User Manual

3DVA 120
3DVA 120-H

- Installation
- Operation
- Programming

➠ Triple Display Voltage Power Monitor

3DVA120

3DVA120-H
With Harmonics Measurement

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ELECTRO INDUSTRIES
GAUGETECH

3DVA120
3DVA120-H

Solid State Digital Triple Display Voltage Monitoring System

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

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CHAPTER 1
MECHANICAL INSTALLATION

1.1: 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.

1.2: 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

The diagrams on the following pages display the various possible mechanical installations for the 3DVA120, and for installation of the Communication Converter. All measurements are in inches.

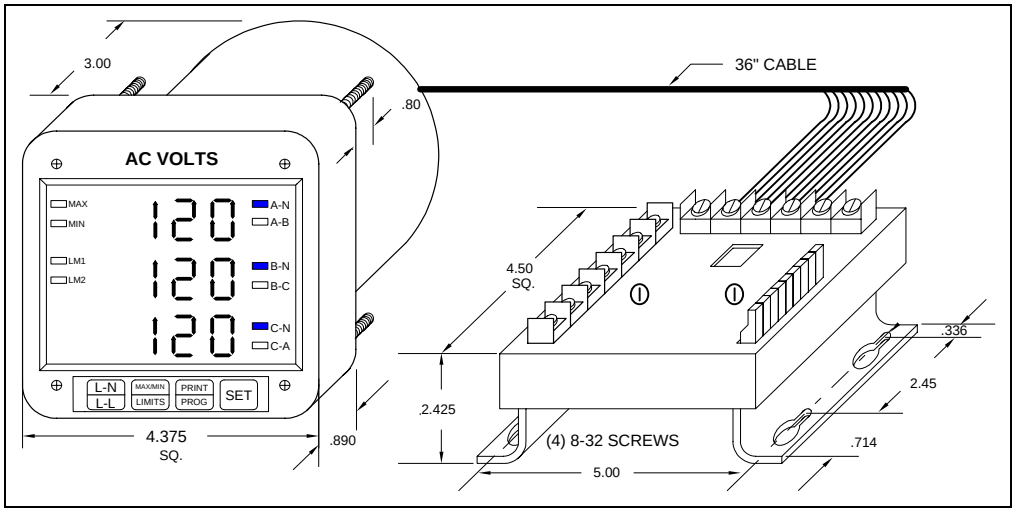


Diagram 1.1 Installation of 3DVA120 with K-110 Option for limited space conditions.
Use supplied 1-1/2" screws only.

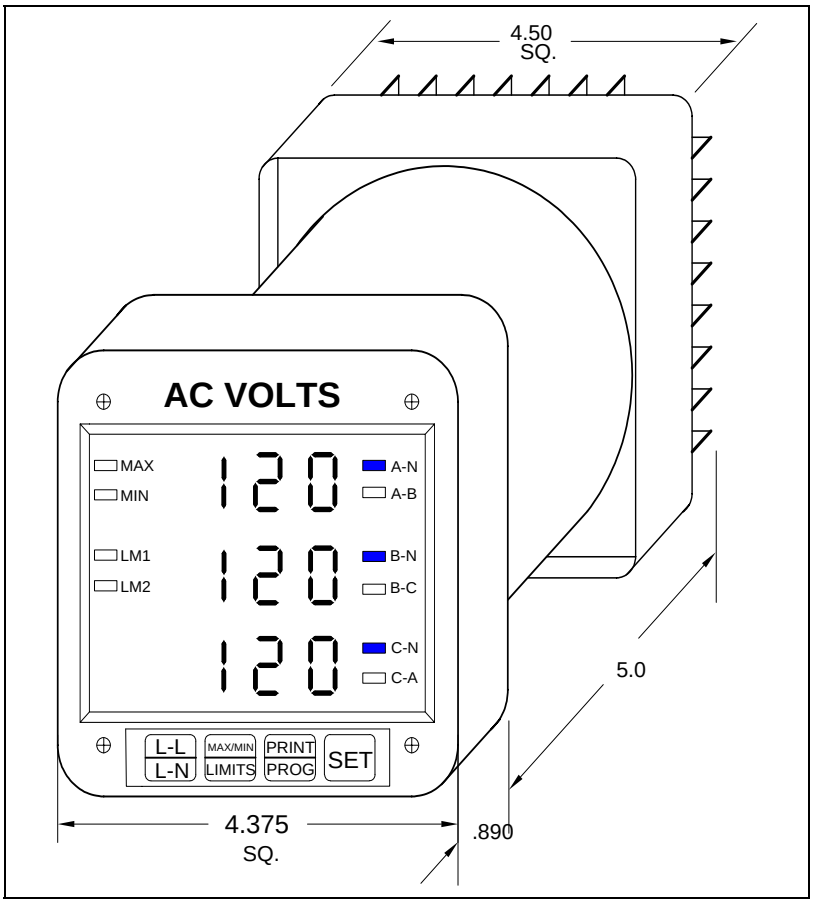


Diagram 1.2 Standard Installation of the 3DVA120

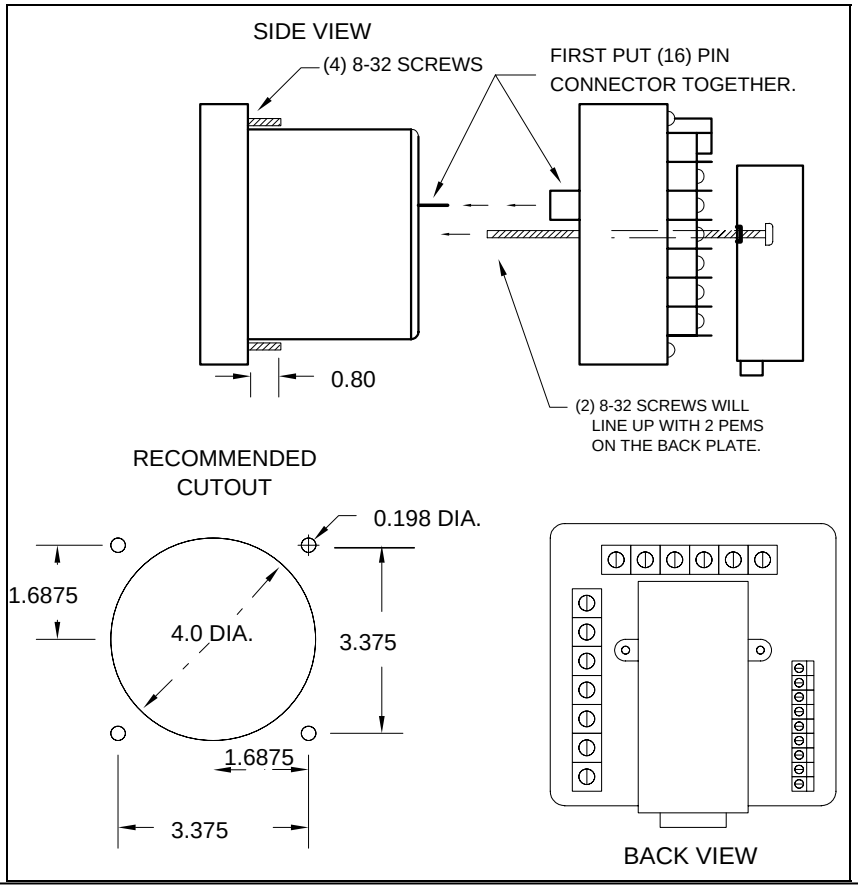


Diagram 1.3 Standard Cutout for 3DVA120.

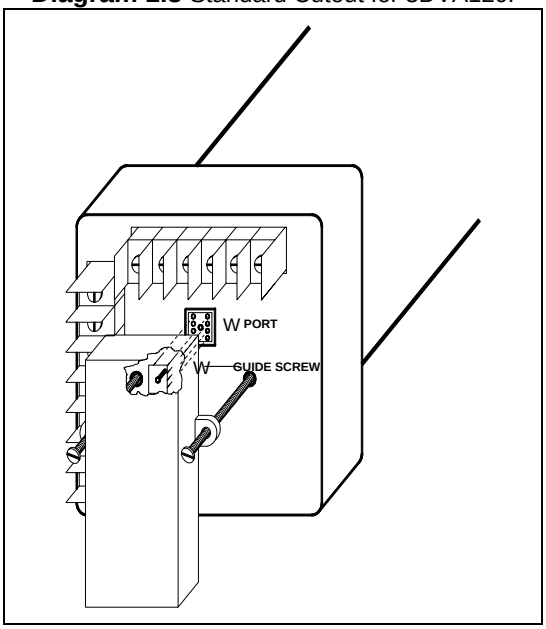


Diagram 1.4 Optional Communication Converter or DC Output Module Installation

Note: ***Carefully line up the guide screw and 8 pin port connector to prevent pins from breaking.***

CHAPTER 2
ELECTRICAL INSTALLATION

2.1: 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.

2.1.1: 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.

For electrical installation, refer to the standard connection diagrams. Find the current diagram based on the model number and whether the instrument is connected directly or with the use of PT's.

2.2: 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 2.1: 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.

2.3: 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.

2.4: 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.

2.5: 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.

2.6: 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 2.2: 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.*

2.7: 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

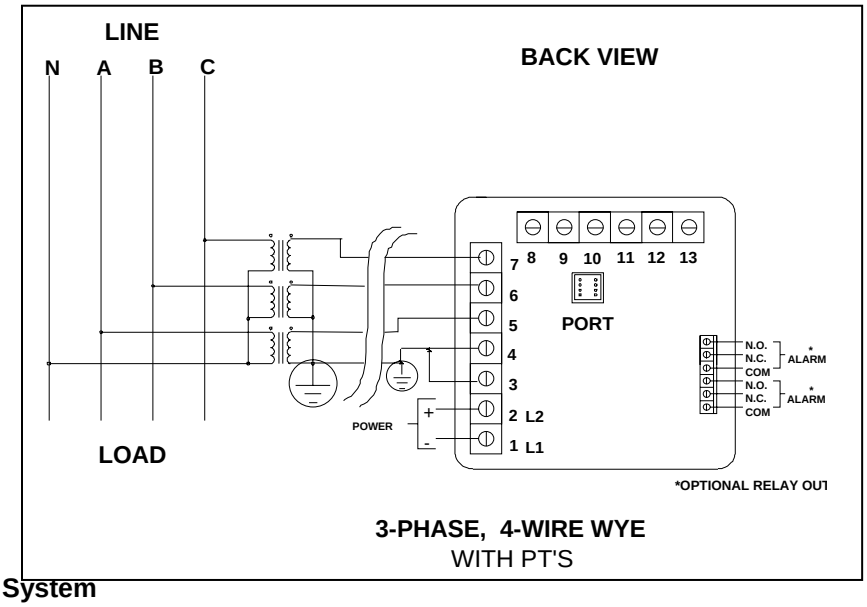
Note: ***See phase reversal if a message of PH is indicated on the display after installation.***

I Three-Phase, Four-Wire Wye with PT's.

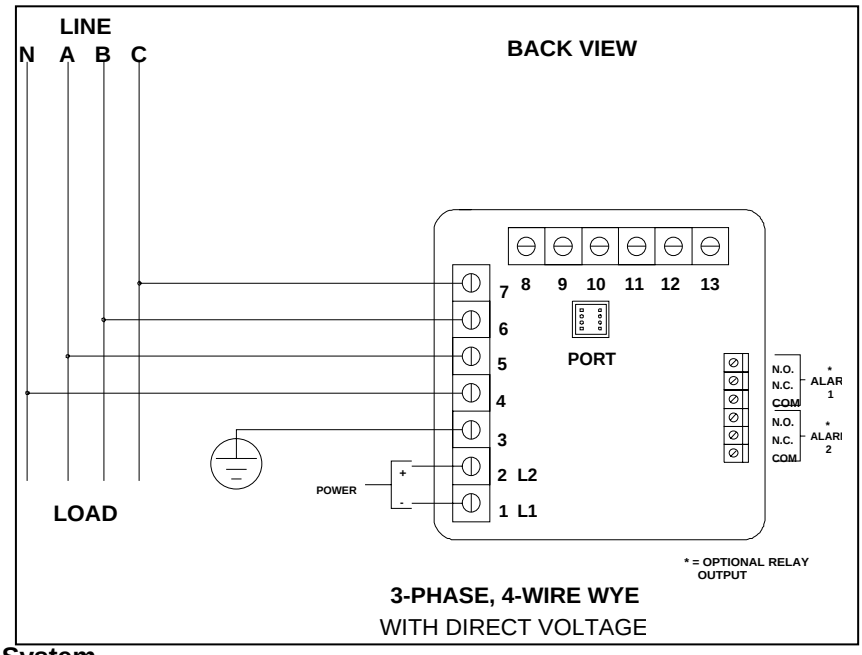
II Three-Phase, Four-Wire Wye, Direct Hookup.

