QuickScan LT
Industrial In-Line NDT Inspection System
User's Manual

DMTA061-01EN — Rev. G
September 2022

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.
Keep this instruction manual in a safe, accessible location.

EVIDENT CANADA, 3415, Rue Pierre-Ardouin, Québec (QC) G1P 0B3 Canada

This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

Part number: DMTA061-01EN
Rev. G
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List of Abbreviations

A/D	analog to digital
DC	direct current
EFUP	environment-friendly use period
I/O	input/output
IP	International (ingress) Protection
LAN	local area network
LED	light-emitting diode
N/A	not applicable
PA	phased array
PC	personal computer
PIM	probe interface module
PLC	programmable logic controller
PRF	pulse rate frequency
QSLT	QuickScan LT
RPC	remote procedure call
UT	ultrasonic testing

Important Information — Please Read Before Use

Intended Use

The QuickScan LT is designed to perform nondestructive inspections on industrial and commercial materials.

WARNING

Do not use the QuickScan LT for any purpose other than its intended use. It must never be used to inspect or examine human or animal body parts.

Instruction Manual

This instruction manual contains essential information on how to use this product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

IMPORTANT

Some of the details of components illustrated in this manual may differ from the components installed on your device. However, the operating principles remain the same.

Device Compatibility

Only use this device with the approved ancillary equipment provided by Evident. Equipment provided by Evident and approved for use with this device is described later in this manual.

CAUTION

Always use equipment and accessories that meet Evident specifications. Using incompatible equipment could cause equipment malfunction and/or damage, or human injury.

Repair and Modification

This device does not contain any user-serviceable parts. Opening the device might void the warranty.

CAUTION

In order to prevent human injury and/or equipment damage, do not disassemble, modify, or attempt to repair the device.

Safety Symbols

The following safety symbols might appear on the device and in the instruction manual:

General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.

 High voltage warning symbol

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the device:

 **DANGER**

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, will result in death or serious personal injury. Do not proceed beyond a DANGER signal word until the indicated conditions are fully understood and met.

 **WARNING**

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in death or serious personal injury. Do not proceed beyond a WARNING signal word until the indicated conditions are fully understood and met.

 **CAUTION**

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following note signal words could appear in the documentation of the device:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides important information, or information essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or provides hints on how to effectively use the capabilities of the product.

Safety

Before turning on the device, verify that the correct safety precautions have been taken (see the following warnings). In addition, note the external markings on the device, which are described under “Safety Symbols.”

Warnings

WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the device.
- Keep this instruction manual in a safe place for further reference.

- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the device and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.
- Do not install substitute parts or perform any unauthorized modification to the device.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the device unless qualified to do so. For any problem or question regarding this device, contact Evident or an authorized Evident representative.
- Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
- Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.

WARNING

Electrical Warning

The device must only be connected to a power source corresponding to the type indicated on the rating label.

CAUTION

If a non-approved power supply cord not dedicated to Evident products is used, Evident will not be able to ensure the electrical safety of the equipment.

Battery Precautions

CAUTION

- Before disposing of a battery, check your local laws, rules, and regulations, and follow them accordingly.

- Transportation of lithium-ion batteries is regulated by the United Nations under the United Nations Recommendations on the Transport of Dangerous Goods. It is expected that governments, intergovernmental organizations, and other international organizations shall conform to the principles laid down in these regulations, thus contributing to worldwide harmonization in this field. These international organizations include the International Civil Aviation organization (ICAO), the International Air Transport Association (IATA), the International Maritime Organization (IMO), the US Department of Transportation (USDOT), Transport Canada (TC), and others. Please contact the transporter and confirm current regulations before transportation of lithium-ion batteries.
- For California (USA) only:

  The device may contain a CR battery. The CR battery contains perchlorate material, and special handling may be required. Refer to http://www.dtsc.ca.gov/hazardouswaste/perchlorate.
- Do not open, crush, or perforate batteries; doing so could cause injury.
- Do not incinerate batteries. Keep batteries away from fire and other sources of extreme heat. Exposing batteries to extreme heat (over 80 °C) could result in an explosion or personal injury.
- Do not drop, hit, or otherwise abuse a battery, as doing so could expose the cell contents, which are corrosive and explosive.
- Do not short-circuit the battery terminals. A short circuit could cause injury and severe damage to a battery making it unusable.
- Do not expose a battery to moisture or rain; doing so could cause an electric shock.
- Only use an external charger approved by Evident to charge the batteries.
- Only use batteries supplied by Evident.
- Do not store batteries that have less than 40 % remaining charge. Recharge batteries to between 40 % and 80 % capacity before storing them.
- During storage, keep the battery charge between 40 % and 80 %.
- Do not leave batteries in the QuickScan LT unit during device storage.

Regulations for Shipping Products with Lithium-Ion Batteries

IMPORTANT

When shipping a Li-ion battery or batteries, be sure to follow all local transportation regulations.

WARNING

Damaged batteries cannot be shipped through normal routes — DO NOT ship damaged batteries to Evident. Contact your local Evident representative or material disposal professionals.

Equipment Disposal

Before disposing of the QuickScan LT, check your local laws, rules, and regulations, and follow them accordingly.

BC (Battery Charger - California, USA Community)

The BC marking indicates that this product has been tested and complies with the Appliance Efficiency Regulations as stated in the California Code of Regulations Title 20, Sections 1601 through 1608 for Battery Charger Systems. The internal battery charger within this device has been tested and certified pursuant to the California Energy Commission's (CEC) requirements; this device is listed on the online CEC's (T20) database.

CE (European Community)

This device complies with the requirements of directive 2014/30/EU concerning electromagnetic compatibility, directive 2014/35/EU concerning low voltage, and directive 2015/863 which amends 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking is a declaration that this product conforms to all the applicable directives of the European Community.

UKCA (United Kingdom)

This device complies with the requirements of the Electromagnetic Compatibility Regulations 2016, the Electrical Equipment (Safety) Regulations 2016, and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. The UKCA marking indicates compliance with the above regulations.

RCM (Australia)

The regulatory compliance mark (RCM) label indicates that the product complies with all applicable standards, and has been registered with the Australian Communications and Media Authority (ACMA) for placement on the Australian market.

WEEE Directive

In accordance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to your local Evident distributor for return and/or collection systems available in your country.

China RoHS

China RoHS is the term used by industry generally to describe legislation implemented by the Ministry of Information Industry (MII) in the People's Republic of China for the control of pollution by electronic information products (EIP).

The China RoHS mark indicates the product's Environment-Friendly Use Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for the QuickScan LT has been determined to be 15 years.

Note: The Environment-Friendly Use Period (EFUP) is not meant to be interpreted as the period assuring functionality and product performance.

电器电子产品有害物质限制使用标志

本标志是根据“电器电子产品有害物质限制使用管理办法”以及“电子电气产品有害物质限制使用标识要求”的规定，适用于在中国销售的电器电子产品上的电器电子产品有害物质使用限制标志。

（注意）电器电子产品有害物质限制使用标志内的数字为在正常的使用条件下有害物质等不泄漏的期限，不是保证产品功能性能的期间。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(Ⅵ))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主体	机构部件	×	○	○	○	○	○
	光学部件	×	○	○	○	○	○
	电气部件	×	○	○	○	○	○

产品中有害物质的名称及含量

部件名称	有害物质					
	铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(Ⅵ))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
附件	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 规定的限量要求以下。

×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。

Korea Communications Commission (KCC)

Seller and user shall be noticed that this equipment is suitable for electromagnetic equipment for office work (class A) and it can be used outside the home. This device complies with the EMC requirements of Korea.

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다 .

EMC Directive Compliance

This equipment generates and uses radio-frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions), may cause interference. The QuickScan LT has been tested and found to comply with the limits for an industrial device in accordance with the specifications of the EMC directive.

FCC (USA) Compliance

NOTE

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

IMPORTANT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

FCC Supplier's Declaration of Conformity

Hereby declares that the product,

Product name: QuickScan LT
Model: QuickScan LT-MR/QuickScan LT-CW

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109.

Supplementary information:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible party name:

EVIDENT CANADA

Address:

3415, Rue Pierre-Ardouin, Québec (QC) G1P 0B3 Canada

Phone number:

+1 781-419-3900

ICES-001 (Canada) Compliance

This Class A digital apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001 du Canada.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at https://www.olympus-ims.com/en/terms/.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.

Introduction

This manual describes the QuickScan LT from the QuickScan family of products, which represents a new generation of industrial instruments for multielement probes developed by Evident. The QuickScan LT product applies the phased array technology, using ultrasound electronic focusing and scanning.

The QuickScan LT is designed for ultrasonic testing as a part of an industrial in-line system. In such a high production environment, the challenge is to perform reliable ultrasonic inspections without slowing down the manufacturing process. To face this challenge, several QuickScan LT units can be used in parallel to increase the productivity. Many QuickScan LT features are designed to facilitate the integration of this technology into an industrial in-line system. The QuickScan LT improves over the earlier technology, the QuickScan PA Dual, with the following enhancements:

- The QuickScan LT casing is sealed, designed to withstand severe environmental conditions.
- The QuickScan LT is lighter (about half the weight of the QuickScan PA Dual).
- The QuickScan LT is smaller (half the volume of the QuickScan PA Dual).
- The input/output signals managed by one QuickScan LT unit can be replicated to the next QuickScan LT unit.
- The QuickScan LT PIM (probe interface module) contains 256 elements. Each aperture can access any single element of the PIM.
- One QuickScan LT unit can be linked to another one to fire four apertures in parallel on the same probe. A common 4-aperture cable is the only requirement.

