Big River LTX3
Real-time Disk System

Installation and User Manual

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About This Manual

This manual is intended to serve the following purposes:

* to provide an overview of the StreamStor LTX3 Real-Time Storage Controller

* to act as a guide for hardware installation

* to act as a reference for the operator

* to provide guidance on software capabilities and choices

* to provide Specifications, operational, non-operational and environmental

* to provide Product Safety instructions and documentation per the European Union Low Voltage Directive (LVD)

* to provide the Declaration of Conformity documentation required for the CE Mark.

We suggest that you periodically check the Conduant web site for the most recent software updates, application notes, and technical bulletins.

If you are unable to locate the information you need, please feel free to contact us by e-mail or phone.

About the LTX3 Real-Time Storage System

Thank you for purchasing the Conduant LTX3 Real-Time Storage System. Your StreamStor based system is a disk-based, real-time recording system for external data sources which can operate standalone or connected to a host computer. The system consists of a 1U chassis housing a StreamStor Amazon Express controller and high performance disk drives. Included with your system are the device drivers, software development tools, and additional utility software required to adapt the system to your specific application. The LTX3 system will usually include an optional mezzanine board to provide external data interfaces for data recording and playback.

The PCIe bus is a high performance I/O bus designed for attaching peripheral devices to computer systems. It is found in computing systems from many different manufacturers and is supported by most major operating systems. The LTX3 system includes a PCIe Host Cable interface that provides a cabled bridge to the computer PCIe bus. By utilizing the PCIe bus instead of a proprietary bus interface, the LTX3 provides an open platform recording system accessible from software applications running Windows or Linux operating system on the host computer. The LTX3 provides a large capacity and cost effective alternative to system memory or other storage solutions for these applications.

The LTX3 System is able to receive data over the PCIe bus directly from the data acquisition device at very high average (sustained) data rates. Virtually all of the available PCIe cards that can record data to system memory are compatible with the LTX3. Only minor software modifications are generally required to redirect data to the LTX3 PCIe (PCIe Host Cable) interface. This capability is often in the software provided by the manufacturers of such data acquisition devices.

The StreamStor technology used in the LTX3 was specifically designed to record sequential data without interruption at very high data rates. This is in contrast to traditional storage systems that are designed for data processing purposes and cannot sustain these high data rates. Unlike typical computer disk storage solutions that are designed for optimum performance during random data reads and writes, StreamStor has been designed for optimum performance in sequential read and write operations. The StreamStor system has also been designed to operate without host computer intervention. This eliminates any bottlenecks or interruptions in the data stream due to heavy computer loads or delays.

The LTX3 system includes the capability of adding daughter (mezzanine) boards to provide different types of external interfaces. Available interfaces include Serial FPDP (optical or copper), and LVDS (32 or 16 bit). These daughter boards move data to/from the LTX3 system at very high data rates with very little overhead. This provides a seamless method of interfacing to nearly any external data interface for high performance recording. Conduant can also develop custom daughter boards for unique or proprietary interface requirements.

The StreamStor SDK includes the device drivers and API (Application Programming Interface) to provide a smooth integration of the LTX3 with the data acquisition device and/or analysis software. Many examples are provided with the SDK and more are available upon request.

The LTX3 system is a flexible and powerful platform for high performance recording applications. The system also has the capability to provide a web based interface to allow command/control from nearly any networked computer. Many custom and unique capabilities are available that are beyond the scope of this documentation so please contact Conduant with your questions and special requirements.

Specifications

Weight	25 lbs (11.3Kg) with 16 Drives installed (Maximum)
Size	H 1.75" (4.4cm) x W 16.8" (42.7 cm) x D 20" (50.8 cm)
Electrical rating	100 – 240v ~, 2.2A, 50-60 Hz
Environmental Note that environmental specifications will vary with disk drive selection.	**Operating:** **Indoor use only** Temperature: 5C to 40C operating Shock (half sine wave): 300G/2 ms, 160G/1 ms Ordinary Protection (not protected against harmful ingress of moisture) Maximum Relative Humidity: 5 – 95% relative humidity, non-condensing **Non-Operating:** Storage Temperature: -40C to 65C Transportation Temperature: -40C to 65C Shock (half sine wave): 1000G/1 ms Altitude: 0 to 2,000 meters
Pollution Degree	2 per EN 61010-1
Capacity	Varies with disk drive model, up to 16 internal 2.5" SATA disk drives (magnetic or solid-state)
Interfaces	PCIe x8 Host Cable, 10/100 Ethernet Various data interfaces including Serial FPDP (optical or cooper), and LVDS (32 or 16 Bit)

