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LTI2

High Frequency Inverter



Installation and Operation Manual

This manual is subject to change without notice. You may obtain the newest version of the manual at www.lamarchemfg.com

Important Safety Instructions

Before using this equipment, read all manuals and other documents related to this inverter and other equipment connected to this unit. Always have a copy of an inverter's manual on file nearby, in a safe place; if a replacement copy of a manual is needed, it can be found at www.lamarchemfg.com.

Electrical Safety



WARNING: Hazardous voltages are present at the input of power systems. The output from inverters and from batteries may be low in voltage but can have a very high current capacity that may cause severe or even fatal injury.

When working with any live battery or power system, follow these precautions:

- Never work alone on any live power system, someone should always be close enough to come to your aid.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Wear complete eye protection (with side shields) and clothing protection.
- Always wear gloves and use insulated hand tools.



WARNING: Lethal voltages are present within the power system. Parts inside the unit may still be energized even when the unit has been disconnected from the DC input power. Check with a meter before proceeding. Do not touch any parts that are not insulated.

- A licensed electrician should be used in the installation of any unit.
- Always disconnect the unit from the supply, batteries and loads before performing maintenance or cleaning.
- If the unit is hot-swappable, simply remove it from the shelf for any maintenance or cleaning.
- Always assume that an electrical connection is live and check the connection relative to ground.
- Be sure that neither liquids nor any wet material come in contact with any internal components.
- Do not operate this unit outside the input and output ratings listed on the unit nameplate.
- Do not use this unit for any purpose not described in the operation manual.

Mechanical Safety

- This unit or parts of the unit may get very hot during normal operation, use care when working nearby.
- Do not expose equipment to rain or snow. Always install in a clean, dry location.
- Do not operate equipment if it has received a sharp blow, been dropped, or otherwise damaged in any way.
- Do not disassemble this unit. Incorrect re-assembly may result in a risk of electric shock or fire.

Battery Safety



WARNING: Follow all of the battery manufacturer's safety recommendations when working with or around battery systems. DO NOT smoke or introduce a spark or open flame in the vicinity of a battery. Some batteries generate explosive gases during normal battery operation.

- To reduce risk of arc, connect and disconnect the battery only when the unit is off.
- If it is necessary to remove the battery connections, always remove the grounded terminal from the battery first.
- Remove personal metal items such as rings, bracelets, necklaces, and watches.
- Always wear rubber gloves, safety glasses, and a rubber lined vest/apron when working near a battery.
- Have plenty of fresh water and soap nearby in case the battery electrolyte contacts skin, clothing, or eyes.
- If the battery electrolyte contacts skin or clothing, wash immediately with soap and water.
- If the electrolyte enters the eye, immediately flood the eye with running cold water for at least ten (10) minutes and seek medical attention immediately.
- Do not drop metal on a battery. A spark or short-circuit could occur and could cause an explosion.

Unit Location

- Allow at least 6 inches of free air on all vented surfaces for proper cooling.
- Do not operate this unit in a closed-in area or restrict ventilation in any way.
- Do not set any battery on top of this unit.
- Never allow battery electrolyte to drip on this unit when reading the specific gravity or filling the battery.
- Never place this unit directly above a standard flooded battery. Gases from the battery will corrode and damage equipment.
- A sealed maintenance free or valve regulated lead acid (VRLA) battery may be placed below this equipment.

Check for Damages

Prior to unpacking the product, note any damage to the shipping container and take pictures. Unpack the product and inspect the exterior and interior of product for damage. If any damage is observed, take pictures and contact the carrier immediately to file a damage claim. Contact La Marche for a Return Material Authorization number to have the inverter sent back for evaluation and repair.



CAUTION: Failure to properly file a claim for shipping damages or provide a copy of the claim to La Marche, may void warranty service for any physical damages reported for repair.

Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is damaged/unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage. *La Marche is not responsible for damage caused by improper packaging of returned products.*

Inspection Checklist

- Enclosure exterior and interior is not marred or dented.
- No visible damage to the components.
- All hardware and connections are tight.
- All wire terminations are secure.
- All items on packing list have been included.

Handling

Equipment can be very heavy with uneven distribution of weight. Use adequate manpower or equipment for handling. Until the equipment is securely mounted, care must be used to prevent equipment from being accidentally tipped over or dropped.

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Model Scope/General Description

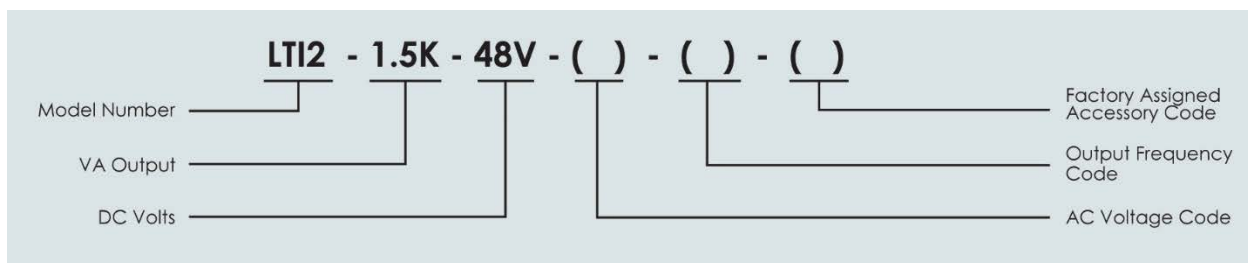
The LT12 Series is a standalone inverter which utilizes high frequency technology (IGBT/MOSFET) to provide reliable power when AC power requirements are critical. The inverter is equipped with standard features such as pure sine wave output, voltage regulation, under/over-voltage conditions, and overload protection. The LT12 Series is designed to operate at 48VDC input and produce 120 VAC nominal output. The 60Hz output sine wave is produced using an advanced DSP controlled architecture for high efficiency. The compact 2RU rack mount enclosure is ideal for data centers, and telecommunications applications.