The successor of the QuickScan PA Dual, the QuickScan LT (QSLT), comes in two different configurations:

- QSLT 32:256: this model offers the possibility of firing two apertures in parallel (limited to 16 elements per aperture), or one aperture of 32 elements. The apertures can access any of the PIM's 256 elements, but not simultaneously.
- QSLT 16:256: this model can fire one aperture of up to 16 elements. The aperture can access any of the PIM's 256 elements.

This manual is organized to help users understand and safely use the instrument, and includes topics such as panel buttons, connections, computer compatibility, operation, and troubleshooting.

IMPORTANT

This unit has been licensed for Windows Compact 2013 and then downgraded back to Windows CE 5 for application compatibility.

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1. QuickScan LT Overview

The first part of this chapter describes the integration of the QuickScan LT system as a part of a production line and gives an overview of the main components' functions.

The second part describes the controls and connectors of the QuickScan LT instrument itself.

1.1 QuickScan LT System — Operation Overview

This section describes the basic operation of the QuickScan LT (QSLT). In a typical installation, several QSLTs are controlled by one computer—the workstation. This workstation manages the configuration of the QSLTs, controls the acquisition process, and analyzes the ultrasonic data collected by the QSLT units (see Figure 1-1 on page 25).

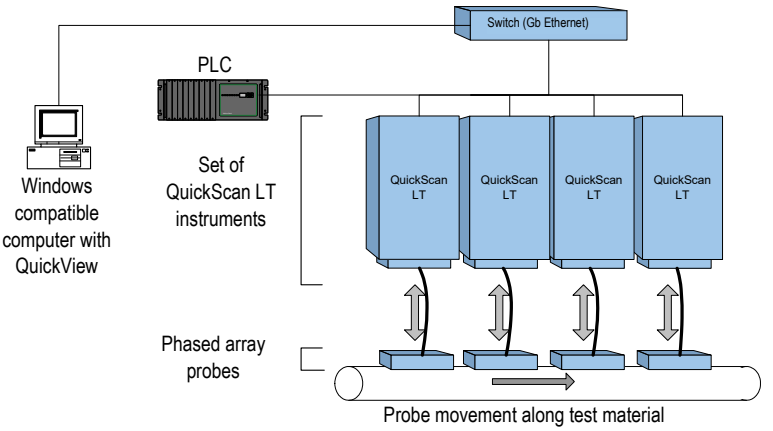


Figure 1-1 QSLT — Typical installation using daisy-chained QuickScan LT units

1.1.1 QuickScan LT Unit

The QuickScan LT unit is an ultrasonic acquisition instrument designed for bidirectional communication with a workstation through an Ethernet link.

Each QSLT runs a RPC (remote procedure call) server. This RPC server controls the unit and manages its configuration. The data acquired by the QSLT unit is then sent to the QuickView software by socket over the Ethernet network.

1.1.2 Workstation

The workstation is a computer connected to an Ethernet network. It performs bidirectional communication with one or more acquisition units.

The workstation is a standard PC computer that functions with Microsoft Windows. The QuickView software (version 3.0 or higher) allows the workstation to communicate with the acquisition units. The workstation performs the following functions:

- Hosts the Bootp server.
- Hosts the QuickView software.
- Hosts the QuickScan LT configuration file.

QuickView software performs the following functions:

- Controls the acquisition and receives data from multiple QSLTs through an Ethernet link.
- Processes and displays UT data generated by the multiple acquisition units.

NOTE

For a more detailed description of the installation and the use of the acquisition software regarding the QuickScan LT system, refer to the QuickView manuals.

1.1.3 Ethernet Link

The QuickScan LT has no internal hard drive, therefore, the unit must be linked to a workstation through a 100Base-T Ethernet network (see “Network Ethernet Connector” on page 47).

Before turning on the QSLTs, the workstation must have first loaded the Bootp server software and all the setup files required for a proper functioning. When booted, the QSLT is accessed through an RPC server.

The RPC server allows the workstation to configure the hardware, control the acquisition process, communicate the acquisition-unit status, etc.

1.2 QuickScan LT — Controls and Connectors Descriptions

This section briefly describes the QuickScan LT's controls and connectors. For a more technical description of the connectors, see "Connectors Reference" on page 45.

1.2.1 QuickScan LT — Front Panel

The QuickScan LT front panel regroups the following elements (see Figure 1-2 on page 27):

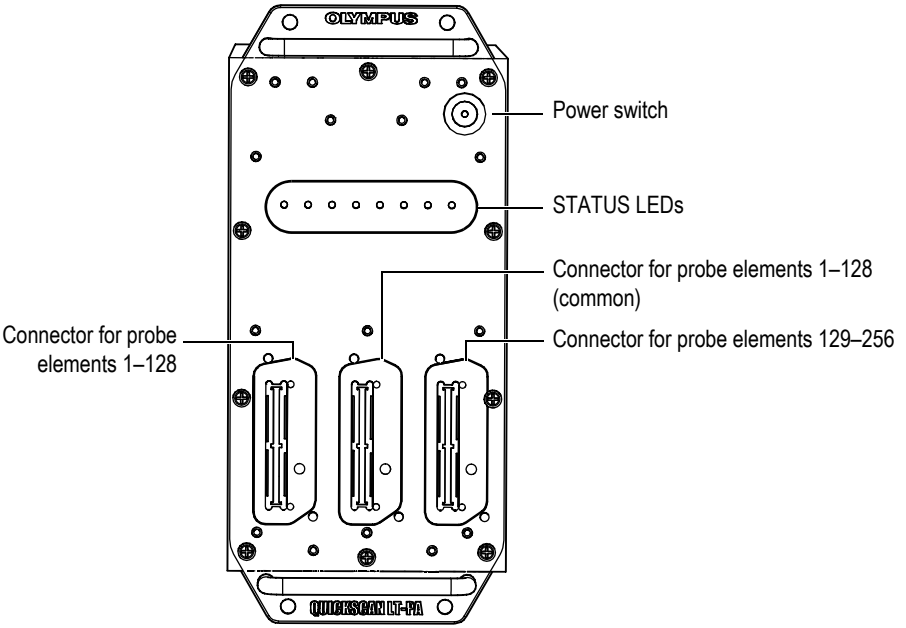


Figure 1-2 QSLT — Front panel

Power switch

Use this switch to turn on or off the QuickScan LT unit. When the unit is turned on, the switch LED lights green.

An auto power-on function is available and disabled by default. With this option, the QuickScan LT is automatically turned on when power is received by the DC input. The power button can still be used to turn the unit off, and back on, when the auto power-on option is active (see "Auto-Boot on DC Power" on page 38).

Status LEDs

These LEDs inform the operator of the operating state of the QuickScan LT unit (see "Troubleshooting a QuickScan LT Unit" on page 41).

Connector for phased array probe elements 1–128

The P1–128 phased array connector is used to connect a phased array probe with up to 128 elements (see "Connecting Probes" on page 34).

Connector for probe elements 1–128 (common)

The P1–128 COMMON phased array connector is used to link two QuickScan LT together to fire four apertures on the same probe (see "Connecting Probes" on page 34).

Connector for probe elements 129–256

The P129–256 phased array connector is used to connect either a second 128-element PA probe, or the last 128 elements (129–256) of a 256-element PA probe (see "Connecting Probes" on page 34).

1.2.2 QuickScan LT — Back Panel

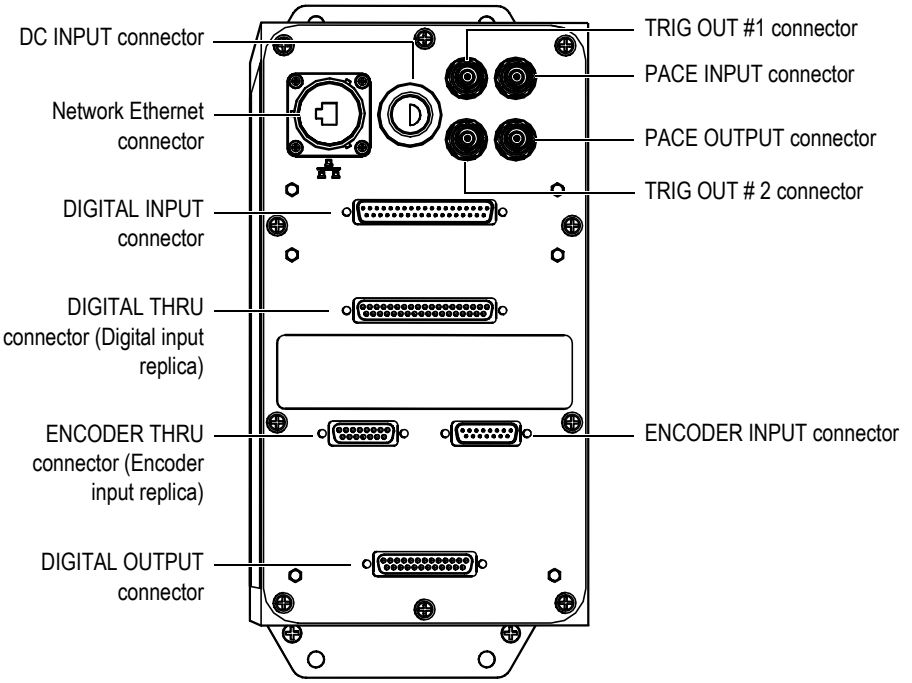


Figure 1-3 QSLT — Back panel

The back panel of the QuickScan LT contains the following connectors:

DC INPUT connector

This connector receive the DC-power cable. The QuickScan LT needs a minimum of 16 V to work properly. The power cable length must be less than 5 meters for optimal results.