III Three-Phase, Three-Wire Delta, Direct Hookup.

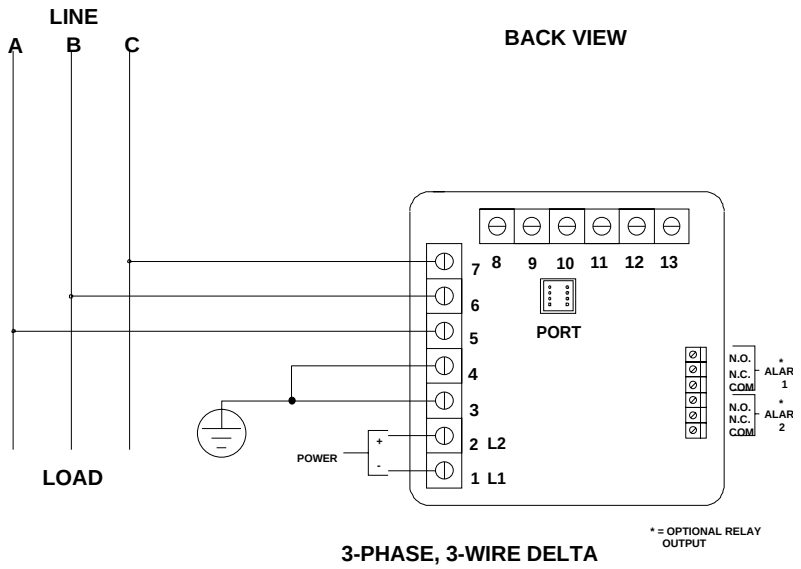
IV Three-Phase, Three-Wire Open Delta.



I. Three Phase System

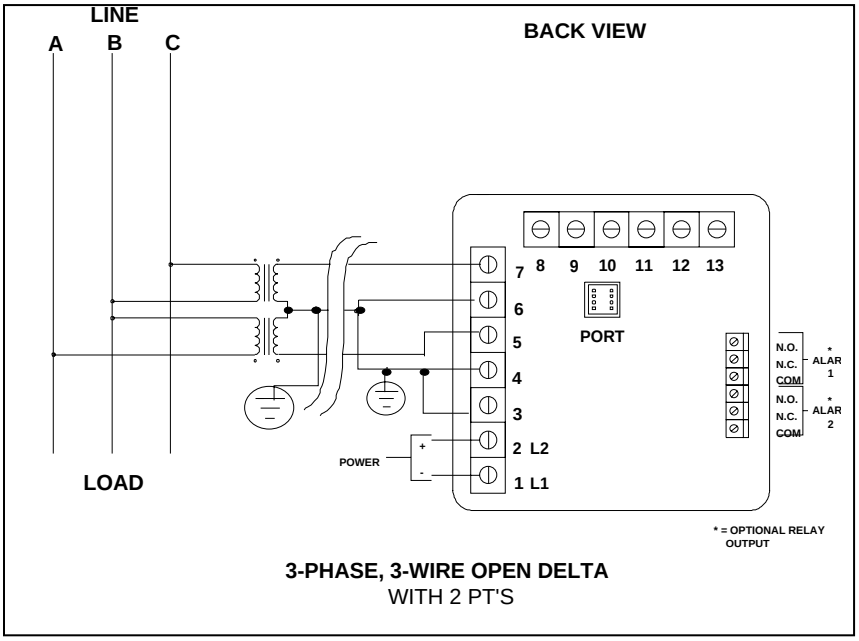


II. Three Phase System



3-PHASE, 3-WIRE DELTA
WITH DIRECT VOLTAGE

III. Three-Phase System



3-PHASE, 3-WIRE OPEN DELTA
WITH 2 PT'S

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

2.8: Relay, Protection and Pulse Output

(This section applies only to a 3DVA120 with the -NL Relay Option.)

FAIL-SAFE MODE: The 3DVA120 -NL option gives the user an adjustable tripping bandwidth. The user specifies a range over which functions, such as Frequency, Phase Relation and Voltage, are acceptable. The relay releases during times of normal operation and engages when functions are outside specified normal levels. The relay can be programmed to engage during normal operating conditions and release outside specified normal range (particularly when power is lost). This is the **fail-safe mode**.

HYSTERISIS: The 3DVA120 -NL option also includes adjustable **hysterisis**. In addition to a time delay on activating any contact, the user may specify a lower level to release the relay, rather than releasing after the initial alarm point. This is ideal during load shedding when an alarm activates at a certain level and the user does not want to turn off the alarm until a much lower, safer level is reached.

SETABLE DELAYS: After reaching the alarm point, a change in relay status may be delayed for 255 seconds. The user also has the option of allowing the device to change relay status without any delay. After the alarm condition passes, the relay can be stopped from returning to a normal condition for a programmable time. Each delay time is independent of one another.

AND/OR LOGIC: If several parameters are assigned to one relay, the user can trip the relay if all functions are out of limit (and programming), or if one function is out of limit (or programming). For example, if limits on Voltage, Kilowatts, and Phase Imbalance are programmed and tied to Relay 1, the user can either trip the relay if one function is out of limit, or if all functions are out of limit.

2 RELAYS & 1 KYZ PULSE OUTPUT -NL OPTION

The 3DVA120's flexibility gives you access to a variety of relay options through the Programming Mode (see programming sections). The relay option package consists of three relays: two can be dedicated to alarm or controlled through communication (or both) and one for KYZ pulse output.

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 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 2.1,** below): Form C relays, rated 250V, 5A–*2 each*.

KYZ relay output (Form C), rated 200V, 100mA–*1 each*.

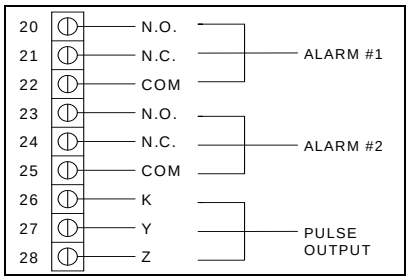


Figure 2.1: Close-up of the Relay and KYZ pulse output on the rear panel.

Note: The relays shown in the figure above are in the NOT energized state.

THE INSTRUMENT DETECTS TWO LEVELS OF ALARM FOR THE FOLLOWING FUNCTIONS:

- Voltage: AN, BN, CN, AB, BC, CA
- Current: A, B, C, N
- Over and Reverse Power
- Under PF/KVAR Lead or Lag
- Over KVA
- Voltage Imbalance (One level only)
- Over/Under Frequency
- Voltage Phase Reversals (One level only)
- Over/Under %THD (Available only with option –H)
- Over/Under K-Factor

KYZ RELAYS: Provides pulses for energy management systems or any other type of recording device. These pulses represent accumulated watt-hour, negative watt-hour, or VA-hour. Accomplish this

assignment through the Programming Mode (see programming sections). The pulse value is determined by the decimal increment of the power function assigned to the pulse. The 3DVA120 can be equipped with KYZ pulse outputs.

NOTE: *Unless otherwise specified, standard KYZ setup represents positive watt hour. See table below for standard rate.* The scale factor for wattage (KW or MW) and Full Scale Decimal Point Placement is selectable in Programming Mode GROUP 1, FUNCTION *2*. Follow the Decimal Point Placement corresponding to the Change in Level. A multiplication or division factor can be programmed. See Programming GROUP 0, FUNCTION 6 for a different rate.

STANDARD RATE TABLE FOR WATTS*

DECIMAL POINT PLACEMENT (KW/MW)	CHANGE IN LEVEL
9999.	1.0 Units W-Hour
999.9	0.1 Units W-Hour
99.99	0.01 Units W-Hour
9.999	0.001 Units W-Hour

**Units could be KiloWatts or MegaWatts.*

CHAPTER 3
COMMUNICATION INSTALLATION

3.1 RS232C

All the 3DVA120 instruments can be equipped with any of the two basic types of communication links: an RS232C or an RS485.

RS232C communication is used to link a single instrument with a computer. This communication link is capable for a distance up to 100 feet. A standard 9-pin female serial port connector is mounted on the instrument for direct connection to a computer with a 9-pin cable. Note that only three pins are used in RS232. Refer to the illustrated hookup installation for the RS232C in Figure 3.1, below.

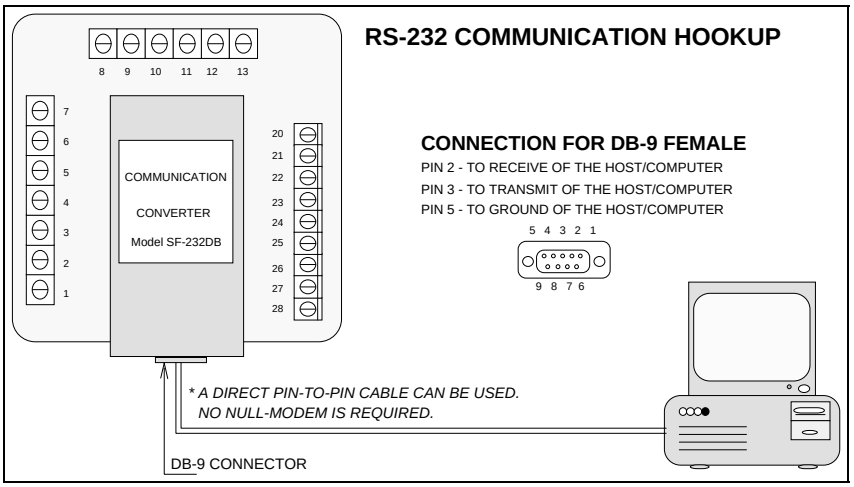


Figure 3.1 RS232C Communication Hookup Installation

3.2 RS485

Each 3DVA120 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.

IF THE USER EXPERIENCES NO COMMUNICATION, CHECK THESE CONDITIONS:

- Is the Baud Rate correctly set (See Programming Section).
- Is the Meter Address correctly set (See Programming Section).
- Set the Communication Mode for EIG protocol for Electro Industries software.
- Set the Communication Mode for MODBUS protocol for most third party vendor software.