Components

The LTX3 real-time storage system generally consists of the following components:

- LTX3 System Chassis
- External AC power cord
- PCIe x8 Host Cable Adapter Board (optional)
- PCIe x8 Cable (optional)
- PCIe x4 to x8 Cable (optional)
- Rack Mount Rails (optional)
- StreamStor Software Development Kit (SDK)
- User Manual(s)

☠ CAUTION: *Please read the entire installation section before starting to install the LTX3 hardware. This manual assumes that the user is knowledgeable and comfortable with basic computer work, including installation and safety considerations. If you are unsure as to how to proceed, please contact Conduant support.*

Unpacking / Handling

Carefully inspect all shipping packages for any sign of damage. In particular, look for wrinkled or bent corners, holes, or other signs of bad handling or abuse. If you notice any damage to the packaging, immediately open the boxes and inspect the contents for damage. Pay close attention to the components near the area where the packing material was damaged. Report any damage to the carrier and Conduant immediately.

Disk Drives

Hard disk drives such as those that have been included within your system are susceptible to damage from excess shock and careless handling. Please observe the following handling precautions:

* Allow the disk drives to reach room temperature BEFORE applying power to the system. This may take several hours depending on shipping conditions. Disk drive damage can occur if the system is powered while the drives are at temperature extremes.

* Do not drop, jar or bump the system. Even setting the chassis on a hard surface too roughly can damage the recording surfaces, heads, or other mechanical components inside the disk drives.

PCIe Host Cable Adapter Board (optional)

The LTX3 system is shipped with an optional PCIe Host Cable Adapter Board in a specially designed box or bag to prevent electrostatic damage to the board. There should be separate installation instructions included with that board. To avoid damage in handling the board, take the following precautions:

* Ground yourself with a grounding strap or grasp a conductive, grounded object to dissipate any static charge while handling the board.

* Always store the board in its antistatic package when not installed in a computer system.

* Inspect the board carefully before installing in the computer. Do not install a damaged board into your computer.

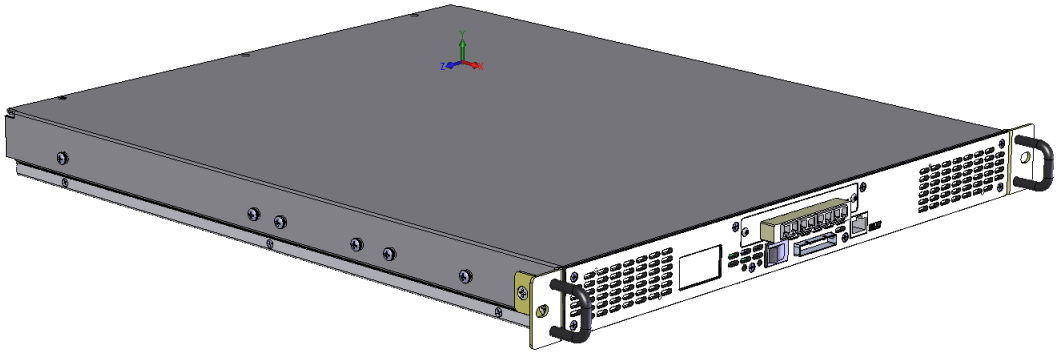
* Never touch any exposed connector pins or component leads.

* Avoid bending or twisting the board.

Planning Your Installation

The LTX3 is designed to allow rack mounting or table top operation. There are optional mounting brackets available to adapt the unit to a standard EIA equipment rack. Please contact your Conduant sales representative for more information.

All electrical connections are designed to come off the front or rear panels. The rear panel utilizes an AC power inlet module.