Figure 1 – LT12 Overview (An option for 21X/SNMP is available)

Understanding the Model Number

The LT12 model number is coded to describe the features that are included. Find the model number on the nomenclature nameplate of the enclosure. Follow the chart below to determine the configuration of the inverter.



Optional Accessories Included in the Inverter

This inverter may have been outfitted with a number of optional accessories or option packages. To determine the options included (if any) refer to the cover page of the manual package. If the manual package that is included with the inverter is no longer available, contact La Marche and provide the model or serial number to receive a list of the included accessories.

1.0 Equipment Handling

1.1 Storing the LT12

If the LT12 is to be stored for more than a few days after delivery, it should be stored within its shipping container. The location chosen for storage should be within an ambient temperature of -40 to 185° F (-40 to 85° C) with a non-condensing relative humidity of 0 to 95%. Storage should not exceed 2 years due to the limited shelf life of the filter capacitors when they are not in service.

1.2 Moving the LT12

After careful inspection and upon verification that the LT12 is undamaged, identify the enclosure style and weight of the inverter. Refer to Table 1 below.

	Output VA	Output Voltage	Output Amps	Input Voltage	Input Current	Dimensions (W x D x H)	Weight
LT12	800VA	120VAC	6.67A	48VDC	19A	17.1" x 3.5" x 14.6"	15 lbs.
	1kVA	120VAC	8.33A	48VDC	24A	17.1" x 3.5" x 14.6"	15 lbs.
	1.5kVA	120VAC	12.5A	48VDC	36A	17.1" x 3.5" x 14.6"	15 lbs.

Table 1 – Case and Weight

2.0 Installation

2.1 Mounting the LT12

Interchangeable mounting brackets are provided for 19/23" rack mounting or wall mounting. When mounting the LT12 in any configuration, consider the size and weight of the Inverter. The wall and/or rack must be able to support the weight of the inverter, as well as an additional safety factor. Refer to Table 1 to verify the weight of the inverter. The location chosen for the inverter should be within an ambient temperature range of 32°F to 122°F (0°C to 50°C) with a non-condensing relative humidity no higher than 95%. The inverter should be mounted in an area free of explosive materials and away from any liquids. Avoid using equipment in location with corrosive gases (e.g. over flooded Lead Acid batteries) and dust. The LT12 utilizes fan-assisted cooling, so a clearance of at least 6 inches of free air must be maintained in front and on top for proper cooling. Maintain 12 inches (300 mm) or more of clearance at the rear of the inverter when rack mounting in order to allow for operation and maintenance. The preferred fastener is a machine bolt backed with a flat washer, lock washer, and nut. All hardware should be corrosion-resistant.

2.1.1 Rack-Mounting the LT12

The LT12 enclosure can be rack mounted on a standard 19" or 23" relay rack. For rack mounting install the brackets to the front of the LT12 enclosure, seen in Figure 2. Flush mount the LT12 enclosure to the relay rack.

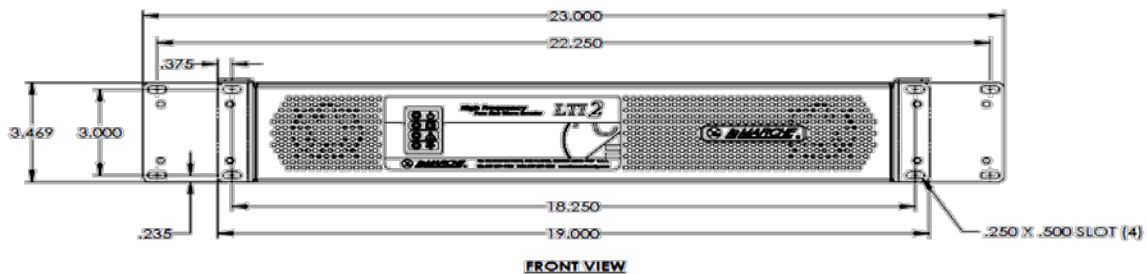


Figure 2 – Rack Mounting Dimensions

2.1.2 Wall-Mounting the LTI2

To wall-mount the LTI2, secure the provided mounting brackets to the inverter as seen in the Figure 1 below. Mark and drill the points on the wall per the mounting dimensions and install (4) #10 bolts in the wall rated to support the inverters weight plus a safety factor of at least four times. Refer to Table 1 for unit weight specifications. Secure the inverter on bolts, add appropriate mounting hardware, and tighten securely.