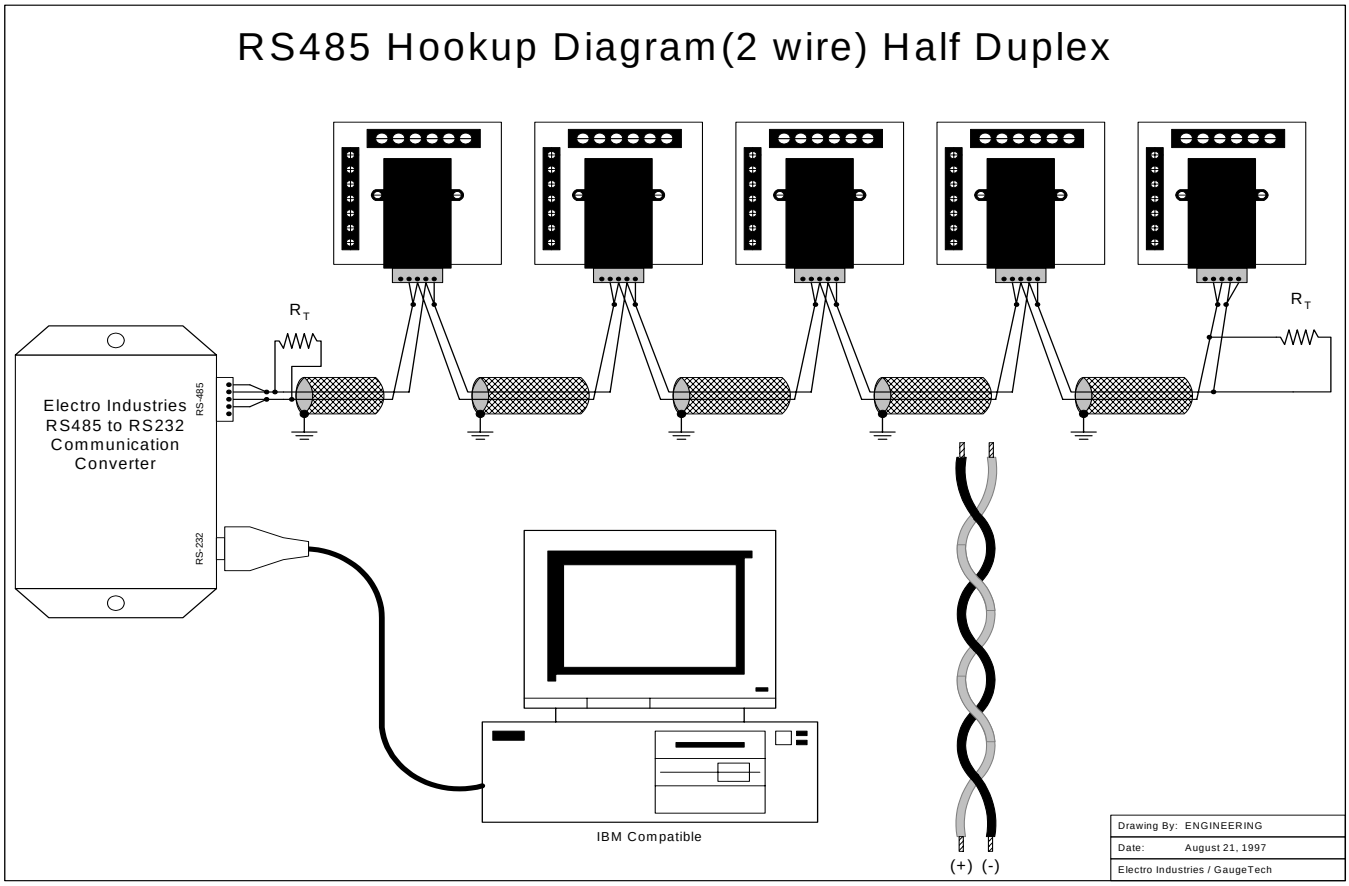


Figure 3.2 2-*Wire RS485 Communication Connection Installation Half Duplex*

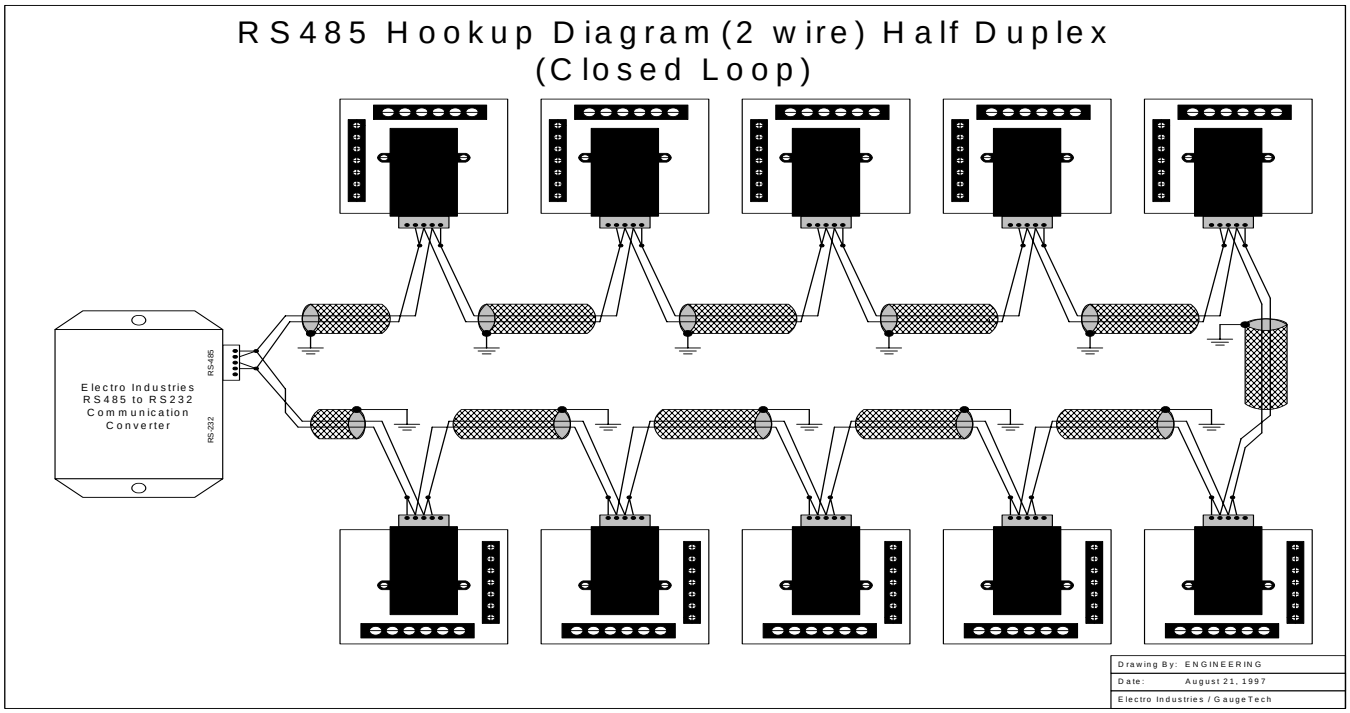


Figure 3.3 2-*Wire RS485 Communication Connection Installation Half duplex (Closed Loop)*

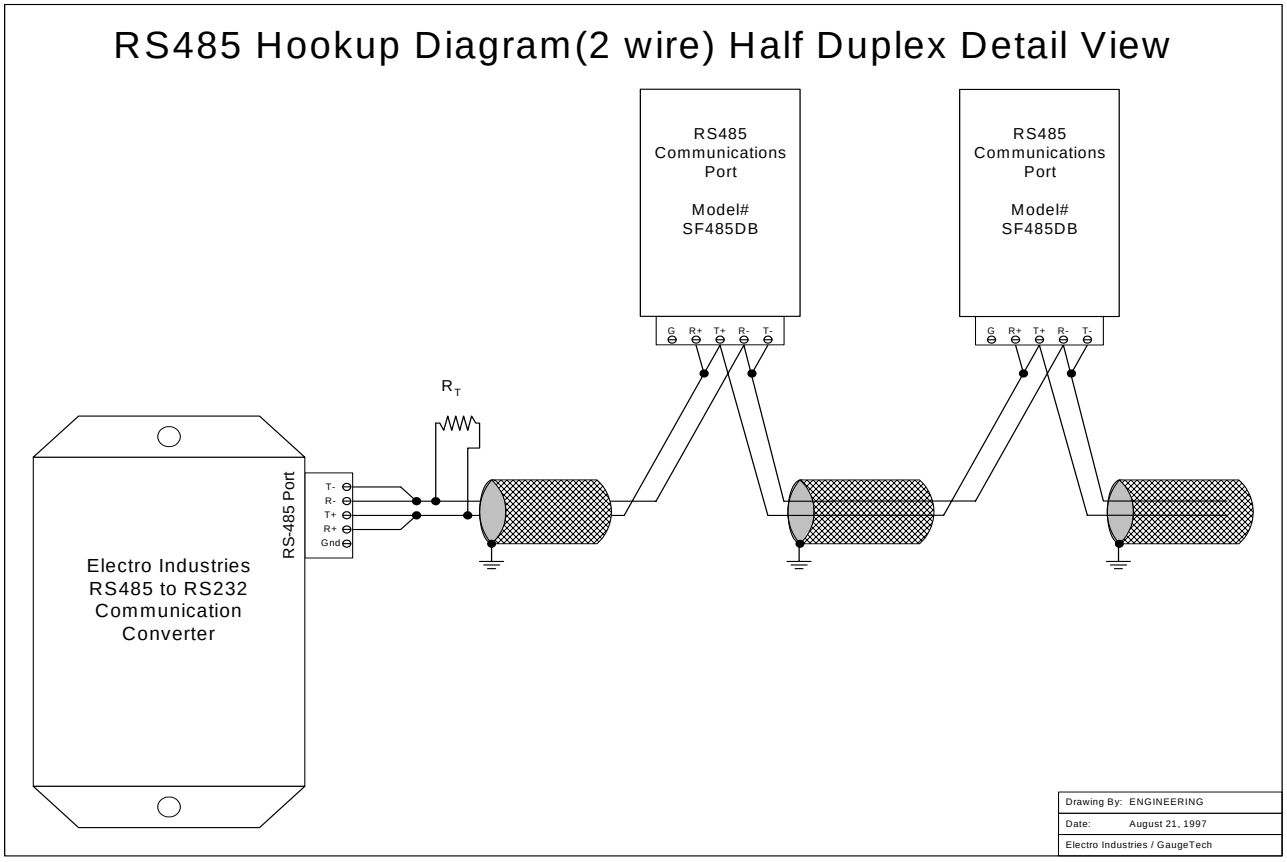


Figure 3.4 Detailed View of 2-*Wire RS485 Communication Connection Installation Half duplex (Closed Loop)*

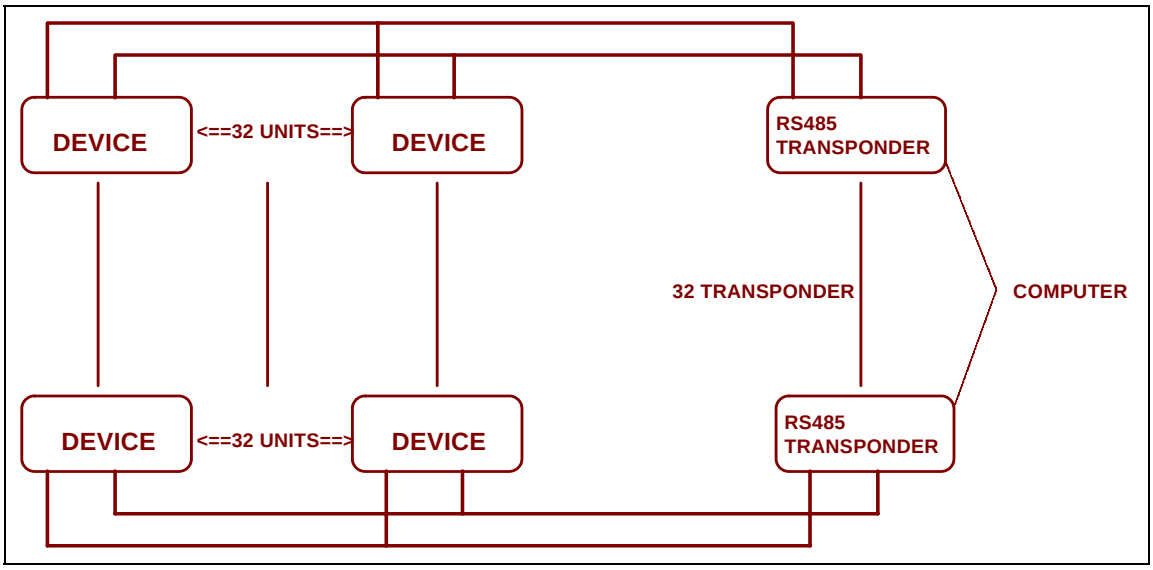


Figure 3.5 2-*Wire RS485 Communication Installation Connection with Transponder*

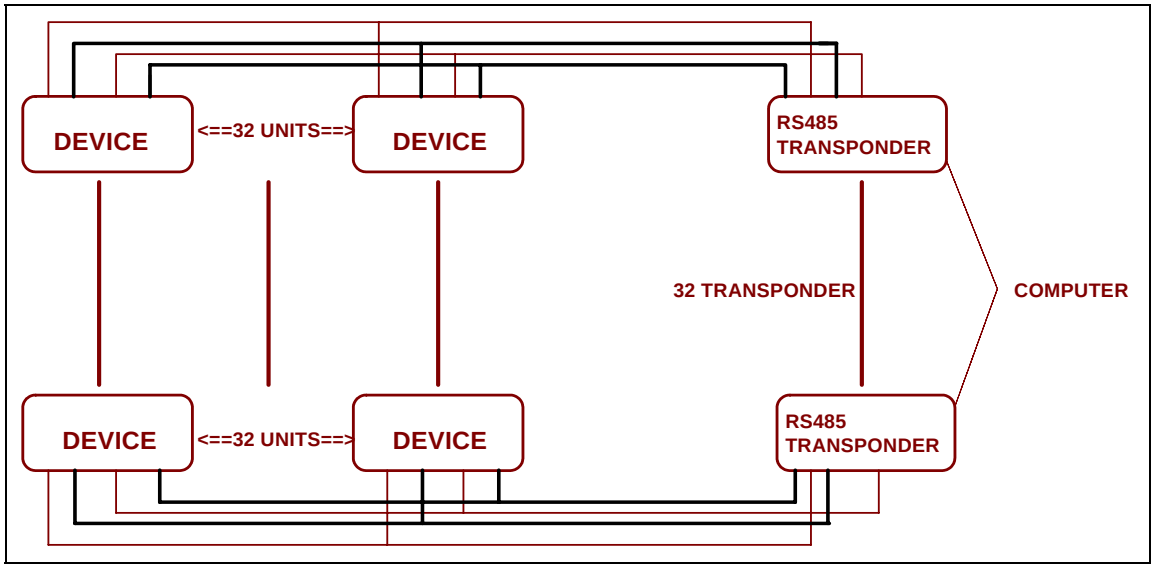


Figure 3.6 *4-Wire RS485 Communication Installation Connection with Transponder*

3.3 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 network, (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 DMMS 300+ and other devices in the modem.