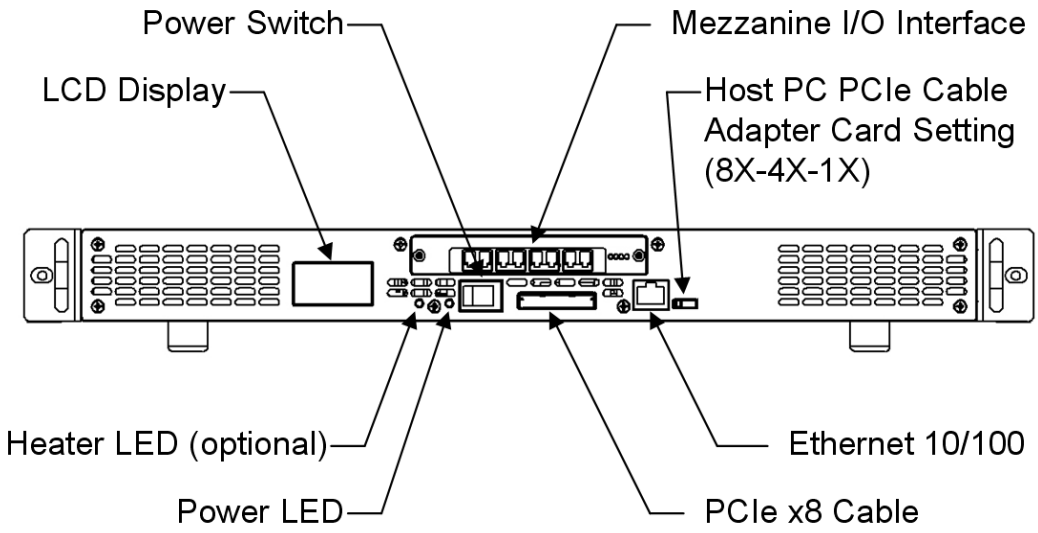
The front panel connections include a PCIe x8 Host Cable interface and an additional RJ45 connector for the Ethernet interface. The data interface connector will vary depending on the installed interface mezzanine board.

☞ **NOTE:** ***The LTX3 is not designed to have other systems stacked on top. Doing so may cause damage to the internal components. Please support these components separately.***

Basic Operation

The LTX3 Power connection is located at the rear of the chassis.. The Power Inlet Module has an "ON/OFF" Switch. When the switch is set to "ON", the Front Panel Power LED will illuminate.

The LTX3 can be connected to a host system with either the Ethernet or the PCIe Host Cable connection. When using the PCIe Host Cable connection, the LTX3 can operate identically to having a StreamStor Amazon Express board installed in the system. Either interface can be used to provide command/control to the system but data access can only be performed using the PCIe Host Cable connection.



Power LED
Green - *Steady* = System ON (OK)
Green - *Blinking* = Power Up Sequence (or Error)
Amber - *Steady* = Remote ON (Host Computer controls power up - Standby Mode)
Amber - *Blinking* = System OFF (unit has power)

PCIe Expansion Cable

The PCIe Host Cable interface on the LTX3 is used to create a PCIe expansion connection back to the host PC. It creates a bridged PCIe segment that is recognized by nearly all operating systems without any additional software or special drivers. Once connected successfully, the Big River LTX3 appears as an ordinary StreamStor device on the host PC as if it was a card plugged directly into the computer PCIe bus. A PCIe Host Cable Adapter Board can be installed in the host PC. This allows the PCIe Cabled connection between the LTX3 and the Host PC.

The PCIe Host Cable can operate as an 1X, 4X, or 8X connection. Cables are available to adapt between the Host PC and the required x8 connection at the LTX3. The 3 Position Slide switch located on the LTX3 Front Panel needs to be correctly set to match the number of PCIe Lanes being utilized by the Host PC PCIe Cable Adapter Card.

Connections

☠ **CAUTION:** ***Over-flexing the circuit board will damage the host adapter.***

1. Ensure that both the PC and the LTX3 are powered off.
2. Locate the dip switches or configuration jumpers on the PCIe Host Cable Adapter Card. Ensure that the card is configured to operate in the "8X" cable mode and configured to enable Remote Power Up (if desired).
3. Carefully insert the host card into the PC
4. Connect the PCIe cable between the Host PC and the LTX3

5. Correctly set the 3-Position Slide switch located on the LTX3 Front Panel to match the number of PCIe Lanes being utilized by the Host PC PCIe Cable Adapter Card (select 1X, 4X, or 8X).
6. Adjust the setting of the 3-Position Rocker Switch located on the LTX3 Front Panel. Select either "Standby" or "ON". Standby is used if you want the Host PC to control the LTX3 power up sequence.
7. Power ON the LTX3 (or set to "REMOTE").
8. Make sure the LTX3 Power LED is Solidly Illuminated Green (Solid Amber for Standby Mode).
9. Power ON the Host PC.