TRIG OUT #1 connector

The trig out signal is generated at the beginning of each focal law. TRIG OUT #1 is for acquisition board #1 (or aperture #1). Usually, the trig out signal is used for calibration and diagnostics. The signal is disabled by default, it can be enabled in the QuickView software (refer to the QuickView Software *User's Manual*).

PACE INPUT connector

The pace input connector is used when the QuickScan LT is a part of a daisy-chained network (see “Synchronization Connectors” on page 60).

PACE OUTPUT connector

The PACE OUTPUT connector outputs the PACE signal. The PACE signal is generated at the beginning of each acquisition cycle. PACE OUTPUT is generally used when the QuickScan LT is a part of a daisy-chained network (see “Synchronization Connectors” on page 60).

TRIG OUT #2 connector

The trig out signal is generated at the beginning of each focal law. TRIG OUT #2 is for acquisition board #2 (or aperture #2). Usually, the trig out signal is used for calibration and diagnostics. The signal is disabled by default, it can be enabled in the QuickView software (refer to the QuickView Software *User's Manual*).

DIGITAL INPUT connector

This connector receives the input from the electrical panel. It contains 28 configurable pins. Here is the list of configurable input functions (see “DIGITAL INPUT Connector” on page 54 for default pinout):

- Enable firing
- Rotation synchronization
- Preset encoder 1 or 2
- Acquisition enable
- Enable alarm 1, 2, or 3
- Enable encoders
- General input

ENCODER INPUT connector

This connector receives the signals from up to two encoders. The input signals are replicated towards the encoder thru connector for daisy chaining.

DIGITAL OUTPUT connector

The DIGITAL OUTPUT connector offers 16 configurable pins used for hardware or software alarms. This connection is not shared through daisy chaining.

ENCODER THRU connector

This connector replicates the buffered signals received through the ENCODER INPUT connector. Given that the same encoders are often used on several units, the encoder's signal is replicated from one QSLT to another. The only requirement is a simple standard cable to link the QSLTs.

DIGITAL THRU connector

This connector replicates the buffered signals received from the DIGITAL INPUT connector. Given that the input signals are often used by several QSLTs, the digital input signals are replicated from one QSLT to another. The only requirement is a simple standard cable to link the QSLTs. Furthermore, given that up to 28 distinct signals can be grouped together on a standard cable, pins can be reserved specifically for the signals belonging to each single QSLT in the system. The DIGITAL THRU connector—as well as the ENCODER THRU connector—simplifies multiple units integration and reduces the number of cables required to connect the components of the system.

LAN Ethernet connector

This connector provides the connection to the LAN. This connector is IP67 rated and the Ingress Protection is effective only when this connector is mated with its male IP67 rated counterpart. When the IP rating is not mandatory, a standard RJ-45 network cable can be used.

2. System Installation

This chapter explains the connections required to operate the QuickScan LT. The connection method depends on whether your system is configured with an individual QuickScan LT instrument, or daisy-chained instruments.

The following sections describe in detail how to connect the QuickScan LT to phased array probes, and to a Microsoft Windows compatible computer.

2.1 Connecting the QuickScan LT

This section explains how to connect the cables and the peripherals to the QuickScan LT.

CAUTION

Evident recommends that you follow these connection instructions to prevent risk of electric shock.

To connect the QuickScan LT

1. Ensure that the QuickScan LT is turned off.
2. Except for the DC INPUT cable, connect all the other components: probes, computer, LAN, and all required peripherals.
3. Finally, connect the DC INPUT cable.
4. Press the power switch.
5. The QuickScan LT is now operational.

CAUTION

Before connecting or disconnecting a cable, make sure that the instrument is turned off. Failure to do so can damage the modules.

2.2 Connecting Probes

Three connectors are provided to connect the probes. They are located on the front panel (see Figure 2-1 on page 36). Depending on the type of installation, these connectors are used in different ways.

2.2.1 Probe Connectors

P1—>P128

This connector controls up to 128 ultrasonic elements. This is the total number of elements in a 128-element PA probe, or half of a 256-element PA probe. On a single QuickScan LT acquisition unit setup, this connector is always in use.

P1—>128 common

This connector is a replica of the P1—>128 connector. This connector provides a way to connect one QSLT unit to another, while maintaining the possibility for a QSLT to access every single ultrasonic probe element, being connected to one QSLT unit or to the other. However, one element cannot be accessed simultaneously by the two acquisition units.

P129—>256

This connector controls up to 128 ultrasonic elements. That is to say, one 128-element probe, or the other half of a 256-element probe.

2.2.2 Connecting the Probes

One of the three PA connectors, the P1—> 128 (COMMON), is used only when a 4-aperture setup is required (see “Connections for Four Apertures in Parallel with a 256-Element Phased Array Probe” on page 36). Otherwise, the other two connectors are used either with one or two 128-element PA probes, or with the two halves of a 256-element PA probes.

To connect a phased array probe to the QuickScan LT

1. When required, remove the protective cover of the PA probe connector.
2. Align the pins of the phased array connector with the receiving holes on the receptacle.
3. Push the connector into the receptacle to ensure a good connection.
4. Screw in the two captive screws on the connector.

NOTE

Evident has developed a latched type of PA connector. The latched PA connector is quicker and easier to connect and disconnect than a PA connector that is secured using screws. If your QuickScan LT unit is delivered with a latched PA connector, or if you bought new probes using a latched PA connector, see “Latched Phased Array Connector” on page 73.

CAUTION

The probes can be damaged if fired without a couplant for a long time. If the probes are not in use, turn off the acquisition software and the instrument.

Figure 2-1 QSLT — Front panel PA-probe connectors

2.2.3 Connections for Four Apertures in Parallel with a 256-Element Phased Array Probe

One of the most important features of the new QuickScan LT technology is that, with two QuickScan LT units, it is possible to fire four apertures on a single 256-element phased array (PA) probe. This setup requires the 32:256 QSLT model, and two 4-aperture cables.

A 256-element PA probe has two cables; each cable can access up to 128 of the 256 elements.

Requirements:

- Two QuickScan LT 32:256 units
- Two 4-aperture cables
- A 256-element PA probe with two cables

To set up a four-aperture connection

1. QSLT A: connect the first PA probe cable to the P1—>128 connector.

2. QSLT B: connect the second PA probe cable to the P1—>128 connector.
3. Using a first 4-aperture cable[1], link the P1—>P128 COMMON connector on the QSLT A to the P129—>P256 connector on the QSLT B.
4. Using a second 4-aperture cable[1], link the P1—>P128 COMMON connector on the QSLT B to the P129—>P256 connector on the QSLT A (see Figure 2-2 on page 37).

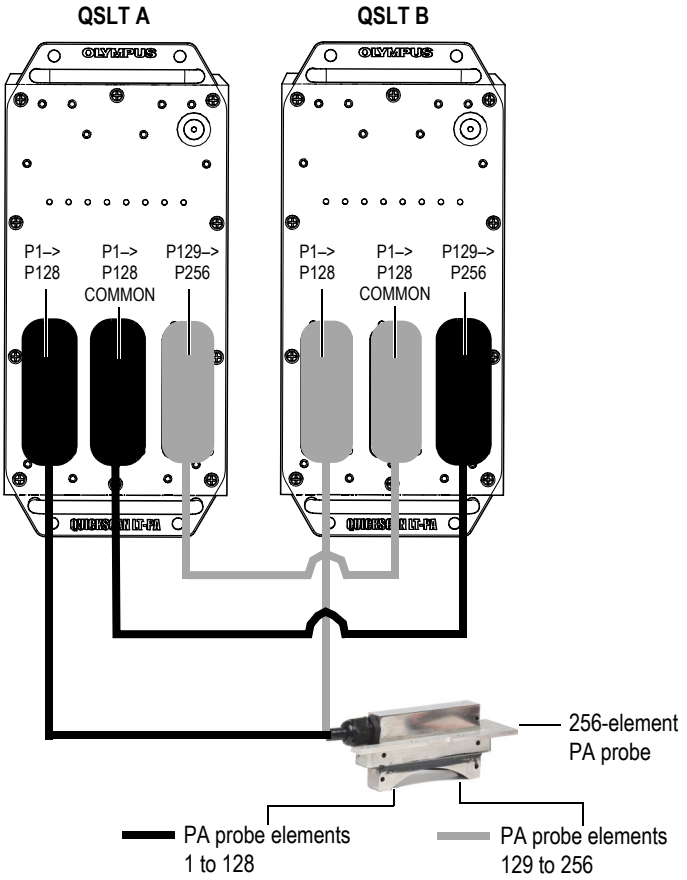


Figure 2-2 QSLT — four apertures in parallel — one PA probe

1. Evident part number: EWIX0813A

2.3 Connecting to an Ethernet Network

The QSLT has no internal hard drive; therefore, the unit must be linked to a workstation through a 100Base-T Ethernet network (see "Network Ethernet Connector" on page 47).

