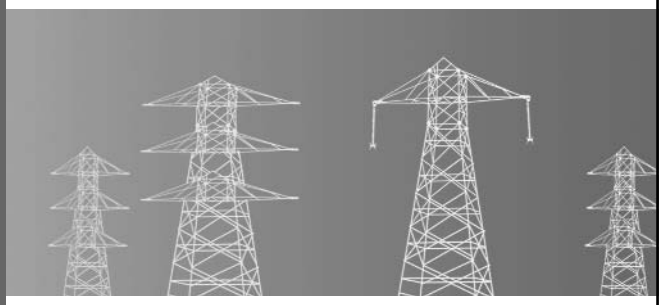
User Manual

3DWA 300

- Installation
- Operation
- Programming



➠ Solid State Digital Triple Display Power Monitoring Systems - Watts, VARS, VA, and PF

3DWA 300

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The 3DWA300
Triple Display Digital Power Monitoring System

Installation, Operation and Programming Manual

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Part I: Installation & Operation

CHAPTER 1
AC POWER MEASUREMENT

The economics of electric power distribution networking dictate several configurations of AC power transmission. The number of phases and voltage levels characterize these configurations.

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,** below).

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

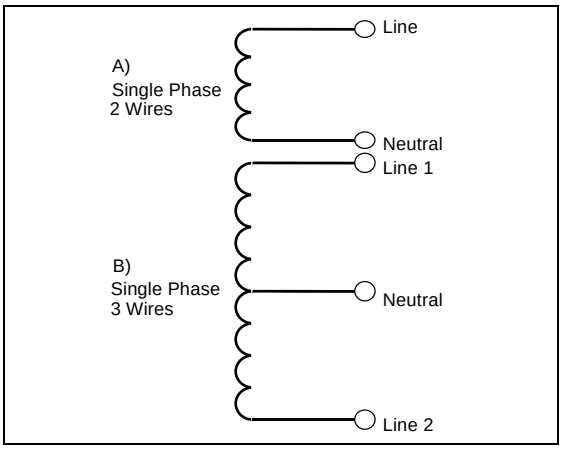


Figure 1.1: Single Phase System: (A) Two Wire, (B) Three Wire

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

Power in a 120/240V AC system is: $W = (E_{Line\,1} \bullet I_{Line\,1} \bullet \cos\Theta) + (E_{Line\,2} \bullet I_{Line\,2} \bullet \cos\Theta)$

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.

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

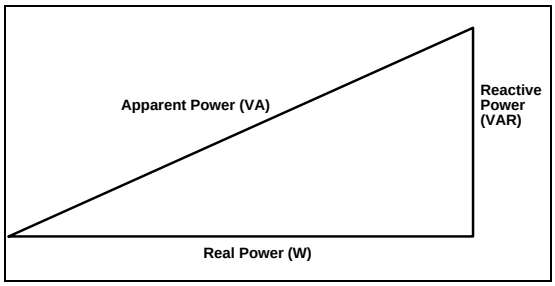


Figure 1.2: Apparent, Real and Reactive power

Ideal power distribution should have a PF of 1. This condition can be met only if no reactive power loads exist. In real life applications, many loads are inductive loads. Often, corrective capacitors are installed to correct Poor Power Factor.

1.2: Three-Phase System

A **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 exists between the three potential lines.

A typical configuration has either a Delta connection or a Wye connection (see **Figure 1.3,** below).

In a three phase system, the voltage levels between the phases and the neutral are uniform and defined by: $E_{an} = E_{bn} = E_{cn} = \frac{E_{ab}}{\sqrt{3}} = \frac{E_{bc}}{\sqrt{3}} = \frac{E_{ac}}{\sqrt{3}}$

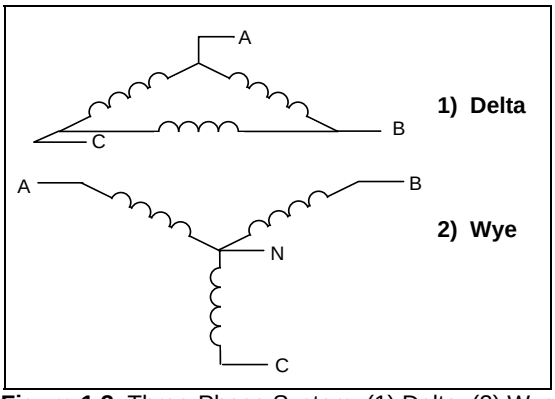


Figure 1.3: Three-Phase System: (1) Delta, (2) Wye

Voltages between the phases vary depending on loading factors and the quality of 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 that 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**, below).

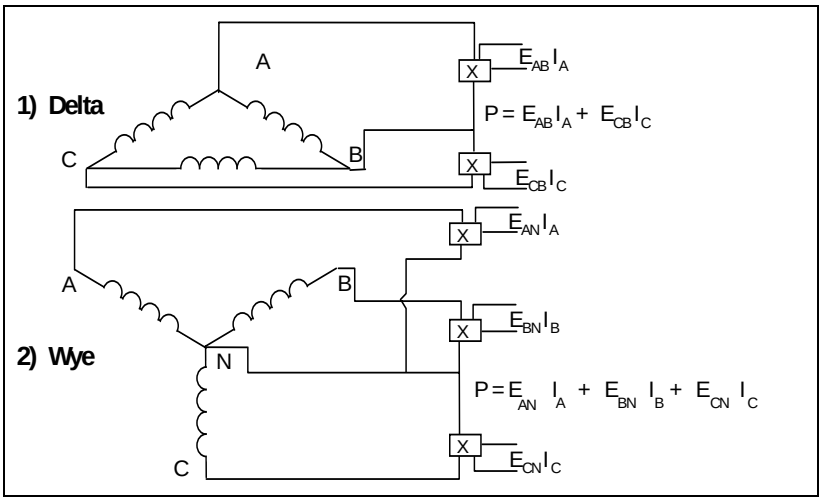


Figure 1.4: Poly Phase System: (1) Delta, (2) Wye

1.3: Consumption, Demand and Poor Power Factor

CONSUMPTION: $WH = W \cdot T$ **W** = instantaneous power **T** = time in hours
The total electric energy usage over a time period is the consumption WH.

Typically, the unit in which consumption is specified is the **kilowatt-hour** (KWH): 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 causing the utility to provide generating capacity to satisfy a high maximum consumption demand. The highest average demand is retained in the metering system 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.

1.4: Waveform and Harmonics

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

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

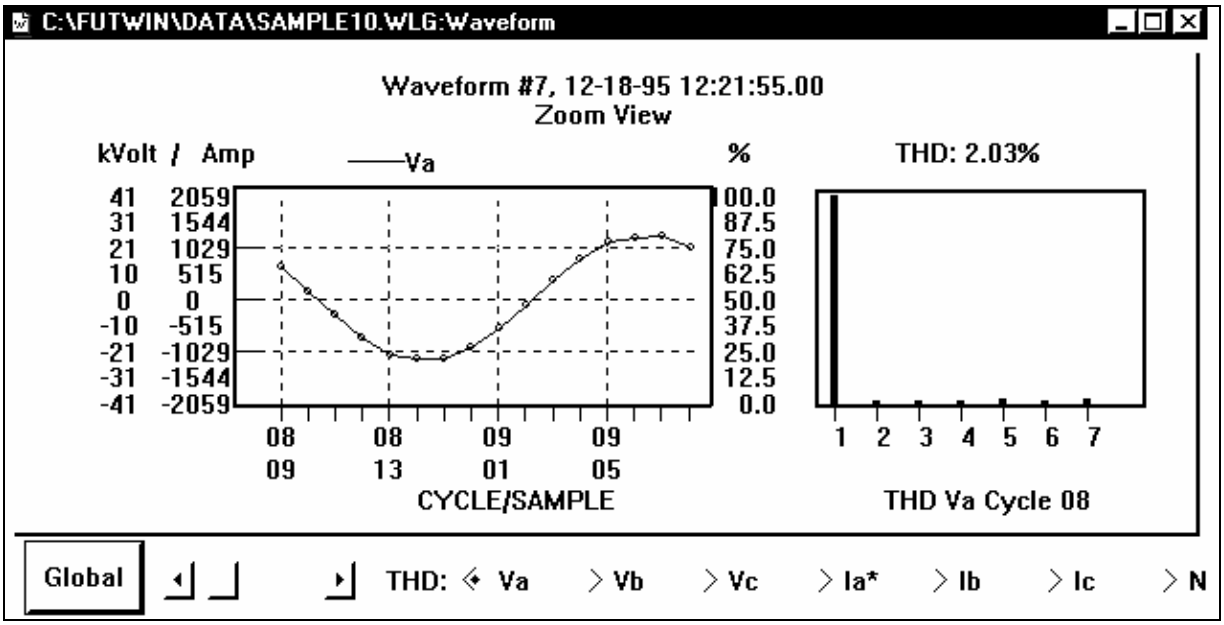
DISTORTED WAVEFORM: $A \bullet \sin(\omega \bullet t) + A_1 \bullet \sin(\omega_1 \bullet t) + A_2 \bullet \sin(\omega_2 \bullet t) + A_3 \bullet \sin(\omega_3 \bullet t) + \cdots$

TOTAL HARMONIC DISTORTION (THD):

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

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. The Futura+ monitors the harmonic distortion to the 31st harmonic. A waveform capture of distorted waveform is also available.

% THD GRAPH



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 mechanical installations and Communication Converter installation. The various models use the same hookup and installation.

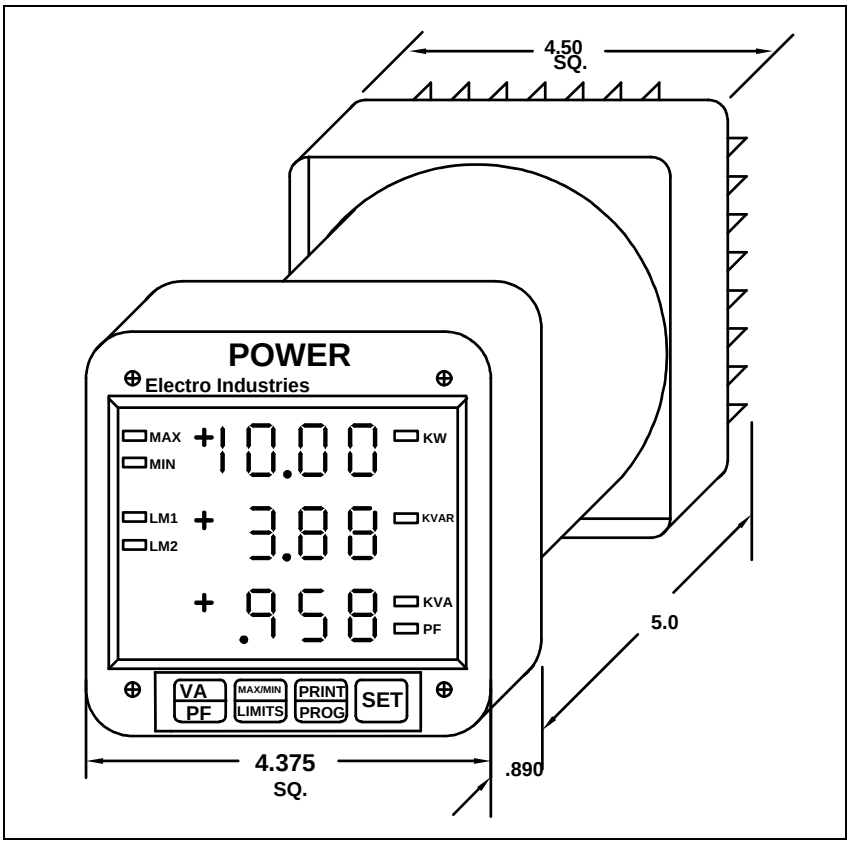


Figure 2.1 Standard Installation of the 3DWA300—measurements in inches

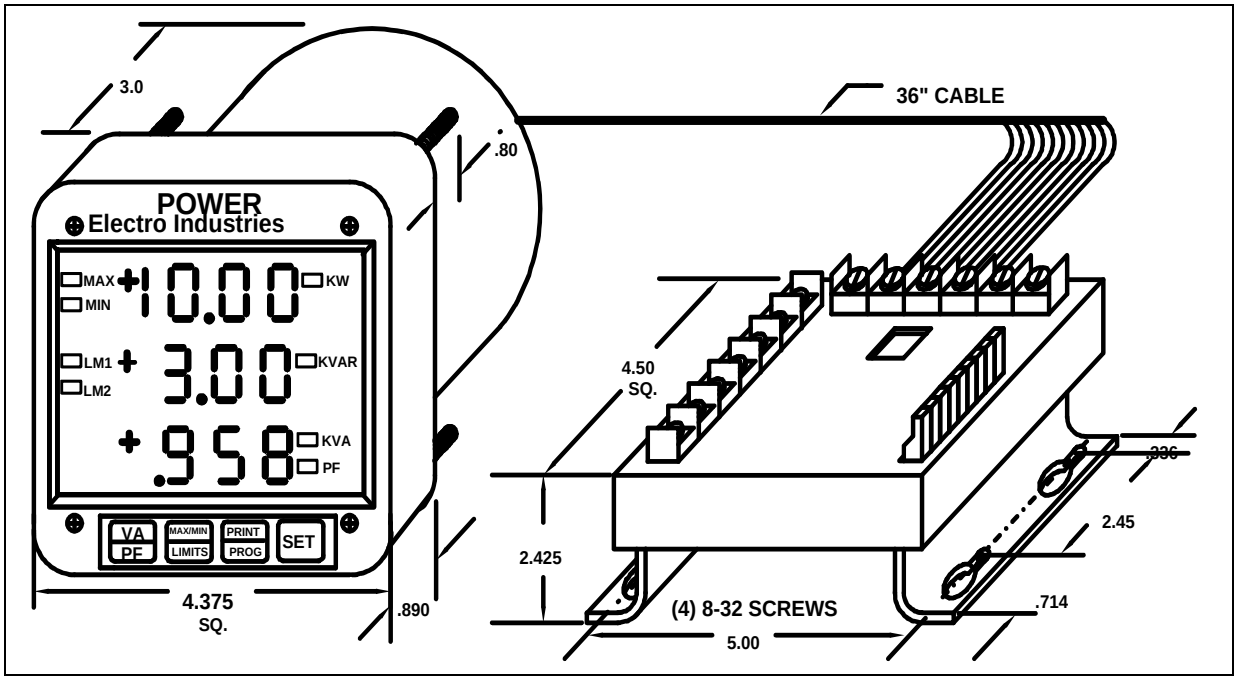


Figure 2.2: Installation of the 3DWA300 with K-110 Option for limited space conditions—measurements in inches