☞ **NOTE:** ***The LTX3 must be powered on BEFORE the host PC. Otherwise the host PC will NOT recognize the LTX3/StreamStor.***

Operation

Upon completion of the host PC boot process, install the SDK if it is not already installed. Windows users may be required to install a driver via the driver wizard. If so, point the driver wizard to the SDK CD and follow the prompts. Upon completion of the installation routine, run the StreamStor Config-Test utility.

Network Connectivity

The Big River LTX3 is equipped with a 10/100 Ethernet port which allows command and control of the LTX3 over a standard TCP/IP network. Note that this port is not intended or designed for data movement to/from the unit. The LTX3 can be assigned a static IP address or can be configured via DHCP. This interface is not required if a PCIe Host Cable interface is available.

Configuration

The LTX3 is configured at the factory with a static IP configuration of:

- IP address: 10.1.249.101
- Port: 10001
- Netmask: 255.255.255.0
- Gateway: 10.1.249.254

There are two alternatives for configuring the LTX3 Ethernet port. For Windows operating systems it is suggested that you use the Lantronix installation/configuration tool. For other operating systems you must use telnet as described below to configure the network settings. Once you have installed the StreamStor SDK you will find a sub-directory named "support" which contains the Lantronix Windows configuration tool and a user manual for this tool. To install this tool simply execute the program DI_Web.exe from the "support" directory. This will install the tool onto your system and allow configuration of the LTX3 network interface. See the Lantronix manual "Xport_UserGuide.pdf" in the StreamStor SDK directory "Docs" for further instructions on using this tool to configure the LTX3.

For either installation method the LTX3 must be connected to the network with a standard CAT6 cable. A direct connection to a host with a loopback cable is also

possible for configuration purposes. Note that the LTX3 must be on the same network segment (no router) to perform this configuration.

Perform the following steps to modify the LTX3's default IP address and configuration using a telnet connection:

1. Connect the LTX3's Ethernet port (via CAT6) to a standard 10/100 Ethernet hub, switch, or to a host PC via a loopback cable. Note that this configuration must be performed with the two devices on the same network segment.

2. Open a command prompt (Start->Run "cmd") and type "telnet 10.1.249.101 9999". 9999 is the special LTX3 port number for telnet configuration. This is NOT the port described above.

3. Press Enter when prompted and the main menu will appear.

4. Press 0 to enter "Server Configuration" and follow the prompts to enter a new static IP address. If DHCP configuration is desired enter 0s for the IP address and follow the prompts.

5. When finished press 9 to save and exit.

The following screen shot shows the IP address configuration being changed from the default static IP assignment to a DHCP configuration:

The following screen shot shows the static IP address being changed from the 10.1.249.92 to 10.1.249.90:

Perform the following steps to change the default IP port number:

1. Connect the LTX3's Ethernet port (via CAT6) to a standard 10/100 Ethernet hub, switch, or to a host PC via a loopback cable.

