

USLT USB

Technical Reference and Operating Manual

Ident No. 49 129
Rev. 2.0

This Issue 02, 03/2009 applies to the version 1.0

Subject to change without notice.

1	Introduction	7	Echo display comparison method	14
1.1	Safety information	8	Limitations of software	15
	Power supply	8	1.3 The USLT USB	16
	Software	8	Versions	16
	Defects/errors and exceptional stresses	9	1.4 Standard package	18
	Further information	10	1.5 Required accessories	19
1.2	Important information on ultrasonic testing	11	1.6 Spare parts requirements	20
	Preconditions for testing with ultrasonic test equipment	11	2 Installation and operation	23
	Operator training	11	2.1 Overview of instrument	24
	Technical test requirements	12	2.2 Installing the device	26
	Limitations of testing	12	2.3 Software	27
	Ultrasonic wall thickness measurement	13	General information	27
	Effect of the test object's material	13	Installing the software USLT 2000	27
	Effect of temperature variations	13	Update USLT 2000	27
	Measurement of remaining wall thickness	13	Installation procedure	28
	Ultrasonic evaluation of flaws	14	New database	29
	Flaw boundary method	14		

Uninstalling	29	2.10 Basic settings	40
Installing the drivers	30	Selecting language	40
2.4 Connection to the computer	31	Selecting units of measurement	40
Power supply and data interface	31	2.11 Data backup	41
2.5 Connecting a probe	32	Saving data to external data media	41
2.6 Connecting the encoder	33	Uploading data from external data media	42
Encoder connection	33	2.12 Online Help	43
Encoder power supply	33	Context-sensitive Help	43
2.7 Remote control	35	Starting the Online Help	43
Assigning the remote control to a receiver	35	Buttons:	44
Key assignment	36	Starting the Online Help without the USLT software	44
2.8 Power on/Power off	37	Printing	45
Starting the operation	37	Printing a complete chapter	45
Closing the application and powering off	37		
2.9 Starting the USLT 2000	38	3 Individual inspection reports	46
License	38	3.1 Documentation of jobs and results	47
Starting the program	38	New from USLT version 2.0 or higher	47
Closing the operation	39		

Prerequisites	47	Example 5	61
Database structure for jobs and results	47	Example 6	61
Recording inspection data (results) in a job	49	Example: Multiple inspection report on a job	62
Viewing jobs and results	49	Templates	62
3.2 Creating individual inspection reports as Excel files	50	Creating the form definition	62
Creating a report form	50	Generating a report	66
Inspection report for a single result	50	Editing and printing inspection reports	67
Form definition	52		
3.3 Generating an inspection report for a single result	54	4 Care, maintenance, errors	69
3.4 Multiple inspection reports	56	4.1 Cleaning the instrument	70
Organization of Excel sheets	56	4.2 Maintenance	70
Arrangement of areas for job data and for result data	57	4.3 Errors	70
Example 1	59	5 Technical specifications	71
Example 2	59	5.1 Specification of the interfaces	72
Example 3	60	10-pin LEMO 1B connection I/O	72
Example 4	60	2-pin LEMO 0S connection +5V	73

5.2 Specifications USLT USB	74
Enclosure	74
Connections	74
Power supply	75
Ultrasound	75
Settings and evaluation	76
Encoder interface	78
6 Annex	79
6.1 EC declaration of conformity	80
6.2 Manufacturer/Service addresses	81
6.3 Disposal	83
General view of the device	84
7 Index	86

Introduction **1**

1.1 Safety information

The USLT USB has been designed and tested according to DIN EN 61 010 Part 1, 2001, Safety requirements for electrical measuring, control and lab equipment, and was technically in perfectly safe and faultless condition when leaving the manufacturing works.

In order to maintain this condition and to ensure a safe operation, you should urgently read the following safety information before putting the instrument into operation. When connecting other equipment to the USLT USB, such as an encoder, follow particularly all safety instructions that apply to these devices.



The USLT USB is an instrument for materials testing. Any use for medical applications or other purposes is not allowed!

The USLT USB may only be used in industrial environments!

Power supply

The power supply for the USLT USB is carried out via the USB interface of the computer. For the operation of a connected encoder an additional power supply unit is required. The power supply unit may only be used inside buildings and may not be exposed to moisture or liquids. Follow all safety instructions that are applicable for the power supply unit used.



Attention:

With connected encoder use only the power supply unit recommended and delivered by GE Sensing & Inspection Technologies.

Software

According to the current state of the art, software is never completely free from errors. Before using any software-controlled test equipment, please make sure that the required functions operate perfectly in the intended combination.

If you have any questions about the use of your test equipment, please contact your nearest representative of GE Sensing & Inspection Technologies.

If you install additional software on the computer, GE Sensing & Inspection Technologies will not bear any responsibility regarding the influence this may have on USLT USB operation. The existing software drivers may be overwritten in such a case.

