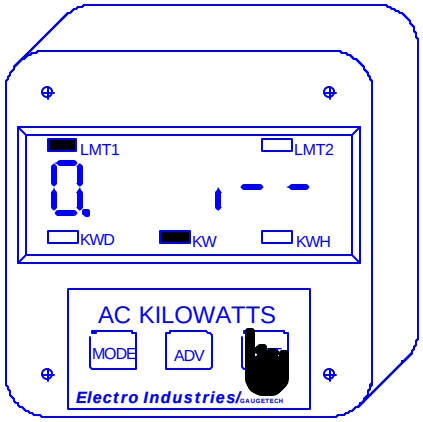
⇨ To change setings go to step 4



Step 3:
a. To view the current Setup Level press ***ADV.***.

b. To skip programming of Limit 1 and proceed to Limit 2 press ***ADV***.

c. To view the Setup Level for Limit 2 Press ***ADV***.



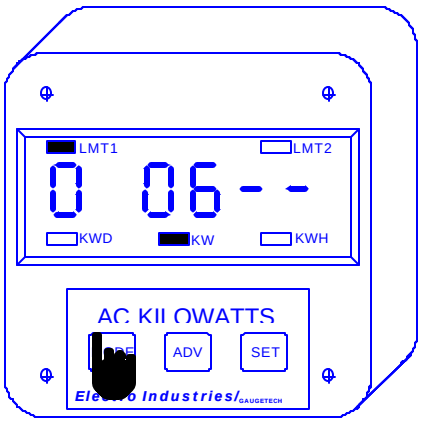
Step 4:
a. Press ***SET*** to begin Data Entry Sequence.

b. Press ***ADV.*** to toggle the segments.

c. Press ***SET*** to store.

⇨ Repeat until all segments are stored.

⇨ To leave segments unchanged and to change the limit value select ***MODE***. Then proceed to step 5



Step 5:
⇨ Four dashes appear next to the Function number.

a. Press ***ADV.*** for desired digits.

b. Press ***SET*** to store.

c. After entering the last 4 numbers the display will revert back to showing segments. Press ***ADV*** to see the LIMIT value**.**

d. After the forth digit is stored, the display reverts back to the segment setting and the decimal point will reappear after the function 0 digit.

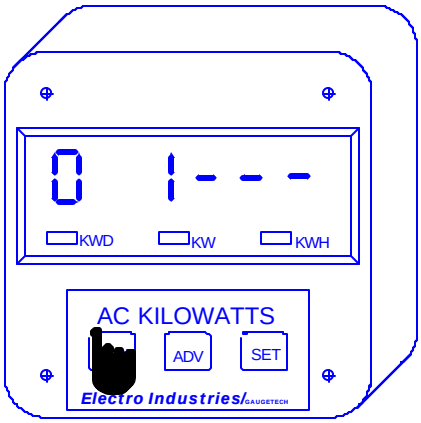
See chapter 8 to exit

CHAPTER 8
EXITING THE PROGRAMMING MODE

STEPS TO EXIT THE PROGRAMMING MODE VARIES AS THE PROGRAMMING STAGE VARY.

Exiting the Programming is always necessary to store any new changes.

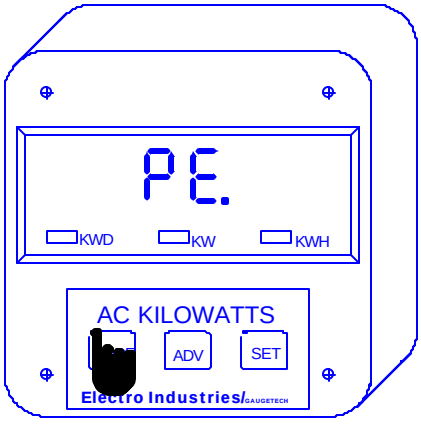
If you are located at:	FUNCTION Level - begin at Step 1.
If you are located at:	GROUP Level - begin at Step 2.



Step 1:
EXITING FROM DATA ENTRY SEQUENCE

a. Press ***MODE*** to cancel the Data Entry Sequence.

⇨ The DMWH returns to the Function Level.

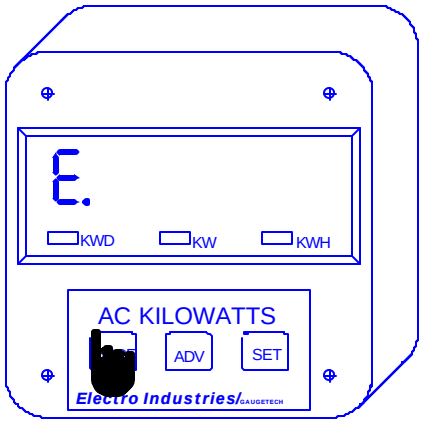


Step 2:
EXITING FROM GROUP LEVEL

a. Press ***MODE*** until ***PE.*** appears.

b. Press ***SET*** to exit entirely from the Programming Mode.

⇨ You have exited the Programming Mode. After a moment the meter returns to the Operating Mode.



Step 1a:
EXITING FROM FUNCTION LEVEL

a. Press ***MODE*** until ***E.*** appears.

b. Press ***SET*** to exit from the Function Level to Group Level.

APPENDIX

A. RESERVED GROUPS, FUNCTIONS, AND PACKS

Programming Group 4, Group 6, and Group 7 are reserved, because these Groups are not used.

In Group 0, Function 3, certain Switch PACKS are reserved. When encountering a pack which is reserved move to the next Switch PACK. (See Chapter 3 of the Programming section).

B. QUICK REFERENCE

PROGRAM GROUP	PURPOSE	DESCRIPTION
0	Global Meter Setup	Sets meter parameters: Integration Interval, Meter Address, Communication Baud Rate, System Configuration, and Relay Operation
1	Full Scale Settings	Changes Full Scale settings for Watts
2	Calibration	High and Low End Calibration for Watts
3	Correction Ratio	Changes the Correction Ratio
4	RESERVED	RESERVED
5	LMT1/LMT2 Set Limits for Power Functions	Changes High and Low Set Limits for Watts
6	RESERVED	RESERVED
7	RESERVED	RESERVED
8	RESERVED	RESERVED

C. OPEN DELTA SYSTEM INSTALLATION PROGRAMMING

A special switch alerts the meter that the electrical system being monitored is a Three-wire Open Delta System using the connection installation in Chapter 3. (See Chapter 3 of the Installation and Operation section). The switch is located in GROUP 0, FUNCTION 3, PACK 1, SWITCH D. (See Chapter 3 of the Programming section).

WARNING: SET THIS SWITCH TO '1' ONLY IF THE ELECTRICAL SYSTEM IS A THREE-WIRE OPEN DELTA. OTHERWISE, SET THE SWITCH TO '0' ALL THE TIME. FAILURE TO SELECT THIS SWITCH RESULTS IN PHASE-TO-NEUTRAL READINGS.

Follow the special Open Delta Connection Installation. (See Chapter 3 in the Operation and Installation section).