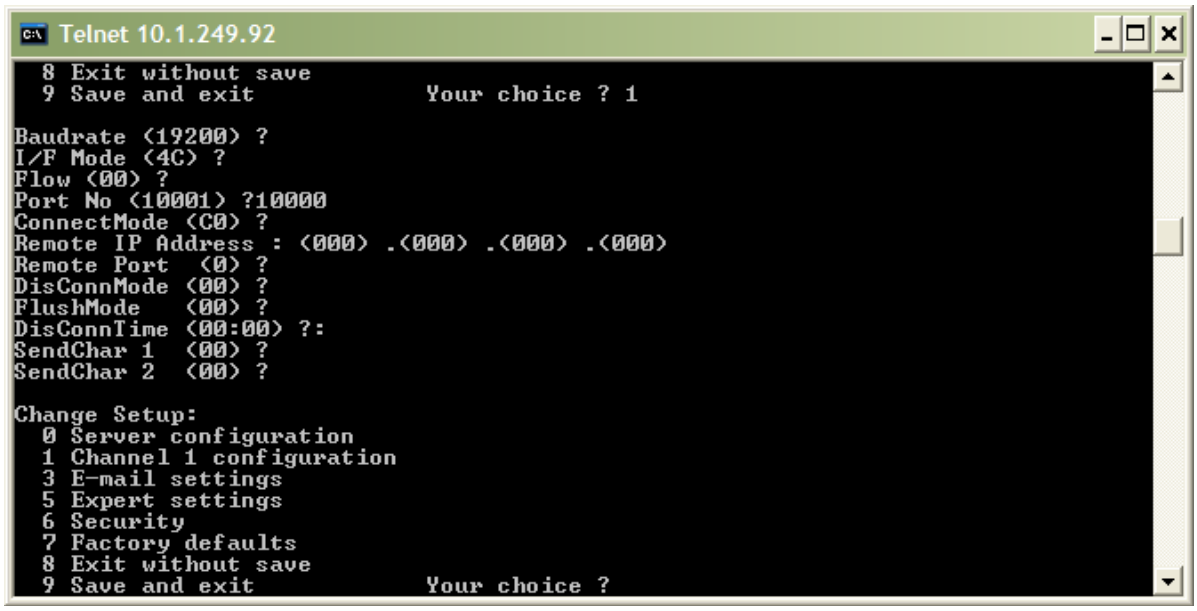
2. Open a command prompt (Start->Run "cmd") and type "telnet x.x.x.x 9999" where x.x.x.x is the default IP address (listed above). 9999 is the special LTX3 port number for telnet configuration. This is NOT the port described above.

3. Press Enter when prompted and the main menu will appear.

4. Press 1 to enter "Channel 1 configuration." At each prompt press enter to leave it blank except for the "Port No" prompt. Enter a new port number at this prompt and press enter. The following screen shot shows the port number being changed from the default 10001 to 10000.

5. When finished press 9 to save and exit.

The following screen shot shows the TCP/IP port number being changed from the default (10001) to 10000:


Telnet 10.1.249.92
8 Exit without save
9 Save and exit Your choice ? 1
Baudrate (19200) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?10000
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (0) ?
DisConnMode (00) ?
FlushMode (00) ?
DisConnTime (00:00) ?:
SendChar 1 (00) ?
SendChar 2 (00) ?
Change Setup:
0 Server configuration
1 Channel 1 configuration
3 E-mail settings
5 Expert settings
6 Security
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ?

Installing the Software

Your system was shipped with the Software Development Kit on CD-ROM. Install the software prior to installing the hardware if possible. On Windows systems, when ready, run the "`StreamStor SDK Setup X.X.exe`" program on the CD-ROM to start the installation process.

Plug and play operating systems such as Windows will detect the installation of the StreamStor board if the LTX3 is connected via PCIe Cable interface and attempt to configure the system using the hardware plug and play wizard program. The required installation information file for plug and play installation is included on the CD-ROM. Make sure the plug and play wizard includes the CD-ROM drive in its search so that the StreamStor drivers will be properly installed. You should not cancel the plug and play wizard since this can create hardware conflicts in the system when using the StreamStor controller. Note that the setup program must still be executed to install the StreamStor SDK onto your system.

The software installation procedure will install the device drivers, library files, example programs and all other components of the SDK onto your system.

The StreamStor SDK does not include software interfaces or drivers used for the control of data acquisition cards made by other manufacturers. However, it does include some sample programs to help in your software development efforts. Other drivers and examples may be available depending on your choice of data acquisition hardware. Contact Conduant support for more information.

Always review the **`readme.html`** file included with the SDK for the latest information not included in this manual. Also, check the Conduant web site periodically for additional information.

Software Functionality

The LTX3 StreamStor controller supports recording and playback (or read) from the PCIe bus or a daughter board interface.

The following API commands are supported by the LTX3 controller: Note: functions marked with an asterisk (*) are not available when using the Ethernet interface.