Defects/errors and exceptional stresses

If you have reason to believe that a safe operation of your USLT USB is no longer possible, you have to disconnect the instrument and secure it against unintentional reconnection.

A safe operation is e.g. no longer possible

- if the instrument shows visible damages,
- if the instrument no longer operates perfectly,
- after prolonged storage under adverse conditions (e.g. exceptional temperatures and/or especially high air humidity, or corrosive environmental conditions),
- after being subjected to heavy stresses during transportation.

Further information



Attention:

Make sure you have read and understood the documentation for the other equipment connected to the USLT USB, such as the computer used, and the encoder and the power supply unit, if applicable. The documentation contains important safety instructions and information about permitted uses.

The USLT 2000 software provides extensive online help which is always available to you when working with the system. In this operating manual you will find any additional information that you might require.

1.2 Important information on ultrasonic testing

Please read the following information before using your USLT USB. It is important that you understand and observe this information to avoid any operator errors that might lead to false test results. This could result in personal injuries or damages to property.

Preconditions for testing with ultrasonic test equipment

In this operating manual you will find essential information on how to operate your test equipment. In addition, there are a number of factors that affect the test results. A description of these factors would go beyond the scope of an operating manual.

Let us therefore only mention the three most important requirements for a safe and reliable ultrasonic inspection in this connection:

- the operator training,
- the knowledge of special technical test requirements and limits,
- the choice of appropriate test equipment.

Operator training

The operation of an ultrasonic test device requires a proper training in ultrasonic test methods.

A proper training comprises for example adequate knowledge of:

- the theory of sound propagation,
- the effects of sound velocity in the test material,
- what happens to the sound wave at the interface between two different materials,
- the propagation of the sound beam,
- the influence of sound attenuation in the test object, and the influence of surface quality of the test object.

Lack of such knowledge could lead to false test results with unforeseeable consequences. You can contact

for example NDT societies or organizations in your country (DGZfP in Germany; ASNT in the USA), or GE Sensing & Inspection Technologies, for information concerning existing possibilities for the training of ultrasonic inspectors as well as on the qualifications and certificates that can finally be obtained.

Technical test requirements

Every ultrasonic test is subject to specific technical test requirements. The most important ones are:

- the definition of the scope of inspection,
- the choice of the appropriate test method,
- the consideration of material properties,
- the determination of the limits for recording and evaluation.

It is the task of those with overall responsibility for testing to ensure that the inspector is fully informed about these requirements. The best basis for such information is experience with identical test objects. It is also essential that the relevant test specifications are clearly and completely understood by the inspector.

GE Sensing & Inspection Technologies organizes specialized training courses in the field of ultrasonic testing at regular time intervals.

Limitations of testing

The information obtained from ultrasonic tests only refers to those parts of the test object which are covered by the sound beam of the probe used. Any conclusions from the tested parts to be applied to the untested parts of the test object should be made with extreme caution.

Such conclusions are generally only possible in cases where extensive experience and proven methods of statistical data acquisition are available.

The sound beam can be completely reflected from boundary surfaces within the test object so that flaws and reflection points lying deeper remain undetected. It is therefore important to make sure that all areas to be tested in the test object are covered by the sound beam.

Ultrasonic wall thickness measurement

All ultrasonic wall thickness measurements are based on a time-of-flight measurement. Accurate measurement results require a constant sound velocity in the test object. In test objects made of steel, even with varying alloying constituents, this condition is mostly fulfilled: the variation in sound velocity is so slight that it is only of importance for high-precision measurements. In other materials, e.g. nonferrous metals or plastics, the sound velocity variations may be even larger and thus affect the measuring accuracy.

Effect of the test object's material

If the test object's material is not homogeneous, the sound may propagate at different sound velocities in different parts of the test objects. In this case, an average sound velocity should be taken into account for the range calibration. This is achieved by means of a reference block whose sound velocity corresponds to the average sound velocity of the test object. If substantial sound velocity variations are to be expected, then the instrument calibration should be readjusted to the actual sound velocity values at shorter time inter-

vals. Failure to do so may lead to false thickness readings.

Effect of temperature variations

The sound velocity within the test object also varies as a function of the material's temperature. This can cause appreciable errors in measurements if the instrument has been calibrated on a cold reference block and is then used on a warm or hot test object. Such measurement errors can be avoided either by warming the reference block to the same temperature before calibrating, or by using a correction factor obtained from tables.

Measurement of remaining wall thickness

The measurement of the remaining wall thickness on plant components, e.g. pipes, tanks and reaction vessels of all types which are corroded or eroded from the inside, requires a perfectly suitable gauge and special care in handling the probe.

The inspectors should always be informed about the corresponding nominal wall thicknesses and the likely amount of wall thickness losses.

Ultrasonic evaluation of flaws

In present-day test practice, there are basically two different methods of flaw evaluation:

If the diameter of the sound beam is smaller than the extent of the flaw, then the beam can be used to explore the boundaries of the flaw and thus determine its area.