SET MODEM TO RETURN NUMERIC RESULT CODES:

- This procedure increases speed connection with DMMS 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 DMMS 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 4
3DVA120: OVERVIEW

The 3DVA120 measures up to 10 electrical parameters. They include: three phases line-to-line, three phases line-to-neutral, maximum, minimum, and two limits. Values for each parameter are accessed through the keypad on the meter's front panel (see Diagram 4.1, below).

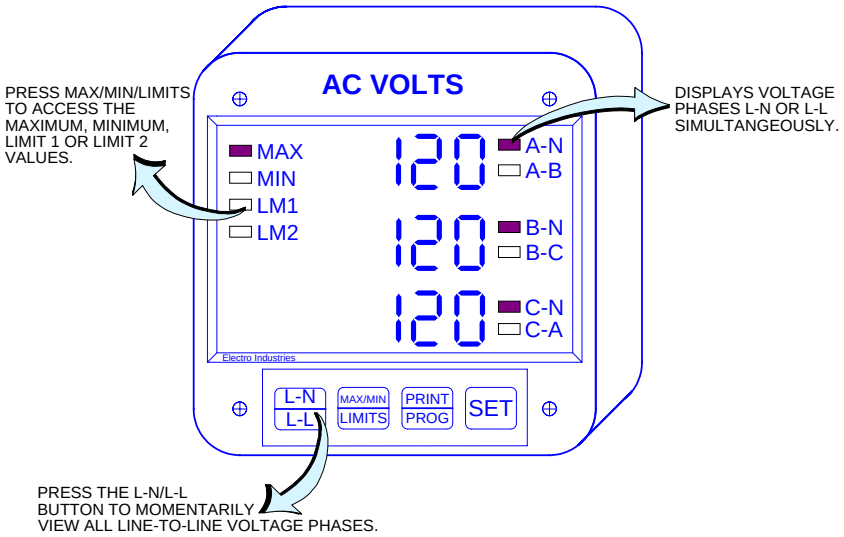


Diagram 4.1 *The 3DVA120 front panel with display and keypad.*

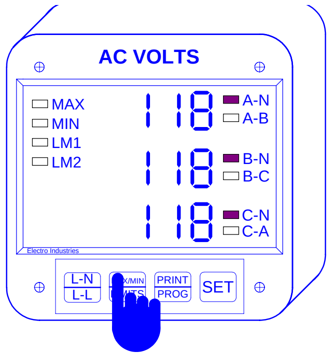
The upcoming sections in this chapter contain:

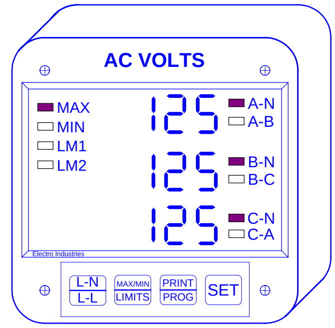
4.1: Accessing Max/Min Values

Maximum and minimum values are available for all instantaneous measurements. Maximum and minimum values represent the highest and lowest average demand over a user programmable period of time known as the *integration interval.* Readings are calculated using a rolling average technique. Each second a new reading is used to calculate the maximum and the minimum and the last reading of the interval is dropped off.

To access maximum or minimum values, press the ***MAX/MIN/LIMITS*** button.

To view the maximum reading, follow the suggested steps:





Step 1:
a. Press the ***MAX/MIN/LIMITS*** button once to view the maximum values and twice to view the minimum values.

⇒ Maximum and minimum values are simultaneously displayed for all three phases. The meter automatically returns to L-N readings after a few seconds.

To view the maximum or minimum of L-L readings:

Step 1:
a. Press L-N/L-L

b. Press the ***MAX/MIN/LIMITS*** button while the L-L readings are being displayed.

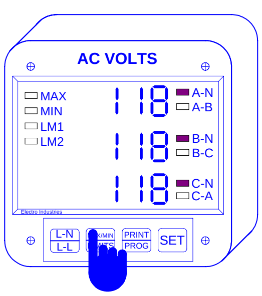
⇒ Readings are displayed momentarily.

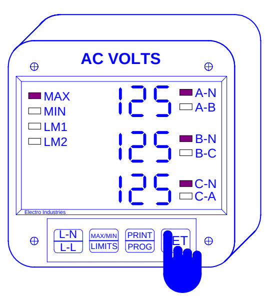
4.2: Resetting Max/Min Values

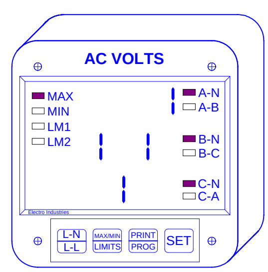
The reset function on the 3DVA120 is used if a new value is desired and is available in two different modes. The first is an unprotected mode which allows quick and easy resetting of maximum and minimum values. The second is a password protected mode which prevents unauthorized personnel from resetting the maximum and minimum values.

❑ Unprotected Reset

To reset in the unprotected mode, press the ***MAX/MIN/LIMITS*** button. While the maximum or minimum is being displayed, press the ***SET*** button. This will cause the display to blank and a check mark to appear momentarily to confirm resetting.







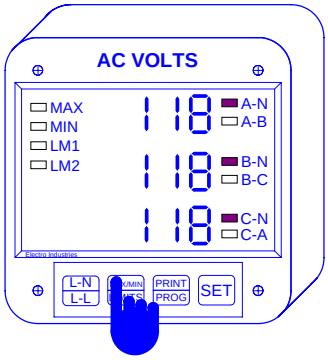
Step 1:
a. Press the ***MAX/MIN/LIMITS*** button once for the max, twice for the min.

Step 2:
b. While the max or min is being displayed press the SET button once to reset.

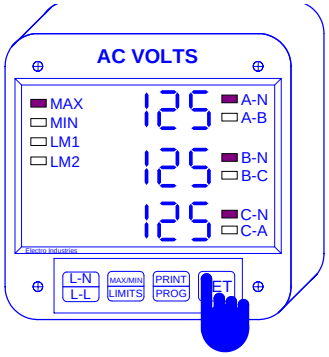
⇒ The display blanks and a check mark appears momentarily to confirm a successful reset.

❑ Protected Reset

If the meter was programmed for a protected reset, a password must be entered before any readings may be reset. The password for the reset is ***0 0 5***. The user must press the ***MAX/MIN/LIMITS*** button to display the maximum. While the maximum value is being displayed, press the ***SET*** button to initiate password entry. Digits will begin to scroll on the display. Press the ***SET*** button to select the necessary digits. When the correct password is entered the display will blank and a check mark will appear momentarily confirming reset.

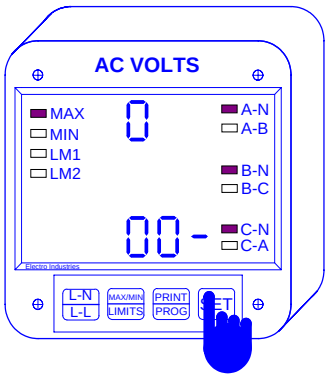


Step 1:
a. To access the max or min press the ***MAX/MIN/LIMITS*** button once or twice, respectively.

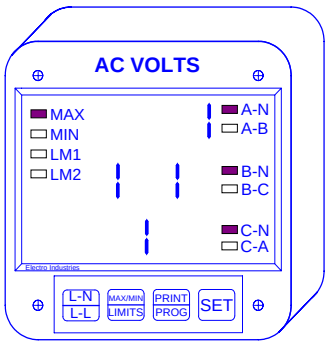


Step 2:
a. Press the ***SET*** button once to begin protected reset.

⇒ The current display will be replaced by three dashes in the bottom level and scrolling digits in the upper level.



Step 3:
b. Press the ***SET*** button to select the appropriate digits, ***0 0 5***.

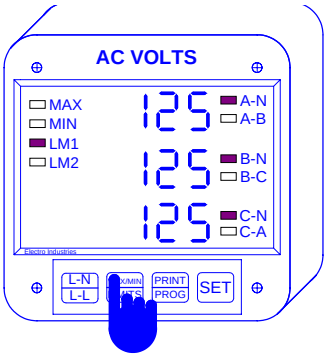


Step 4:
⇒ Once the correct password has been entered, the display blanks and a check mark appears momentarily to confirm a successful reset.

4.3: Accessing LM1/LM2 Set Limits

The 3DVA120 is designed with two manual set limits which are intended to monitor the instantaneous readings to warn the user of any abnormal conditions. Each limit can be programmed to detect readings that are either above or below the set limit. The set limits are the point when the relay will change position if the 3DVA120 is equipped with the Relay Option Package (Suffix -NL).

To view the setup of LM1/LM2, follow the instruction given below:



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

⇒ These values are displayed momentarily.

4.4: Access Mode

The following sections (4.4, 4.5 and 4.6) allow the user to access specific operation tasks (see Table 4.1, below).

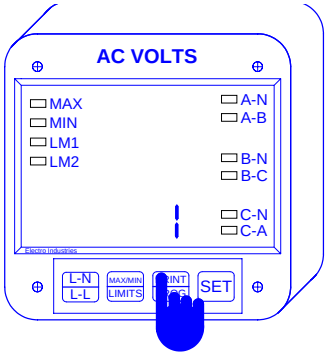
Table 4.1

ACCESS	OPERATION
1	Print Programming Data
2	Print Operating Data
3	Enter Programming Mode (see Programming Manual)
4	Firmware Version/L.E.D. Test

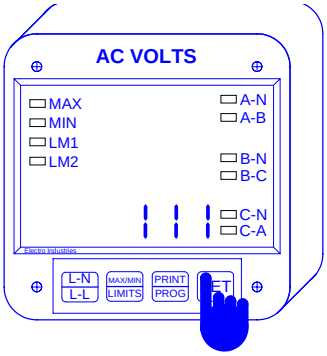
Note: ***Print commands 1 and 2 are only available if enabled in the programming mode and are not recommended when using the multimeter hookup RS485.***

4.5: Printing Operating Data

The Printing Operating Data function sends data to a serial printer to provide a hard copy of the instantaneous, maximum and minimum values for compiling. This function will apply only if a serial printer is connected to the 3DVA120 via an RS232C Communication Converter. To print the data follow the steps below:



Step 1:
a. Press the ***PRINT/PROG*** button once and 1 appears.

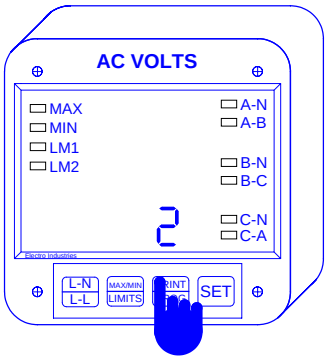


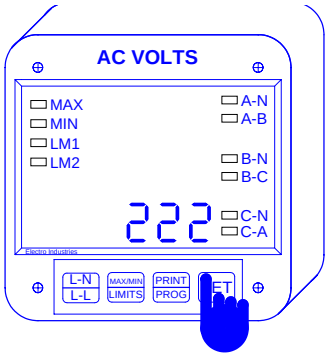
Step 2:
a. Press the SET button to activate the Printing Operating Data function.

⇒ Three 1's appear momentarily to confirm this function, then the display returns to the current reading.

4.6: Printing Programming Data

The Printing Programming Data function sends the programming data (also known as the meter setup) to a serial printer for quick reference and verification. This function will apply only if a serial printer is connected to the 3DVA120 via an RS232C Communication Converter. To print the data follow the steps below:





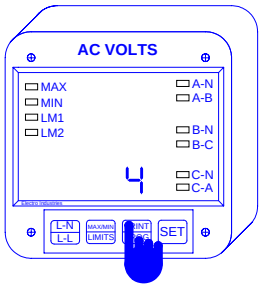
Step 1:
a. Press the ***PRINT/PROG*** button once and a 2 appears.

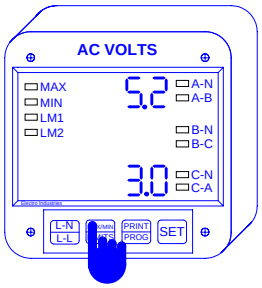
Step 2:
a. Press the ***SET*** button to activate the Printing Programming Data function.

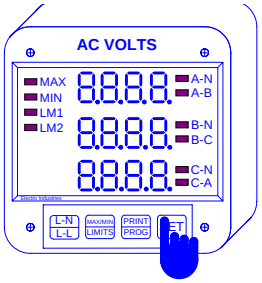
⇒ Three 2's appear momentarily to confirm this function, then the display returns to its current reading.

4.7: Firmware Version/LED Test

The 3DVA120 includes a function to access the firmware version number of the DSP and communicator digital microprocessors. Also available is the LED test to check if the LED's and annunciators are all functioning properly.







Step 1:
a. Press the ***PRINT/ PROG*** button four times and a 4 appears.

⇒ To check the Firmware Version proceed to Step 2.

⇒ To perform L.E.D. Test proceed to Step 3.