Before turning on the QSLTs, the workstation must have first loaded the Bootp server software and all the setup files required for a proper functioning. When booted, the QSLT is accessed through an RPC (remote procedure call) server.

2.4 Auto-Boot on DC Power

The QuickScan LT can auto-boot using the DC power feature. Use this feature to remotely power up a QuickScan LT unit. When this feature is enabled, you do not need to press the on/off switch (⏻) to start the QuickScan LT. The QSLT starts automatically when you supply DC power to the power entry module (back panel). The auto-boot on DC power feature is disabled by default.

To toggle the state of the auto-boot on DC power mode

1. Power off the QuickScan LT unit and disconnect the DC power cord.
2. Press and hold the on/off switch (⏻).
3. Connect the DC power cord to the power entry module (back panel).
4. Release the on/off switch (⏻) when the STBY indicator lights green.
5. To toggle the state of the auto-boot mode, repeat steps 1 to 4.

3. Maintenance and Troubleshooting

By following basic maintenance procedures, you can keep the QuickScan LT instrument in good physical and working condition. Thanks to its heavy-duty design, the QuickScan LT requires only minimal maintenance.

3.1 Preventive Maintenance

As the QuickScan LT has no moving parts, no fan, and no fuse, it does not require preventive maintenance. Only a regular inspection of the instrument is recommended to ensure that the QuickScan LT has an adequate grounding, and that the instrument is properly ventilated.

3.1.1 Heat and Ventilation

The best configuration to suit the QuickScan LT design should follow the points listed below:

- There should be no heat source close to the QuickScan LT unit.
- The unit must be installed in an upright position (see Figure 3-1 on page 40).
- A steady upward air draft should circulate over the heat sink to help dissipate the heat (see Figure 3-1 on page 40). Use ventilation when necessary.

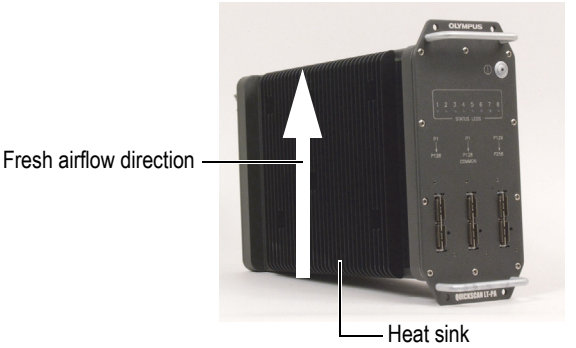
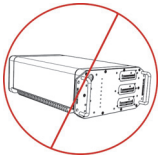


Figure 3-1 QSLT — Heat sink location and air circulation

CAUTION



Avoid placing a QuickScan LT unit flat on its heat-sink side. This situation limits the air circulation and can alter the heat sink finish. Also, avoid placing the unit in a position where the connectors and cables are subject to unnecessary force, cable pinching, or cable twisting.

3.1.2 Cleaning the Instrument

Depending on the production environment, dust, oil, or other airborne chemical pollutants can accumulate on the instrument, in particular on the heat sink. Use a nylon brush with an industrial detergent to clean off any contaminants. Then, wipe the instrument with a damp cloth.

3.1.3 Environmental Resistance

QuickScan LT is designed to withstand severe environmental conditions (for example, dust or splashing water), as long as the following conditions are met:

- All unused connectors are closed off with a protective cap.

- The used connectors are linked together with their respective IP-rated counterparts (mating connectors and cables).
- No high-pressure water stream is used to clean or rinse the unit.

3.2 Troubleshooting a QuickScan LT Unit

There is a set of eight LEDs at the front of a QuickScan LT unit. The purpose of these LEDs is to inform you about the state of the instrument, and to help you with troubleshooting.

Each LED can show three different colors—red, green, or yellow—and three different states—steady, blinking, and off.

NOTE

At the time of writing of this manual revision, LEDs #6 and #7 are reserved for future use. Therefore, these LEDs are always off.

The active LEDs, in combination with the QuickView software, allow effective diagnostics.

Refer to the following tables for the meaning of the LEDs statuses.

Table 1 QSLT — LED 1 — Ready LED

Color	State	Description	Duration	Corrective action
Green	**Steady**	Boot completed, ready for QuickView to connect.	N/A	N/A
	Blinking	Unit is booting.	< 2 min	When bootup takes more than 2 minutes, verify network or bootp configuration.
Red	**Steady**	Error at bootup. Unit temperature is above 70 °C.	3 s, then the unit shuts down	Let the unit cool down before trying to restart it.

Table 2 QSLT — LED 2 — DC INPUT voltage monitoring

Color	State	Description	Duration	Corrective action
Green	**Steady**	Input voltage is within normal range.	N/A	N/A
Red	**Steady**	Input voltage out of range (<15 V or >25 V). The unit does not boot at all.	N/A	Verify the DC source, and if the DC source is within range (15 V to 25 V), contact Evident.

Table 3 QSLT — LED 3 — On board voltage

Color	State	Description	Duration	Corrective action
Green	**Steady**	On-board voltage is within normal range.	N/A	N/A
Red	**Steady**	Voltage out of range (±5 %). One or more voltages in the unit are out of range.	N/A	If this LED turns red, contact Evident.

Table 4 QSLT — LED 4 — Temperature check

Color	State	Description	Duration	Corrective action
Green	**Steady**	Inside temperature of the unit is within range.	N/A	N/A
Red	**Blinking**	Inside unit temperature is above 70 °C. When this happens during normal operation, the system shuts down automatically[a].	30 s, then the unit shuts down	Let the unit cool down before trying to restart it.

a. In QuickView, the maximum temperature inside the QSLT unit is displayed.

Table 5 QSLT — LED 5 — Protection against overcurrent

Color	State	Description	Duration	Corrective action
Green	**Steady**	No overcurrent detected in the unit	N/A	N/A
Red	**Steady**	Overcurrent detected. The setup requires too much current.	N/A	Stop acquisition. Wait 10 seconds. Change parameters to reduce required current[a].
				If this LED remains red after these verifications, this could means that a pulser is broken. Do a calibration procedure to verify all pulsers. If a pulser fails, contact Evident.

a. Possible parameters to change: decrease PRF; decrease voltage; decrease acquisition range; decrease pulse width. Some probes also have a lower impedance, thus requiring more current.

Table 6 QSLT — LED 8 — PIM protection status

Color	State	Description	Duration	Corrective action
Off	**Steady**	Unit working properly; no sharing.	N/A	N/A
Green	**Steady**	Unit working properly; link cable connected.	N/A	N/A
Yellow	**Steady**	Acquisition is stopped because a link cable is not connected properly (Link Fault).	N/A	Verify the link cable connection; disconnect it or replace it and update a parameter via QuickView[a].
Red	**Steady**	Acquisition is stopped because of a connection change or error (Link Fault).	N/A	Ensure that probe connections are correct, then update a parameter via QuickView[a]. If it doesn't return to a valid state, contact Evident.

a. You can update parameters by loading a setup or changing parameters on that QSLT; for example the gain, gate, acquisition rate, etc.

4. Connectors Reference

This chapter provides a technical description of all the connectors mentioned in the manual. They are presented according to the number of pins, from smallest to largest.

For each connector, you find the following information: a brief description; the manufacturer number; the number of the corresponding cable connector; an illustration; a table giving the signal pinout for the connector. The QuickScan LT includes the following connectors:

- DC INPUT
- Network Ethernet
- ENCODER INPUT
- ENCODER THRU
- DIGITAL INPUT
- DIGITAL THRU
- DIGITAL OUTPUT
- Synchronization

4.1 DC INPUT Connector

The DC INPUT connector is a sealed, circular LEMO hermaphroditic IP 68-rated connector.

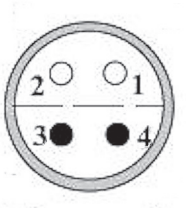


Figure 4-1 QSLT — DC INPUT connector

Label

DC INPUT ⎓ 24V MAX 3A

Description

4-way, circular, sealed hermaphroditic connector, IP 68 rated

Connector manufacturer and part number

LEMO, HGP.2E.304.CLLPV
Evident, 21AB5385

Suggested cable and mating connector, manufacturer, and part number

LEMO, FFA.2E.304.CLAC70
Evident, 21AB5386

Table 7 QSLT — DC INPUT connector pinout

Pin number (gender)	Name	Description
1 (f)	Rsense−	Remote voltage sensing −
2 (f)	Rsense+	Remote voltage sensing +
3 (m)	+24 V DC IN	N/A
4 (m)	Return (0 V)	N/A

NOTE

Voltage compensation is not a prerequisite, since the QuickScan LT can run under an input voltage as low as 15 V and as high as 24 V. However, Evident does not recommend operating the QuickScan LT at a voltage lower than 16 V at the DC INPUT connector.