If, however, the diameter of the sound beam is larger than the size of the flaw, the maximum echo response from the flaw must be compared with the maximum echo response from an artificial flaw provided for comparison purposes.

Flaw boundary method

The smaller the diameter of the probe's sound beam, the more accurately the boundaries (and therefore the flaw area) can be determined by the flaw boundary method. If, however, the sound beam is relatively broad, the flaw area determined can substantially differ from the actual flaw area. Care should therefore be taken to select a probe which will give a sufficiently narrow beam at the position of the flaw.

Echo display comparison method

The echo from a small, natural flaw is usually smaller than the echo from an artificial comparison flaw, e.g. circular disc flaw of the same size. This is due, for instance, to the roughness of the surface of a natural flaw, or to the fact that the beam does not impinge on it at right angles. If this fact is not taken into account when evaluating natural flaws, there is a danger of underestimating their magnitude.

In the case of very jagged or fissured flaws, e.g. shrink holes in castings, it may be that the sound scattering occurring at the boundary surface of the flaw is so strong that no echo at all is produced. In such cases, a different evaluation method should be chosen, e.g. by using the backwall echo attenuation in the evaluation. The distance sensitivity of the flaw echo plays an important part when testing large components.

Attention should be paid here to choosing artificial comparison flaws which are as far as possible governed by the same "distance laws" as the natural flaws to be evaluated.

The ultrasonic wave is attenuated in any material. This sound attenuation is very low, e.g. in parts made of

fine-grained steel, likewise in many small parts made of other materials. However, if the sound wave travels larger distances through the material, a high cumulative sound attenuation can result even with small attenuation coefficients. There is then a danger that echoes from natural flaws appear too small. For this reason, an estimate must always be made of the effects of attenuation on the evaluation result and taken into account if applicable.

If the test object has a rough surface, part of the incident sound energy will be scattered at its surface and is not available for the test. The larger this initial scattering, the smaller the flaw echoes appear, and the more errors occur in the evaluation result.

It is therefore important to take the effect of the test object's surfaces on the height of the echo into account (transfer correction).

Limitations of software

Based on the present state of the art, software cannot be completely free of faults. Any software-controlled equipment should therefore be checked before and after use in order to ensure that the necessary functions operate perfectly.

Always carry out a check by means of a calibration standard both before and after the test.

1.3 The USLT USB

The USLT USB is an ultrasonic instrument for manual testing. The consistent use of large-scale integrated components enables to carry out essential functions of the system in a purely digital and consequently reproducible mode.

The gates can be set either to echo flank or peak value of the positive or negative half-wave to make the measurement settings easier with wall thickness measurements.

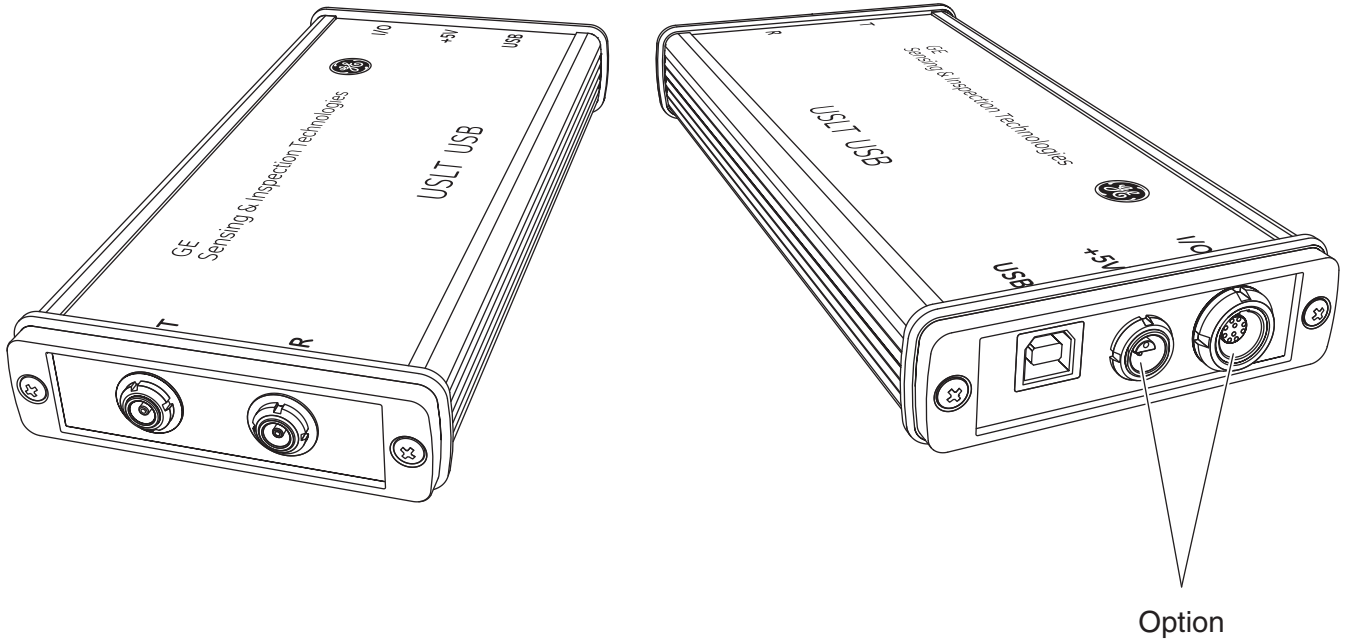
The optional encoder interface allows the connection of an encoder.