Step 2:
a. Press the ***MAX/MIN/LIMITS*** button to view Firmware Versions momentarily.

⇒ The top level displays the DSP processor version

⇒ The bottom level the communicator processor version.

Step 3:
a. Press the ***SET*** button for the L.E.D. test.

⇒ All segments and annunciators glow simultaneously and then the display will return to current reading.

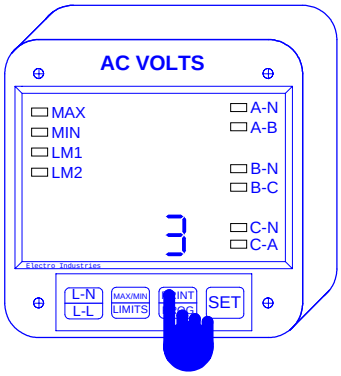
PROGRAMMING YOUR 3DVA120

CHAPTER 1
ENTERING THE PROGRAMMING MODE

1.1 PASSWORD ENTRY

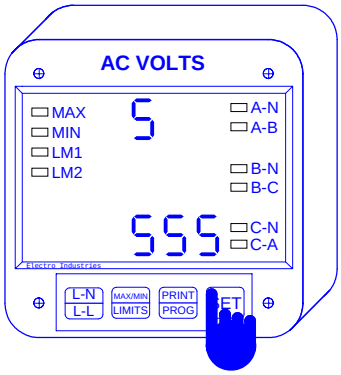
Password entry insures information security and eliminates possible intrusion. For the 3DVA120, the password is preset at the factory and cannot be changed. The passwaord is 555. To enter the Programming Mode, the user needs to correctly enter the password.

Follow the procedure outlined below to enter the password correctly.



Step 1:
A. Press the ***PRINT/PROG*** button until ***3*** appears in the bottom level.

b. Press the ***SET*** button to multiselect and ***333*** appears in the bottom level.

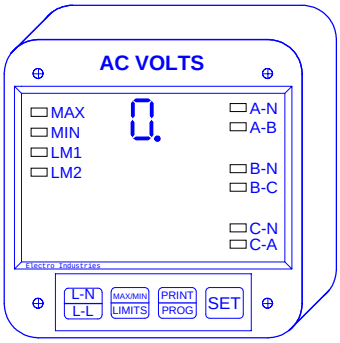


Step 2:
⇒ Digits will begin scrolling in the upper level.

⇒ The password is **555**.

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

⇒ The selected digits appear in the bottom level.



Step 3:
⇒ The display blanks and ***PPP*** flashes in the upper level to confirm.

⇒ ***PPP*** is replaced by ***0.*** and the meter is now in the Programming Mode.

CHAPTER 2
GENERAL PROCEDURE

To simplify things, programming tasks are logically bundled into nine major **GROUPS**. Located within each **GROUP** are specific meter **FUNCTIONS**.

1. Enter the Programming Mode.

2. Select the appropriate GROUP.

3. Select the desired FUNCTION within the GROUP.

4. When the FUNCTION is selected, we can proceed with DATA ENTRY of the new value of the desired parameter.

5. Once the value is entered, the display returns to the selected FUNCTION, with the new value. From here you may move to another FUNCTION within the GROUP, exit the GROUP and proceed to a different GROUP for programming, or exit the Programming Mode entirely. To alter programming data permanently you must exit the Programming Mode (see Exiting the Programming Mode, Chapter 9, Page 28)

2.1 PROCEDURE

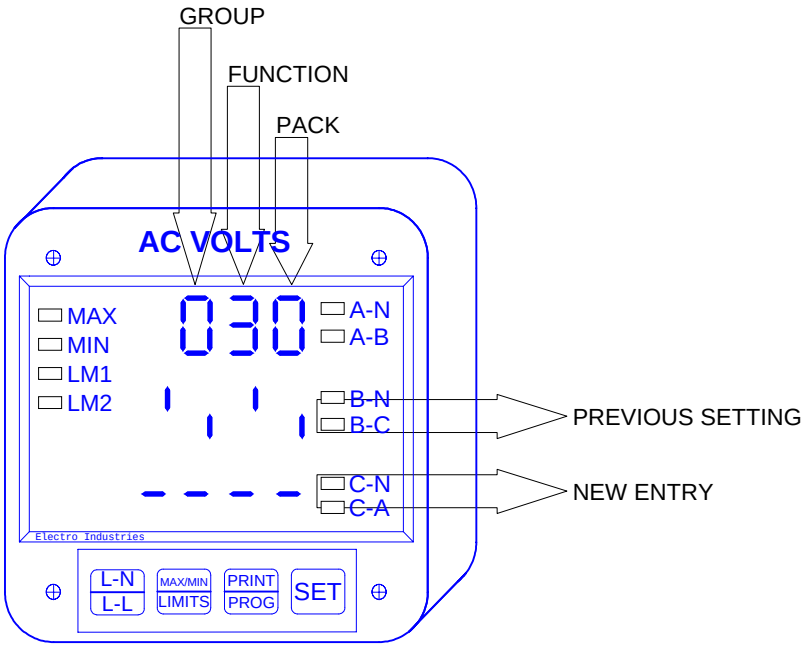
BUTTON	FUNCTION	DESCRIPTION
L-N/L-L	ADVANCES	Scrolls groups, functions, and advances to exit point from function and group level.
MAX/MIN/LIMITS	CHANGE VALUE	Scrolls packs, digit counters, and changes switch pack position UP or DOWN.
PRINT/PROG	STORE	Activates new data entry, and enters or exits from group or function level.

CHAPTER 3
IMPORTANT PROGRAMMING NOTES

3.1 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 parameter you must enter all four digits, leading zero's included. For instance, if you need to enter the number 25, you must enter 0025.

3.2 SWITCH PACKS



While Programming GROUPS are divided into FUNCTIONS, some FUNCTIONS are further divided into switch packs. These switch packs are a set of separate ON/OFF or toggle switches. These toggle switches have only two positions, either UP segment or DOWN segment. By setting the segment to UP or DOWN, you are turning a particular meter feature ON or OFF, respectively

CHAPTER 4
PROGRAMMING GROUP 0: GLOBAL METER SETUP

Programming Group *0*, The Global Meter Setup, includes Functions ***0*** through ***5*** which control the configuration and basic operation of the 3DVA120. See Table 4-1 for a list of Group 0 Functions.

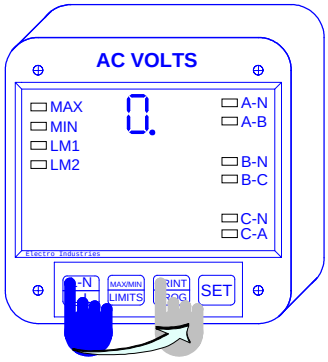
TABLE 4-1: GROUP *0* PROGRAMMING FORMAT

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 I
5.	Delay Time in Seconds for Relay II
E.	Exit Programming Group 0

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

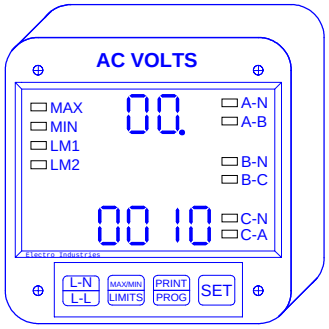
Integration Interval - The time over which all instantaneous readings are averaged to obtain a maximum and minimum demand. The Integration Interval is entered in seconds. For instance, if you would like to enter 15 minutes, enter 0900 seconds. The default is 900 seconds. To change the Integration Interval follow the steps below:

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 0, proceed to Step 3.

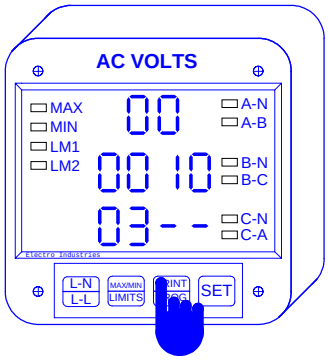


Step 2:
a. Press the ***L-N/L-L*** button until ***0.*** appears.

b. Press the ***PRINT/PROG*** button to activate Group *0*.



Step 3:
⇒ The current value is displayed in the bottom level and the group and function number, here ***00.***, in the upper level.

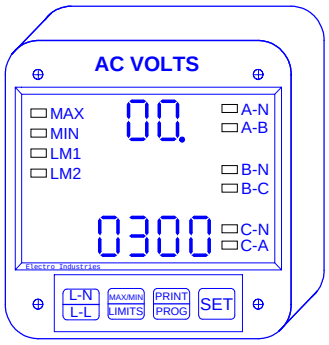


Step 4:
a. Press the ***PRINT/PROG*** button once to begin the data entry sequence.

⇒ The previous value shifts to the middle level and the bottom level is replaced with four dashes.

b. Press the ***MAX/MIN/LIMITS*** button until the desired number appears.

c. Press the ***PRINT/PROG*** button to store the digit and proceed to the next.



Step 5:
⇒ Repeat Step 4 until the desired value is entered.

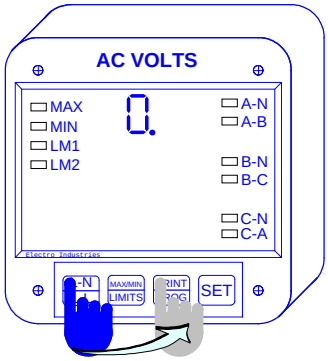
⇒ When complete, the new value is displayed in the lower level and the group and function number are displayed in the upper level.

See Chapter 9 to Exit.

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

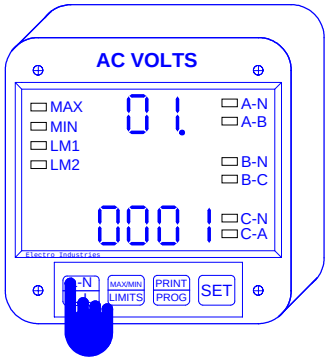
Meter Address - Used to identify the meter when it is communicating with digital communications. When there are numerous meters at one site, it is essential that each have its own address. To change the Meter Address follow the steps below:

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 0, proceed to Step 3.



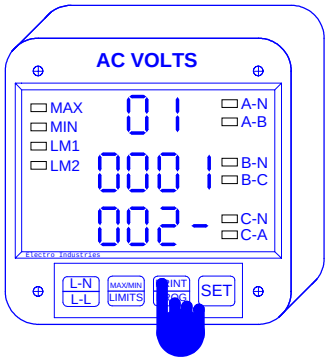
Step 2:
a. Press the ***L-N/L-L*** button until ***0.*** appears.

b. Press the ***PRINT/PROG*** button to activate Group 0.



Step 3:
a. Press the ***L-N/L-L*** button until ***01.*** appears.

⇒ The current value is displayed in the bottom level.



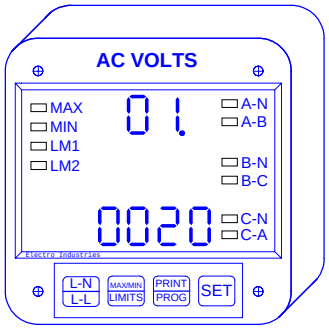
Step 4:

a. Press the ***PRINT/PROG*** button once to begin the data entry sequence.

⇒ The previous value shifts to the middle display and four dashes appear in the bottom display.

b. Press the ***MAX/MIN/LIMITS*** button until the desired number appears.

c. Press the ***PRINT/PROG*** button to store the digit and proceed to the next.



Step 5:

⇒ Repeat Step 4 until the desired value is entered.

⇒ When complete, the new value is displayed in the lower level and the group and function number are displayed in the upper level.

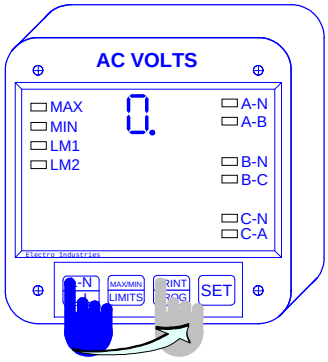
See Chapter 9 to Exit.

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

Baud Rate - The speed at which data is transmitted between the meter and a remote computer or serial printer. The rate that is programmed into the meter must match the rate used by the remote device. Valid Baud Rates are 150, 1200, 2400, and 4800. If the harmonic option is ordered (soffix -h), then the meter will be capable of communiating to 9600 baud. To change the Communication Baud Rate follow the steps below:

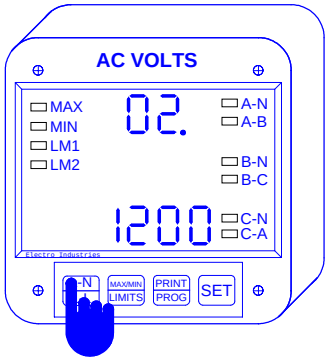
Note: ***When entering the Communication Baud Rate remember to include leading zero's for a four digit entry, when necessary.***

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 0, proceed to Step



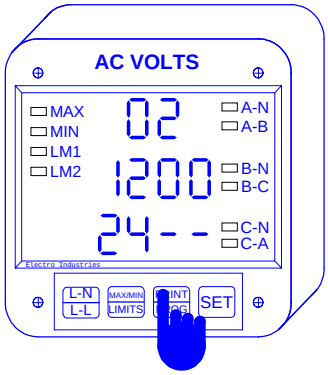
Step 2:
a. Press the ***L-N/L-L*** button until ***0.*** appears.

b. Press the ***PRINT/PROG*** button to activate Group *0*.