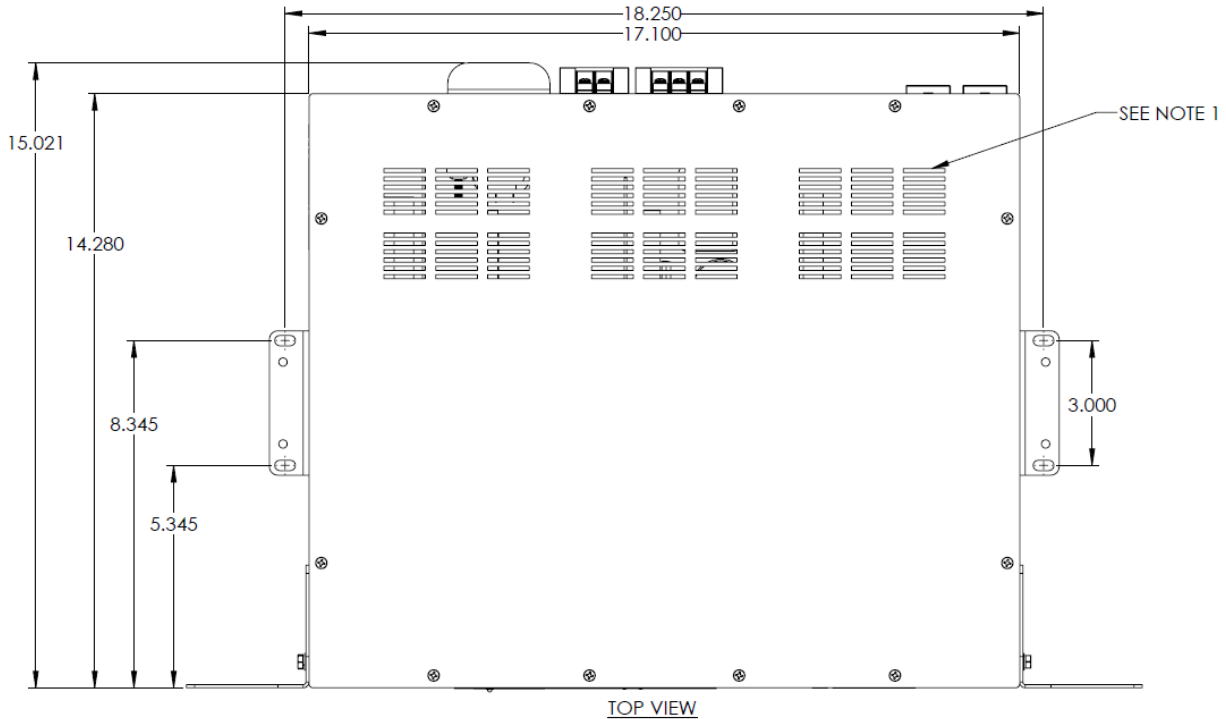


Figure 3 – Wall Mounting Dimensions

2.2 Electrical Connections

Before beginning any work on the inverter, ensure that all incoming and output power is de-energized. Verify that no voltage is present by using a voltmeter at all input and output terminals. Check that the voltage and frequency match the inverter front nameplate specifications. Select wire size using the table below.

Inverter Rating	Input Breaker Rating (DC Amps)	Output Fuse Rating (AC Amps)	AWG Minimum Wire Size for DC Connection	AWG Minimum Wire Size for Equipment Grounding	AWG Minimum Wire Size for AC Connection
LTI2-800	35	10	#10	#14	#14
LTI2-1K	35	15	#8	#14	#14
LTI2-1.5K	50	20	#8	#10	#12

Table 2 – Wire Size Minimum Requirements
(All wires specified in the table are rated at 90 °C or 194 °F)

NOTE: These are recommended sizes per La Marche Standards. The National Electrical Code (NEC) and Local Wiring Codes must be followed.

2.2.1 Input Wiring



WARNING: Connecting the battery to the Inverter may cause a spark at the point of connection. There is a RISK OF EXPLOSION in hazardous areas or locations where explosive gases have accumulated.

Access the rear of the inverter and locate the DC Input connection terminal. With the DC breaker in the off position, connect DC wiring to the inverter per the below image. Refer to Table 3 for recommended wire size.

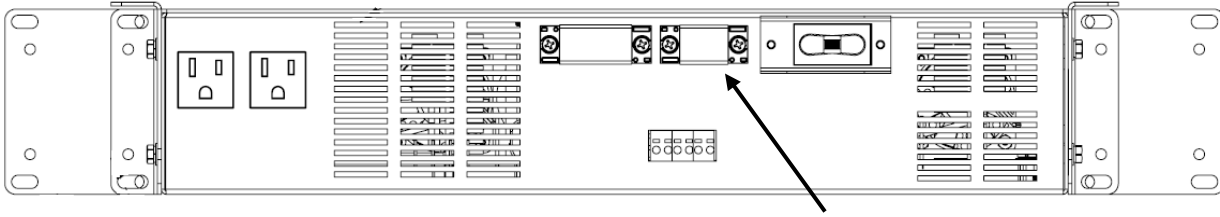


Figure 4 – Input Connections(Use Appendix B for further instructions)

With DC input wiring connected and operating within the DC range, flip the DC breaker ON to verify inverter starts up. The Inverter INV. ON LED should turn solid green, indicating successful start-up and no faults. Using a digital multimeter, measure the AC output to verify voltage output. Turn the DC breaker off.