The provided application software USLT 2000 runs under the powerful operating system Windows XP.

Versions

The USLT USB is available in two versions:

- with two probe sockets,
- with two probe sockets, encoder interface and connector for additional power supply.



1.4 Standard package

Product code	Description	Order No.
USLT USB	USLT USB box without encoder interface, incl. USB cable B-A, product CD USLT2000, operating manual (German and English), manufacturer's certificate	36 752
USLT USB IO	USLT USB box with encoder interface, incl. USB cable B-A, power supply, product CD USLT2000, operating manual (German and English), manufacturer's certificate	36 751

1.5 Required accessories

Product code	Description	Order No.
USLT IO Cable	I/O cable, LEMO-1B plug with open end cable, for connecting an encoders to the USLT USB with encoder interface	36 692

1.6 Spare parts requirements

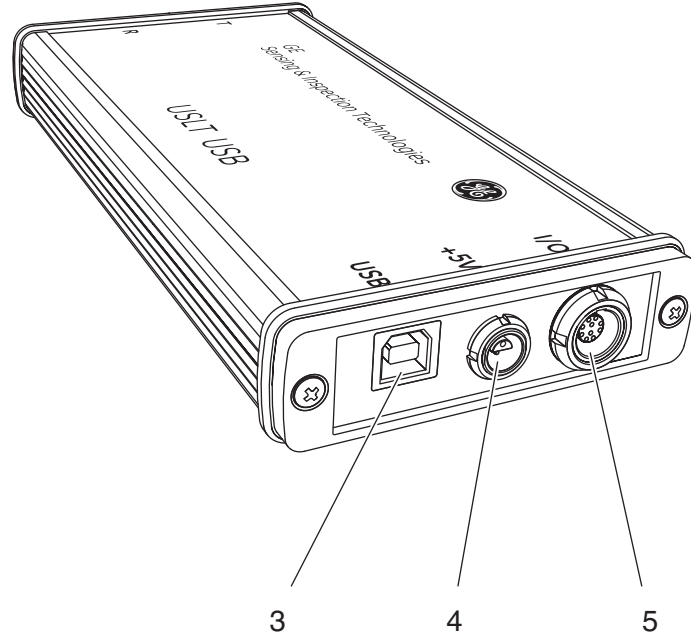
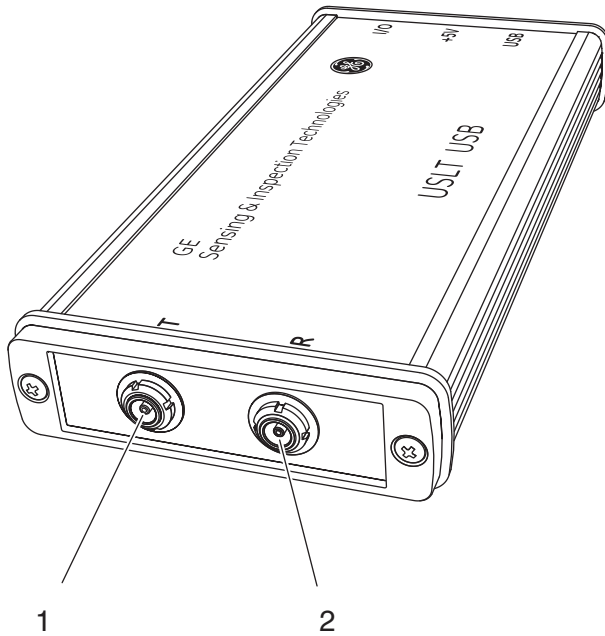
Product code	Description	Order No.
	Unit complete	
	USLT USB Box	36 696
	ULSL USB Box with I/O	36 685
	PCB	
	PCB, main USLT USB	36 697
	PCB, main USLT USB with I/O	36 668
	Connector LEMO TRIAX 00	18 183
	Spacer for LEMO TRIAX 00	36 659
	Connector USB Type B	109 216
	Connector LEMO 0 2 p. (USLT USB I/O only)	109 217
	Connector LEMO 1 10 p. (USLT USB I/O only)	109 215

Product code	Description	Order No.
	Cabinet	
	Profile, aluminium, black (cabinet)	109 251
	Adhesive label USLT USB	36 698
	Front plate USLT USB	36 686
	EMC gasket (Front plate)	109 252
	Washer, red (Receiver)	35 651
	Washer, black (Transmitter)	35 652
	Rear panel USLT USB	36 699
	EMC gasket (Rear panel)	109 252