NOTE

Evident recommends using a 5 m power cable maximum length. Using a power cable longer than 5 m (15 ft) results in a loss of voltage.

4.2 Network Ethernet Connector

The network Ethernet connector is used to connect the QuickScan LT to the computer using an Ethernet or a Fast Ethernet link. This connector is a sealed, circular IP67-rated connector.

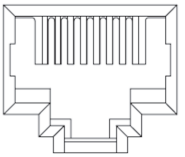


Figure 4-2 QSLT — Ethernet connector

Label

Description

Sealed, circular, RJ45, female, IP67-rated connector

Connector manufacturer and part number

RJField, Amphenol Socapex, RJF21N
Evident, 21AC6009

Suggested cable and mating connector, manufacturer, and part number

Waterproof shell for Ethernet Cat. 5e cables: Amphenol Socapex, RJF6MN
Evident, 21EA0027

Table 8 QSLT — Pinout of the network Ethernet connector

Pin	I/O	Signal	Description
1	Output	TX+	Data transmission
2	Output	TX−	Data transmission
3	Input	RX+	Data reception
4	N/A	NC	No connection
5	N/A	NC	No connection
6	Input	RX−	Data reception
7	N/A	NC	No connection
8	N/A	NC	No connection

The QuickScan LT must be linked to the computer with a category 5, shielded, twisted pairs (RJ45) Ethernet cable. The maximum cable length depends on the link speed (see Table 9 on page 48).

Table 9 QSLT — Ethernet cable parameters and specifications

Parameter	Specification
Description	Crossover-link Ethernet cable
Evident part number	EWTX525A
Cable type	EIA/TIA
	150 Ω, shielded, level 5
Minimum cable length between nodes	0.6 m (2 ft)
Maximum cable length, 100Base-T	100 m (328 ft)

IMPORTANT

To ensure the proper functioning of the Ethernet cable, you must keep the twisted pairs to a maximum of 12.7 mm (0.5 in.) from the end of the connector (see Figure 4-3 on page 49).

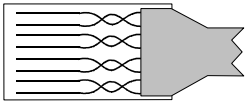


Figure 4-3 QSLT — The twisted pairs in an Ethernet cable

4.3 ENCODER INPUT Connector

The ENCODER INPUT signal levels are non isolated TTL 5 V differential or single-ended. The protection on these inputs is done using an external encoder input board (Evident part number 20ZZ0057) located in the electrical panel. This input board accepts different input signal levels (single-ended or differential), and thus accommodates nearly all the encoder requirements.

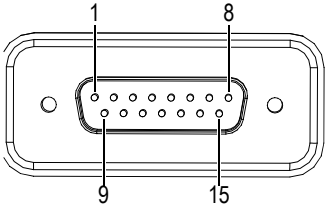


Figure 4-4 QSLT — ENCODER INPUT connector

Label

ENCODER INPUT

Description

Sealed, D-Sub, 15-pin, male connector

Connector manufacturer and part number

CONEC, 6STD15SCR99E1OX
Evident, 21AE5143

Suggested cable and mating connector, manufacturer, and part number

Cable assembly: Evident, 21AE5152
Connector: CONEC, 8STD15PCM99A1OX
Hood: CONEC, 165 X 15329 X; Evident, 21EA5026

Table 10 QSLT — ENCODER INPUT connector pinout

Pin number	Name	Description
1	1PHA_CLK	Encoder 1: [Phase A+] in Quadrature mode OR [Clock+] in Clock-Dir mode OR [Up+] in Up mode OR [Down+] in Down mode
2	1PH	Encoder 1: [Phase A−] in Quadrature mode OR [Clock−] in Clock-Dir mode OR Up−] in Up mode OR [Down−] in Down mode
3	Ground	System ground (return)
4	1PHB_DIR	Encoder 1: [Phase B+] in Quadrature mode OR [Direction+] in Clock-Dir mode Not used in Up and Down modes
5	1PHB	Encoder 1, Phase B− OR Left unconnected for single-ended encoder mode
6	Ground	System ground (return)

Table 10 QSLT — ENCODER INPUT connector pinout *(continued)*

Pin number	Name	Description
7	ENC_SE_EN	Left unconnected for differential encoders mode OR Tied to ground to use single-ended encoders
8	ENC_+5VOUT_EN	Left unconnected OR Tied to ground to enable the 5 V power output accessory at pin 10
9	Ground	System ground (return)
10	ENC_+5VOUT	Open OR 5 V/300 mA max power output if pin 8 is tied to ground
11	2PHA_CLK	Encoder 2: [Phase A+] in Quadrature mode OR [Clock+] in Clock-Dir mode OR [Up+] in Up mode OR [Down+] in Down mode
12	2PHA	Encoder 2: [Phase A−] in Quadrature mode OR [Clock−] in Clock-Dir mode OR [Up−] in Up mode OR [Down−] in Down mode
13	Ground	System ground (return)

Table 10 QSLT — ENCODER INPUT connector pinout *(continued)*

Pin number	Name	Description
14	2PHB_DIR	Encoder 2: [Phase B+] in Quadrature mode OR [Direction+] in Clock-Dir mode Not used in Up and Down modes
15	2PHB	Encoder 2: [Phase B−] in Quadrature mode OR [Direction−] in Clock-Dir mode Not used in Up and Down modes

For the differential mode, each encoder phase requires the use of twisted-pair cable for phase and quadrature components integrity. The encoder input interface conforms with both differential and single-ended TTL standards.

Table 11 QSLT — ENCODER INPUT signal levels

Specification	Value
Logic input low level	0 V to 0.8 V
Logic input high level	2 V to 5 V
Absolute maximum voltage applied on any input (with respect to ground)	±25 V
Maximum input signal frequency	6 MHz

By default, each encoder input is configured for differential-encoder mode. It is possible to change to single-ended mode.

To configure the encoder input for single-ended mode

- Short the pin 7 to ground.

4.4 ENCODER THRU Connector

The ENCODER THRU connector is a buffered replica of the ENCODER INPUT signals. This connector is used for daisy chaining one QuickScan LT to another.

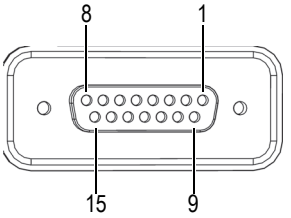


Figure 4-5 QSLT — ENCODER THRU connector

Label

ENCODER THRU

Description

Sealed, D-Sub, 15-pin, female connector

Connector manufacturer and part number

CONEC, 6STD15SCR99E10X
Evident, 21AE5144

Suggested cable and mating connector, manufacturer, and part number

Cable assembly: Evident, 21AE5153
Connector: CONEC, 8STD15PCM99A1OX
Hood: CONEC, 165 X 15329 X; Evident, 21EA5026

Metal cap to protect the connector when not in use

CONEC, 165X17169X
Evident, 21IC5181

Table 12 QSLT — ENCODER THRU connector pinout

Pin number[a]	Name
1	1PHA_CLKT_OUT
2	1PHAT_OUT
3	GROUND
4	1PHB_DIRT_OUT
5	1PHBT_OUT
6	GROUND
7	RESERVED

Table 12 QSLT — ENCODER THRU connector pinout *(continued)*

Pin number[a]	Name
8	RESERVED
9	GROUND
10	RESERVED
11	2PHA_CLKT_OUT
12	2PHAT_OUT
13	GROUND
14	2PHB_DIRT_OUT
15	2PHBT_OUT

a. For descriptions of each pin signal, refer to the encoder input connector in "ENCODER INPUT Connector" on page 49.

Table 13 QSLT — ENCODER THRU signal levels

Specification	Value
Logic output low differential voltage (output "A" – "B")	≤ −2 V
Logic output high differential voltage (output "A" – "B")	≤ −2 V
Propagation delay (from ENCODER INPUT to ENCODER THRU)	≤ 100 ns
Maximum switching frequency	6 MHz

4.5 DIGITAL INPUT Connector

The DIGITAL INPUT connector has 28 configurable signal pins. The input signal level is 24 V, isolated by optocoupler circuits, and conforms with IEC 61131-2 standard. The protection on this input is done inside the electrical panel—by using an external optocoupler, or remote input/output module—although basic protection is done inside the QuickScan LT.