2.2.2 Output Wiring

The LT12 comes with Bulk AC connections and (4) NEMA 5-20R receptacles at the rear of the inverter. Connect AC cables to the equipment per the image below. Select the recommended AC wire size using Table 3. If the distance between the inverter’s output and the load exceeds 10 feet, use the Power Wiring Guide in Appendix B to minimize the voltage drop across the wire distance.

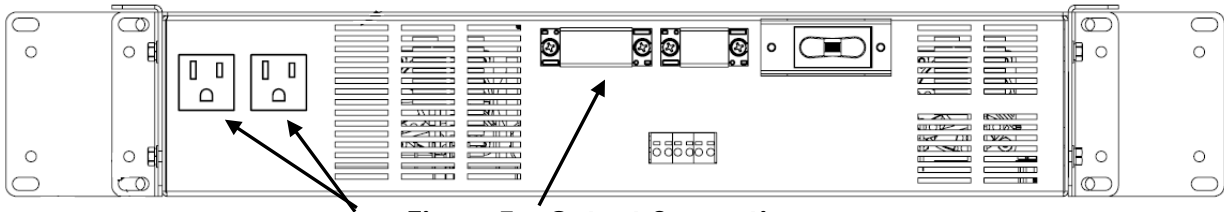


Figure 5 – Output Connections

2.2.3 Alarm Connections

The LT12 inverter is equipped with a single set of Form ‘C’ dry-type relay contacts (30 VDC @ 2A rating) for Alarm.

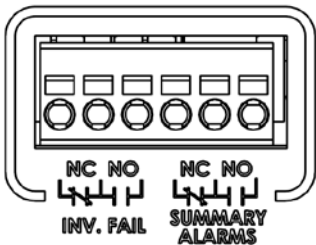


Figure 6 – Alarm Connections

Alarm	Condition	Relay Logic
INV. FAIL	Will trigger when inverter fails to regulate output voltage	De-energize on Fail
SUMMARY	Will trigger when any alarm is present. (Low DC, High DC, Overload, Short Circuit, Over Temp. Shutdown, Fan Failure)	De-energize on Fail

Table 4 – Alarm Relay Logic

3.0 Operation

3.1 Start-Up Sequence

After all DC, AC, and alarm connections have been made, apply DC power and turn on the inverter DC breaker. The unit will automatically power up and the Inverter INV ON LED should turn solid green, indicating successful start-up and no faults. The inverter will output 120VAC.

3.2 LED and Alarm Indications Details



Figure 7 – LED Panel

1. INV ON LED: Green LED indicates the Inverter ON condition.
2. Battery Low LED: Red LED (solid) indicates the battery low condition.
3. Summary LED: Red LED (solid) reference table 5.
4. Fan Failure LED: Red LED (solid) indicates a fan failure is present.















Alarm Conditions	Symbols	Color	Description
Low DCV Alarm	 	Red (Solid) Green (Solid)	-Indicates that the input DC voltage is below 43 Volts. -Indicates that the inverter is providing AC output. -Audible alarm will beep intermittently.
Low DCV Shut Off		Red (Solid)	-Indicates that the input DC voltage is below 42 Volts and the inverter output has shut off. -Recovery voltage is 49VDC.
High DCV Alarm	 	Red (Solid) Green (Solid)	-Indicates that the input DC voltage above 55 Volts. -Indicates that the inverter is providing AC output. -Audible alarm will sound continuously.
High DCV Shut Off		Red (Flashing)	-Indicates that the input DC voltage is above 56 Volts and the inverter output has shut off. -Recovery voltage is 55VDC.
Overload		Red (Solid)	-Indicates that the inverter is in overload (100-110% for 30sec, 110-150% for 18sec, >150% for 1sec), and unit will shut off.
Short Circuit	 	Red (Flashing) Red (Flashing)	-Indicates that the inverter is in short circuit condition and inverter is off.
Fan Failure	  	Red (Solid) Green (Flashing) Red (Solid)	-Indicates that there is a fan failure. -Indicates that the inverter is providing AC output.
Over Temperature		Green (Solid)	-Indicates temperature is over 70°C -Indicates the inverter is providing AC output -Audible alarm will sound continuously.
Over Temperature Shutdown		Red (Solid)	-Indicates the inverter temperature is over 80°C and unit has shutdown from over temperature. -Recovery temperature is 60°C.