Product code	Description	Order No.
Miscellaneous		
	Cable, USB A/B, Y-Cable, 1 m	109 420
	I/O cable (Plug with cable with open ends)	36 692
	Power supply +5 V (USLT USB I/O only)	36 761
	Remote control, transmitter	36 818
	Remote control, receiver, ext. USB	36 830

Installation and operation **2**

2.1 Overview of instrument



- 1 Lemo 00 TRIAX socket **T**,
for connecting the transmitter probe
- 2 Lemo 00 TRIAX socket **R**,
for connecting the receiver probe
- 3 USB interface type B **USB**,
for connecting the computer
- 4 LEMO 0S connection **+5V**,
for connecting the power supply unit for the
power supply of the encoder
- 5 LEMO 1B connection **I/O**
for connecting the encoder

 **Note:**

The figure shows the USLT USB with optional encoder interface. The connectors **4** and **5** are not available on the USLT USB without encoder interface.

2.2 Installing the device



Attention:

Ensure the USLT USB is placed on a stable flat surface.

The device is intended for use indoors or in housings. Select a suitable location for installation that guarantees to meet the environmental conditions. The ambient temperature must be between -10 and $+50$ °C. The relative humidity must not exceed 95 %.

The USLT USB generates heat during operation, ensure that there is adequate ventilation and enough clearance between the unit and heat-sensitive objects or equipment.

Avoid direct heat, heat accumulation and overheating by direct sunlight or other heat sources. Ensure there is adequate and unhindered circulation of air, especially in housings or cabinets.

The USLT USB is shock resistant according to EN 60 068-2-27 and vibration resistant according to EN 60 068-2-6.

Ensure that no dirt or only dry, nonconducting dirt appears on the instrument, in particular at the connectors. The following conditions must be met at installation:

- The instrument must not show any sign of moisture condensation inside. Moisture and condensation water reduce the functional safety. Avoid quick or intense changes in temperature. If the instrument has been exposed to temperature change of more than 10 °C, you must wait two hours or three before switching-on the USLT USB.
- No iron or steel dust must penetrate into the instrument, in particular at the connectors. Apply protective caps on the connectors that are not in use.

2.3 Software



Attention:

Install the USLT 2000 software **before** connecting the USLT USB to a computer for the first time. The device drivers will be installed after a connection is established between the computer and USLT USB.

Subsequent to the installation of the USLT 2000 software you will need a valid license file to start the program.

General information

You will find basic information on how to use the Windows operating system in the documentation for Windows and in the Windows Online Help (Start – Help).

Important information on how to use the computer is given in the documentation for your computer.

Installing the software USLT 2000

You must install the USLT 2000 software before connecting the USLT USB with a computer for the first time.

The software only has to be re-installed in the case of a system failure, or if you want to install the software into another directory or on another computer.

To do this, you have to carry out an uninstalling process. The program has also to be uninstalled if you want to remove it from your hard disk.

For installing and uninstalling you need the software CD included in the equipment supply.

Update USLT 2000

If you install an update, don't delete the old version. Install the new version in the directory suggested by the installation program. The old program version is automatically deleted; the old database is maintained and automatically copied into the correct directory.

Installation procedure

For a new installation or an update, please follow the procedure outlined below.

Normally, installation covers the complete package for USLT 2000, consisting of the USLT 2000 user-interface and UltraWORKS (interface between user-interface and ultrasonic functions).

Note:

Ensure your computer has adequate storage space (about double the database size).

Proceed as follows:

- Switch the computer on. Windows will start.
- Close all applications (including active drivers).
- Insert the software CD into the CD drive. The installation program will start automatically.

Follow the instructions of the installation program.

During the program run, please observe the following:

- Enter your name and the name of your company in the window **Registration**.
- When installing the update you will be asked whether you wish to convert the old database. Normally you would want to keep and process your data, therefore select **Yes**. The database is then automatically converted and can be used in the updated version.
- If you select **No**, then a new empty database will be created. This can be any time independent of the installation. To do this, refer to Section **New Database**.

 **Note:**

If during an update the program was installed in another directory as before, links as the desktop icon (or other programs) must be correspondingly adjusted.

New database **Attention:**

If you wish to file a new database firstly save your old database (USLT2000.MDB) using another file name; otherwise it will be overwritten.

During installation, a file will be transferred into the installation directory to enable filing a new, empty database:

```
..\USLT2000\EMPTY_DB\USLT2000.MDB_EMPTY
```

If you wish to file a new database, rename the file USLT2000.MDB_EMPTY in USLT2000.MDB and copy it in the main directory (normally ..\USLT2000).

Uninstalling **Attention:**

With the uninstalling process the existing database is deleted as well; therefore ensure that your data are stored (refer to chapter **Data backup**).

Proceed as follows:

- Switch the computer on. Windows will start.
- Click the **Start** button in the Windows taskbar and choose **Settings – Control Panel**.
- Click **Software** and choose **Add/Remove Programs**.
- Select now the program **USLT2000** and then click the button **Add/Remove**.
- Follow the program instructions.