Step 3:
a. Press the ***L-N/L-L*** button until ***02.*** appears.

⇒The current value is displayed in the bottom level.

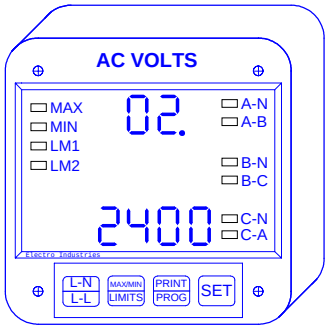


Step 4:
a. Press the ***PRINT/PROG*** button once to begin the data entry sequence.

⇒ The previous value shifts to the middle level and the bottom level is replaced with four dashes.

b. Press the ***MAX/MIN/LIMITS*** button until the desired number appears.

c. Press the ***PRINT/PROG*** button to store the digit and proceed to the next.



Step 5:
⇒ Repeat Step 4 until the desired value is entered.

⇒ When complete, the new value is displayed in the lower level and the group and function number are displayed in the upper level.

See Chapter 9 to Exit.

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

The System Configuration is used to set the 3DVA120's basic operation parameters. This Function utilizes Switch PACK.

Function *3* contains four separate switch PACKS, numbered 0 - 3. Each PACK contains four individual UP/DOWN segments. Toggling the segment between UP and DOWN segments, toggles the switch ON or OFF, respectively.

The meter displays one Switch PACK at a time. Use the ***MAX/MIN/LIMITS*** button to scroll from PACK to PAC

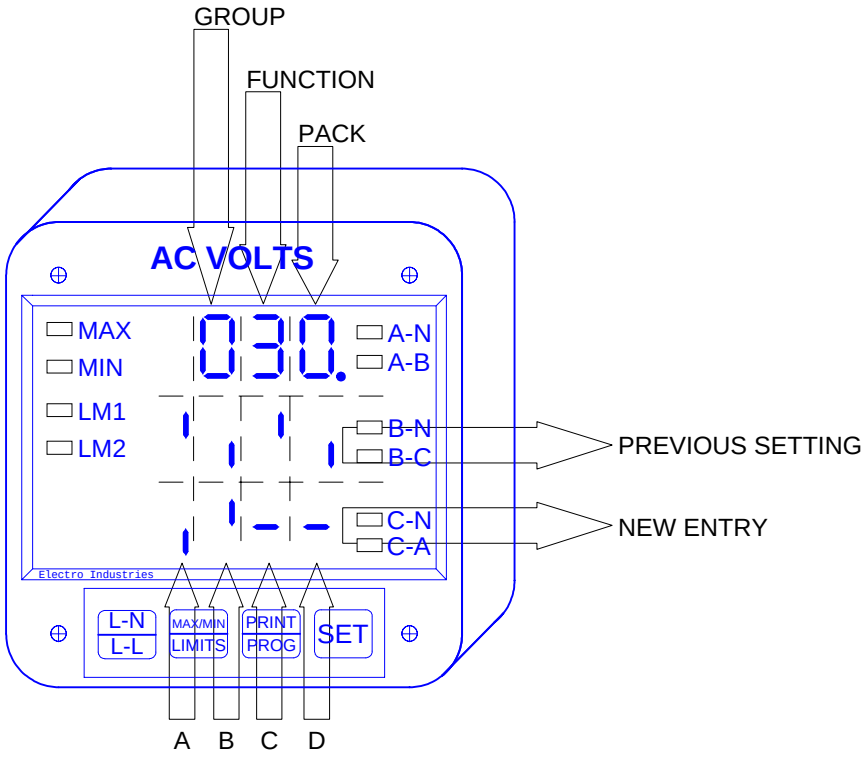


TABLE 4-2: SYSTEM CONFIGURATION - SWITCH FEATURES

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	UP⇨Enable DOWN⇨Disable
	C	L-L Voltage Readings	UP⇨Toggle Manually DOWN⇨Displays Momentarily
	D	Open Delta Installation	UP⇨Enable DOWN⇨Disable
2	A	Reserved	-
	B	Reserved	-
	C	Reserved	-
	D	Reserved	-
3	A	Trip Relay Control I	UP⇨Enable DOWN⇨Disable
	B	Trip Relay Control II	UP⇨Enable DOWN⇨Disable
	C	Communications	UP⇨Enable DOWN⇨Disable
	D	DC Output or Print Operating and Programming Data	UP⇨Enable DOWN⇨Disable

PRINTING OPTION

To print, access Mode 1 and Mode 2 (See Installation and Operation Manual). Printing serial options should be disabled when using a multimeter communications connection RS485.

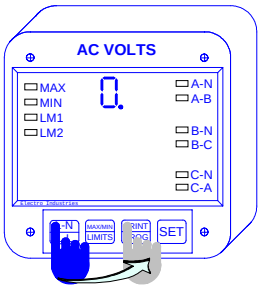
DISABLING PREVENTS: 1. Printing through the keypad.
2. Corrupting data at a computer terminal while multiple meters poll.
3. Corrupting printing commands through communications.

This option connects a serial printer to the RS232 port and prints the data. When the meter does not use an RS232 port (i.e., RS485 or DC outputs are being used), disable this feature.

Chapter 4 Global Meter Setup

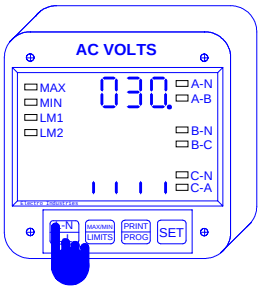
To Change the System Configuration Switch Setting follow the steps below:

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 0, proceed to Step 3.



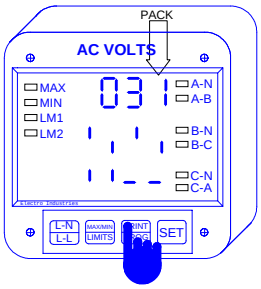
Step 2:
a. Press the ***L-N/L-L*** button until ***0.*** appears.

b. Press the ***PRINT/PROG*** button to activate Group *0*.



Step 3:
a. Press the ***L-N/L-L*** button until ***030.*** appears.

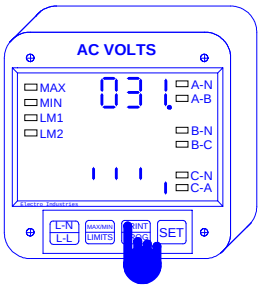
⇒ The current setting for PACK 0 is displayed in the bottom level.



Step 4:
a. Press the ***MAX/MIN/LIMITS*** button until the desired PACK is chosen.

b. Press the ***PRINT/PROG*** button to activate the data entry sequence.

⇒ The previous setting shifts to the middle level and four dashes appear in the bottom level.



Step 5:
a. Press the ***MAX/MIN/LIMITS*** button to toggle segments for the desired settings.

⇒ Use the ***PRINT/PROG*** button to store setting and proceed to the next.

⇒ Once all of the desired switches are set, the new setting will be displayed in the bottom level..

See Chapter 9 to Exit.

4.5 GROUP *0*, FUNCTIONS *4-5* - TIME DELAY FOR RELAYS I & II (OPTION -NL)

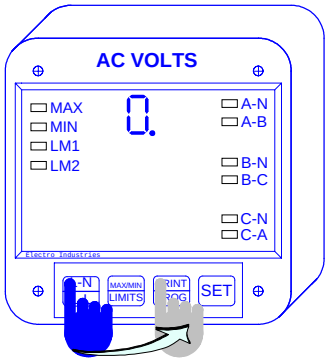
Under GROUP *0*, FUNCTIONS *4-5*, the time delay for relays 1 and 2 can be set between 0 - 255 seconds. This would allow conditions mentioned in the example to exist for a user specified period of time before the relay or alarm is activated. If a time greater than 255 seconds is entered, the meter defaults to the maximum value of 255 seconds.

Chapter 4 Global Meter Setup

For example, if relay 1 is set for 140 Volts and the volts increase to 141, the relay will trip only after the time delay period. If the meter then measures 139 Volts, the relay will return to it's original position.

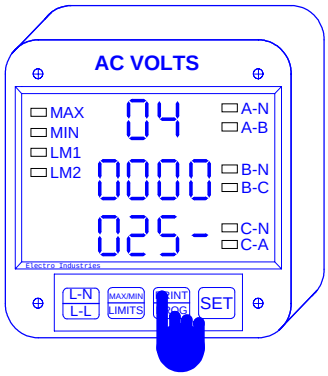
The programming procedure for the time delay is the same for both relays (Functions *4* and *5*).

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 0, proceed to Step 3.



Step 2:
a. Press the ***L-N/L-L*** button until ***0.*** appears.

b. Press the ***PRINT/PROG*** button to activate this group.

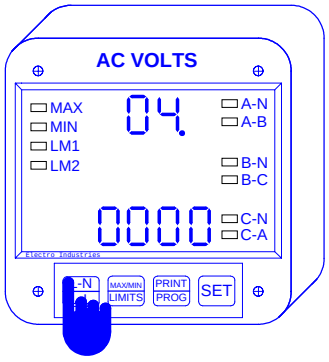


Step 4:
a. Press the ***PRINT/PROG*** button once to begin the data entry sequence.

⇒ The previous value shifts to the middle level and the bottom level is replaced with four dashes.

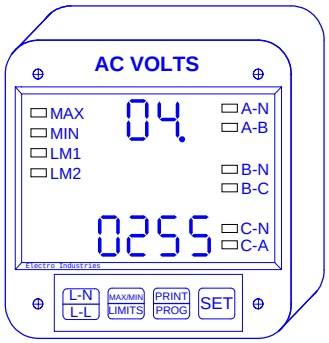
a. Press the ***MAX/MIN/LIMITS*** button until the desired number appears.

b. Press the ***PRINT/PROG*** button to store the digit and proceed to the next.



Step 3:
a. Press the ***L-N/L-L*** button until ***04.*** appears.

⇒ The current setting for is displayed in the bottom level.



Step 5:
⇒ Repeat Step 4 until the desired value is entered.

⇒ When complete, the new value is displayed in the lower level and the group and function number are displayed in the upper level.

To exit GROUP *0*, refer to Chapter 9, Exiting the Programming Mode.

CHAPTER 5
PROGRAMMING GROUP 1: FULL SCALE SETTINGS

The 3DVA120 measures to a resolution of 1 part in 2000. Programming Group *1* Functions provide a selection of Full Scale Settings to accommodate the different PT's that may be in use at the site. The site technician has a choice of Full Scale Selection between Volts and Kilovolts.

TABLE 5-1: FULL SCALE SETTINGS FOR TYPICAL VOLTAGE/PT ARRANGEMENTS

INPUT VOLTAGE	PT RATIO	FULL SCALE
120/208 V	1:1 (Direct)	120.0 V
120/208 V	4:1	0480 V
120/208 V	12:1	01.44 KV[1]
277/480 V (Suffix G)	1:1 (Direct)	0300 V
277/480 V (Suffix G)	4:1	01.20 KV[1]

TABLE 5-2: GROUP *1* PROGRAMMING FORMAT

Function Number	Function
0.	Scale Selection/Full Scale for Volts
E.	Exit Programming Group 1

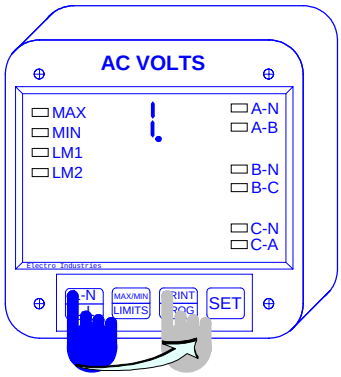
Note: Programming the unit above 2000 counts is allowed but will result in an instability in the least significant digit.

5.1 GROUP *1*, FUNCTION *0* - FULL SCALE SETTING FOR VOLTAGE CHANNELS AND DECIMAL POINT PLACEMENT FOR VOLTAGES

To change the Full Scale Settings follow the steps given below:

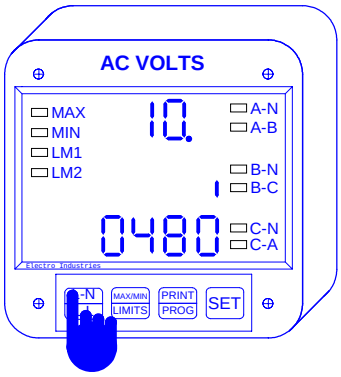
Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 1, proceed to Step 3.