Table 5 – Alarm Conditions

3.3 Communications (Option 21X)

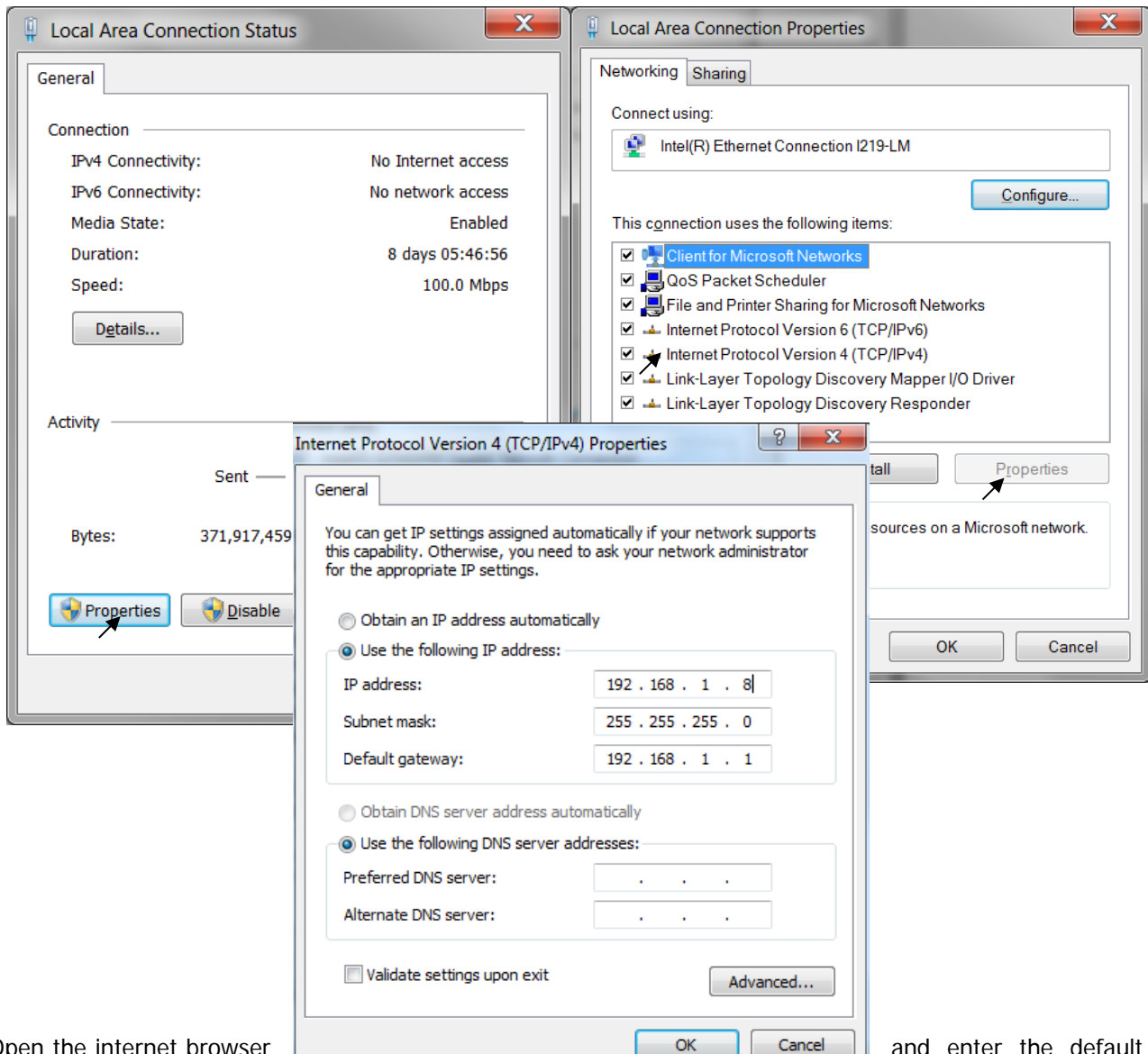
3.3.1 Default Settings

Host Name: MCHPBOARD IP Address: 192.168.1.100
Gateway: 192.168.1.1 Subnet Mask: 255.255.255.0
DHCP: Disabled VLAN: Disabled

3.3.2 Setting up a Local Network Connection using Static IP or DHCP

Connect an Ethernet Cable between the PC and the Ethernet port on the LTI2. Open the Control Panel through the Windows start menu. In Control Panel, double click Network Connections. In Network Connections, click Local Area Connection to view the status.

From Local Area Connection Status window, select Properties in the bottom left corner. From the Properties menu, select Internet Protocol Version 4(TCP/IPv4) and click Properties. From this new window, change the IP address to (192.168.1.8 for this example) and Subnet mask (255.255.255.0). Click OK on the two Properties menus.



Open the internet browser
Address of the LTI2

and enter the default IP
system in the address bar

(192.168.1.100). The LT12 home page will be loaded as seen below.

The screenshot shows the La MARCHÉ LTI Monitoring & Control Application interface. At the top is the La MARCHÉ logo with the tagline "The Powerful Advantage Since 1933" and "ISO 9001:2008 CERTIFIED". Below the logo is a red navigation bar with "LTI Monitoring & Control Application". A sidebar on the left contains three menu items: "Overview", "Network Configuration", and "SNMP Configuration". The main content area is titled "Welcome!" and contains a brief description of the application's purpose. To the right, there is a status panel with a list of indicators: INVERTER ON (green dot), BATTERY HIGH (grey dot), BATTERY LOW (grey dot), OVERLOAD (grey dot), OVER TEMP. (grey dot), SHORT CIRCUIT (grey dot), and FAN FAIL (grey dot). Below the indicators, the current system status is displayed: Output Voltage: 120V, Output Freq: 60.0Hz, Load Current: 0%, and Battery Voltage: 54.6V. A green "INVERTER ON" button is located at the bottom of the status panel. At the very bottom of the page, a small copyright notice reads: "© Copyright 2006 to 2012, La Marche Manufacturing Company. La Marche is a registered trademark., Inc."