- XLRApiVersion
- XLRAppend
- XLRArmChannelForSync (FPDPII only)
- XLRBindInputChannel
- XLRBindOutputChannel
- XLRCardReset
- XLRClearChannels
- XLRClearOption
- XLRClearWriteProtect
- XLRClose
- XLRDeleteAppend
- XLRDeviceFind
- XLREdit
- XLREditData
- XLRErase
- XLRGetBaseAddr*
- XLRGetBaseRange*
- XLRGetDBInfo
- XLRGetDeviceInfo
- XLRGetDeviceStatus
- XLRGetDirectory
- XLRGetDriveInfo
- XLRGetDriveTemp
- XLRGetErrorMessage
- XLRGetLabel
- XLRGetLastError
- XLRGetLength
- XLRGetLengthPages
- XLRGetLengthLowHigh
- XLRGetMode
- XLRGetOption
- XLRGetPartitionInfo
- XLRGetPlayBufferStatus
- XLRGetPlayLength
- XLRGetRecordedChannelInfo
- XLRGetSample
- XLRGetSFPDPInterfaceStatus

- XLRGetSystemAddr*
- XLRGetUserDir
- XLRGetUserDirLength
- XLRGetVersion
- XLRGetWindowAddr*
- XLRGetWrapLength
- XLRNetCardReset (Ethernet interface only)
- XLRNetOpen (Ethernet interface only)
- XLROpen (non-Ethernet interface only)
- XLRPartitionCreate
- XLRPartitionDelete
- XLRPartitionResize
- XLRPartitionSelect
- XLRPlayback
- XLRPlaybackLoop
- XLRPlayTrigger
- XLRRead, XLRReadData
- XLRReadImmed
- XLRReadSmartThresholds
- XLRReadSmartValues
- XLRReadStatus
- XLRRecord
- XLRRecoverData
- XLRReset
- XLRSdkVersion
- XLRSelectChannel
- XLRSelfTest
- XLRSetDBMode
- XLRSetLabel
- XLRSetMode
- XLRSetOption
- XLRSetPlaybackLength
- XLRSetPortClock (not available for Serial FPDP daughter boards)
- XLRSetReadLimit
- XLRSetSampleMode
- XLRSetUserDir
- XLRSetWriteProtect
- XLRStop
- XLRTruncate
- XLRWrite, XLRWriteData

The LTX3 system does not currently support event capture or bank switching. See the StreamStor SDK user manual for more information.

SDK and Network Operation

Most API commands will work in an identical fashion in either Network or PCIe modes. The main exception is the open command. `XLROpen` is used when the LTX3 is connected to the host over PCIe. `XLRNetOpen` is required when the LTX3 is connected to the host PC over Ethernet/TCP/IP. More details on each command can be found in the function reference section of the StreamStor SDK Users Manual.

Daughter Boards

The LTX3 StreamStor controller includes the capability to add a daughter board (mezzanine) with its own connectors and electronics to provide an alternate method of transferring data into and out of StreamStor. These additional paths offer several advantages, including:

- freedom from interaction with other devices on an arbitrated bus such as PCIe;
- the reduction or elimination of bus FIFO's that may otherwise be required to interface with an arbitrated bus;
- full isolation of the data path from operating system and computer hardware facilitates predictable and repeatable behavior;
- better or additional control over timing and other parameters;
- higher bus utilization efficiency due to a non-arbitrated nature;
- access to interface signals without risk of crashing host computer;
- potential for dual-port operation (simultaneous transfers on both PCIe bus and external ports) while recording or playing back.

If an optional daughter board is ordered with your LTX3 board it will come completely installed and ready to use. The `XLRSetDBMode` function in the API is used to program the behavior of the daughter boards and the modes and options are unique to the specific type of daughter board installed. Please refer to the programming manual provided for your specific daughter board. These documents use the naming convention "DB_xxxxx.pdf" where "xxxxx" is the interface type implemented by the daughter board (e.g. DB_FPDP2.pdf) and are also available on the CD delivered with your system.

Safety Symbols and Warnings

Safety Symbols

This section provides a description of the safety marking symbols that appear on the LTX3 chassis. These symbols provide information about potentially dangerous situations.

 Located on the chassis, this symbol means "Caution Risk of Danger." Refer to the Manual for more information.

 Located inside the chassis, this symbol means "Protective Ground."