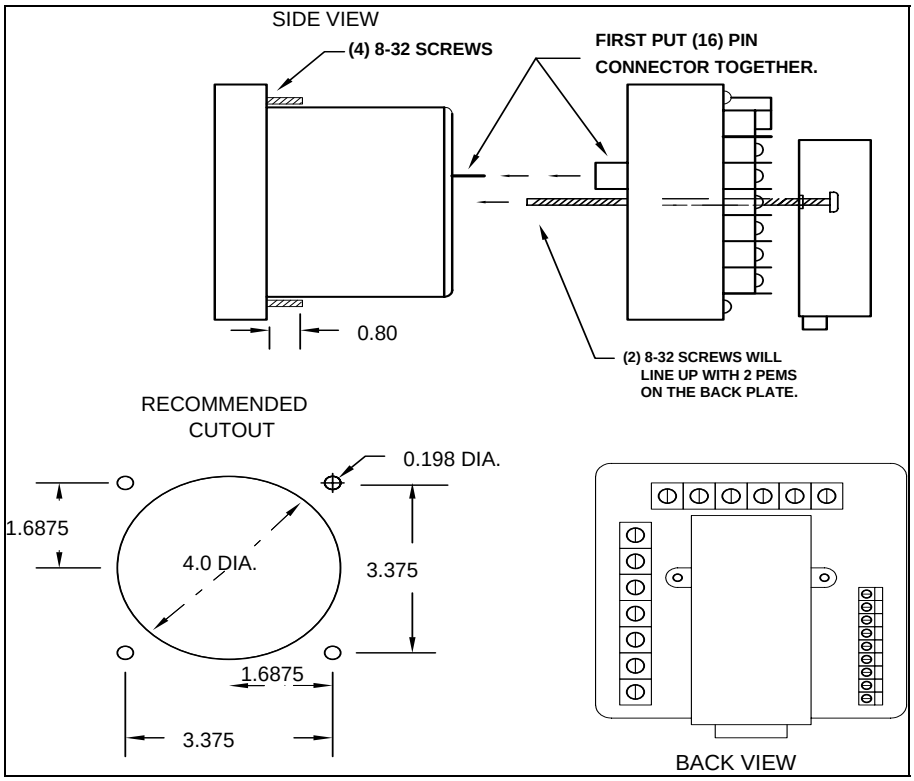


Figure 2.3: Standard cutout for 3DWA300—measurements in inches

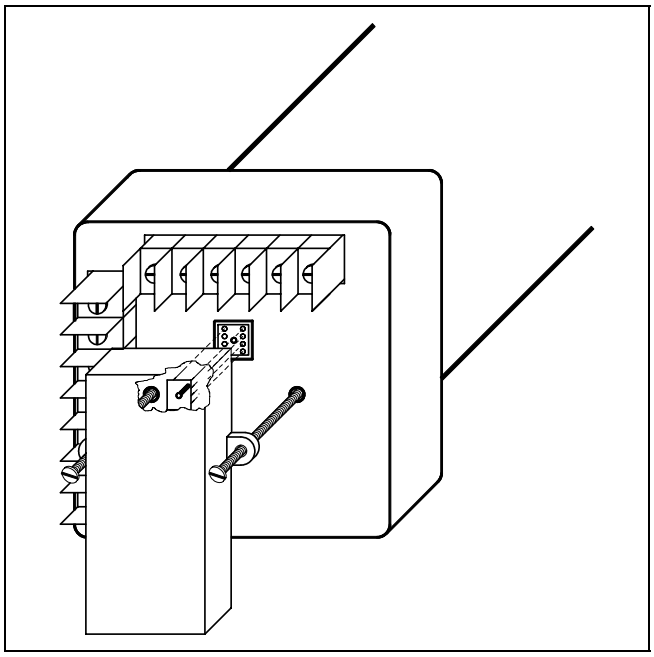


Figure 2.4 Optional Communication Converter Installation or DC Output Module Installation

***** Recommended wire gauge size is 22 AWG for DC output and RS-485 options.

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

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

CT Size (VA)	Maximum Distance (CT to 3DWA)
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 CT open when primary current is flowing. This may cause high voltage, which will overheat the CT. If the CT is not connected, provide 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

Choose the diagram that best suits your application and maintain the CT polarity. Follow the outlined procedure to verify correct connection. ***IMPORTANT:*** *For PT connections only, short terminals 3 and 4. Connect local ground to terminal 3. This protects the unit from spikes and transients*.

- The meter and terminal module DSP3 are factory calibrated together; the serial numbers are matched on both. The DSP3 input module and the meter base MUST MATCH!
- Mismatching of the meter and DSP3 input module will cause inaccurate readings because calibration ratios are stored in the meter's memory, not in the DSP3 input module.

LIST 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 Installation should only be used if the electrical system is a 3-wire 2 PT OPEN DELTA. Open Delta can be enabled or disabled in Programming GROUP 0, FUNCTION 3, PACK 1, Switch D—see Chapter 7.)

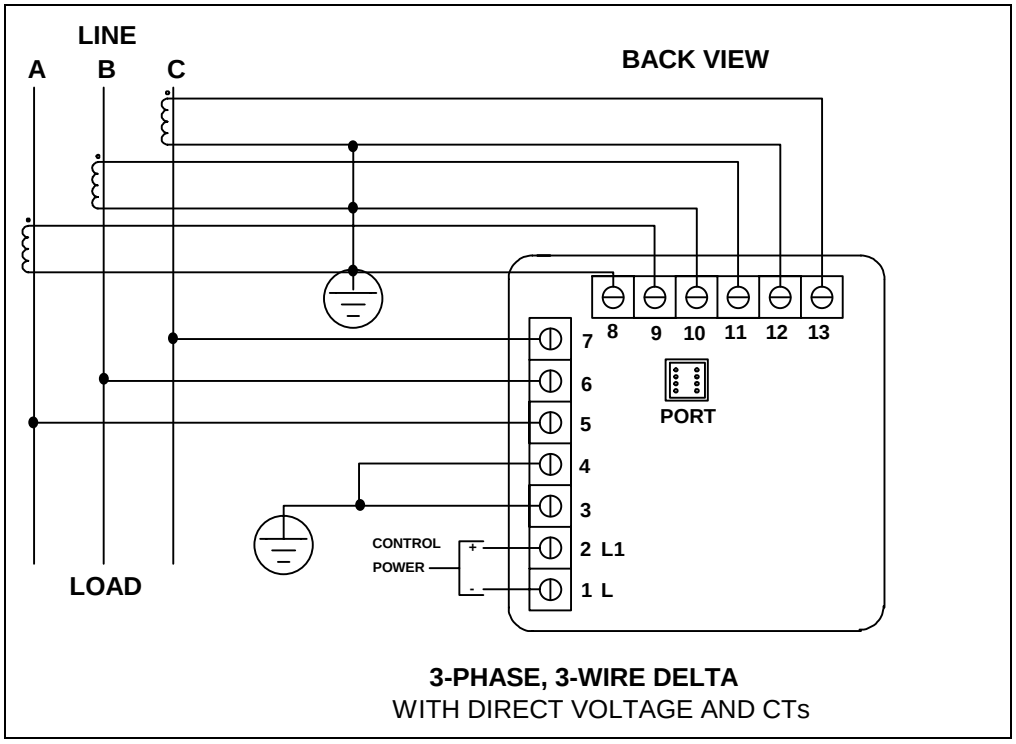
III Three-Phase, Four-Wire System Wye with Direct Voltage and CTs.

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

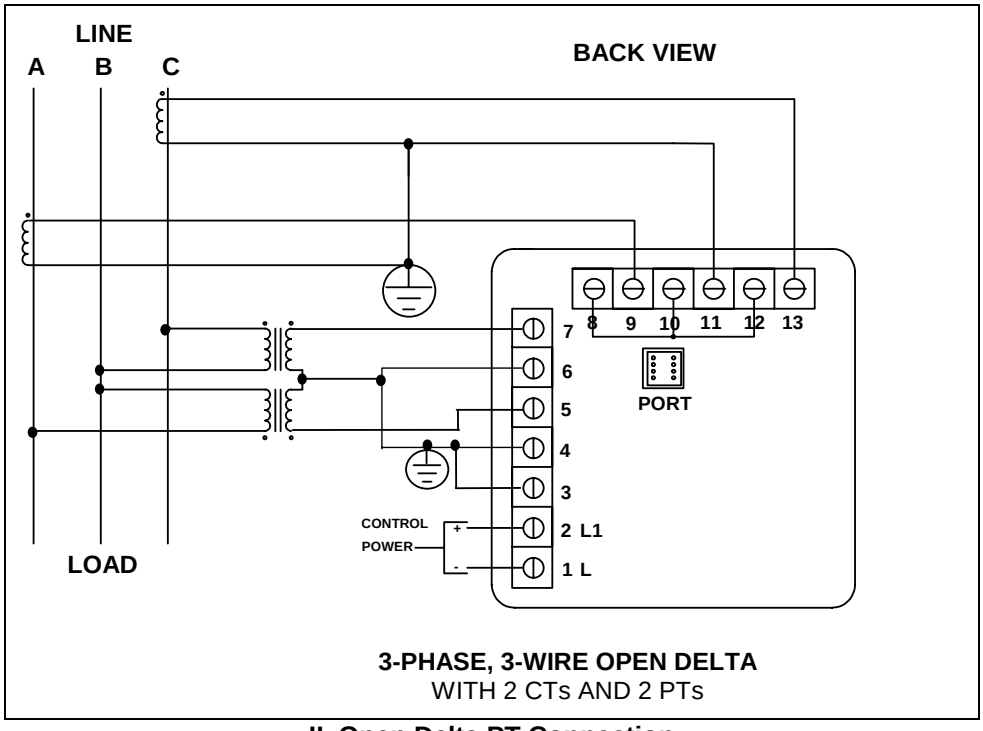
V Three-Phase, Four Wire System Wye 2½ Element with CTs and PTs (3DWA250 only)

VI Single Phase with CT and PT Connection

VII Dual Phase with CTs and PTs

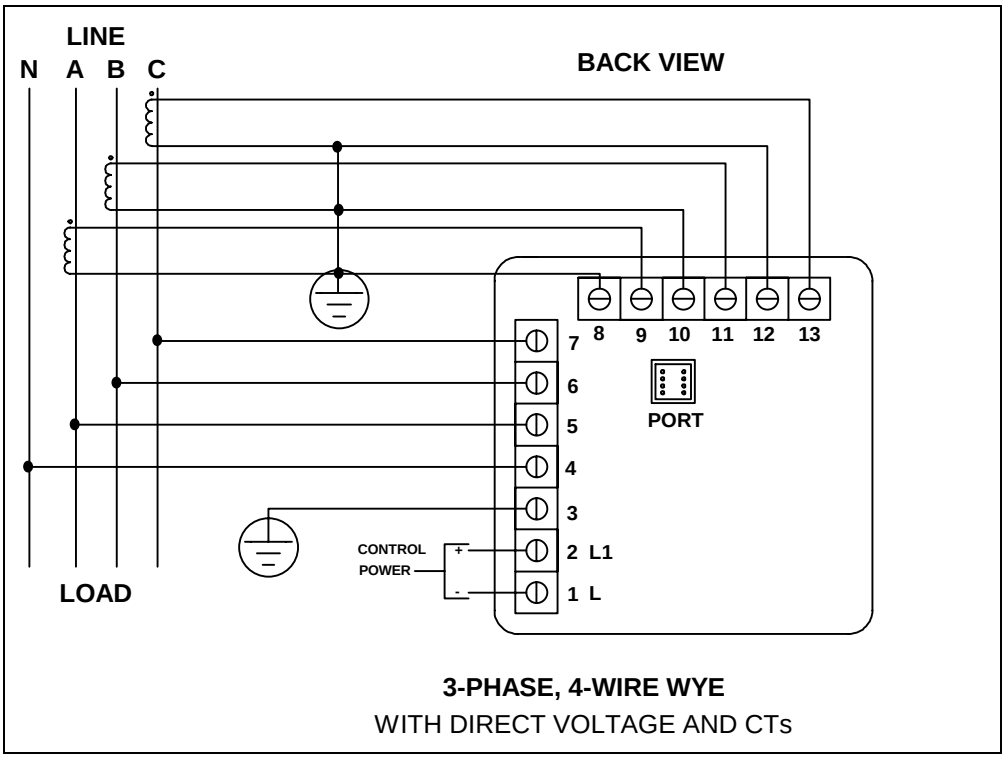


I. Three Phase Delta System

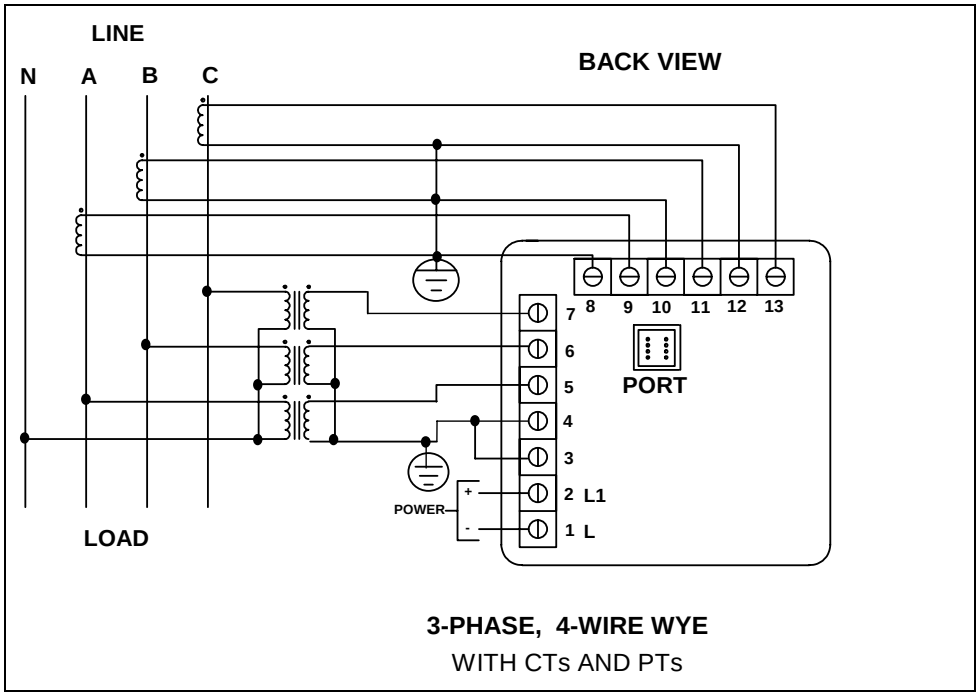


II. Open Delta PT Connection

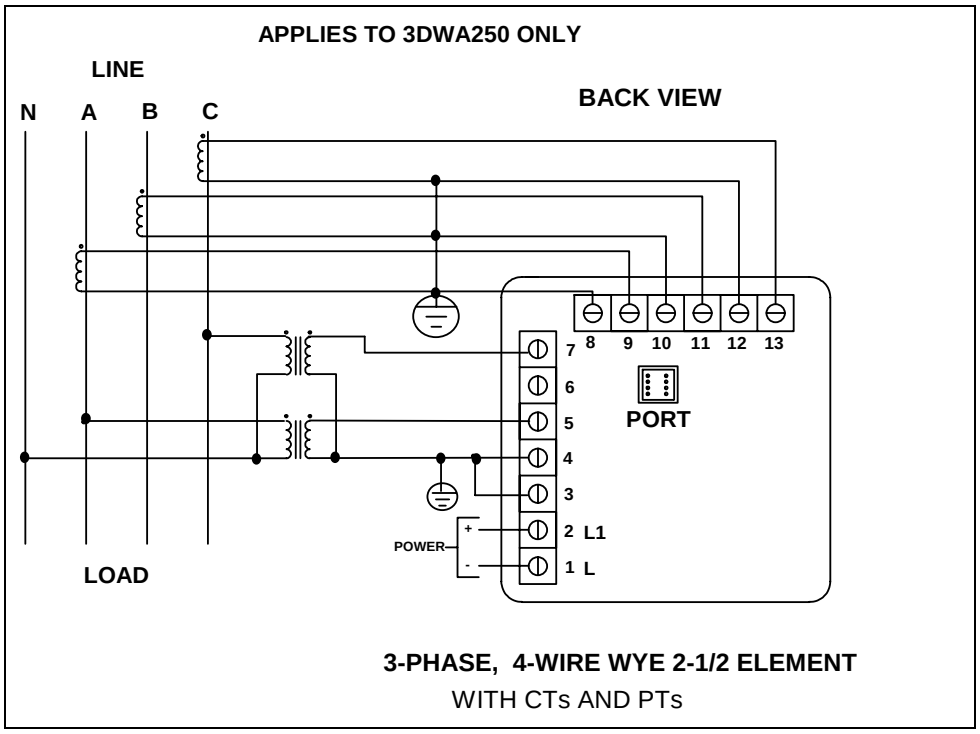
—Special programming required; see Group 0, Function 3, Pack 1 Switch D: Chapter 7, section 7.4.