In order to access the LT12 system IP address settings, click on Network Configuration. A window will popup asking for the user name and password. By default, the username is *admin* and the password is *lamarche*.

The LT12 Configuration is set up to Static IP per the default settings. The Board Configuration screen includes the MAC Address, the name of the LT12, and the IP information. The name can be changed to differentiate the different LT12 units connected on the same network.

The screenshot shows the "Board Configuration" page within the LTI Monitoring & Control Application. The page title is "Board Configuration" and it includes a navigation sidebar with "Overview", "Network Configuration", and "SNMP Configuration". A red "CAUTION" box at the top states: "Incorrect settings may cause the board to lose network connectivity. Recovery options will be provided on the next page." Below the caution, the user is prompted to "Enter the new settings for the board below:". The configuration form contains the following fields: MAC Address (00:1E:C0:C2:9C:54), Host Name (MCHPBOARD), IP Address (192.168.1.100), Gateway (192.168.1.1), Subnet Mask (255.255.255.0), Primary DNS (0.0.0.0), and Secondary DNS (0.0.0.0). There are two checkboxes: "Enable DHCP" (unchecked) and "Enable VLAN" (unchecked). The VLAN ID is set to 201. A "Save Config" button is located at the bottom of the form.

In this example, we change the Host Name to LMC1, the IP Address to 192.168.1.6 and the Subnet to 255.255.255.0

LTI Monitoring & Control Application

Overview

Network Configuration

SNMP Configuration

Board Configuration

This page allows the configuration of the board's network settings.

CAUTION: Incorrect settings may cause the board to lose network connectivity. Recovery options will be provided on the next page.

Enter the new settings for the board below:

MAC Address:	<input type="text" value="00:1E:C0:C2:9C:54"/>
Host Name:	<input type="text" value="LMC1"/>
	<input type="checkbox"/> Enable DHCP
IP Address:	<input type="text" value="192.168.1.6"/>
Gateway:	<input type="text" value="192.168.1.1"/>
Subnet Mask:	<input type="text" value="255.255.255.0"/>
Primary DNS:	<input type="text" value="0.0.0.0"/>
Secondary DNS:	<input type="text" value="0.0.0.0"/>
	<input type="checkbox"/> Enable VLAN
VLAN ID:	<input type="text" value="201"/>
	<input type="button" value="Save Config"/>

As soon as the Save Config button is clicked, the website will show the following message. The connection to the LTI2 will be lost.

Overview

Network Configuration

Reboot In Progress...

Your settings were successfully saved, and the board is now rebooting to configure itself with the new settings.

Your board is now located at: <http://LMC1/>

Reconnection Instructions

- Did you change the hostname, IP or MAC address?**
It is necessary to clear the address caches in your web browser and OS. From the command prompt in Windows, enter "nbtstat -R" to clear the hostname cache, close your current web browser, open a new web browser, and then try to access the web address above.
- Did you try the IP address?**
Try accessing the board directly at the IP address shown on Network Connections > Local Area Connection Status > Support window. (ex: enter "http://192.168.5.23/" into your browser). If this fails, then the IP address you set is not reachable. Try the step below.
- Still not working?**
You can restore compile-time settings by clearing the Configuration Area into the Microcontroller FLASH. Hold BTN1(SW2) and press MCLR (or reset power). Continue holding BTN1(SW2) until the LEDs flash. Release BTN1 and press MCLR (or reset power) again. This procedure restores the configuration settings in TCPIPConfig.h. You'll be able to access the board as you did when first connecting.

Open the internet browser and enter the IP address (192.168.1.6 in this example) or the new device name (LMC1 in this example).

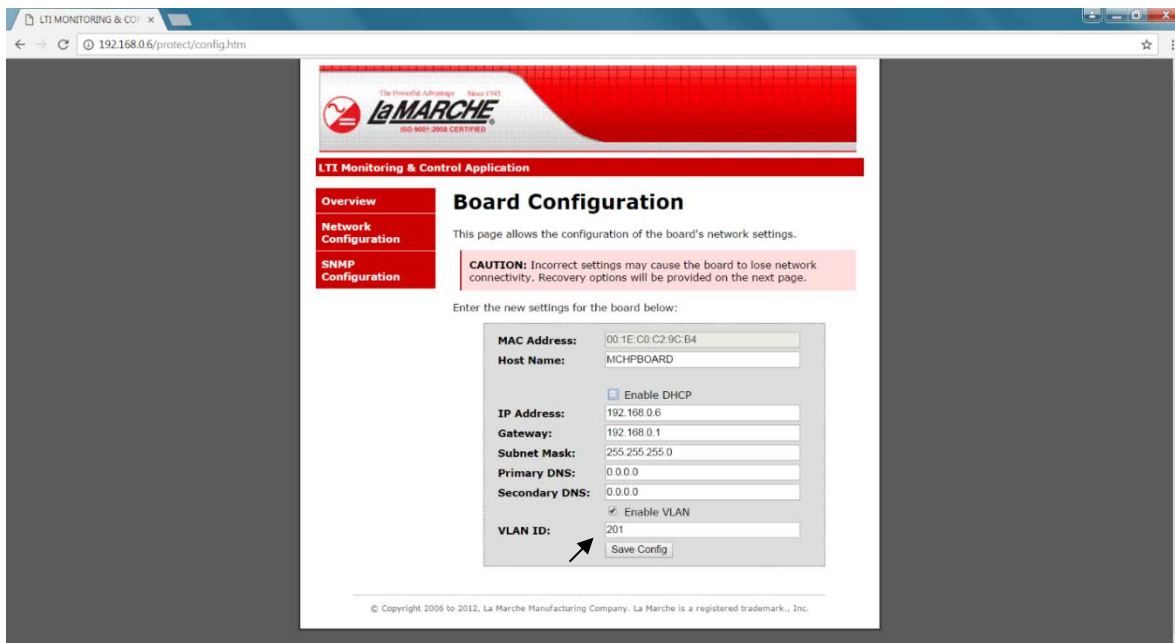
If everything has been done correctly, the LTI2 is now setup to be operated on the Local Area Network. Follow this same procedure to setup additional LTI2 systems. Make sure that the IP address and name for each LTI2 is different.