The USLT 2000 program is now automatically erased from the hard disk.

Finally, carry out the uninstallation sequence for UltraWORKS in the same way.

After the uninstalling process, the complete software is erased from the hard disk. Some temporary files may still exist.

Installing the drivers

Subsequent to the installation of the USLT 2000 software you will need to install the required drivers for the USLT USB.

- Connect the **USB** connector of the USLT USB with a free USB 2.0 interface of the computer by means of the USB cable included in the equipment supply. When Windows recognises the new hardware, a new window is opened to select the drivers.
- Select the driver file from the software CD. The driver installation will start automatically.
- When you are asked to restart the computer, confirm by clicking **Yes** in order to get the drivers activated.
- After you restart the computer, the software is ready to run.
- After successful installation remove the software CD from the CD drive.

2.4 Connection to the computer

Power supply and data interface

For power supply, configuration and operation the USLT USB must be connected directly to a computer (notebook, industrial notebook or desktop system). The connection is made by means of a USB Y-cable (USB A type plug on USB B type plug).

The direct connection of the USLT USB to a network by means of a switch or a hub is not supported.

- Connect the **USB** connector of the USLT USB with two free USB 2.0 interface of the computer by means of the Y-cable included in the equipment supply.



Attention:

If the power supply from a single USB 2.0 interface of the computer is sufficient for operation, a standard USB cable can be used (USB A type plug on USB B type plug).

2.5 Connecting a probe

All probes manufactured by GE Sensing & Inspection Technologies may be used in combination with the USLT USB, provided the suitable connecting cable is available and the operating frequency is in the range of 0.5 ... 20 MHz.

In addition, the dialog probes of GE Sensing & Inspection Technologies can also be connected, and they are automatically recognized by the USLT system. This requires the use of the probe connecting cables MPKL2X or SEKL2X.

The probe connecting cable must be equipped with a LEMO 00 plug at the instrument end. Existing cables can also be used by means of a probe adapter.

The connector sockets for one or more probes are located on the front end of the USLT USB.

When connecting probes having only one transducer element, both connector sockets are equally suitable (connected in parallel) so that it does not matter which one of the two sockets is used.

The connectors for transmitter and receiver are labelled with **T** (= transmitter) and **R** (= receiver).



Attention:

Wrong connections lead to a mismatching which may result in considerable power losses or distortions of the echo waveform.

When connecting a dual-element (TR) probe (having one transmitter element and one receiver element), or two probes (of which one is transmitting and the other one receiving), attention should be paid to the following assignment:

- Connect the transmitter element with the socket **T**.
- Connect the receiver element with the socket **R**.

2.6 Connecting the encoder



Attention:

Use only encoders recommended by GE Sensing & Inspection Technologies.

Encoder connection

At the USLT USB with encoder interface the connection to the encoder is made by means of the connection **I/O**.

Cabling and contact assignment depend on the encoder used, the environmental conditions and the application requirements. Therefore a prefabricated cable is not provided with the USLT USB.

The total length of the line link must not exceed 3 m.



Note:

For contact assignment of the **I/O** connector see Chapter 5 **Technical Specifications**.

Encoder power supply

For encoder operation in combination with the USLT USB an additional power supply by means of an external power supply unit is required.



Attention:

Check the mains voltage before connecting the power supply unit. Use only the power supply unit recommended and provided by GE Sensing & Inspection Technologies. The power supply unit is intended for indoor use only.

Do not connect the power supply unit to the mains until the connection to the USLT USB has been made.

The power supply unit is delivered with two different power cables – for Euro and USA standard. Connect the power supply unit to the LEMO 0S connector **+5V** on the front end of the USLT USB.

- Push the LEMO plug of the power supply unit into the **+5V** plug receptacle until it snaps into place with a clearly audible click.

- When pulling off the Lemo plug, withdraw the metal bushing on the plug first in order to release the lock.

Subsequently plug the power supply unit into a power outlet. The power supply unit is automatically set to any AC voltage between 100 V and 230 V (nominal voltage).

2.7 Remote control

The wireless remote control is not included with the standard package of the USLT USB. It is available as an accessory. The remote control consists of a transmitter with eight keys and a USB receiver.

The inspector can easily operate the inspection-relevant functions via a wireless radio control if required. The user has eight keys at his disposal to which he can assign the functions most frequently required, e.g. gain setting, A-scan freeze on/off, saving.

Thanks to the radio link, the remote control is non-directional; it has a radius of approx. 10 meters.

The remote control is automatically recognized. Several remote control systems can also be simultaneously operated without any mutual interferences. This independence of several remote control systems is automatically ensured by a special code.

Notes:

Remote control operation can be influenced by external interference (e.g. welding robot in the production line). Therefore, especially before storing, check to see whether the transmitted commands (e.g. evaluation) have been correctly recognized by the program.