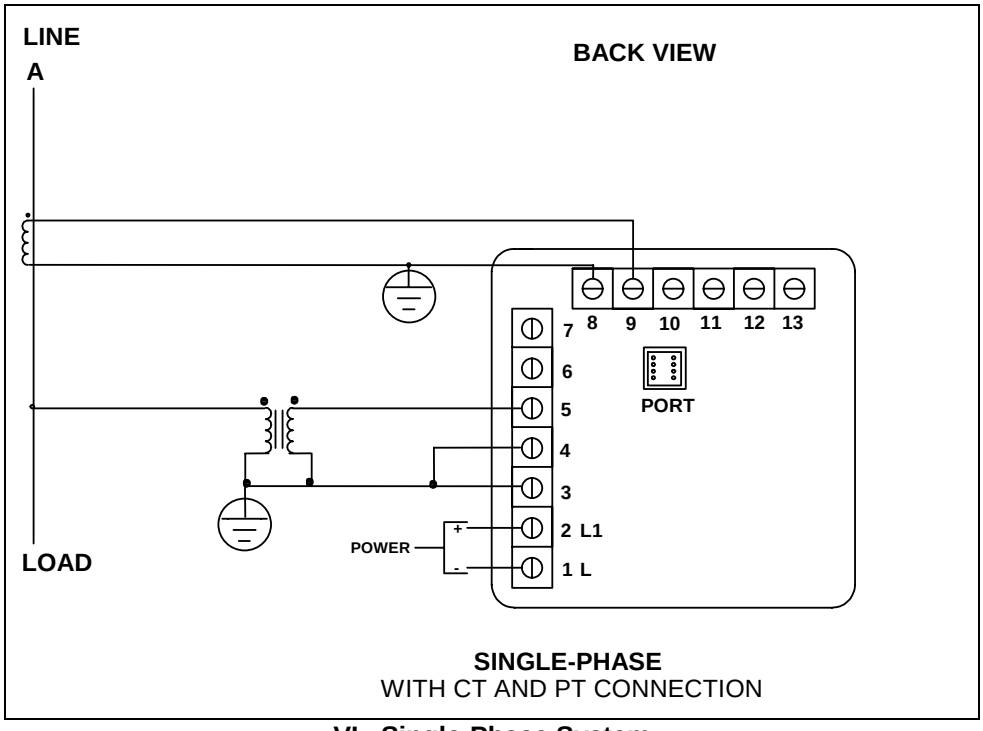
III. Three Phase Wye System



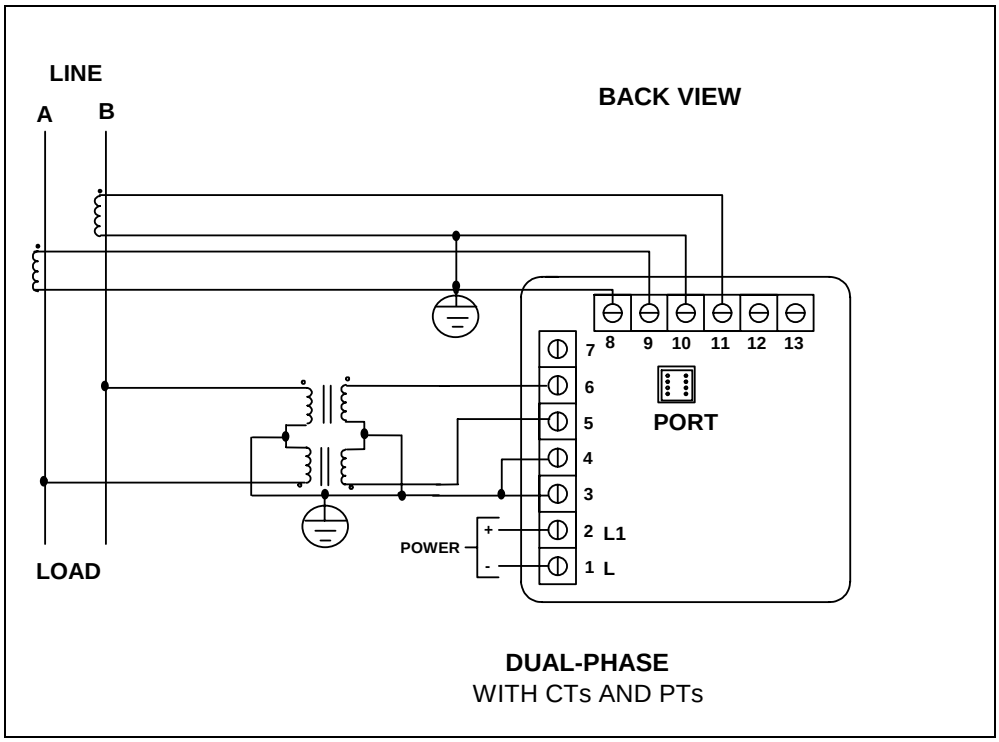
IV. Three Phase Wye System with PTs



V. Three Phase, Four Wire System Wye 2½ Element with CTs and PTs
—3DWA250 only



VI. Single-Phase System



VII. Dual-Phase System

HELPFUL DEBUGGING TOOLS

ISOLATING A CT CONNECTION REVERSAL

1. 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.

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

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

3.7: Relays and Protection

Note: This section applies only to the -NL Relay Option.

The 3DWA's flexibility allows the user to access a variety of relay options through the Programming Mode (see Chapter 7, section 7.5). The relay option package consists of two relays with two contacts, one normally open and one normally closed. The relays can be either dedicated to alarm, or communication controlled, or both.

The time delay is used to set an alarm, alerting the user when an out-of-limit condition has been sustained beyond the user-defined time limit. The time delay can be programmed for up to 9999 seconds.

If the relays are controlled through 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 controlled through communication and dedicated to 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.

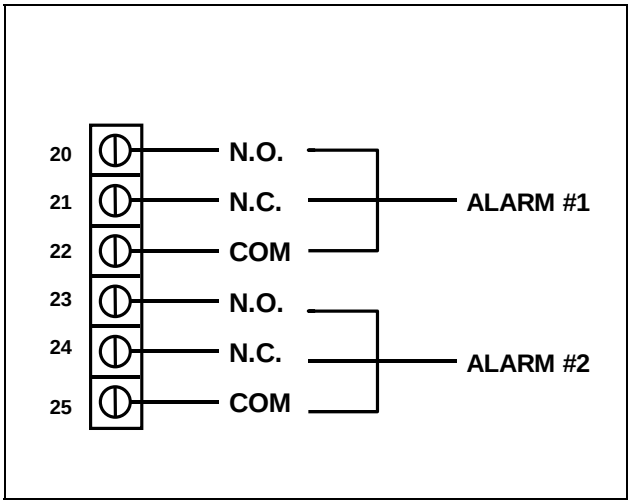


Figure 3.1: Relay Configuration

Diagram 3.1 is a close-up of the relays on the rear panel. The relays shown are in the NOT energized state (form C relays, rated 250V, 5A, 2 each).

KYZ relays are not available because the meter does not have a WATT/HOUR counter.

The 3DWA300 can be programmed to detect two levels of alarm for the following functions:

- Over and Reverse Power
- Under PF/KVAR Lead or Lag
- Over KVA

CHAPTER 4
COMMUNICATION INSTALLATION

All 3DWA instruments can be equipped for RS232C or RS485 communication.

4.1: RS232C

RS232C communication is used to link a single 3DWA instrument with a computer or device such as RTU or PLC. The link is capable for a distance up to 100 feet. A standard 9-pin female serial port allows direct connection to a computer with a 9-pin cable.

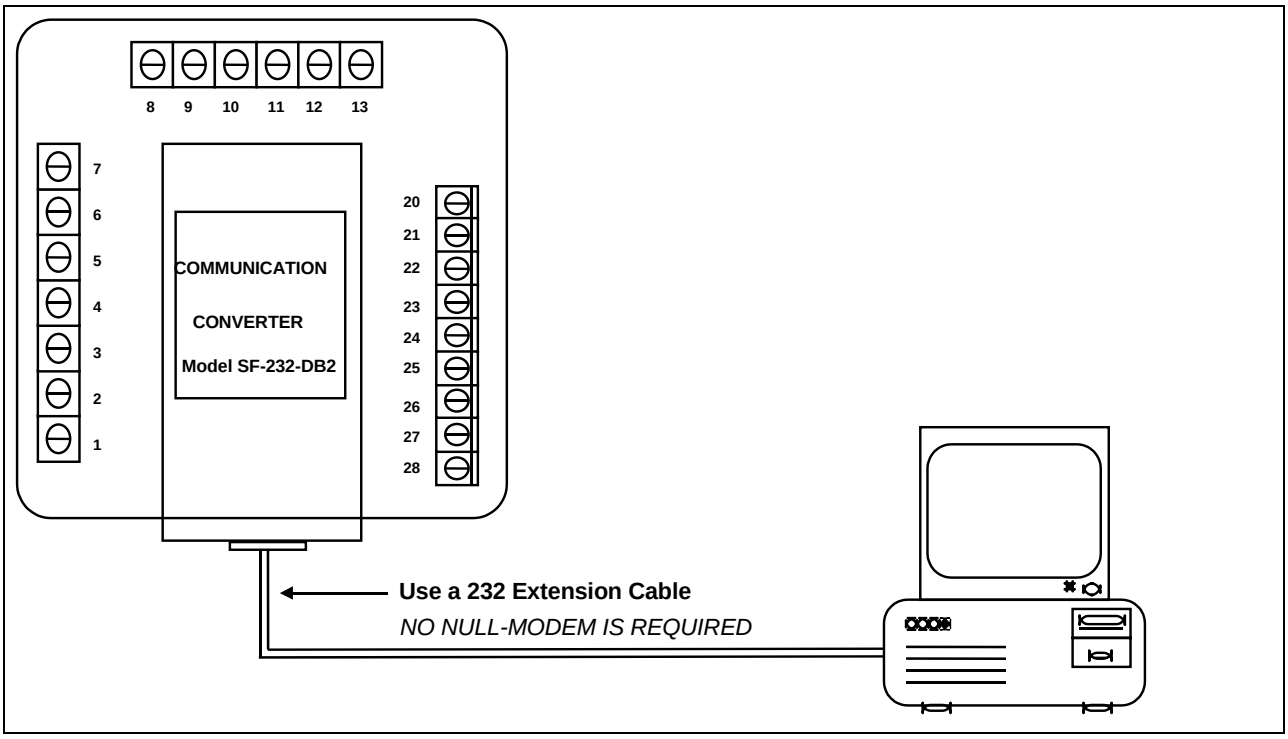


Figure 4.1: RS232C Communication Connection Installation

4.2: RS485

Each 3DWA instrument has a unique address up to four digits long. This allows the user to communicate with up to 10,000 instruments. Available standard baud rates are 1200, 2400, 4800, and 9600. To select the proper baud rate, apply the following rules:

> *The unit operates up to 9600 baud. 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.*

RS485 parallels multiple instruments on the same link. Its operating capability is up to 4000 feet. The link can include up to 60 instruments.

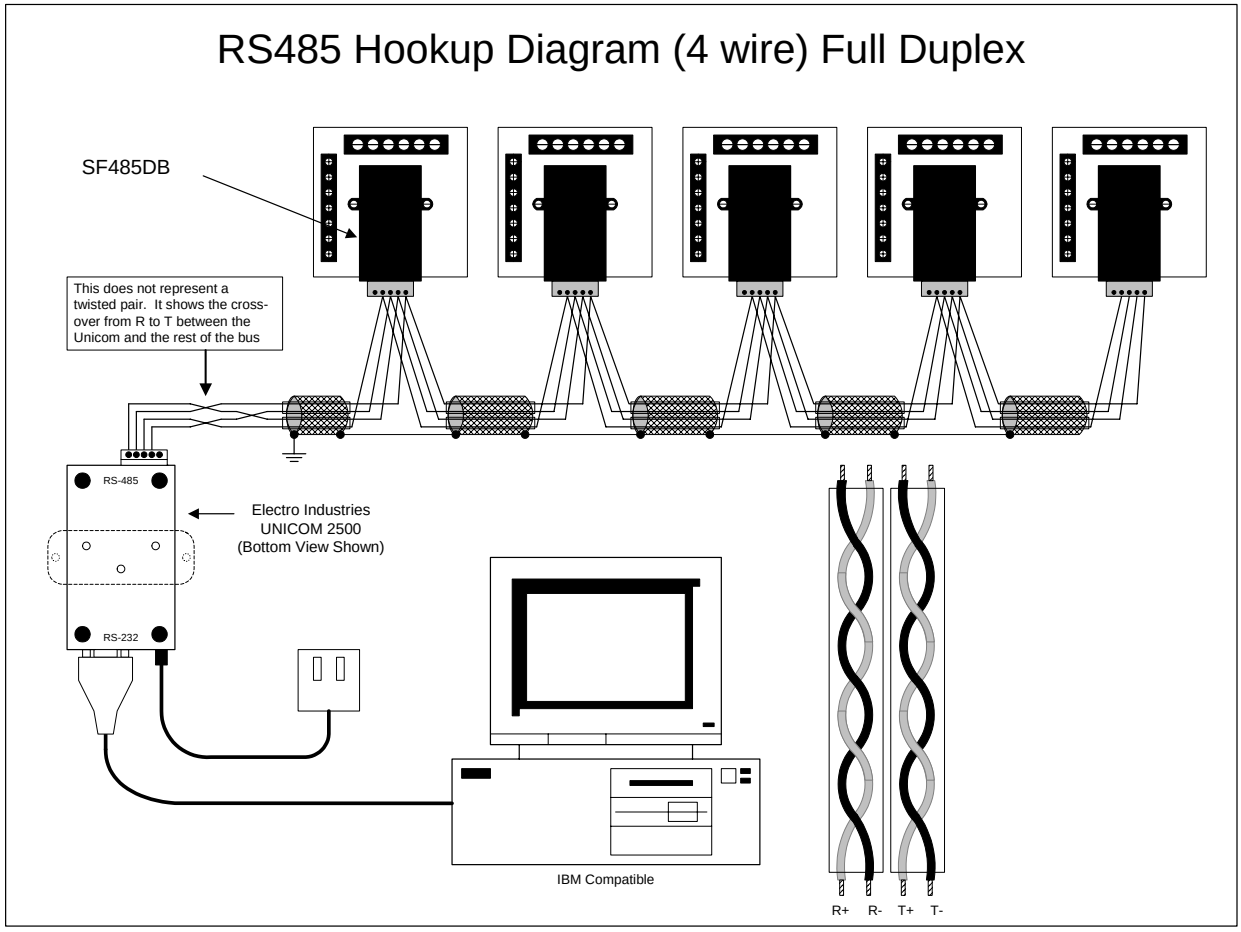


Figure 4.2: 4-Wire RS485 Communication Connection Installation Full Duplex
—Detail View next page

***Note**: 4-wire RS485 is strongly recommended because it provides cleaner communication and is less susceptible to noise interference. It is important to shield the communication wire and ground it at one end. Grounding at both ends causes a ground loop and results in noise problems.*

Connecting 4-Wire BUS to RS485 Port:

- Connect the T- wire of the Unicom 2500 to the R- on the RS485 port
- Connect the R- wire of the Unicom 2500 to the T- on the RS485 port
- Connect the T+ wire of the Unicom 2500 to the R+ on the RS485 port
- Connect the R+ wire of the Unicom 2500 to the T+ on the RS485 port