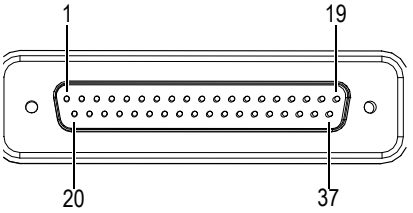


Figure 4-6 QSLT — DIGITAL INPUT connector

Label

DIGITAL INPUT

Description

Sealed, 37-pin, D-Sub, male connector

Connector manufacturer and part number

CONEC: 6STD37PCR99E10X
Evident, 21AE5145

Other cable assembly. Manufacturer and part number

Evident, 21AE5149
Connector: CONEC 8STD37SCM99A1OX
Hood: CONEC 165 X 15349 X, Evident, 21EA5024

Table 14 QSLT — DIGITAL INPUT pinout

Pin number	Name	Pin number	Name	Pin number	Name	Pin number	Name
1	DIN1	11	DIN11	21	DIN21	31	COMMON
2	DIN2	12	DIN12	22	DIN22	32	COMMON
3	DIN3	13	DIN13	23	DIN23	33	COMMON
4	DIN4	14	DIN14	24	DIN24	34	COMMON
5	DIN5	15	DIN15	25	DIN25	35	COMMON
6	DIN6	16	DIN16	26	DIN26	36	COMMON
7	DIN7	17	DIN17	27	DIN27	37	COMMON
8	DIN8	18	DIN18	28	DIN28		
9	DIN9	19	DIN19	29	COMMON		
10	DIN10	20	DIN20	30	COMMON		

From within the QuickView software, any pin can be associated to a number of predefined functions. A single function can be associated to one pin exclusively, except for the general input, which is associated to all inputs by default. The following input functions are available:

- Enable firing
- Rotation synchronization
- Preset encoder 1, preset encoder 2
- Acquisition enable
- Enable alarm 1, enable alarm 2, enable alarm 3
- Enable encoders
- General input

The digital input signals conform with specification IEC 61131-2. The input level is 24 VDC, type 3. The logic signals are positive logic and open inputs are read as logic-state 0.

The digital input signal is compatible with **sink input type**, and **source input type**:

- Connecting the COMMON signal to the return (ground) enables each digital input to be activated by a logic high (1) 24 V level, and results in a **sink input type**.
- Connecting the COMMON signal to the 24 V supply enables each digital input to be activated by a logic low (0) ground level, and results in a **source input type**.

Table 15 QSLT — DIGITAL INPUT signal levels

Specification	Value
Logic input low	–3 V to 5 V
Logic input high	11 V to 26 V
High-level input current at 24 V input	~± 11 mA
Maximum input current	±15 mA
Galvanic isolation	Bipolar optocouplers
Maximum switching frequency	3 kHz

4.6 DIGITAL THRU Connector

The DIGITAL THRU is a female connector with 28 open-drain-sink outputs. The DIGITAL THRU is a buffered replica of the DIGITAL INPUT signals and is used to daisy chain one QuickScan LT to another.

Inside the QuickScan LT, the signals from the DIGITAL INPUT are buffered first, and then forwarded to the DIGITAL THRU connector to ensure signals integrity to a daisy-chained QuickScan LT.

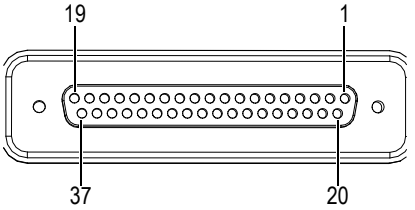


Figure 4-7 QSLT — DIGITAL THRU connector

Label

DIGITAL INPUT

Description

Sealed DC-37F 37-pins D-Sub female with 28 open-drain-sink outputs

Suggested connector manufacturer and part number

CONEC, 6STD37SCR99E1OX
Evident, 22AE5146

Other cable assembly. Manufacturer and part number

Cable assembly: Evident, 21AE5150
Connector: CONEC, 8STD37PCM99A1OX
Hood: CONEC, 165 X 15349 X, Evident, 21EA5024

Table 16 QSLT — DIGITAL THRU pinout

Pin number	Name	Pin number	Name	Pin number	Name	Pin number	Name
1	DINT1	11	DINT11	21	DINT21	31	DINT_+24 VOUT
2	DINT2	12	DINT12	22	DINT22	32	DINT_+24 VOUT
3	DINT3	13	DINT13	23	DINT23	33	DINT_+24 VOUT
4	DINT4	14	DINT14	24	DINT24	34	DINT_+24 VOUT
5	DINT5	15	DINT15	25	DINT25	35	DINT_+24 VOUT
6	DINT6	16	DINT16	26	DINT26	36	DINT_+24 VOUT
7	DINT7	17	DINT17	27	DINT27	37	DINT_+24 VOUT
8	DINT8	18	DINT18	28	DINT28		
9	DINT9	19	DINT19	29	DINT_+24 VOUT		
10	DINT10	20	DINT20	30	DINT_+24 VOUT		

Table 17 QSLT — DIGITAL THRU signal levels

Specification	Value
Logic output low level at 20 mA Iout	≤100 mV
Open-drain voltage	50 V max.
Sink capability	−50 mA max.
Maximum switching frequency	3 kHz

4.7 DIGITAL OUTPUT Connector

The DIGITAL OUTPUT connector has 16 active-low open-collector output signals. Each QuickScan LT has its own DIGITAL OUTPUT connector. Usually, the digital output of each unit is not shared, nor daisy-chained.

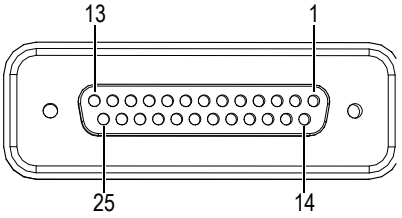


Figure 4-8 QSLT — DIGITAL OUTPUT connector

Label

DIGITAL OUTPUT

Description

DB-25F, 25-pin, D-Sub female connector

Connector manufacturer and part number

CONEC, 6STD25SCR99E1OX
Evident, 21AE5147

Suggested connector manufacturer and part number

Cable assembly: Evident, 21AE5151
Hood: CONEC, 165X15339
Evident, 21EA5025

Table 18 QSLT — DIGITAL OUTPUT pinout

Pin number	Name	Pin number	Name	Pin number	Name
1	DOUT1	10	DOUT10	19	COMMON (0 V)
2	DOUT2	11	DOUT11	20	COMMON (0 V)
3	DOUT3	12	DOUT12	21	COMMON (0 V)
4	DOUT4	13	DOUT13	22	COMMON (0 V)
5	DOUT5	14	DOUT14	23	COMMON (0 V)
6	DOUT6	15	DOUT15	24	COMMON (0 V)
7	DOUT7	16	DOUT16	25	DOUT_+24 VIN
8	DOUT8	17	COMMON (0 V)		
9	DOUT9	18	COMMON (0 V)		

Any digital output can be configured within QuickView software, either as a hardware alarm, a software alarm, or a generic output. The digital outputs are open-collector type and active low and conform with IEC 61131-2 specifications. Although these outputs are open-collectors, you need to supply a nominal 24 V DC at pin 25 (DOUT_+24VIN) in order for the outputs to work properly.

4.8 Synchronization Connectors

Four water-sealed BNC connectors—located on the rear face of the QuickScan LT unit—are available for synchronization purposes with other QuickScan LT units (see Figure 4-9 on page 60). The BNC connectors conform with specification IEC-61010 clause 6.3.2 to protect against hazardous live parts.

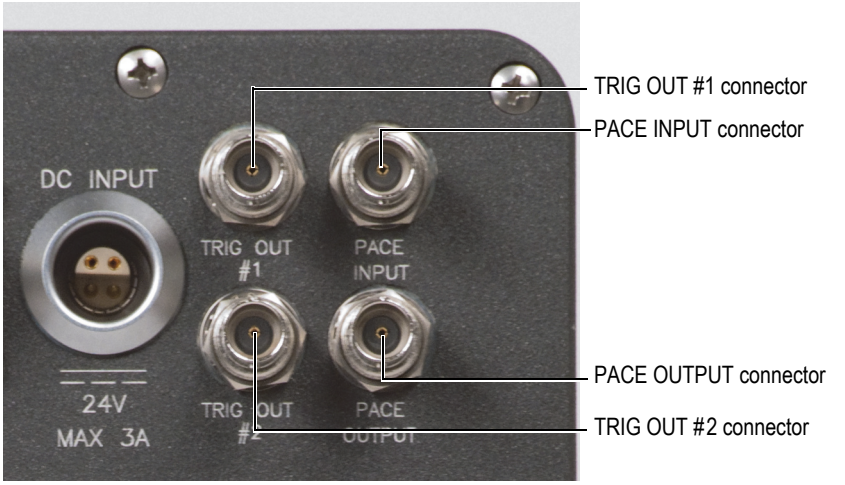


Figure 4-9 QSLT — Four synchronization connectors

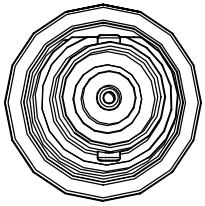


Figure 4-10 QSLT — Example of a synchronization connector

Labels

TRIG OUT #1
TRIG OUT #2
PACE INPUT
PACE OUTPUT

Description

BNC jack, sealed

Connector manufacturer and part number

TYCO/AMP, 5227426-1 sealed

Suggested connector

CONEC, 6STD25SCR99E1OX
Evident, 21AE5147

Other cable assembly. Manufacturer and part number

Any standard sealed BNC connector

Metal cap to protect the connector when not in use

Evident part number: 21AJ0015

Table 19 QSLT — PACE OUTPUT, TRIG OUT #1, and TRIG OUT #2 signal levels

Specification	Value
Logic output low level (into high z load)	0 V to 0.8 V
Logic output high (into high z load)	2 V to 5 V
Absolute maximum output level	−0.5 V/5.5 V
Maximum output drive level	±24 mA
Maximum switching frequency	20 kHz

Table 20 QSLT — PACE INPUT signal levels

Specification	Value
Logic input low	0 V to 0.8 V
Logic input high	2 V to 5 V
Absolute maximum input level	−0.5 V/5.5 V
Maximum switching frequency	20 kHz

4.9 PACE Signal Propagation

Figure 4-11 on page 62 shows an example of a 3-QuickScan LT synchronization. In this example, there is one master unit (QSLT #1) and two slave units (QSLT #2 & QSLT #3). The master unit synchronizes the other units with the PACE signal. The PACE signal is sent to the other units, which synchronize with the master unit to start firing together.