[1] *Due to the resolution capability of the meter, a setting of 01.44 KV (or 01.20 KV for the previous example) will result in more stable readings, and is recommended.*



Step 2:
a. Press the ***L-N/L-L*** button until ***1.*** appears.

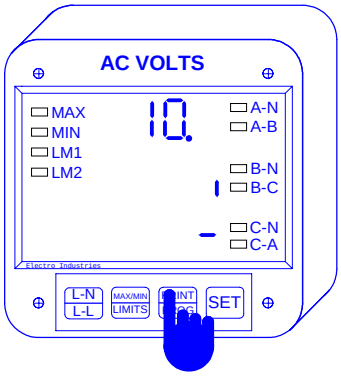
b. Press the ***PRINT/PROG*** button to activate this group.



Step 3:
a. Press the ***L-N/L-L*** button until ***10.*** appears.

⇒ The current value is displayed in the bottom level.

⇒ The middle level displays a single segment. UP signifies the larger unit (Kilovolts) and DOWN signifies the smaller unit (Volts). Here the full scale is 480 V.



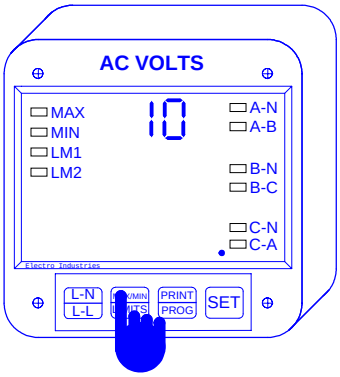
ENTERING SCALE FACTOR

Step 4:
a. Press ***PRINT/PROG*** to activate Scale Factor Entry.

⇒ The previous value is displayed in the middle level and the bottom level is replaced with a single dash.

b. Press the ***MAX/MIN /LIMITS*** button to toggle the segment UP or DOWN, as desired.

c. Press the ***PRINT/PROG*** button to store and proceed to decimal point selection.

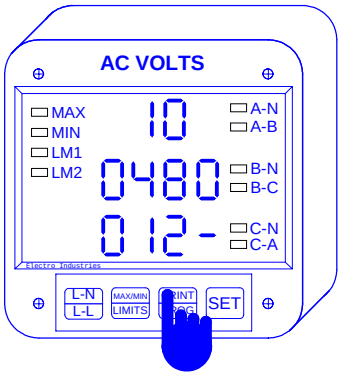


DECIMAL POINT SELECTION

Step 5:
⇒ Use the ***MAX/MIN/LIMITS*** button to move the decimal point to desired position.

a. Press the ***PRINT/PROG*** button to store and to proceed to entry of the Full Scale.

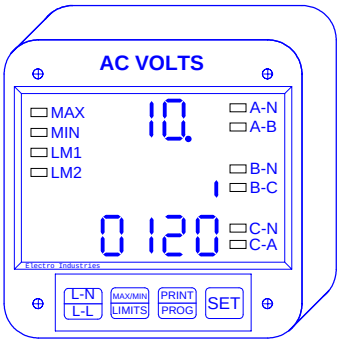
Chapter 5 Full Scale Setting



Step 6:
⇒ The previous value shifts to the middle display and the bottom display is replaced with four dashes

a. Press the ***MAX/MIN/LIMITS*** button until the desired number appears.

b. Press the ***PRINT/PROG*** button to store and proceed to the next.



Step 7:
⇒ Repeat Step 6 until the desired value is entered.

⇒ When complete, the new value is displayed in the lower level.

- The unit segment is displayed in the middle level.
- The group and function number are displayed in the upper level.

To exit GROUP *1*, refer to Chapter 9, Exiting the Programming Mode

5.2 Open Delta System Installation Programming

Warning: ***This switch should be set UP to enable only if the electrical system is a 3-wire OPEN DELTA. Otherwise, the segment should be set DOWN constantly. Failure to select this switch will result in Phase to Neutral readings.***

Delta System utilizing the hookup installation in Chapter 2 of the User's Installation and Operation Manual. The switch is located at: ***Group 0, Function 3, Pack 1***. Refer to page 9 for the programming procedure.
A special switch is used to indicate to the meter that the electrical system being monitored is a Three-Wire Open Special Open Delta Hookup Installation should be followed in the User's Operating and Installation Manual, Page 7.

CHAPTER 6
PROGRAMMING GROUP 2: METER CALIBRATION

Warning - Read this section carefully before proceeding further:

- The calibration procedure requires highly accurate and stable input signals. Incorrect readings will result from improper calibration procedures. If in doubt, return unit to the factory for calibration.
- BEFORE calibrating any channel, make a note of its Full Scale Setting. Set the Full Scale in accordance with Table 6-2 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 will *drift* slightly over time, requiring periodic calibration to insure accuracy. If the user does not have access to the equipment and procedures required to properly calibrate the meter, we recommend that it be returned to the factory on a yearly basis.

6.1 CALIBRATION REQUIREMENTS

Functions *0* - *2* (High End Calibration) can be calibrated by qualified site technicians if a stable calibration source can be applied. Otherwise, the meter should be returned to the factory.

For calibration purposes, the 3DVA120 requires precise inputs of 120 Volts.

TABLE 6-1: GROUP *2* PROGRAMMING FORMAT

Function Number	Function
P.	Standard Correction - *Factory procedure only*.
0.	High End Calibration, Volts A
1.	High End Calibration, Volts B
2.	High End Calibration, Volts C
E.	Exit Programming Group 2

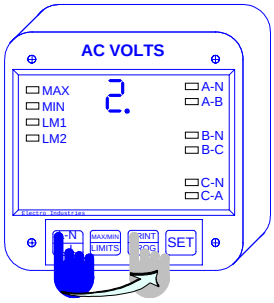
❒ **TABLE 6-2: CALIBRATION SOURCE, FULL SCALE AND VALUE SETTINGS FOR CALIBRATION**

Calibration Type/Ranges	Calib. Source	Full Scale Setting/Scale Factor	Calib. Value
Volts Hi End 120/208 V	120 V	0120	0120
277/480 V	300 V	0300	0300

6.2 GROUP *2*, FUNCTION *0-2* - HIGH END CALIBRATION OF VOLTAGE CHANNELS

Note: ***Full Scale Setting for the channel being calibrated must be set according to Table 6-2 BEFORE beginning this procedure.***

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 2, proceed to Step 3.



Step 2:
a. Press the ***L-N/L-L*** button until ***2.*** appears[1].

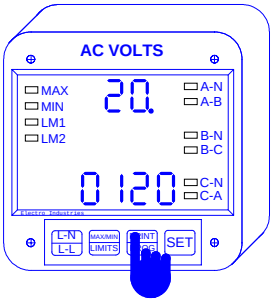
b. Press the ***PRINT/PROG*** button to activate.

⇒ A one digit password is required to continue.

c. Press the ***MAX/MIN/LIMITS*** button until ***5*** appears

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

⇒ ***2P.*** appears in the upper display and in the lower display ***0980*** appears. This is a constant number and should not be changed.

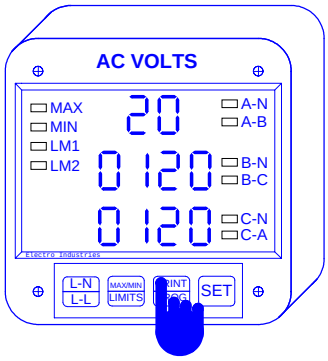


Step 3:
⇒ Refer to Table 6-1 for the Function Number corresponding to the channel you wish to calibrate.

a. Press the ***L-N/L-L*** button to scroll through the channels

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

⇒ The current value is displayed in the bottom level. For example we will use Function 0.

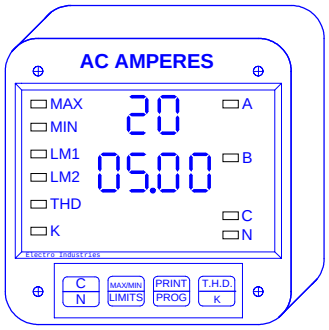


Step 4:
⇒ *At this time the calibration source should be applied to the appropriate channel.*

a. Enter the calibration value using the standard data entry method

b. Press the ***MAX/MIN/LIMITS*** button to scroll though the number

c. Press the ***PRINT/PROG*** button to store the number and lock in the calibration.

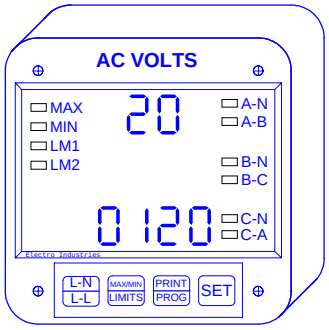


Step 5:
⇒ When the entry is complete the new value moves to the center level.

⇒ The bottom level will display the calibrated reading after 10-15 seconds.

[1] *To abort this procedure at any time press the **L-N/L-L** button.*

Step 6:
a. Press the ***L-N/L-L*** button to end the Calibration Sequence.



⇒ If the calibrated reading is not acceptable, the procedure should be repeated after checking all connections and the calibration signal.

To exit GROUP *2*, refer to Chapter 9, Exiting the Programming Mode.

CHAPTER 7
PROGRAMMING GROUP 3: INPUT CORRECTION RATIOS

The 3DVA120 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, and the rear (*input module*) supports all incoming signal connections. The sections can be easily separated, allowing the meter module to be moved, or serviced, off-site without interrupting service loops or removing meter connections.

Though a lot simpler in design, 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. We refer to them as* ***CORRECTION RATIOS****.*

The Programming Mode makes it possible to key in the CORRECTION RATIO values of any input module to which the meter is attached. This allows a site technician to move a meter to a different input module, re-program the correction ratios and resume accurate power metering.

Warning: ***An Incorrect entry will result in false readings.***

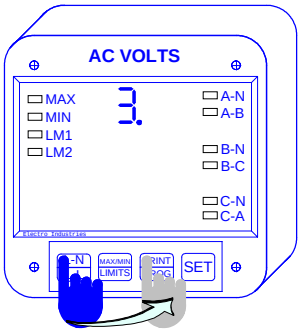
TABLE 7-1: GROUP *3* PROGRAMMING FORMAT

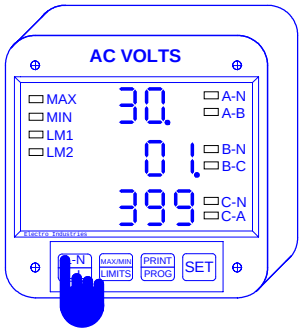
Function Number	Function
0.	Hi End Correction Ratio, Volts A
1.	Hi End Correction Ratio, Volts B
2.	Hi End Correction Ratio, Volts C
e.	Exit Programming Group 3

7.1 GROUP *3*, FUNCTIONS *0-2* - HI END CORRECTION RATIOS

To change the Correction Ratio follow the steps below:

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 3, proceed to Step 3.





Step 2:
a. Press the ***L-N/L-L*** button until ***3.*** is displayed.

b. Press the ***PRINT/PROG*** button to activate.

⇒ A one digit password is required to continue.

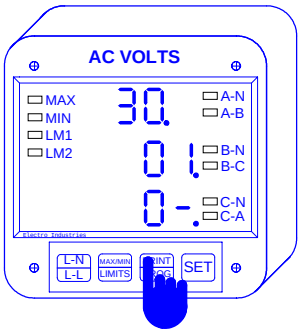
c. Press the ***MAX/MIN/LIMITS*** button until ***5*** appears

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

Step 3:
a. Press ***L-N/L-L*** button to select the desired function (*0-2*).

⇒The middle level displays the integer portion and the bottom level displays the fractional portion of the ratio.

Chapter 7 Input Correction Ratios



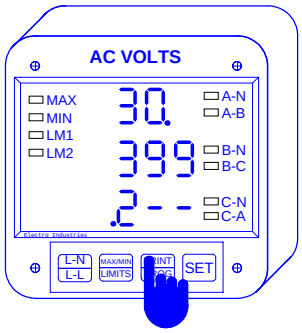
Step 4:

a. Press ***PRINT/PROG*** to begin entering the integer portion of the new ratio.

⇒ Two dashes appear on the bottom level. *(To skip to changing the fractional portion press **L-N/L-L** once and proceed to Step 5.)*

b. Use the ***MAX/MIN/LIMITS*** button to scroll through numbers

c. Press ***PRINT/PROG*** to select the number[1] and proceed to the next.



Step 5:

⇒ Entering the fractional portion of the ratio repeat Step 4.