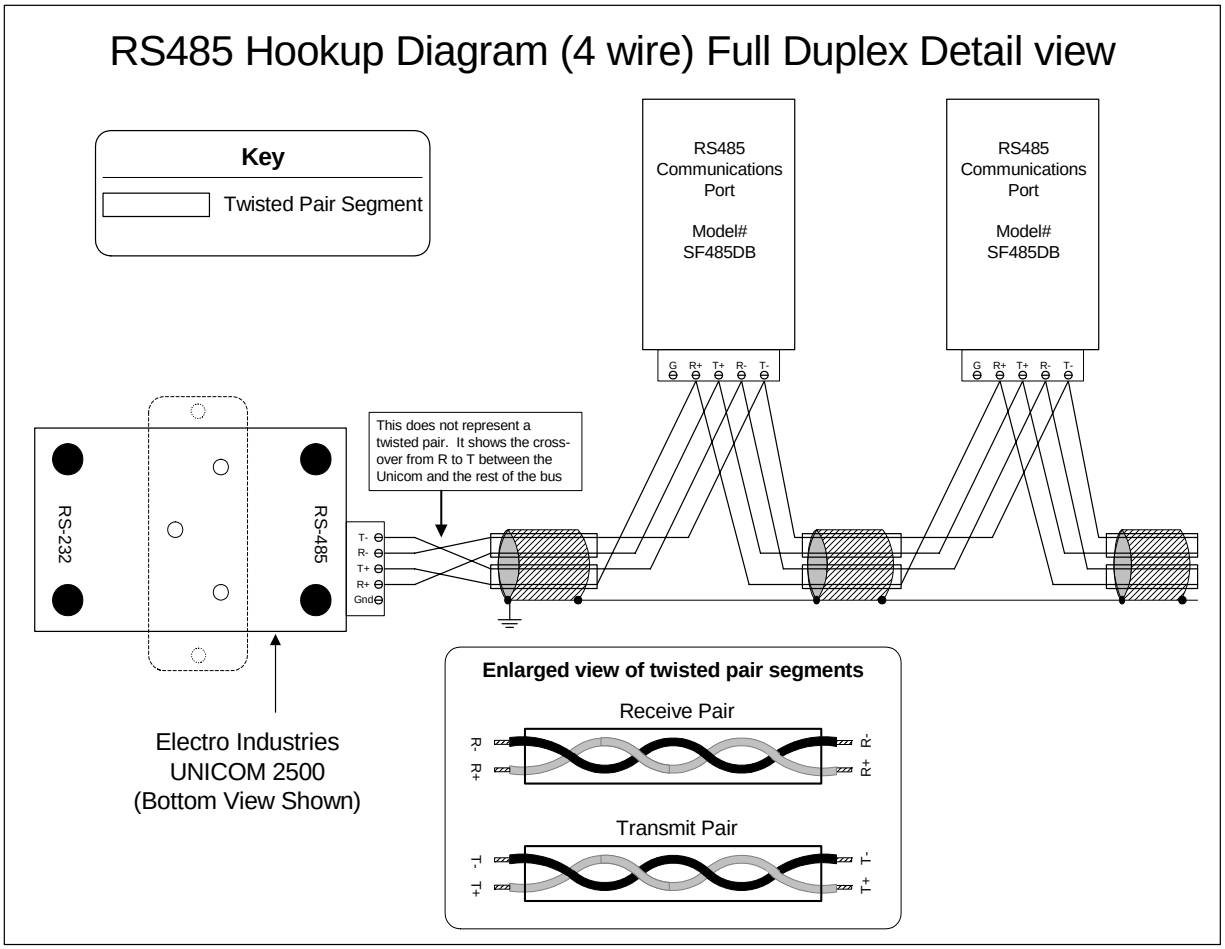


Figure 4.3: 4-Wire RS485 Communication Connection Installation Full Duplex Detail View

Connecting 4-Wire bus to RS485 Port:

- Connect the T- wire of the Unicom 2500 to the R- on the RS485 port
- Connect the R- wire of the Unicom 2500 to the T- on the RS485 port
- Connect the T+ wire of the Unicom 2500 to the R+ on the RS485 port
- Connect the R+ wire of the Unicom 2500 to the T+ on the RS485 port

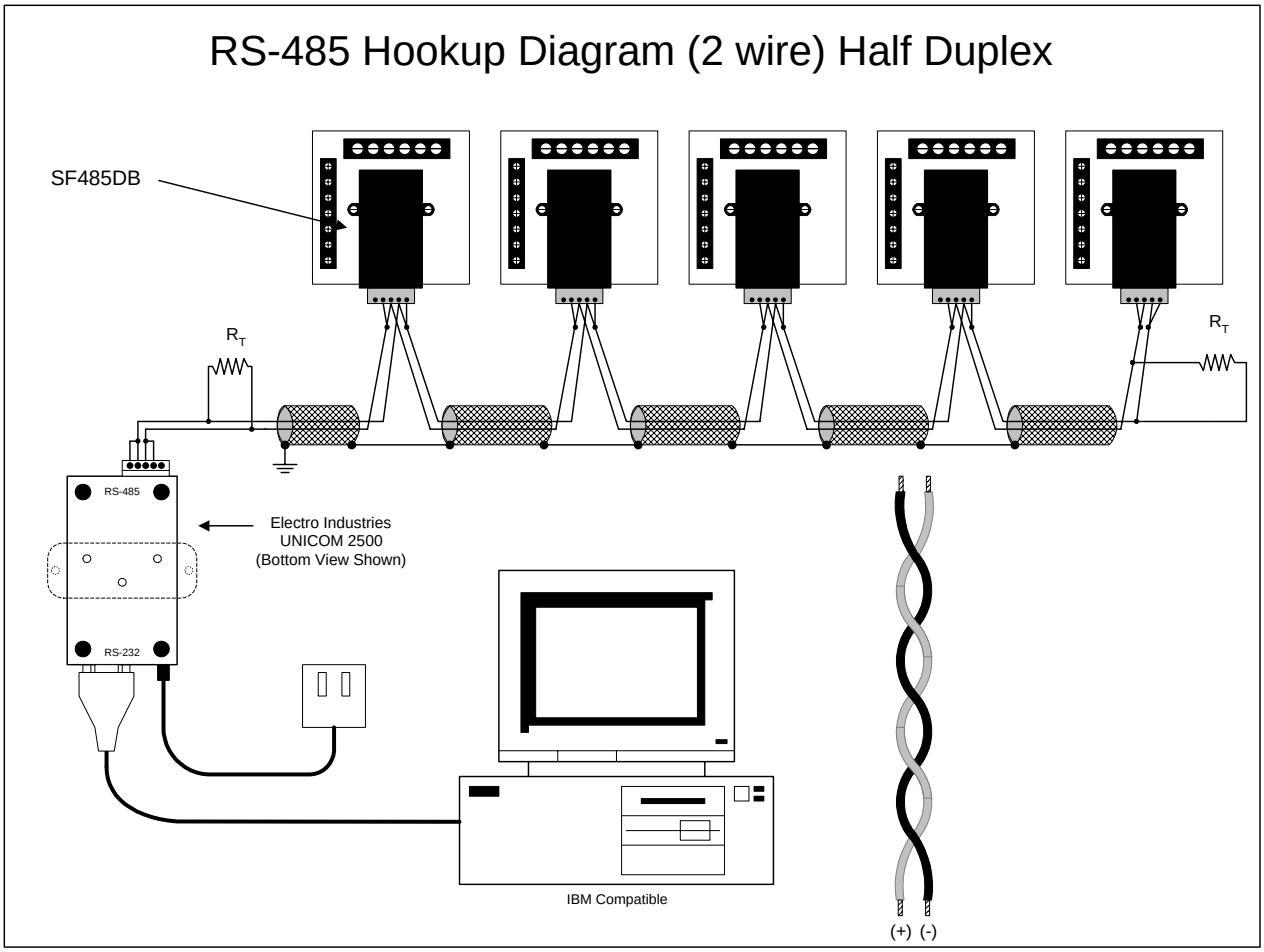


Figure 4.4: 2-Wire RS-485 Communication Connection Installation Half Duplex
—Detail view on following page

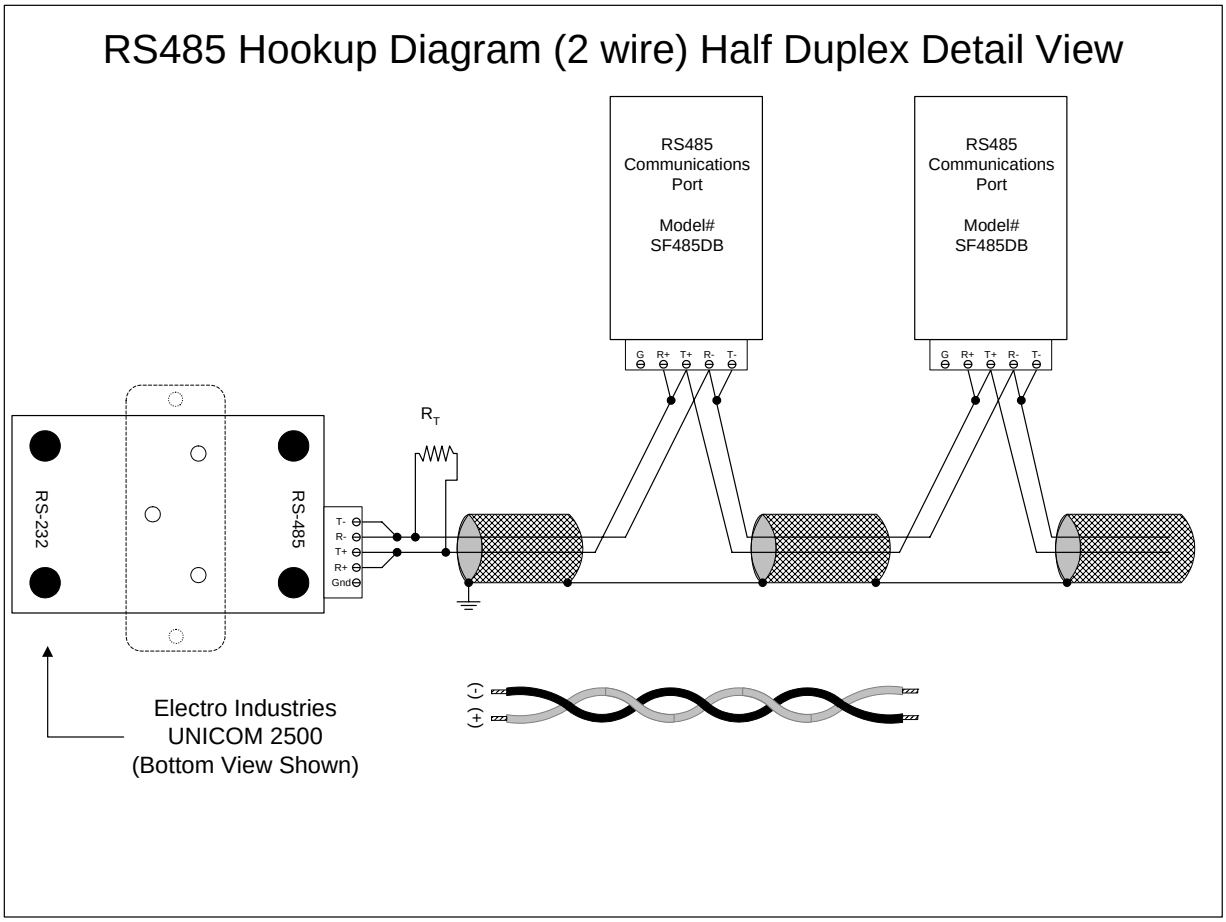


Figure 4.5: 2-Wire RS485 Communication Connection Installation Half Duplex Detail View

Connecting two-wire BUS to RS485 Port on CPU-1000

1. Take the positive (+) wire and connect to R+ on the RS485 Port.
2. Connect a jumper from R+ to T+ on the RS485 Port.
3. Take the negative (-) wire and connect to R- on the RS485 Port.
4. Connect a jumper from R- to T-.on the RS485 Port.

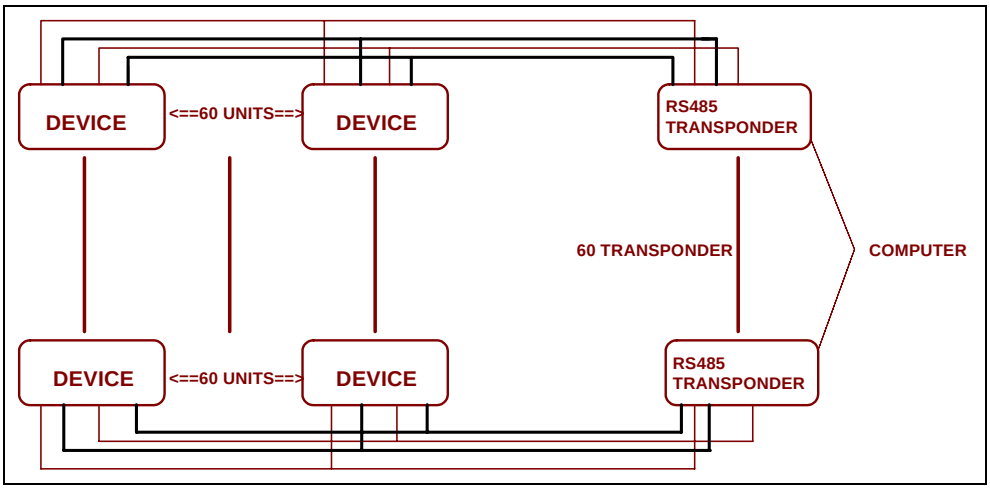


Figure 4.6 4-Wire RS485 Communication Installation Connection with Transponder

4.3: Network of Instruments and Long Distance Communication

Use the RS485 Transponder for a large instrument network. 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 4.2**).

You may want to use a Modem Manager RS485-RS232 Converter. When speaking to most RS485 or RS232C based devices, the remote modem must be programmed for the communication to work. This task is often quite complicated because modems are quirky when talking to remote devices. To make this task easier, EIG has designed a **Modem Manager** RS485 to RS232C converter. This device automatically programs the modem to the proper configuration. Also, if you have poor telephone lines, modem manager acts as a line buffer, making the communication more reliable. Use modems (dedicated or dial-up) when the instruments are at great distances. However, set the modem to auto-answer at the recommended 1200 baud rate if noise conditions exist.

I. Modem Connected to Computer (Originate Modem)

Programming the Modem

Comply with the modem's instruction manual and 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:
- Places these settings into nonvolatile memory; the settings take effect after the modem powers up.

II. Modem Connected to the Device (Remote Modem)
Programming the Modem

Comply with the modem's instruction manual and follow these instructions:

RESTORE MODEM TO FACTORY SETTINGS:
- This procedure erases all previously programmed settings.

SET MODEM TO AUTO ANSWER ON **N** RINGS:
- Sets the remote modem to answer the call after **n** rings.

SET THE MODEM TO AUTO NEGOTIATE MODE:
- Sets the remote to auto negotiate to communicate successfully with DMMS300+ and other devices in the modem.

SET MODEM TO RETURN NUMERIC RESULT CODES:
- Increases speed connection with DMMS300+.

SET MODEM TO IGNORE DTR SIGNAL:
- Necessary for device to ensure connection with originate modem.

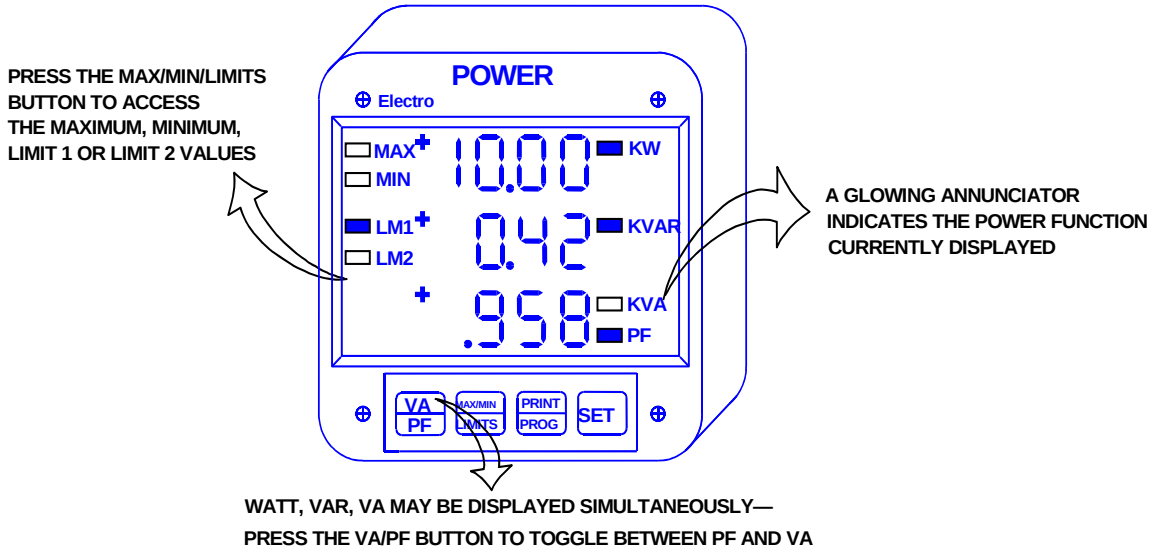
SET MODEM TO DISABLE FLOW CONTROL:
- Necessary to communicate with remote modem connected to DMMS300+.

TELL THE MODEM TO WRITE THE NEW SETTINGS TO ACTIVATE PROFILE:
- Places new settings into nonvolatile memory; settings take effect after the modem powers up.

CHAPTER 5
3DWA300 OVERVIEW

The **3DWA300** monitors four electrical parameters: WATT, VAR, VA and PF. It reads to 0.50% accuracy with a resolution of 0.1% at a range up to 1999 counts and reads PF to 1.0% to a range of 1.0 to ± 0.5.