QuickView software assigns to each QSLT on the network, the *master* flag or the *slave* flag (Refer to your *QuickView User's Manual* for details on the software's functions).

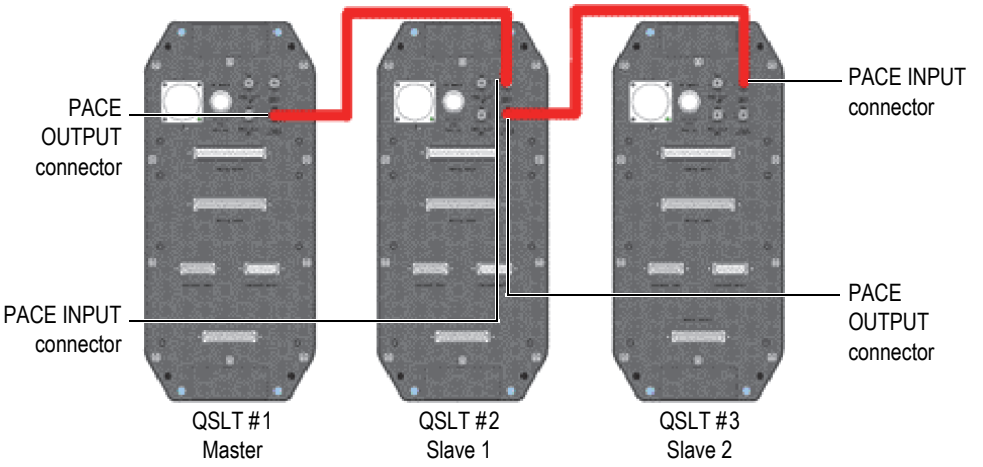


Figure 4-11 QSLT — Three QSLT units daisy-chained and synchronized together

Table 21 QSLT — PACE signal propagation

Signal	Specification	Value
PACE	Propagation delay	<35 nanoseconds

4.10 I/O Sharing and Cabling

Almost all applications share the same I/O between QSLTs. The DIGITAL INPUT/DIGITAL THRU connectors, and the ENCODER INPUT/ENCODER THRU connectors propagate the signals between the QSLTs (see Figure 4-12 on page 63 for an example of I/O sharing).

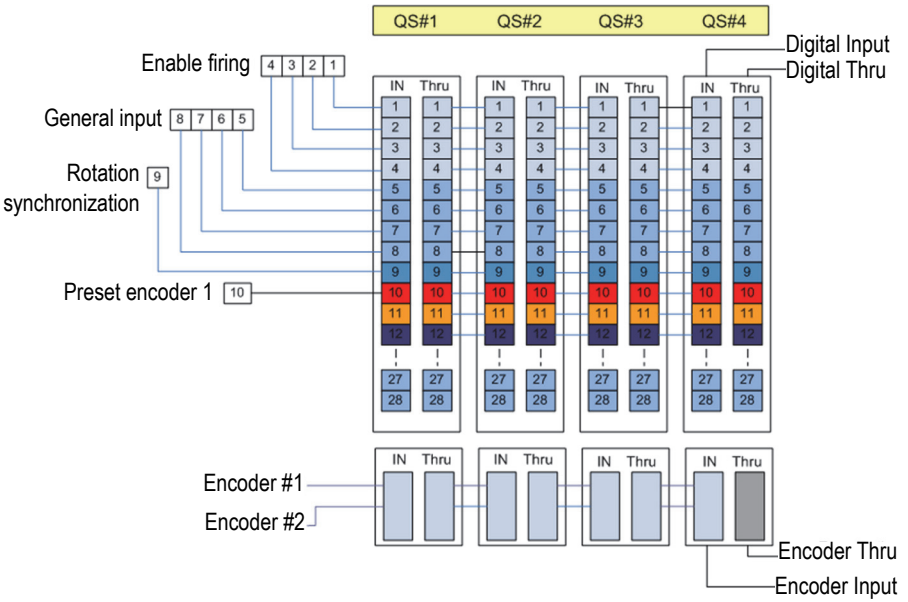


Figure 4-12 QSLT — Example of I/O integration

Table 22 QSLT — Propagation delay

From	To	Delay
DIGITAL INPUT	DIGITAL THRU	18 microseconds
ENCODER INPUT	ENCODER THRU	55 nanoseconds

Recommended Cables for I/O Sharing

Evident recommends using the following cables to share I/O between units:

- Between DIGITAL THRU and DIGITAL INPUT:
  Evident part number EWIX0846, length: 0.91 m (3 ft).
- Between ENCODER THRU and ENCODER INPUT:
  Evident part number EWIX0847, length: 0.91 m (3 ft).

5. Specifications

This chapter contains the QuickScan LT technical specifications for two available models (or configurations).

5.1 QuickScan LT Models

The QuickScan LT comes in two models (or configurations):

Model 1, QSLT 16:256

One aperture of 16 elements.

Model 2, QSLT 32:256

One aperture of 32 elements or two apertures of 16 elements.

At connection time, the QuickView software checks each QuickScan LT unit to calculate how many apertures are supported. It does this through an inquiry to the RPC (remote procedure call) server service.

5.2 Limitations and Setups

The QSLT 16:256 (Model 1) does not have any limitations on accessing the PIM's elements. The aperture can access any of the 256 elements.

The QSLT 32:256 (Model 2), however, has one main limitation: its two apertures in parallel can access any of the PIM's 256 elements, but not simultaneously.

The only other limitation for the QSLT 32:256 model is that you cannot have one aperture and two apertures in the same setup.

Setup Limitation for QSLT 32:256

The QSLT 32:256 setups must take into account the limitations. Examples of correct and incorrect setups are shown in Table 23 on page 66 and Table 24 on page 66.

Table 23 QSLT — Example of a *correct* setup

Four laws of 16 elements each	Fired in parallel
Context 0: law of 16 elements	Context 0 and Context 1
Context 1: law of 16 elements	
Context 2: law of 16 elements	Context 1 and Context 2
Context 3: law of 16 elements	

Table 24 QSLT — Example of an *incorrect* setup

One law of 32 elements and two laws of 16 elements each	Fired in parallel
Context 0: law of 32 elements	N/A
Context 1: law of 16 elements	Context 1 and Context 2
Context 2: law of 16 elements	

The example setup of Table 24 on page 66 is incorrect because the setup contains one law of 32 elements and two laws of 16 elements. Two laws of 32 elements would, however, be correct, as are four laws of 16 elements, as shown in Table 23 on page 66.

5.3 General Parameters

Table 25 QSLT — General parameters

Specification	Model	
	QSLT 16:256	QSLT 32:256
Total peak power consumption	63 W	
Maximum number of focal laws	128	128 per aperture
Weight	12.5 kg	
Size (H × W × D)	295 mm × 133 mm × 458 mm (overall, with handle and connectors)	

Table 25 QSLT — General parameters *(continued)*

Specification	Model	
	QSLT 16:256	QSLT 32:256
Connectivity	Fast Ethernet (RJ-45 connector)	
Operating temperature	0 °C to 45 °C[a]	
Storage temperature	−20 °C to 70 °C	
Power	DC INPUT (16 V to 24 V)	
Environmental resistance	Designed to withstand severe environmental conditions (see “Environmental Resistance” on page 40)	

a. Depending on the installation and the setup used, the unit requires ventilation to operate at 45 °C.

Table 26 QSLT — Receiver parameters[a]

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Receiver gain range/increment	74 dB	
Gain resolution	0.1 dB	
Maximum input signal	950 mVpp	
Input impedance ±10 %	70 Ω	
Gain precision between channels (measured at 12 dB)	0.5 dB	
Cross-talk isolation	50 dB at 10 MHz	
Bandwidth of the system (−3 dB) ±10 %	0.54 MHz to 22.5 MHz	

a. Gain is independent for each aperture.