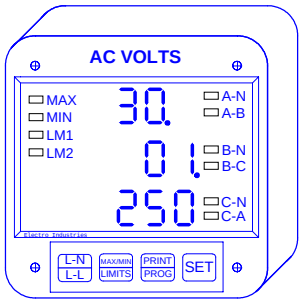
a. Use the ***MAX/MIN/LIMITS*** button to scroll through numbers

b. Press ***PRINT/PROG*** to select the number[2] and proceed to the next.

Step 6:

⇒ When the new ratio is complete the meter replaces the old correction ratio with the new.

⇒ The middle level displays the integer portion and the bottom level displays the fractional portion of the ratio.



To exit Group *3*, refer to Chapter 9, Exiting the Programming Mode.

[1] *To cancel at any time press **L-N/L-L** twice.*

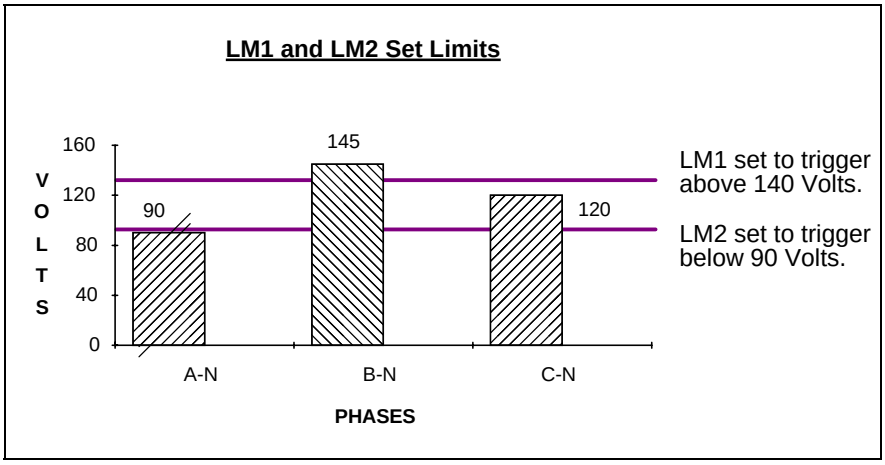
[2] *To cancel at any time press **L-N/L-L** once.*

CHAPTER 8
PROGRAMMING GROUP 4: SETTING LIMITS AND RELAYS

The purpose of the set limit is to alert the user when a particular voltage level has been exceeded or has dropped too low. The 3DVA120 has two set limits available for each metered function. They are referred to as LM1 and LM2. Each limit can be set at any desired level.

Group *4* contains LM1 and LM2 Set Limit Values for all voltage channels: A-N, A-B, B-N, B-C, C-N, and C-A.

GRAPH 8-1: EXAMPLE OF LM1/LM2 SET LIMITS



8.1 TRIP RELAY[1]

The 3DVA120 has two relays which are linked through the program to LM1 and LM2 Set Limits. The relay outputs can be programmed individually to close when LM1 and/or LM2 is triggered. Each relay has provisions for a separate delay time which is discussed in Chapter 4.

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

TABLE 8-1: GROUP *4* PROGRAMMING FORMAT

Function Number	Function
0.	LM1/LM2 Set Limits for Volts A-N
1.	LM1/LM2 Set Limits for Volts B-N
2.	LM1/LM2 Set Limits for Volts C-N
3.	LM1/LM2 Set Limits for Volts A-B
4.	LM1/LM2 Set Limits for Volts B-C
5.	LM1/LM2 Set Limits for Volts C-A
E.	Exit Programming Group 4

In Table 8-1, all functions contain a two part entry. First is the setup of Set Above/Below, Trip Relay I, and Trip Relay II options. The second part is the Setup Level.

[1] ***NOTE:*** *All information pertaining to Trip Relays I and II applies to the 3DVA120-NL only.*

8.2 GROUP *4*, FUNCTION *0-5* - LM1/LM2 SET LIMITS

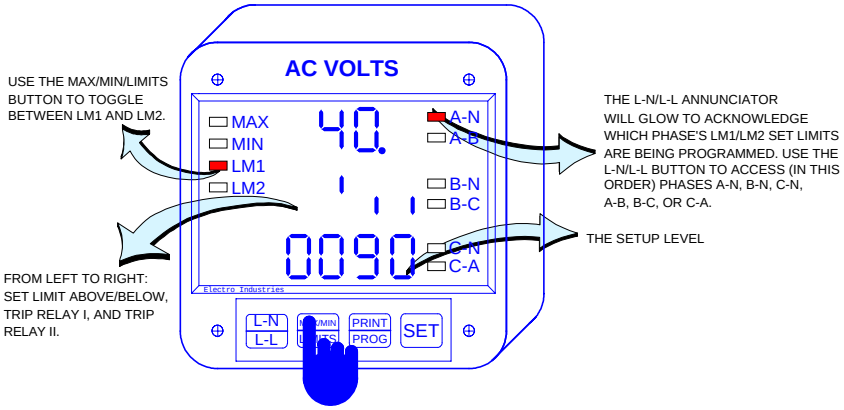


Diagram 8-1: *Programming Group 4, LM1/LM2 Set Limits*

TABLE 8-2: FUNCTIONS *0-3*

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	0-9999 0-9999
OFF	ON	digit up-trigger above level digit down-trigger below level	digit up-enabled digit down-disabled	digit up-enabled digit down-disabled	0-9999 0-9999

TABLE 8-3: EXAMPLE FOR FUNCTION *0*

ON	OFF	digit up	digit up	digit down	0140
OFF	ON	digit down	digit down	digit up	0090

Example:
If Voltage Phase A-N exceeds 150 V, LM1 is triggered and relay 1 is enabled. If Voltage Phase A-N drops below 90 V, LM2 is triggered and relay 2 is enabled

CHAPTER 7
PROGRAMMING GROUP 3: INPUT CORRECTION RATIOS

The 3DVA120 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, and the rear (*input module*) supports all incoming signal connections. The sections can be easily separated, allowing the meter module to be moved, or serviced, off-site without interrupting service loops or removing meter connections.

Though a lot simpler in design, 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. We refer to them as* ***CORRECTION RATIOS****.*

The Programming Mode makes it possible to key in the CORRECTION RATIO values of any input module to which the meter is attached. This allows a site technician to move a meter to a different input module, re-program the correction ratios and resume accurate power metering.

Warning: ***An Incorrect entry will result in false readings.***

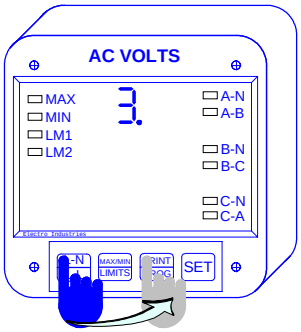
TABLE 7-1: GROUP *3* PROGRAMMING FORMAT

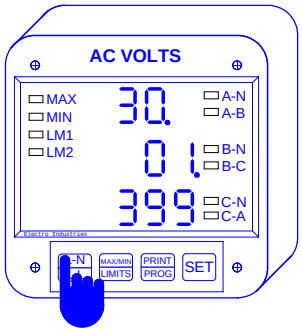
Function Number	Function
0.	Hi End Correction Ratio, Volts A
1.	Hi End Correction Ratio, Volts B
2.	Hi End Correction Ratio, Volts C
e.	Exit Programming Group 3

7.1 GROUP *3*, FUNCTIONS *0-2* - HI END CORRECTION RATIOS

To change the Correction Ratio follow the steps below:

Step 1:
If not at Group Level of the Programming Mode, use password entry sequence to begin (see Chapter 1, Page 16 for details). If already in Group 3, proceed to Step 3.





Step 2:
a. Press the ***L-N/L-L*** button until ***3.*** is displayed.

b. Press the ***PRINT/PROG*** button to activate.

⇒ A one digit password is required to continue.

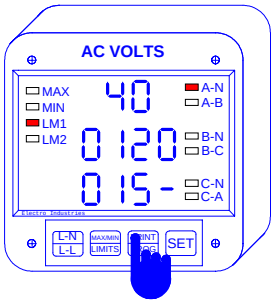
c. Press the ***MAX/MIN/LIMITS*** button until ***5*** appears

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

Step 3:
a. Press ***L-N/L-L*** button to select the desired function (*0-2*).

⇒The middle level displays the integer portion and the bottom level displays the fractional portion of the ratio.

Chapter 8 Setting Limits and Relays

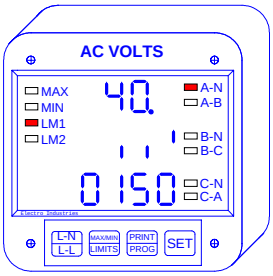


Step 6:

⇒ When in the Setup Level portion of programming, the display will have the current setting displayed in the middle level and four dashes in the bottom level.

a. Use the ***MAX/MIN/ LIMITS*** button to scroll through numbers.

b. Press ***PRINT/PROG*** button to select numbers and proceed to the next.



Step 7:

⇒ When complete the display will return to the Function Level of programming.

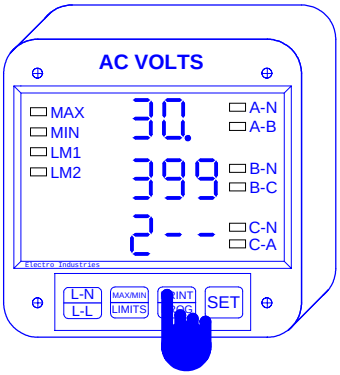
- The new Set Above/Below, Trip Relay I, and Trip Relay II setting displayed in the middle level
- The new Setup Level displayed in the bottom level.

Note: ***To cancel changes at any time and return to the Function Level of Group 4, press the L-N/L-L button once.***

To exit Group *4*, refer to Chapter 9, Exiting the Programming Mode.

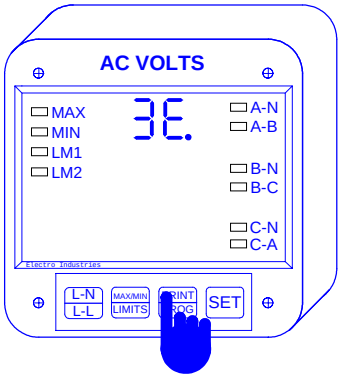
CHAPTER 9
EXITING THE PROGRAMMING MODE

The steps for exiting the Programming Mode will vary depending upon which stage of programming you are in. If you are in the Data Entry Sequence begin at Step 1. If you are in the Function Level begin at Step 2. If you are in the Group Level begin at Step 3.



Step 1:
EXITING FROM DATA ENTRY SEQUENCE

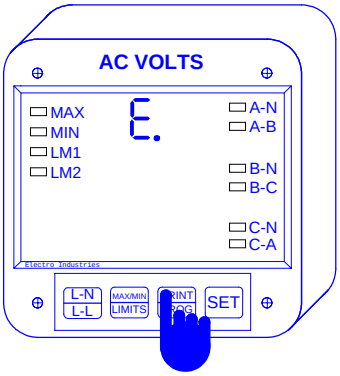
a. Press the ***L-N/L-L*** button to cancel the Data Entry Sequence. The 3DVA120 will return to the Function Level.



Step 2:
EXITING FROM FUNCTION LEVEL

a. Press the ***L-N/L-L*** button until the Group number in the upper level is followed by ***E.***

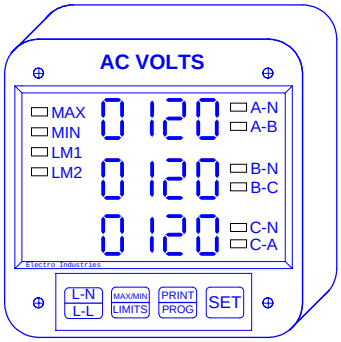
b. Press the ***PRINT/PROG*** button to exit from the Function Level to the Group Level.



Step 3:
EXITING THE GROUP LEVEL

a. Press the ***L-N/L-L*** button until ***E.*** appears in the upper level.

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



Step 4:

⇒ You have exited the Programming Mode. After a moment the meter will return to the Operating Mode.

APPENDIX

A. RESERVED GROUPS, FUNCTIONS, AND PACKS

The 3DVA120 contains some groups which are reserved. Programming Group 5 and 7 are reserved and not used.

In Group 0, Function 3, there are certains packs which are reserved. When you encounter a pack which is reserved move on to the next pack. Refer to Chapter 4, Group 0, Function 3 for more information about these reserved packs.

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	Full Scale Selection
2	Calibration	High End Calibration for Voltage Channels
3	Correction Ratio	Changing the Correction Ratio
4	LM1/LM2 Set Limits for Volts	High and Low Set Limits for Volts A-N, B-N, C-N, A-B, B-C, and C-N.
5	RESERVED	RESERVED
6	RESERVED	RESERVED
7	RESERVED	RESERVED
8	DC Output[1]	DC Output Calibration and Setup

[1] *Applies only if DC Output Option was ordered with the 3DVA120.*