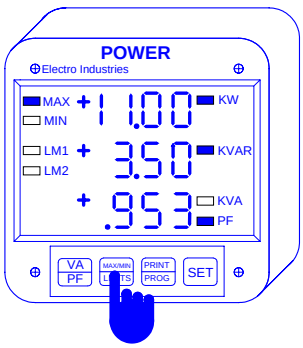
***Note**: The 3DWA300 and 3DWA250 are essentially the same meter. The 3DWA250 includes a 2.5 element WYE.*



5.1: Accessing Max/Min Values

Max/min values are available for all instantaneous measurements. Max/min values represent the highest and lowest average demand over a user programmable period of time. This is known as the **Integration Interval**. Readings are calculated using a rolling average technique. Each second a new reading is used to calculate the max and the min; the last reading of the interval is dropped off.

To access the max or min:



Step 1:
a. Press ***MAX/MIN/LIMITS***:
- once to view the max values
- twice to view the min values
- five times to view the negative max
- six times to view the negative min

⇨Values appear momentarily.

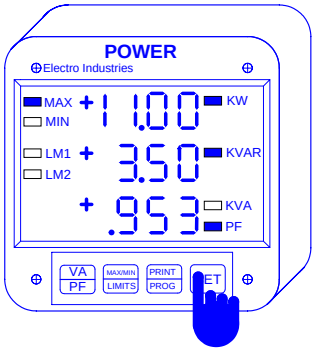
5.2: Resetting Max/Min Values

Use the reset function if a new max/min value is desired. The max/min reset is available in two modes.

1. **Unprotected Mode**—Allows quick resetting of max/min values.
2. **Protected Mode**—Prevents unauthorized resetting of the max/min values. To enable the protected mode, enter Programming Group 0, Function 3, Pack 1, Switch B, see Chapter 7.

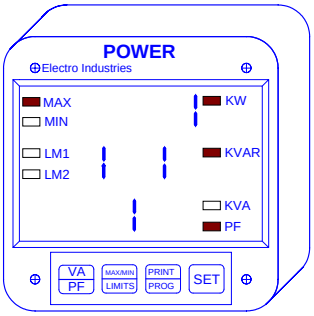
The KVA and PF cannot be displayed simultaneously and require separate resetting of the max/min demand values.

Unprotected Reset



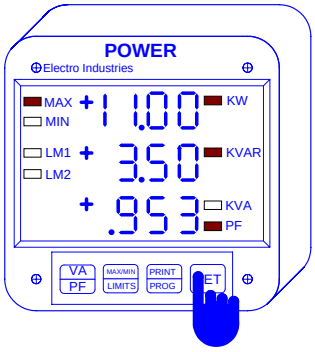
Step 1:
a. Press ***MAX/MIN/LIMITS*** once to view max values and twice to view min values.

b. While the number is displayed, press ***SET*** to reset the values.



The display blanks and a check mark appears momentarily, confirming a successful reset.

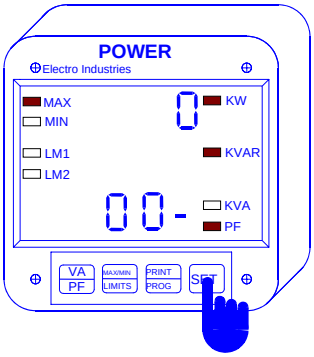
Protected Reset



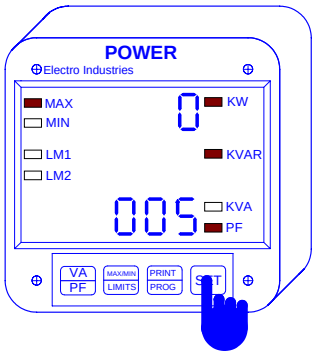
Step 1:
⇨ The password is ***005***.

a. Press ***MAX/MIN/LIMITS*** once to view max values and twice to view min values.

b. While the number is displayed, press and hold down the ***SET*** button until two **0**s appear in the lower display. Then release the ***SET*** button.

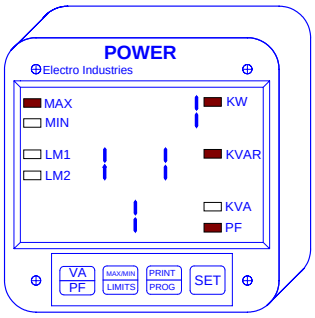


⇨A **0** appears in the upper display, two 0s appear in the lower display.



Step 2:

a. The top display begins to scroll from 0 to 5. When a **5** appears press ***SET*** again.

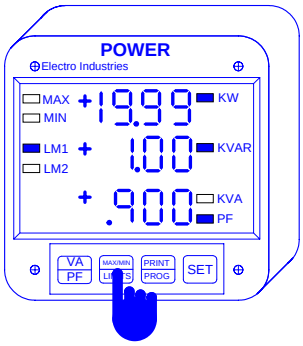


⇨The display blanks and a check mark appears momentarily, confirming a successful reset.

5.3: Accessing the LM1/LM2 Set Limits

The 3DWA300 has two set limits that monitor the instantaneous readings and warn the user of any abnormal conditions. Each limit can detect readings above or below the set level. The set limits flash an annunciator on the face of the monitor. To trigger a relay, the -NL option must be purchased. If a limit is exceeded, the LM1 or LM2 annunciator will flash.

To view the LM1/LM2 set limits:



Step 1:
a. Press ***MAX/MIN/LIMITS***:
- three times to access LM1 limit
- four times for the LM2 limit

⇨Set limits appear momentarily.

5.4: Access Modes

Access commands allow the user to perform specific operations.

ACCESS COMMANDS	OPERATION
1	Print Operating Data
2	Print Programming Data
3	Enter Programming Mode (see Part II: Programming)
4	Firmware Version/LED Test

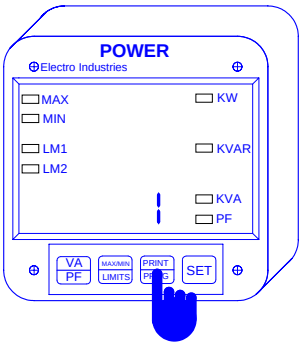
Note: ***Print commands 1 and 2 are only available if enabled in the programming mode (see Group 0, Function 3, Pack 3, Switch D, Chapter 7); they are not recommended when using the multimeter hookup RS-485. The print option should be disabled when using the RS-485. Disabling prevents the user from corrupting data at a computer terminal while multiple meters are being polled.***

5.5: Print Operating Data

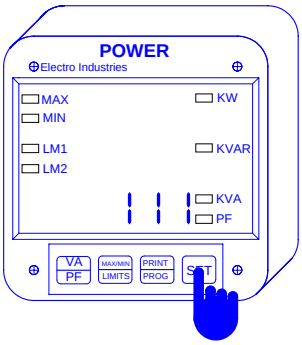
***Note*: This function applies if a serial printer is connected to the 3DWA300 via an RS-232C communication port.**

This function sends data to a serial printer, creating a hard copy of the instantaneous and max/min data of all the functions.

To print the Operating Data:



Step 1:
a. Press ***PRINT/PROG*** until ***1*** appears.



Step 2:
a. While the **1** is displayed, press ***SET*** to activate the Print Operating Data function.

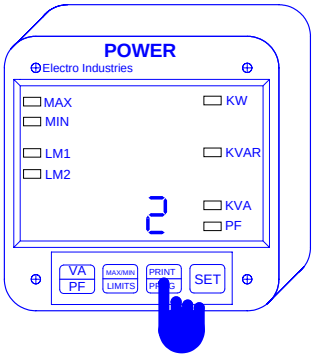
⇨***111*** appears momentarily to confirm printing.

5.6: Print Programming Data

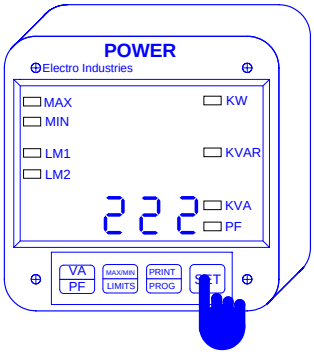
***Note*: This function applies if a serial printer is connected to the 3DWA300 via an RS232C communication port.**

The Print Programming Data function sends programming data (also known as the meter setup) to a serial printer for quick reference and verification.

To print programming data:



Step 1:
a. Press ***PRINT/PROG*** until ***2*** appears.



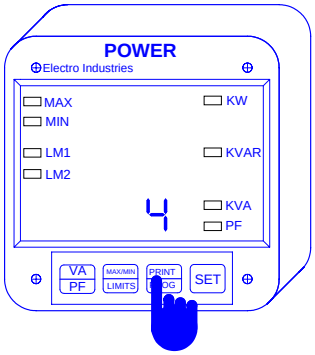
Step 2:
a. While the 2 is displayed, press ***SET*** to activate the print programming data function.

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

5.7: Firmware Version/LED Test

The 3DWA300 can access the firmware version number of the dual microprocessors. It can also perform an LED test to check if the LEDs and annunciators are functioning properly.

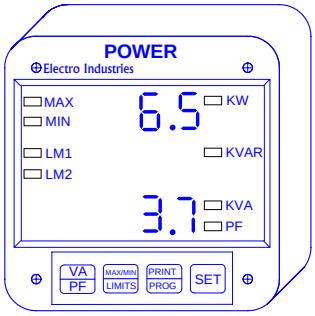
To access firmware versions and perform an LED test:



For Firmware Versions:

Step 1:
a. Press ***PRINT/PROG*** until **4** appears.

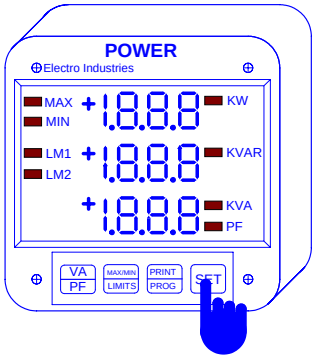
b While the **4** is displayed, press ***MAX/MIN/ LIMITS*** for Firmware Versions.



⇨The upper display indicates the analog processor version.

⇨The lower display indicates the digital processor version.

⇨Versions appear momentarily.



For The LED Test:

Step 1:
a. Press ***PRINT/PROG*** until ***4*** appears.

b. While the **4** is displayed, press ***SET*** for the LED Test.

⇨All segments and annunciators glow simultaneously.

⇨The display returns to the current readings.

Part II: Programming

CHAPTER 6
PROGRAMMING OVERVIEW

- This chapter describes basic programming procedures. Refer to chapters 7–10 for details on specific programming features.

6.1 General Procedure

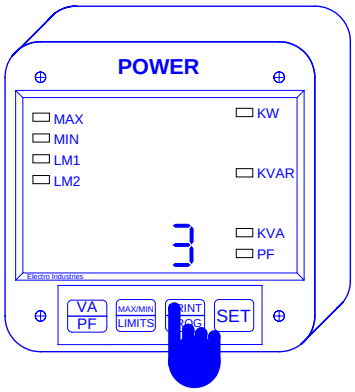
To program your 3DWA300 you will:

1. Enter a **password** to gain access to the programming mode (section 6.2).
2. Select a programming **GROUP** to work in (section 6.3).
3. Select a **FUNCTION** or **SWITCH PACK** within that GROUP (section 6.3).
4. Change the selected parameters of the FUNCTION or SWITCH PACK with **DATA ENTRY** (section 6.4).
5. **Exit** the programming mode to store your changes permanently (section 6.5).

6.2: Password Entry

To access the programming mode you must enter a password. Password entry ensures information security and eliminates unauthorized intrusion. The password is preset at the factory and cannot be changed. It is **555**.

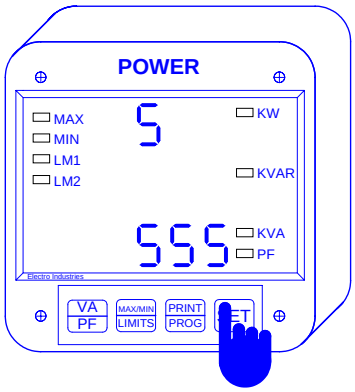
To enter the programming mode:



Step 1:
a. Press ***PRINT/PROG*** until ***3*** appears in lower display.

b. While the 3 is displayed**,** press ***SET*** again to multiply the ***3*** to ***333***.

⇨***333*** appears in lower display.

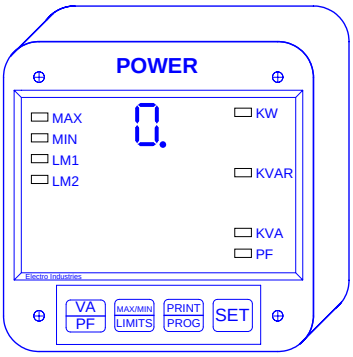


Step 2:
a. Digits begin scrolling in upper display.

⌦The password is **555**.

b. Press ***SET*** each time a ***5*** appears until **555** is entered.

⇨The selected digits appear in lower display.



⇨The display blanks and **PPP** flashes in upper display, confirming a correctly entered password.

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

6.3: Programming GROUPS and FUNCTIONS

Programming tasks are bundled into **GROUPS**. Located within each **GROUP** are specific meter **FUNCTIONS**. See the Table of Contents and individual chapters for descriptions of the tasks performed by each GROUP.

Some FUNCTIONS are further divided into SWITCH PACKS, which are a set of separate ON/OFF toggle switches. Toggle switches have only two positions: either UP segment or DOWN segment. By setting the segment to UP or DOWN, a particular feature is turned ON or OFF, respectively.

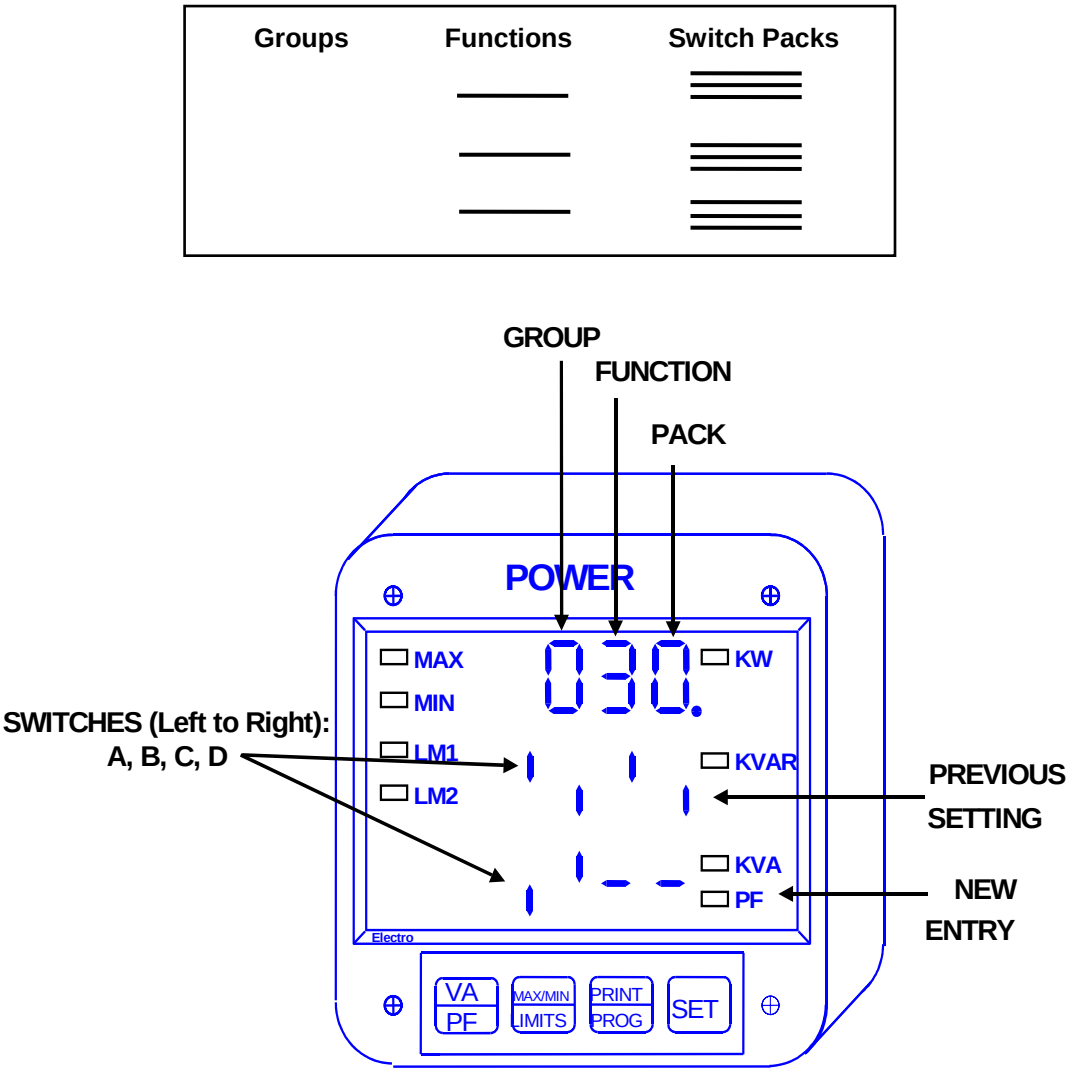


Figure 6.1: The Programming Mode—the switch segments of Group 0, Function 3, Pack 0

6.4: Data Entry

Programmable FUNCTION values are always four-digit numeric fields designed to accept any value between 000 and 1999 (a blank signifies a 0). When entering the value of a parameter you must enter all four digits, leading zeros included. For example, if you want to enter the number 25, you must enter 025.