The assignment of the transmitter (coding) to the required receiver (USLT 2000 system) is made after the system start-up by pressing the keys 1 and 8 of the transmitter unit simultaneously.

It must be ensured at this moment that no other USLT 2000 systems are waiting for a receiver assignment in the neighborhood, otherwise several instruments are controlled by one transmitter.

Assigning the remote control to a receiver

- Push the receiver unit of the remote control into a free USB socket of the computer.
- In order to establish the first-time connection hold the remote control as close as possible to the desired receiver unit.

- Press key **1** of the remote control, hold it down and press key **8** simultaneously for approx. 2 seconds. The transmitter will be assigned to the receiver.

After this, the remote control is ready for operation.

Key assignment

You can assign program-specific function to the eight keys of the radio remote control.

- Select **Options** in the menu **Configuration** and then click the tab **Function keys**.
- Select the program function you want in the respective list box for the keys and activate the appropriate tag.
- Confirm the changes you have made with **OK**.

2.8 Power on/Power off

Starting the operation

The USLT USB does not have a power switch. When connected to the computer, the USLT USB is powered by means of the USB cable as soon as the computer is switched on.

- Check the connection between the USLT USB and the computer to ensure both plugs are secured.
- Power on the computer.
- Start USLT software.

After start of the software the USLT USB is ready for testing operation.

Closing the application and powering off



Attention:

Always close the program first before switching off the computer. If you turn off the computer while the program is running, you may lose your data.

- Choose the menu item **Close** in the menu **File**. All settings are stored and the program is exited.
- Click the button **Start** in the taskbar and choose the menu item **Shut Down** to shut down the operating system Windows.
- Switch off other devices (e.g. power supply unit) and the computer if required.

2.9 Starting the USLT 2000

License

With the first-time start of the software USLT 2000 you will be asked for a valid license.

To obtain the license key you must send the MAC address (unique physical address) of one of the network interface cards installed in the computer to GE Sensing & Inspection Technologies. After this you will be given a license file valid for the corresponding computer.

The MAC address normally consists of six groups of two hexadecimal digits. You can detect it as follows:

- Switch on the computer. Windows will start.
- Click the button **Start** in the Windows taskbar and choose **Programs – Accessories – Command Prompt**. The window **Command Prompt** will be opened.
- Enter the command **ipconfig/all** and press the Enter key. Depending on the number of installed

network interface cards one or more MAC addresses will be shown, each in the parameter line **Physical Address** (example: 00-14-22-48-57-BB).

- Send the detected MAC addresses to GE Sensing & Inspection Technologies. After this you will be given a license file.
- Copy the license file **license.txt** into the installation directory **USLT2000**.



Attention:

The license is only valid for a single computer and can not be assigned to others.

Starting the program

To enable a quick start of the USLT 2000 software, the icon for the USLT system has been installed on the Windows desktop.

- Switch the computer on. Windows will start.
- Click the button **Start** in the Windows taskbar and choose **Programs – USLT 2000**.

The program starts and you will see the program interface with the A-scan and different parameters as well as adjustment elements.

Closing the operation

- Choose the menu item **Close** in the menu **File**. All settings are stored and the program is exited.
- Click the button **Start** in the taskbar and choose the menu item **Shut Down** to shut down Windows.

2.10 Basic settings



Attention:

Before using the USLT 2000, you always have to check the following setting:

- Call **Regional Settings** under Windows Control Panel.
- Make sure that the characters for Decimal point and Thousands separator have different settings. Otherwise there may be calculation errors in the system.

Selecting language

The USLT is available in multiple languages. All program texts are displayed in the selected language, and the test report, parameter list and A-scan information printouts are likewise made in the selected language.

- Select the menu item **Dialog** in the menu **Setup**. A menu containing the selectable language options

is displayed. The currently selected language is marked with a tick.

- Click the language of your choice. The selected language is marked with a tick. All texts are now displayed in the selected language.

Selecting units of measurement

The units of measurements can be defined for the USLT 2000 operation.

- Select the menu item **Units** in the menu **Setup**. A menu containing the selectable units is displayed. The currently selected units are marked with a tick.
- Click the units of your choice. The selected units are marked with a tick and changed accordingly in the program.

2.11 Data backup

With normal program exit, the last setup is saved (under Job\Instrument\Last instrument setting); all data are filed in the database of the system (USLT2000.MDB). The adjustment parameters are restored when the system is restarted.

It is recommended to regularly save the data generated using the USLT 2000 to external data media (e.g. CD-ROM). In addition to the quick recovery of the instrument setting in the case of a computer crash possibly occurring, this method allows you to create a library for different tests which can be loaded into the corresponding USLT 2000 system whenever necessary. We recommend the Windows **Backup** tool for data backup.

A backup copy of the following file should regularly be created:

USLT2000.MDB

Saving data to external data media



Attention:

Quit working with the USLT 2000 before starting with the data backup.