To enable the LT12 communication card to DHCP, access the LT12 system IP address settings as done previously and click on Network Configuration. A window may popup asking for the username and password. By default, the username is *admin* and password is *lamarche*.

To enable DHCP, check the box labeled Enable DHCP and save the the settings by clicking on Save Config. As soon as the Save Config button is clicked, the connection to the LT12 will be lost.

3.3.3 Setting up VLAN

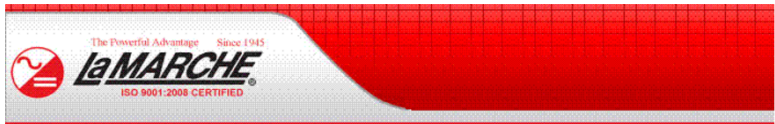
With the LT12 system set to default settings, access the LT12 system through the web browser and enter Network Configurations as done in the previous section. The following screen will be displayed.



To enable VLAN, click on the Enable VLAN box. Enter appropriate VLAN ID in the VLAN ID field. Enter appropriate IP Address and Gateway in their respective fields. With desired information entered, click on Save Config which is the last option in the settings. The LT12 communications board will reboot. If everything was done correctly, the LT12 system should be ready to connect to your VLAN.

3.3.4 SNMP

With the LT12 communication card set to default settings, access the LT12 system through the web browser as done in the previous sections and enter SNMP Configuration. The following screen will be displayed.



LTI Monitoring & Control Application

- Overview
- Network Configuration**
- SNMP Configuration

SNMP Community Configuration

Read/Write Community String configuration for SNMPv2c Agent.

Configure multiple community names if you want the SNMP agent to respond to the NMS/SNMP manager with different read and write community names. If less than three communities are needed, leave extra fields blank to disable them.

Read Comm1 :	public
Read Comm2 :	read
Read Comm3 :	
Write Comm1:	private
Write Comm2:	write
Write Comm3:	public
Save Config	

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MIB File Location

The La Marche MIB file for your LT12 can be downloaded from:

[https://www.lamarchemfg.com/web/userfiles/LaMarche%20LTI_mib\(2\).txt](https://www.lamarchemfg.com/web/userfiles/LaMarche%20LTI_mib(2).txt)

SNMP Data Points

Object ID	Description	Scale Factor	Read/Write	Sends Trap
inverterOn	Inverter ON (ON=1)	None	R	Yes
batteryHigh	Battery High (FAIL=1)	None	R	Yes
batteryLow	Battery Low (FAIL=1)	None	R	Yes
overload	Overload (FAIL=1)	None	R	Yes
overTemperature	Over Temperature (FAIL=1)	None	R	Yes
shortCircuit	Short Circuit (FAIL=1)	None	R	Yes
fanFail	Fan Failure (FAIL=1)	None	R	Yes
outputVoltage	Output Voltage, Volts	0.1	R	No
outputFrequency	Output Frequency, Hz	0.1	R	No
loadCurrent	Load Current, Percent	0.1	R	No
batteryVoltage	Battery Voltage, Volts	0.1	R	No
inverterStatus	1=Inverter OFF 2=Inverter ON 3=Inverter in Battery High 4=Inverter in Battery Low 5=Inverter in Output Low 6=Inverter in Output High 7=Inverter in Overload 8=Inverter in Short Circuit 9=Inverter in Over Temperature 31=WARNING – Battery Low 41=WARNING – Battery High 71=WARNING – Overload 91=WARNING – Over Temperature Any other value=Inverter COMM Fail	None	R	Yes