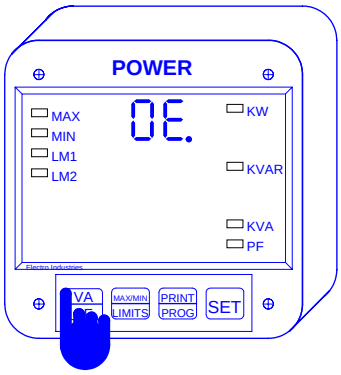
6.5: Exiting Programming Mode

***Note*: To store new programming data permanently you must EXIT the programming mode.**

The steps for exiting the programming mode vary depending upon the level of programming.

IF YOU ARE LOCATED IN THE FUNCTION Level—begin at **Step 1**.
IF YOU ARE LOCATED IN THE GROUP Level—begin at **Step 2**.

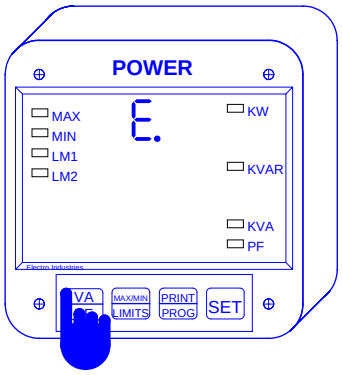
EXITING FROM THE FUNCTION LEVEL



Step 1:
a. Press ***VA/PF*** until the Group number in upper display is followed by ***E***.

b. Press ***PRINT/PROG*** to exit from Function Level to Group Level.

EXITING FROM THE GROUP LEVEL



Step 2:
a. Press ***VA/PF*** until ***E***. appears in upper display.

b. Press ***PRINT/PROG*** to exit entirely from the Programming Mode.

6.6: Checksum Error—Protective Mechanism

If the control power is interrupted while in Programming Mode or the user does not completely exit, the meter enters a checksum mode. The display blanks, except for the max LED. Press ***VA/PF*** and ***PRINT/PROG*** simultaneously and the unit will recover. Follow the procedure to enter Programming Mode to check program data. If the data is correct, then exit.

This checksum error is a protective mechanism. It alerts the user if a procedure was not correctly followed to prevent the meter from displaying inaccurate numbers.

CHAPTER 7
PROGRAMMING GROUP 0—GLOBAL METER SETUP

The Global Meter Setup includes FUNCTIONS **0** through **5**, which control configuration and basic operation of the 3DWA300. The table below lists GROUP 0 Functions.

Group and Function Number	Function
00.	Integration Interval
01.	Meter Address for Communication
02.	Baud Rate for Communication
03.	System Configuration
04.	Relay 1 Set-up / Time delay
05.	Relay 2 Set-up / Time delay
0E.	Exit Programming GROUP 0

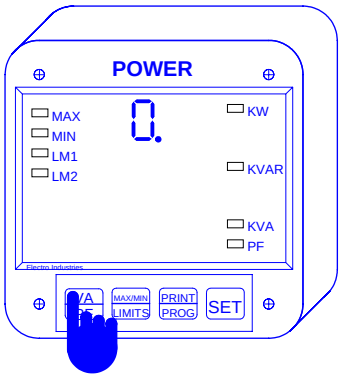
Table 7-1: Group 0 Programming Format

7.1: Group 0, Function 0—Integration Interval

The **Integration Interval** is the time period over which all instantaneous readings are averaged to obtain a maximum and minimum demand. The Integration Interval is entered in seconds. For example, to enter 15 minutes enter 0900 seconds.

To change the Integration Interval:

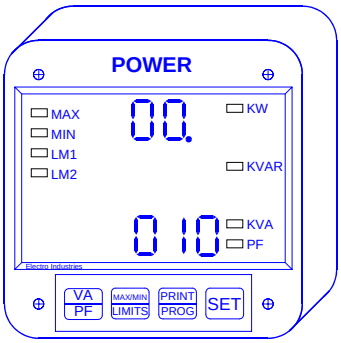
***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter 6).

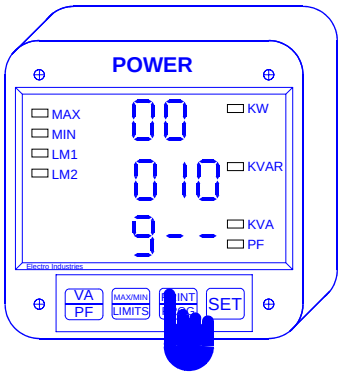
b. Press ***VA/PF*** until **0.** appears in upper display.

c. Press ***PRINT/PROG*** to activate the Group.



⇨Function **00**. appears in upper display.

⇨Lower display indicates the current Integration Interval.

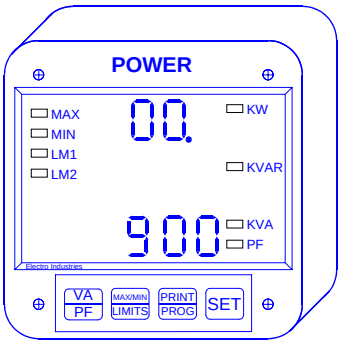


Step 2:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨The previous value shifts to middle display and three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit (blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.



⇨Repeat this procedure until new Integration Interval is entered. Press ***PRINT/PROG*** to store entire setting.

⇨When complete, middle display blanks and lower display indicates new Integration Interval.

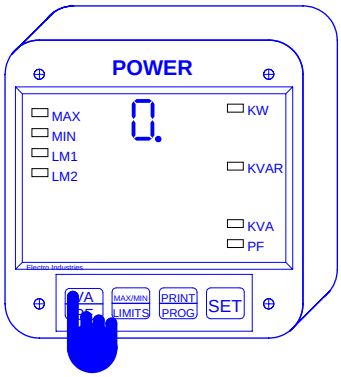
See Chapter 6, section 6.5 to Exit.

7.2: Group 0, Function 1—Meter Address

The **Meter Address** identifies the meter for the purposes of digital communications. When numerous meters are at one site, it is essential that each meter have its own address. Otherwise, all meters will speak simultaneously and communication is useless.

To change the Meter Address:

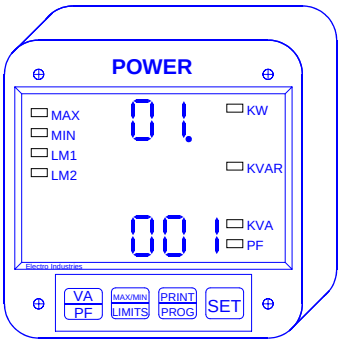
Note**: **Press VA/PF at any time to cancel before storing the last digit or switch.



Step 1:
a. Enter Group Level of Programming Mode (see Chapter 6).

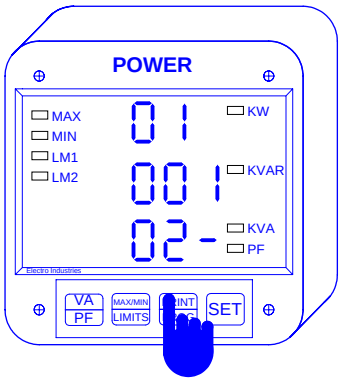
b. Press ***VA/PF*** until **0.** appears in upper display.

c. Press ***PRINT/PROG*** to activate the Group.



⇨Press ***VA/PF*** until Function **01.** appears in upper display.

⇨Lower display indicates current Meter Address.

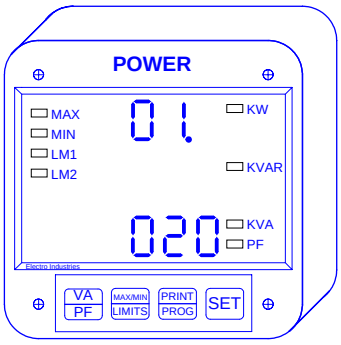


Step 2:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨The previous value shifts to middle display and four dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit (blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.



⇨Repeat this procedure until new address is entered. Press ***PRINT/PROG*** to store entire setting.

⇨When complete, middle display blanks and lower display indicates new Meter Address.

See Chapter 6, section 6.5 to Exit.

7.3: Group 0, Function 2—Communication Baud Rate

The **Baud Rate** is the speed at which data is transmitted between monitor and remote communications. The rate programmed into the meter must match the rate used by the remote device. Valid Baud Rates are: 1200, 2400, 4800 and 9600.

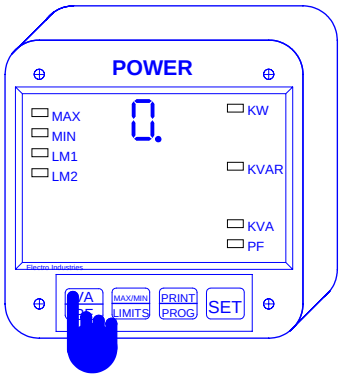
Note: For data entry purposes the last zero for each rate is dropped off. Leading zero's must be included. For example: to enter a Baud Rate of 2400, enter 0240. Remember, the last zero is a blank. See Table 7-2, below, for the Baud Rates and their corresponding Baud Rate Numbers.

Communication Baud Rate	Left Digit—*Blank Or 1 Only*	Enter Baud Rate Number
1200	BLANK	120
2400	BLANK	240
4800	BLANK	480
9600	BLANK	960

Table 7-2: Baud Rate Numbers

To change the Baud Rate:

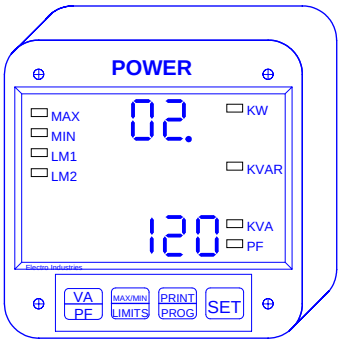
***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter 6).

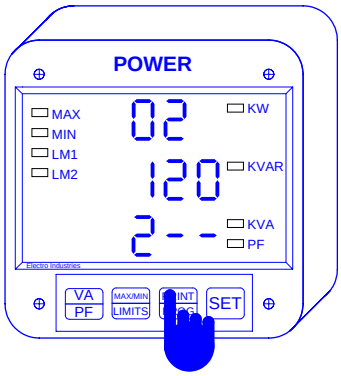
b. Press ***VA/PF*** until **0.** appears in upper display.

c. Press ***PRINT/PROG*** to activate the Group.



⇨Press ***VA/PF*** until Function **02.** appears in upper display.

⇨Lower display indicates current Baud Rate.

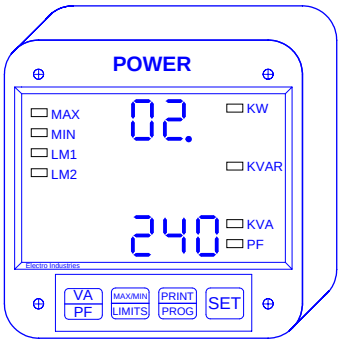


Step 2:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨The previous value shifts to middle display and three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit (blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.



⇨Repeat this procedure until new Communication Baud Rate is entered. Press ***PRINT/PROG*** to store entire setting.

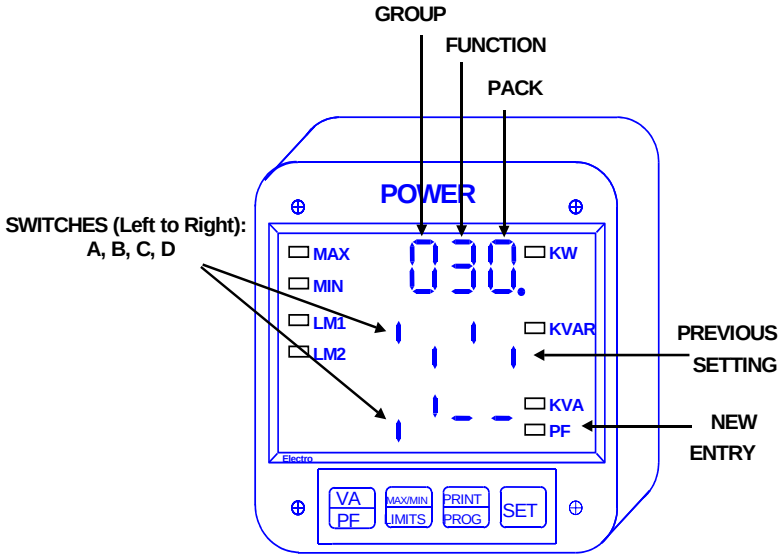
⇨When complete, middle display blanks and lower display indicates the new Baud Rate.

See Chapter 6, section 6.5 to Exit.

7.4: Group 0, Function 3—System Configuration

The System Configuration function sets the 3DWA300's basic operational parameters. This Function contains four different 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 chooses between two options. The meter displays one Switch PACK at a time. Press ***MAX/MIN/LIMITS*** to scroll from PACK to PACK.



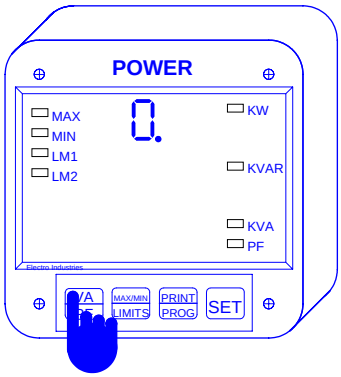
PACK	SWITCH	FEATURE	SEGMENT POSITION
0	A	Reserved	—
	B	Reserved	—
	C	Reserved	—
	D	Reserved	—
1	A	Non-significant Blank Leading Zero	UP—Enable DOWN—Disable
	B	Reset Protection	UP—Enable DOWN—Disable
	C	VA/PF Display	UP—Enable DOWN—Disable
	D	Open Delta Installation	UP—Enable DOWN—Disable
2	A	Reserved	—
	B	Reserved	—
	C	Reserved	—
	D	Reserved	—
3	A	Trip Relay Computer Control I	UP—Alarm Only DOWN—Computer Control & Alarm
	B	Trip Relay Computer Control II	UP—Alarm Only DOWN—Computer Control & Alarm
	C	Communications*	UP—Comm DOWN—Disable Comm & Print
	D	DC Output Print Operating and Programming Data*	UP—Print DOWN—Disable Print

Table 7-3: System Configuration and switch features

***Note**: To Print, PACK 3, Switches C and D must be in the UP position.*

To change a system configuration switch setting:

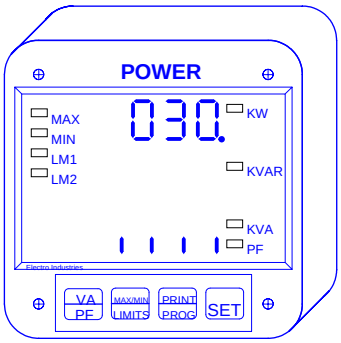
***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter 6).

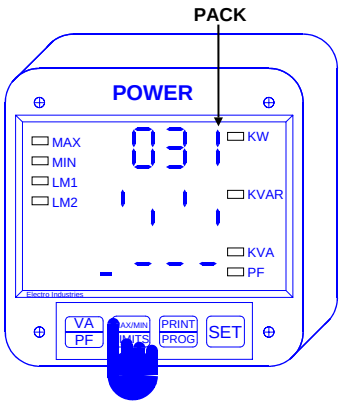
b. Press ***VA/PF*** until **0.** appears in upper display.

Press ***PRINT/PROG*** to activate the Group.



⇨**Press VA/PF until** function ***030.*** appears in upper display.