 Located in the electrical ratings, this symbol means "Alternating Current."

Safety Warnings

Warnings

 ***Caution***

Protection is impaired if the unit is not used within the guidelines of this manual.

 ***Caution***

Do not use the front handles for moving the unit. It's recommended that two people move the unit by placing both hands under both sides of the unit. The handles are not designed to carry the full weight of the unit.

 ***Caution***

The Remote/Off/On switch is a cycling type switch. The switch does not fully isolate or disconnect the power supplies from the unit when in the "standby or off" mode. AC line voltage is still present in the power supply.

 ***Caution***

Do not block the rear of the unit or the position the LTX3 in such a way as to block access to the on/off switch on the rear of the unit where the power cord enters the back.

Warnings (continued)

Caution

The unit can be turned on, unexpectedly, by remote control.

Caution

When replacing the fuse only use the same type, an approved fuse with a rating of 250V ~ , 5A.

Caution

Disconnect Power Cord before removing Chassis Cover and servicing the unit.

Cleaning Instructions

The unit should only be cleaned with a damp cloth, using water - no cleaning solutions should be used.

Rack Mount Precautions

If rack mounting the chassis, read and follow the instructions from the rack manufacturer.

If slide rails are to be used with the chassis, read and follow the instructions from the slide rail manufacturer.

CE Mark Declaration of Conformity

CE Declaration of Conformity

(Manufacturer)	Conduant Corporation
(Address)	1501 South Sunset Street, Suite C
	Longmont, CO 80501 USA

declares that the product:

High Speed Data Acquisition Unit, 1U, model LTX3, cord connected, tabletop type or instrument rack mounting, electrical supply input rated 100-240V ~ 50-60 Hz 2.2A.

conforms to the following Directives:

1. Low Voltage Directive 2006/95/EC
2. Electromagnetic Compatibility Directive 2004/108/EC

using the following primary standards:

EN 60950-1 2nd Edition	: Safety of Electrical Equipment for Information Technology Equipment
EN 55024: 2010	: Immunity Standard for Information Technology Equipment
EMC Requirements:	
EN 55022: 2006 +A1:2007	: Radiated and Conducted Emissions - Class A
EN 61000-4-2	: Electrostatic Discharge
EN 61000-4-3	: Radiated RF Immunity
EN 61000-4-4	: Electrical Fast Transients/Burst
EN 61000-4-5	: Surge Immunity
EN 61000-4-6	: Conducted RF Immunity
EN 61000-4-8	: Power Frequency H Field Immunity
EN 61000-4-11	: Voltage Dips, Interruptions
EN 61000-3-2	: AC Harmonic Emissions
EN 61000-3-3	: AC Short and Long Term Flicker

and complies with the relevant Essential Health and Safety Requirements.

I, undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards and is therefore eligible to carry the CE Marking.

Ken Owens	President/CEO	Ken Owens
(Name)	(Position)	(Signature)

Longmont, Colorado — September 14, 2011 (Date)

Technical Support

Conduant wants to be sure that your LTX3 StreamStor system works correctly and stays working correctly. In the event, however, that you are unable to get your new system to work properly, or if a working system ceases to function, we will do all that we can to get your system back online.

Solving the problem is largely a matter of data collection and steps that must be taken one at a time. In order for us to better serve you, we ask that you take the time to perform the following steps prior to calling us. This way, you can provide us with the most meaningful information possible that will help us solve the problem.

Is the problem one that obviously requires replacement parts due to physical damage to the system? If yes, then please gather the information described below and report the problem to tech support, by phone or through the Conduant web site.

Have you confirmed that no cabling has been inadvertently disconnected or damaged while working around the equipment?

Do all the systems have good power connections and voltages?

Does the confidence test sscfg.exe run OK?

Has the software installation been corrupted? Try re-installing software.

Have you checked the Conduant web site for technical bulletins?

Have you recently installed a new compiler or a new Windows Service Pack?

If the above steps did not resolve the problem, then please initiate a trouble ticket on the support section of the Conduant website at www.conduant.com. Please provide as much information about your system and the problem as possible. We will do all that we can to resolve the problem as quickly as possible.

Contacting Technical Support

E-mail: support@conduant.com

Web: www.conduant.com

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Technical Support
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