Appendix A: Technical Specifications

<i>ELECTRICAL</i>	
DC Input	48VDC (Range: 42-56 VDC) (Nominal Input Current: 19A for 800VA, 24A for 1kVA, 36A for 1.5kVA)
AC Output	120 VAC, 60Hz, Pure Sine Wave 800VA, 1000VA, or 1500VA
Overload Capacity	100-110%, 30 sec 110-150%, 18 sec >150%, 1 sec
Efficiency	>90%
Load Power Factor	0.8 to 1
Crest Factor	3:1
Transient Response	< 8% (Linear load from 10%-90%)
Voltage Harmonics	<3 (Linear load) <8 (Inductive load)
Regulation	Voltage regulation \pm 1% from no load to full load over the specified input voltage and ambient temperature range. Frequency \pm 0.1Hz
Alarm and Indicators	LED Indicators (INV ON, Batt Low, Batt High, Overload, Over temp) Audible Alarm (Overload, Battery Low, Over Temp)
<i>PROTECTION</i>	
Current Walk-In	The output current will gradually increase after the inverter is turned on, eliminating surges and overshoot
Current Limit	Overload protection
Input	Standard DC Input Breaker Battery Low or High Shutdown Protection
Temperature	Over Temperature Shutdown Protection
<i>ENVIRONMENTAL</i>	
Operating Temperature	32 to 122°F (0 to 50°C)
Storage Temperature	-40 to 185° F (-40 to 85° C)
Relative Humidity	0 to 95% (non-condensing)
Cooling	Fan Assisted
Shock	The inverter in its shipping container withstands shock developed when one edge of the container is dropped six inches while the opposite edge is resting on the ground, or it is dropped two inches without any physical damage or degradation of the electrical performance.
Vibration	The inverter in its shipping contained, withstands vibration encountered in shipping without physical damage or degradation of the electrical performance.
Altitude	The inverter is capable of operation at altitudes up to 10,000 feet at an ambient temperature of up to +40 degrees C.
Ventilation	The unit should be mounted so that ventilating openings are not blocked and air entering the cabinet does not exceed 50 degrees C (122 degrees F).

Appendix B: Power Cabling Guide

Use the following formulas and table to determine proper wire size for minimal voltage drop. At distances exceeding 10 feet, the DC wire size should be chosen to keep the voltage difference between the inverter's DC input terminals and the battery at less than 1/2 volt when the inverter is fully loaded.

Table of Conventions:

- CMA* = Cross section of wire in circular MIL area
A = Ultimate drain in amperes
- LF* = Conductor loop feet
MaxAmp = Maximum allowable amperes for given voltage drop
AVD = Allowable voltage drop
K = 11.1 for commercial (TW) copper wire
 = 17.4 for aluminum

Calculating Wire Size Requirements:

$$CMA = \frac{A \times LF \times K}{AVD}$$

Size (AWG)	Area CIR.MILS	Size (MCM)	Area CIR.MILS
18	1620	250	250000
16	2580	300	300000
14	4110	350	350000
12	6530	400	400000
10	10380	500	500000
8	16510	600	600000
6	26240	700	700000
4	41740	750	750000
3	52620	800	800000
2	66360	900	900000
1	83690	1000	1000000
0	105600	1250	1250000
00	133100	1500	1500000
000	167800	1750	1750000
0000	211600	2000	2000000

Table 5 – Wire Size/Area Table

Calculating Current Carrying Capacity of Wire:

$$MaxAmp = \frac{CMA \times AVD}{LF \times K}$$

Appendix C: Manufacturer's Warranty

All La Marche Manufacturing Co. equipment has been thoroughly tested and found to be in proper operating condition upon shipment from the factory and is warranted to be free from any defect in workmanship and material that may develop within two (2) years from date of purchase under normal use.

If the equipment proves defective within a two year period, it shall be replaced without charge after examination at our factory, providing such defect in our opinion, is due to faulty material or workmanship and not caused by tampering, abuse, misapplication or improper installation.

Should the equipment require major replacement or repair, the equipment must be returned to the La Marche factory to have the inspections, parts, replacements and testing performed by factory personnel. Should it be necessary to return a piece of equipment to the factory, the customer or Sales representative must first obtain a RMA (Return Material Authorization) from the factory. If upon inspection at the factory, the defect was due to faulty material or workmanship, all repairs will be made at no cost to the customer during the warranty period.

All internal maintenance to be performed by La Marche. **Warranty is void if seal is damaged.**

La Marche reserves the right to honor the warranty with a replacement unit.

In accepting delivery of the equipment, the purchaser assumes full responsibility for proper installation, installation adjustments and service arrangements. Should minor adjustments be required, the local La Marche Sales Representative should be contacted to provide this service.

All sales are final. Only standard La Marche units will be considered for return. A 25% restocking fee is charged when return is factory authorized. Special units are not returnable.

In no event shall La Marche Manufacturing Co. have any liability for consequential damages, or loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause. In addition, any alterations of equipment made by anyone other than La Marche Manufacturing Co. renders this warranty null and void.

La Marche Manufacturing Co. reserves the right to make revisions in current production of equipment, and assumes no obligation to incorporate these revisions in earlier models.

The failure of La Marche Manufacturing Co. to object to provisions contained in customers' purchase orders or other communications shall not be deemed a waiver of the terms or conditions hereof, nor acceptance of such provisions.

The above warranty is exclusive, supersedes and is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer, nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an official of the manufacturer.

Appendix D: Document Control and Revision History

Part Number: 135927
Instruction Number: P25-LLTI2-1
Issue ECN: 21434 – 04/17

			22050 – 01/19
22021 – 12/18	21905 – 08/18	21502 – 07/17	21434 – 04/17