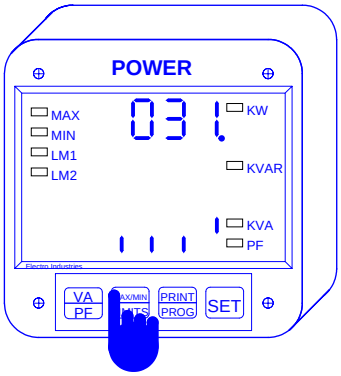
⇨Lower display indicates current System Configuration Switch setting.



Step 2:
a. Press ***MAX/MIN/LIMITS*** until desired PACK appears.

b. Press ***PRINT/ PROG*** to begin Data Entry Sequence.

⇨The previous Switch settings shift to middle display and four dashes appear in lower display



Step 3:
a. Press ***MAX/MIN/LIMITS*** to toggle the first segment to a desired setting.

b. Press ***PRINT/PROG*** to store it. Repeat for all segments.

⇨Press ***PRINT/PROG*** to store entire setting**.** When complete, middle display blanks and lower display indicates new System Configuration Switch setting.

See Chapter 6, section 6.5 to Exit.

7.5: Group 0, Functions 4–5—Time Delay for Relays 1 and 2 (Option-NL)

The 3DWA300can be equipped with a relay option. Two relays are included in this option. The relays can be used in computer-controlled or dedicated alarm options. Function 4 is used to set Relay 1; Function 5 is used to set Relay 2.

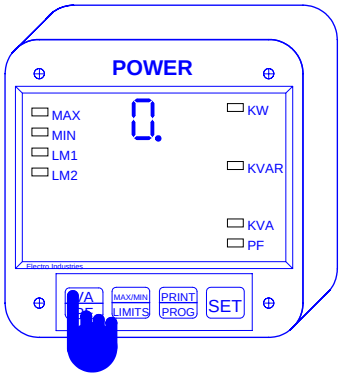
Computer Controlled: The relays can be locked or unlocked through a computer (the 3DWA300 must have a communication option).

Dedicated Alarm: The relays can be locked or unlocked using the meter's keypad or its measured inputs. The computer cannot change the state of the relay.

The time delay for Relays 1 and 2 can be set from 0–255 seconds. This allows conditions to exist for a user-specified period of time 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.

To program the time delay:

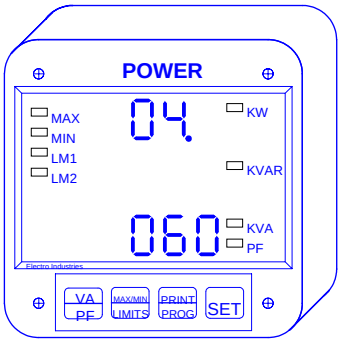
***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter. 6).

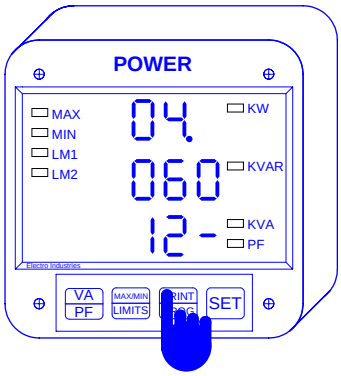
b. Press ***VA/PF*** until ***0.*** appears in upper display.

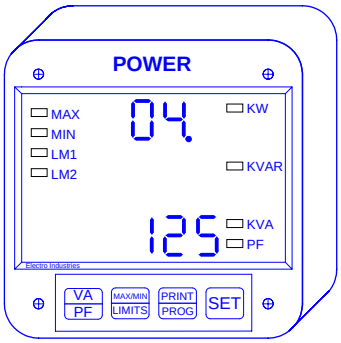
c. Press ***PRINT/PROG*** to activate the Group.



Step 2.
Press ***VA/PF*** to select Function **04** for Relay 1 or Function **05** for Relay 2.

⇨Lower display indicates the current Time Delay.





Step 3:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨The previous value shifts to middle display and three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit. (Blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.

⇨Repeat this procedure until new Time Delay is entered. Press PRINT/PROG to store entire setting.

⇨When complete, middle level blanks and lower display indicates the new Time Delay.

See Chapter 6, section 6.5 to Exit.

CHAPTER 8

PROGRAMMING GROUP 1—VOLTAGE, AMPERAGE AND WATT SCALE SETTINGS

8.1: Group 1, Functions 0–1—Full Scale Settings & Decimal Point Placement for Volt & Amp Channels

Programming GROUP 1 functions provide a selection of Full Scale Settings to accommodate different CTs and PTs. Scale selection may be performed in each of the functions. The group also allows selection for Volts/Kilovolts, Amps/Kiloamps and Kilowatts/Megawatts.

GROUP AND FUNCTION NUMBER	FUNCTION
10.	Full Scale Selection for Volts
11.	Full Scale Selection for Amps
12.	Full Scale Selection for Watts
1E.	Exit Programming GROUP 1

Table 8-1: Group 1 Programming Format

INPUT VOLTAGE	PT RATIO	FULL SCALE
75 V (Suffix L)	120.13:1	9.01 KV
120/208 V	1:1 (Direct)	0120 V
120/208 V	4:1	0480 V
120/208 V	12:1	01.44 KV
277/480 V (Suffix G)	1:1 (Direct)	0300 V

Table 8-2: Full Scale Settings for Volts

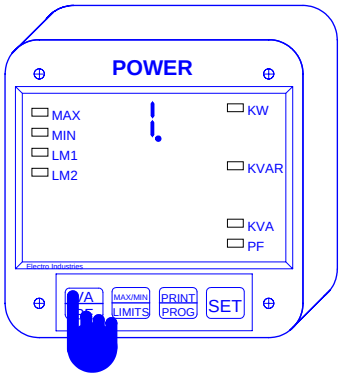
INPUT CURRENT	CT TYPE	FULL SCALE
0–5 A	None	05.00 A
0–1000 A	1000/5	1000 A
0–5000 A	5000/5	05.00 KA

Table 8-3: Typical Full Scale Settings for Amps

Note: ***Decimal point placement for Volt and Amp channels is selected through Function 0 and Function 1. The decimal position must be re-set each time these Functions are used.***

To change the full scale settings (**Functions 10–11**):

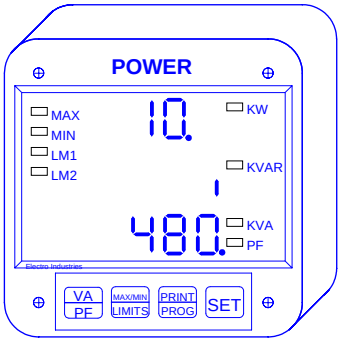
***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter 6).

b. Press ***VA/PF*** until **1.** appears in upper display.

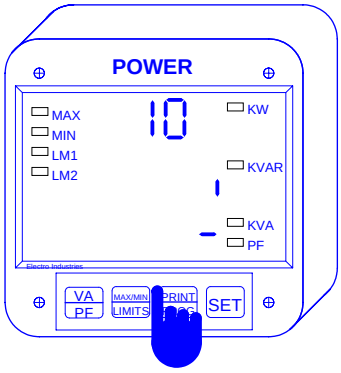
c. Press ***PRINT/PROG*** to activate the Group .



⇨Function **10** (Full Scale Volts) appears in upper display. Press ***VA/PF*** to select Function **11** for Full Scale Amps.

⇨Middle display indicates current Scale Factor Setting.

⇨Lower display indicates Full Scale (for Volts in this example).



ENTERING THE SCALE FACTOR:

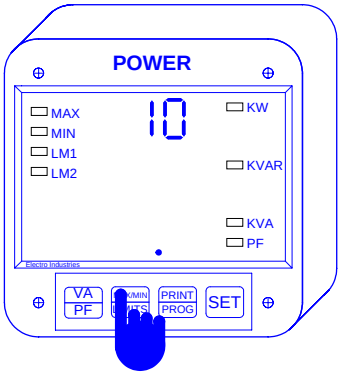
Step 2:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨Lower display is replaced with a dash.

b. Press ***MAX/MIN/LIMITS*** to move the segment UP or DOWN to set Scale Factor.

⇨UP signifies **Kilovolts**.
⇨DOWN signifies **Volts**.

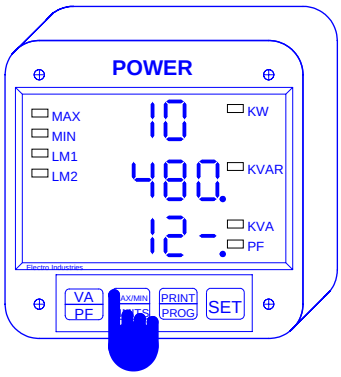
c. Press ***PRINT/PROG*** to store.

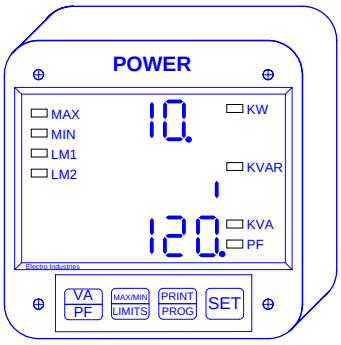


DECIMAL POINT SELECTION:

Step 3:
a. Press ***MAX/MIN/LIMITS*** to move decimal point.

b. Press ***PRINT/PROG*** to store.





ENTERING THE FULL SCALE:

Step 4:
⇨Middle display indicates Full Scale for Volts

⇨Three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit (blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.

⇨Repeat this procedure until desired value is entered. Press ***PRINT/PROG*** to store entire setting.

⇨Lower display indicates new Full Scale Setting

⇨Middle display indicates Scale Factor.

⇨Upper display indicates Group and Function Number (including decimal point).

See Chapter 6, section 6.5 to exit.

8.2: Group 1, Function *2*: Scale Selection & Decimal Point Placement for Kilowatts/Megawatts

Programming GROUP 1 also provides decimal point positioning for maximum resolution. The following aids in selecting the best decimal position for Function *2*.

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 three phases multiply the FSW by 3.

FSW (one phase) =120 Vx5.00 A
FSW (one phase)=600 W
FSW (three phase)=600 Wx3 = 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.

Example 2:

FSV=480 V
FSA=1000 A

FSW (one phase)=480 Vx1000 A
FSW (one phase=480,000 W

FSW (three phase)=480,000 Wx3 = 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:

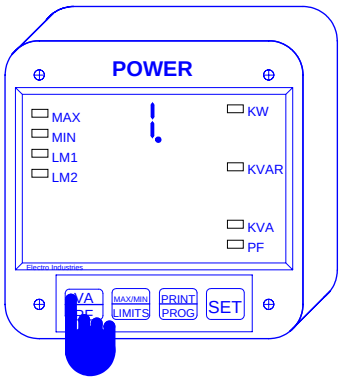
FSV=1.440 KV
FSA=1000 A

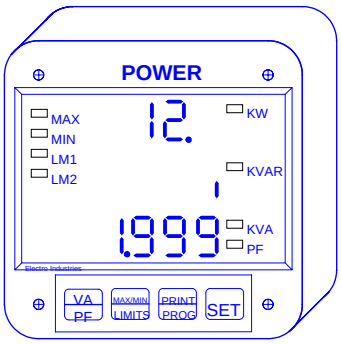
FSW (one phase)=1440 Vx1000 A
FSW (one phase)=1,440,000 W
FSW (three phase)=1,440,000 Wx3 = 4,320,000 W

FSW for a Kilowatt meter equals 4320 KW. Here the FSW is too large a value for a Kilowatt meter (the range is 000–1999). FSW for a Megawatt meter equals 04.32 MW. In FUNCTION *2*, place the decimal point after the second digit.

To change scale selection and decimal point placement: for Full Scale Watts:

Note**: **Press VA/PF at any time to cancel before storing the last digit or switch.





Step 1:

a. Enter Group Level of Programming Mode (see Chapter 6).

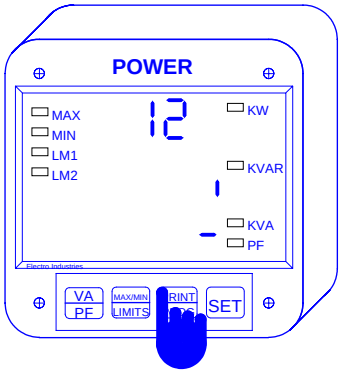
⇨Press ***VA/PF*** until Function **12.** appears in upper display.

b. Press ***VA/PF*** until ***1.*** appears in upper display.

⇨Middle display indicates Scale Factor Setting.

c. Press ***PRINT/PROG*** to activate the Group.

⇨Lower display indicates **1999** (decimal point placement).

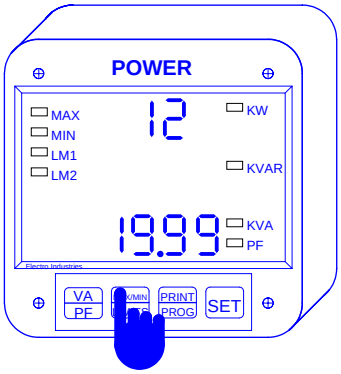


Step 2:
a. Press ***PRINT/PROG*** to begin Data Entry Sequence.

⇨Lower display is replaced with a single dash

b. Press ***MAX/MIN/LIMITS*** to toggle between UP (Megawatt) and DOWN (Kilowatt).

c. Press ***PRINT/PROG*** to store.



Step 3:
⇨Display blanks and ***1999*** appears in lower display (including current decimal setting).

a. Press ***MAX/MIN/LIMITS*** to move the decimal.

b. Press ***PRINT/PROG*** to store.

See Chapter 6, section 6.5 to Exit.

CHAPTER 9
PROGRAMMING GROUP 2—METER CALIBRATION

WARNING—READ THIS SECTION CAREFULLY BEFORE PROCEEDING:

- *Any rescaling, such as a change in a transformer ratio, can be accomplished in GROUP 1. Calibration is not necessary.*
- *Meter calibration cannot be performed if the meter is installed for service. The sensing inputs must be connected to a power supply with variable voltage and separate current outputs.*
- *The calibration procedure requires highly accurate and stable input signals. Incorrect readings result from improper calibration procedures. If unsure, return unit to EIG for calibration.*
- *BEFORE calibrating any channel, make a note of its Full Scale Setting (See Chapter 8). Set the Full Scale in accordance with **Table 9-2** 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 EIG for assistance.*

In general, a significant drift in calibration is unlikely. Therefore, a yearly re-calibration of the meter is not required.

9.1: Calibration Requirements

FUNCTIONS 0–8 (High and Low End Calibration) can be calibrated by qualified site technicians if a stable calibration source can be applied.

Calibration on the 3DWA300 requires precise inputs of 120 Volts, 5 Amps, and 2.5 Amps. The 3DWA300-G model requires precise inputs of 300 Volts, 5 Amps, and 2.5 Amps. If this equipment is unavailable, contact EIG for assistance.

GROUP AND FUNCTION NUMBER	FUNCTION
2P.	Standard Correction—Factory Procedure only.
20.	High End Calibration—Volts AN
21.	High End Calibration—Volts BN
22.	High End Calibration—Volts CN
23.	High End Calibration—Amps A
24.	High End Calibration—Amps B
25.	High End Calibration—Amps C
26.	Low End Calibration—Amps A
27.	Low End Calibration—Amps B
28.	Low End Calibration—Amps C
2E.	Exit Programming GROUP 2

Table 9-1: Group 2 Programming Format

The Full Scale and Calibration values should be equal during the calibration procedure. Refer to Table 9-2, below.

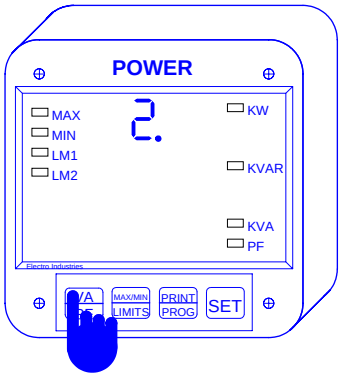
CALIBRATION TYPE/RANGES	CALIBRATION SOURCE	CALIBRATION VALUE
Volts 75 V	75 V	14.40
Volts 120/208 V	120 V	14.40
Volts 277/480 V	300 V	0300
Amps Hi End 2000/5 CT	5 A	1999
Amps Lo End	2.5 A	1000

Table 9-2: Calibration Source, Full Scale and Value Settings for Calibration

9.2: Group 2, Functions 0–8—High-End Calibration of Voltage Channels, High- & Low-End Calibration of Amperage Channels

To change the calibration (Functions 0–5):

***Note**: Press VA/PF at any time to cancel before storing the last digit or switch.*



Step 1:
a. Enter Group Level of Programming Mode (see Chapter. 6).