Table 27 QSLT — Pulser parameters[a]

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Pulse output (into 50 Ω load) ±10 %	25 V, 50 V, 67 V	
Pulse output (high impedance) ±10 %	40 V, 80 V, 115 V	

Table 27 QSLT — Pulser parameters[a] *(continued)*

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Number of pulser/receiver	16	2 × 16 (2 apertures) 1 × 32 (1 aperture)
Number of elements	256	
UT channels quantity	none	
UT channels	none	
Pulse width/step (precision of 5 ns or ±10 %, whichever is greater)	50 ns to 500 ns/step 2.5 ns	
Fall time	< 10 ns	
Pulse shape	Negative square pulse	
Output impedance (115 V)	< 65 Ω	

a. Same voltage for all apertures and all laws.

Table 28 QSLT — Beam forming

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Scan type	Linear, Azimuthal	
Aperture quantity	1	1 or 2
Aperture size[a]	1 × 16	1 × 32 or 2 × 16
Number of elements	256	
Delay range transmission	0 µs, step of 2.5 ns	
Delay range reception	0 µs, step of 2.5 ns	
Delay precision	2.5 ns	

a. For pitch-and-catch mode, the aperture size is divided by 2.

Table 29 QSLT — Data acquisition

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Elementary A/D converter	10 bits 100 MHz	

Table 29 QSLT — Data acquisition *(continued)*

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Number of bits on summed signal	8 or 12	
Acquisition delay value/step	up to 9.9 ms/10 ns step	
A-scan rate	up to 4 MB/s	
Max. pulsing rate, pulse width/40 V (30 V) range dependent[a]	20 kHz, pulse width = 100 ns	20 kHz, pulse width = 100 ns (per aperture)
Max. pulsing rate, pulse width/80 V (60 V) range dependent[a]	20 kHz, pulse width = 100 ns	20 kHz, pulse width = 100 ns (per aperture)
Max. pulsing rate, pulse width/115 V (100 V) range dependent[a]	20 kHz, pulse width = 100 ns	20 kHz, pulse width = 50 ns (per aperture)
Acquisition depth (8 bits data)	81.9 µs without compression	

a. The power available in the system can limit the acquisition range according to voltage, pulse width, number of focal laws, and the pulse rate frequency (PRF).

Table 30 QSLT — Data production

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
A-scan	8000 A-scan of 512 bytes (8 bits A-scan of 512 points)	
C-scan	20 kHz (I, A, B, C, D)	
Maximum throughput	4 MB/s	4 MB/s total for both apertures

Table 31 QSLT — Data processing[a]

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Interpolation	1 or 4	
Averaging	2, 4, 8, 16	
Rectifier	Yes (digital)	
Analog filtering[b]	Analog high-pass 3.5 MHz	

Table 31 QSLT — Data processing[a] *(continued)*

Specification	Model	
	QSLT 16256 (Model 1)	**QSLT 32256 (Model 2)**
Digital filtering ±10 %, Cutting frequency at −3 dB, Fpass: ±0.5 dB	**Low-pass**: 2 MHz, 5 MHz, 10 MHz, 15 MHz **High-pass**: 1 MHz, 2 MHz, 3.5 MHz, 10 MHz **Band-pass**: 1 MHz to 3.37 MHz, 2 MHz to 7.5 MHz, 3.33 MHz to 11.25 MHz Possible combination of low-pass–high-pass filters:	
	High-pass	**Low-pass**
	1	5/10/15
	2	5/10/15
	3.5	10/15
	5	10/15
	10	15
Video filtering	Smoothing adapted to probe frequency	

a. All data processing parameters are per law.
b. An analog filter is used with next combination of digital filters: High-pass: 3.5 MHz and 10 MHz, Band-pass: 5 MHz to 15 MHz.

Table 32 QSLT — Data video

Specification	Model	
	QSLT 16256 (Model 1)	**QSLT 32256 (Model 2)**
A-scan video	Yes	Per aperture
Remanent	Yes	Per aperture

Table 33 QSLT — Data synchronization[a]

Specification	Model	
	QSLT 16256 (Model 1)	**QSLT 32256 (Model 2)**
On time (max. PRF could be lower, see max. pulsing rate)	1 Hz to 20 kHz ±1 Hz	
External (max. PRF could be lower, see max. pulsing rate)	1 Hz to 20 kHz ±1 Hz	
Slow mode	N/A	N/A

Table 33 QSLT — Data synchronization[a] *(continued)*

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
On encoder	On 2 axis divided 1 step to 65536 steps	

a. Same synchronization mode for all apertures

Table 34 QSLT — TCG

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Number of inflexion points	32	
Gain range/resolution	0 dB to 74 dB, step 0.1 dB	
Reference	Pulser or interface	
Applied at	Input	
TCG time-range/increment	10 ms/step of 10 ns	10 ms/step of 10 ns[a]

a. For the 32:256, the TCG is independent per aperture.

Table 35 QSLT — Alarms

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Number of possible alarms	16 outputs	
Condition	Same conditions as the actual QuickView software	

Table 36 QSLT — Phased-array connector

Specification	Model	
	QSLT 16256 (Model 1)	QSLT 32256 (Model 2)
Number of contacts	3 OmniScan connectors	

Appendix: Latched Phased Array Connector

Evident has developed a phased array (PA) connector that uses a latch to attach it to the instrument. This connector offers water resistance and is easier to connect and disconnect than the older type of connector (see Figure A-1 on page 73).

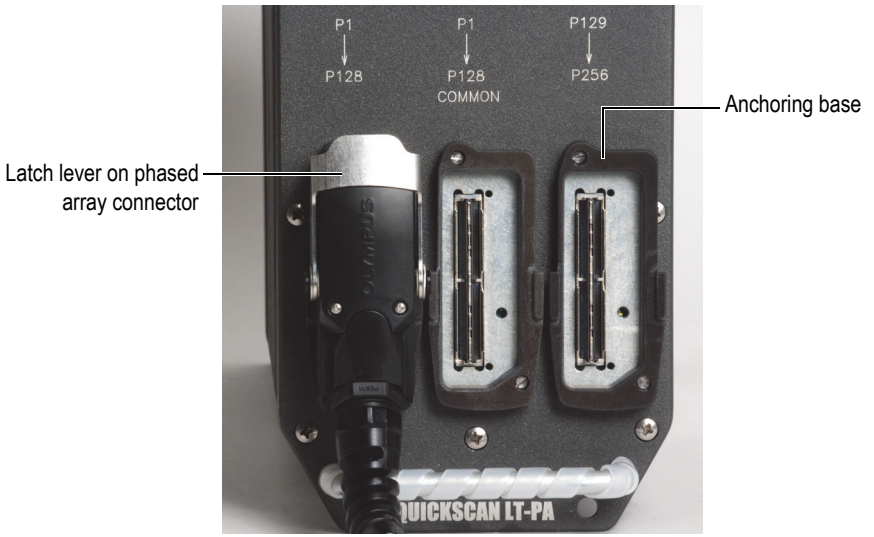


Figure A-1 Phased array—Latched PA connector

The latched PA connector uses the same connecting pattern as the earlier PA connector. A latch-anchoring-base combination replaces the two captive screws and the alignment pin (Evident part number for anchoring base: MQIV4485D). The anchoring base for the latch attachment is easy to install. The two screws attaching the anchoring base use the same receiving holes as the older connector type.

To install an anchoring base

1. Align the anchoring base with the receiving holes.
2. Use a flat-headed screwdriver to screw the anchoring base to the unit (see Figure A-2 on page 74).

To uninstall the anchoring base

- Use a flat-headed screwdriver to unscrew the two anchoring-base screws (see Figure A-2 on page 74).

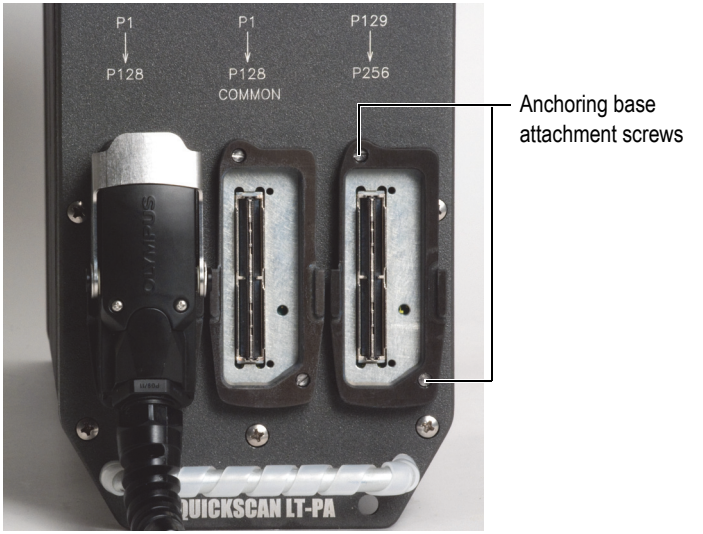


Figure A-2 Phased array—Attachment screws

To connect the latched PA connector

1. Lift the latch lever.
2. Connect the PA connector to the QSLT unit.
3. Push down the latch lever to lock the connector (see Figure A-3 on page 75).

To disconnect the latched PA connector

1. Lift the latch lever to unlock the connector (see Figure A-3 on page 75).

2. Disconnect the PA connector from the unit.

Figure A-3 Phased array connector with latch

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