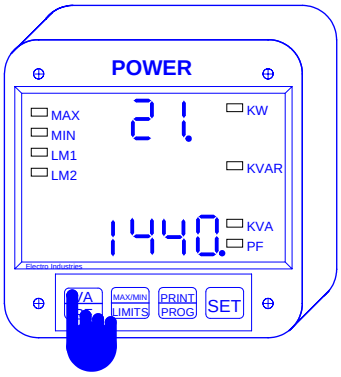
b. Press ***VA/PF*** until ***2.*** appears in upper display.

c. Press ***PRINT/PROG*** to activate the Group.

⇨A one digit password is required to continue.

d. Press ***MAX/MIN/LIMITS*** until ***5*** appears.

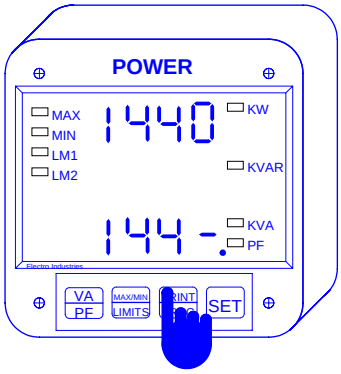
e. Press ***PRINT/PROG*** to select.



Step 2:
⇨Refer to **Table 9-1** for the Function Number that corresponds to channel requiring calibration.

a. For example, to calibrate Volts BN, press ***VA/PF*** until **21.** appears.

⇨*(2P is pre-calibrated. This is a factory-set value and should not be altered.)*



Step 3:
⇨Apply the calibration to the appropriate channel.

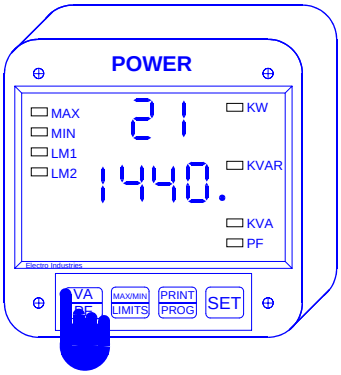
a. Press ***PRINT/PROG*** to activate calibration.

⇨Current value moves to middle display.

⇨Three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit (a blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit. Repeat until value is entered.



Step 4:
⇨The new value moves to middle display.

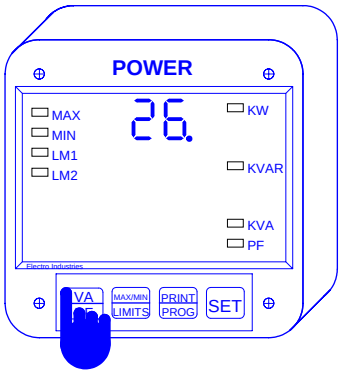
⇨Lower display indicates new calibrated value after **10-15 seconds.**

a. Press ***VA/PF*** to exit calibration sequence.

⇨*If the calibrated reading is not acceptable repeat the entire procedure after checking all connections and calibration signals.*

***Note*: Repeat the same procedure for FUNCTIONS 0–2. Set FUNCTIONS 3–5 High-End current value to 999. Set Low End value to 1000.**

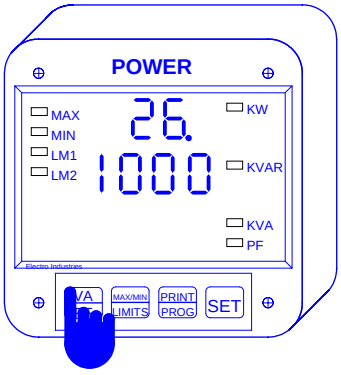
For Function 6, Low-end Amps:



Step 1:
⇨Set the source to half of the current Hi End Scale.

a. After entering Programming mode (see Chapter 6) press ***VA/PF*** until **26.** appears in upper display.
b. Press ***PRINT/ PROG*** to activate.
⇨Middle and lower displays blank.

⇨*After 10 seconds, the calibrated number appears.*



Step 2:
⇨The new value moves to middle display.
⇨Lower display indicates calibrated reading, after **10-15 seconds**.
a. Press ***VA/PF*** to exit Calibration Procedure.

CHAPTER 10
PROGRAMMING GROUP 5—SET LIMITS AND RELAYS

Group 5 allows the user to set the limit values LM1 and LM2 for all power functions—Kilowatt, Kilovar, Kilovolt-ampere, Power factor, Negative kilovar, Negative power factor, and Negative kilowatt.

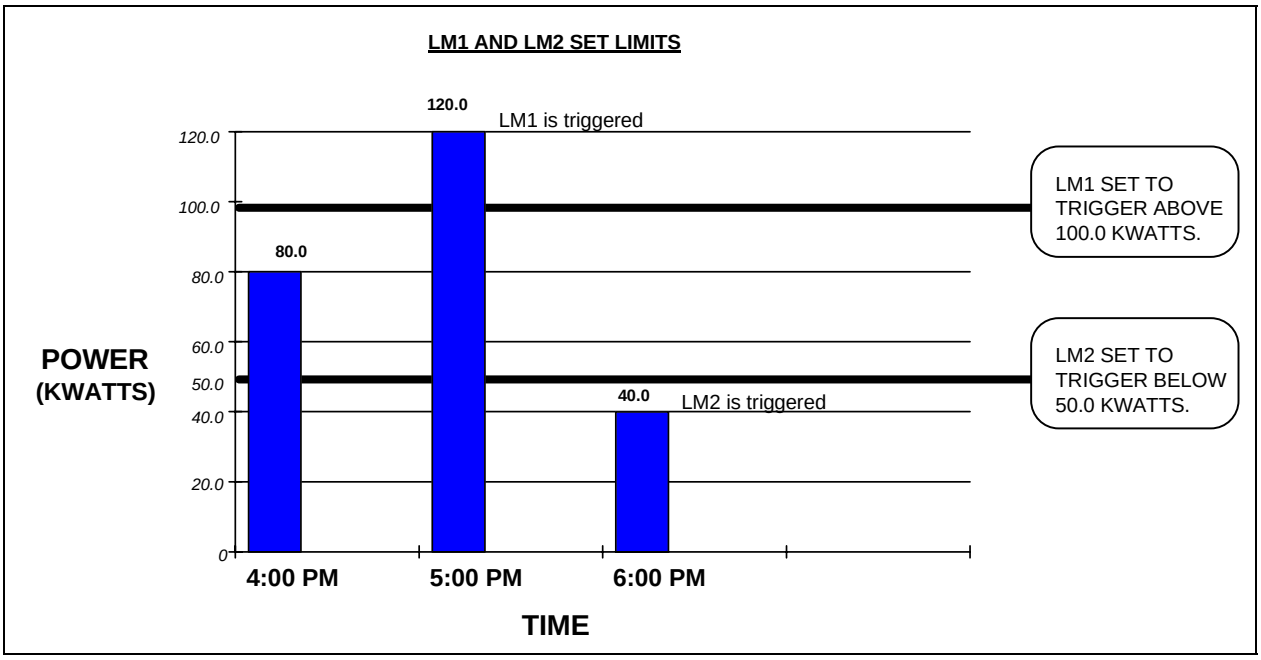


Figure 10.1 Example of LM1/LM2 Set Limits

10.1: Trip Relay

The 3DWA300 has two relays. These relays are linked through the program to Set Limits LM1 and LM2. The user can program above or below set limits for every reading. When a measurement exceeds a particular value, the set limit triggers and alerts the user.

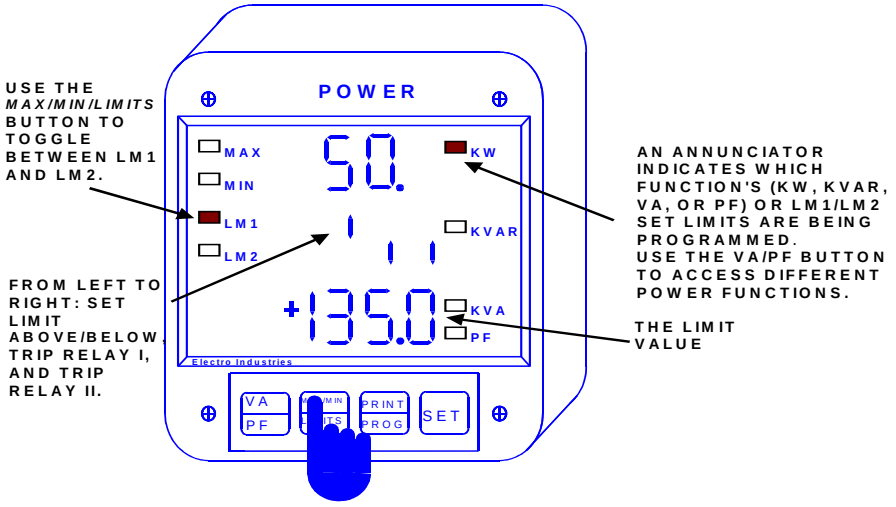
***Note**: Each limit can be programmed to trigger the two internal Form-C dry-contact relays for alarm or secondary protection.*

10.2: Time Delays & Relay Mode

Time Delay indicates whether a delay exists in the relay changing position.
Relay Mode indicates whether the relay will act as a protective switch or not.

Note: The Time Delay is located in GROUP 0, FUNCTIONS 4 & 5, Chapter 7, section 7.5. The Relay Mode is located in GROUP 0, FUNCTION 3, PACK 3, Switches A and B—see Chapter 7, section 7.4

10.3: Group 5, Functions 0–7—LM1/LM2 Set Limits



GROUP AND FUNCTION NUMBER	FUNCTION
50.	LM1/LM2 Set Limits for Kilowatt
51.	LM1/LM2 Set Limits for Kilovar
52.	LM1/LM2 Set Limits for Kilovolt-ampere
53.	LM1/LM2 Set Limits for Power Factor
54.	Reserved
55.	LM1/LM2 Set Limits for Negative Kilovar
56.	LM1/LM2 Set Limits for Negative Power Factor
57.	LM1/LM2 Set Limits for Negative Kilowatt
5E.	Exit Programming GROUP 4

Table 10-1: Group 5 Programming Format

***Note**: In Table 10-2, all functions have a two-part entry.*

Part 1: The first switch sets the limit to trip either above or below the limit level value.
The second switch sets whether Relay 1 will trip when the condition occurs.
The third switch sets whether Relay 2 will trip when the condition occurs.

Part 2: The second part is the Limit Value.

LM1 LED	LM2 LED	ABOVE/BELOW	RELAY 1	RELAY 2	LEVEL
ON	OFF	DIGIT UP-Trigger above level DIGIT DOWN-Trigger below level	DIGIT UP-Enabled DIGIT DOWN-Disabled	DIGIT UP-Enabled DIGIT DOWN-Disabled	0-1999 0-1999
OFF	ON	DIGIT UP-Trigger above level DIGIT DOWN-Trigger below level	DIGIT UP-Enabled DIGIT DOWN-Disabled	DIGIT UP-Enabled DIGIT DOWN-Disabled	0-1999 0-1999

Table 10-2: Functions 0–7

***Note**: Function 3, Power Factor, contains a permanent decimal point after the first digit. The highest and lowest level limits that can be programmed are 1.000 and 0.000, respectively.*

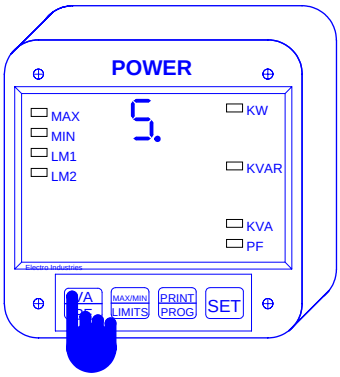
LM1 LED	LM2 LED	ABOVE /RETURN	RELAY 1	RELAY 1	VALUE
ON	OFF	Digit Up	Digit Up	Digit Down	0120
OFF	ON	Digit Down	Digit Down	Digit Up	0090

Table 10-3: Example for Function 0

Example (see Table 10-3, above): If Kilowatts exceed 120W, LM1 is triggered and Relay 1 is enabled. If the Kilowatts do not exceed 90W, LM2 is triggered and Relay 2 is enabled.

To change Relay 1 or Relay 2:

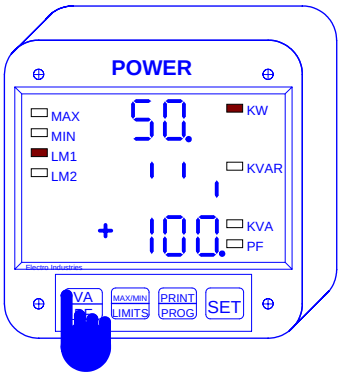
***Note*: Press VA/PF, at any time, to cancel before storing the last digit or switch.**



Step 1:
a. Enter Group Level of Programming Mode (see Chapter. 6).

b. Press ***VA/PF*** until ***5.*** appears in upper display.

c. Press ***PRINT/PROG*** to activate the Group.

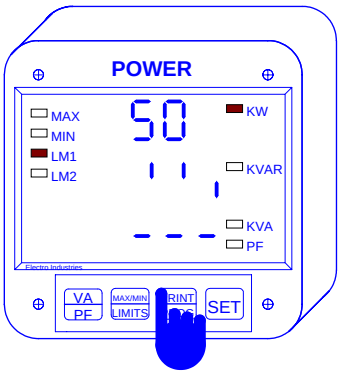


Step 2:
a. Press ***VA/PF*** to select desired FUNCTION (0-7).

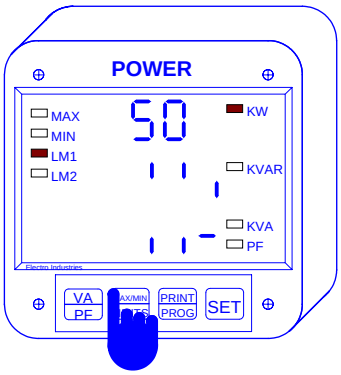
⇨Middle display indicates the selected value for whether to trip above or below on Relay 1 and Relay 2.
Left Switch: UP position indicates above tripping value for lower display's value. DOWN position indicates below tripping value for lower display's value.
Middle Switch: UP position sets Relay 1 to trip. DOWN position does not activate Relay 1 when limit condition exists.
Right Switch: Same as Middle Switch, regarding Relay 2.

b. Press ***MAX/MIN/LIMITS*** to toggle between LM1 and LM2 settings.

⇨The LM1 or LM2 annunciator indicates the limit being displayed.



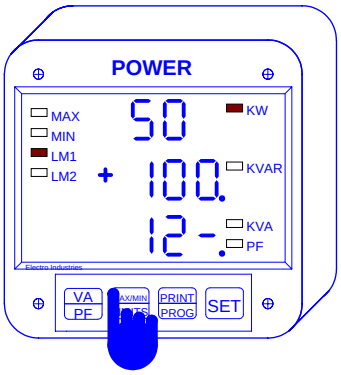
Step 3:
a. Press ***PRINT/PROG*** once to activate data entry..



Step 4:
a. Press ***MAX/MIN/LIMITS*** to toggle each the segment to desired setting (see **Table 10-2**).

b. Press ***PRINT/PROG*** to store it and move to the next one. Press ***PRINT/PROG*** to store entire setting.

⇨When complete, display automatically switches to programming the Setup Level.

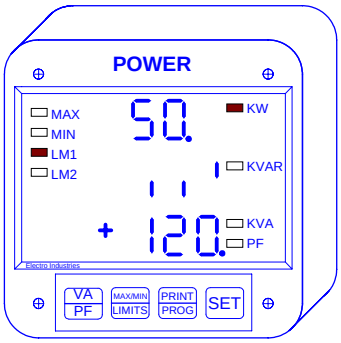


Step 5:
⇨Middle display indicates current Setup Level.

⇨Three dashes appear in lower display.

b. Press ***MAX/MIN/LIMITS*** to select desired number for the first digit. (Blank signifies a 0).

c. Press ***PRINT/PROG*** to store it and move to the next digit.



⇨Repeat this procedure until the new Setup Level is complete.

⇨The display returns to the Function Level with new settings.

See Chapter 6, section 6.5 to Exit.