- Close the program USLT 2000.
- Insert an empty CD into the drive of the computer.
- Click the **Start** button in the Windows taskbar.
- Choose **Backup** in the folder **System Tools – Accessories**.
- Follow the instructions of the Backup program.

Uploading data from external data media

 **Attention:**

When uploading files to the computer, an overwrite will occur if any files of the same name already exist. Quit working with the USLT 2000 before uploading any data.

- Insert a CD containing backup files into the drive of the computer.
- Click the **Start** button in the Windows taskbar.
- Select **Backup** in the folder **System Tools** – **Accessories** and click the **Restore** tab.
- Follow the instructions of the Backup program.

 **Attention:**

After starting the USLT 2000 with a new database, the correct function has to be checked.

2.12 Online Help

Context-sensitive Help

The USLT 2000 software contains a context-sensitive Help. This is the fastest way to get information on individual elements of the program interface. The context-sensitive Help is always active and does not have to be started separately.

Proceed as follows:

- Start the USLT 2000 software. You will see the program interface. In the title bar of each window you will see the ? symbol at the right.
- Click ?. The mouse pointer now also receives a ?.
- Move the ? mouse pointer to an element of the operator interface, e.g. a button.
- Briefly press the left mouse button. A window containing information on the program element where the mouse pointer is placed appears.

Starting the Online Help

The Online Help for USLT 2000 consists of several chapters and individual sections just like a manual. To view the required information, you have to start Help, choose a topic, and then have the page displayed in the Help window.

Proceed as follows:

- Start the USLT 2000 software. You will see the program interface.
- Click the button with the question mark. The window for selecting the Help topics appears.
- Choose a Help topic as in the General Help for Windows.

Note:

In all windows or panels, please pay attention to the information on how to select and display Help topics.

After a topic has been selected, the Help window for displaying the selected page appears. Every Help window has a button bar. By clicking one of the buttons you can move within the Online Help, e.g. to the

list of Contents or to the next section of a sequence of topics.

Buttons:

Contents Back to Contents

Index Move to Index

Back Back to the page that was opened last

Print Print currently active page

<< Move to the previous section of a sequence of topics (not always active)

>> Move to the next section of the sequence of topics (not always active)

Some elements of a Help page refer to related Help topics. These cross-references are highlighted green and underlined in the text. Other cross-references are made via icons or buttons. When you move the mouse pointer over to a cross-reference, the mouse pointer is shown as a pointing hand.

In that case you can press the left mouse button and call another Help topic.

Starting the Online Help without the USLT software

The Online Help can be opened without activating the program itself beforehand. To do this, you have to call the Help file.

Proceed as follows:

- Click the icon of the Help file on the Windows desktop,
- or
- start the Windows-Explorer and click the icon of the file USLT2_D.HLP in the folder C:\USLT2000.

The Online Help will start and windows will appear for selecting the Help topics.

Printing

All information displayed in the Help window may be printed via a connected printer.

Proceed as follows:

- Choose a Help topic. The Help window appears, and the required page is displayed.
- Click the **Print** button to print out the page.

Printing a complete chapter

You can print out individual chapters of the Online Help completely if required.

Proceed as follows:

- Click the **Contents** button of the Help window. The window **Help Topics** appears.
- Click a chapter (book symbol) or a topic (? symbol) and then the **Print** button.

Note:

All topics that can be clicked in the list of Contents are printed out (individually or as a book). If there are links (underlined words or phrases) to other topics on the printed pages, they are not automatically included in the printout. If you want to have a printout of them, click the topics and print out the displayed pages one by one.

Individual inspection reports **3**

3.1 Documentation of jobs and results

New from USLT version 2.0 or higher

From version 2.0 or higher, the USLT 2000 enables users to complete individually created Excel files with the data from the jobs and results.

To generate ultrasonic inspection reports, users can use the new report generator. As MS Excel allows to merge graphics as well, you can also include the A-scans from the results besides your company logo, a drawing or a photo of the test object.

Prerequisites

To be able to use the new functions for creating individual inspection reports, the program Microsoft® Excel 2000 must be installed on the same computer that the program USLT 2000 is used on. Earlier versions of the Microsoft Excel application are not supported.

Database structure for jobs and results

The USLT database is divided into two main areas:

1. instrument settings
2. jobs

An **instrument setting** represents a data set containing the complete setup of the USLT 2000, including the A-scan. An instrument setting is described by the following data or entries:

- Setup name
- Comment
- Name of the person who created the instrument setting
- Date of creation (is automatically added by the system)
- Time of creation (is automatically added by the system)

The instrument settings can be used to save an optional number of defined instrument settings or ultrasonic test results which can then be restored for reuse (repeat test) at a later date, or for a printout.

A **job** is created if one or an optional number of results (= ultrasonic single results) should be recorded using basically the same instrument settings.

A job is described as follows:

- Job name
- Comment
- Name of the instrument settings used
- Name of the person who created the job
- Date of creation (is automatically added by the system)
- Time of creation (is automatically added by the system)

The decisive fact in this regard is that a job is always linked with an (existing) instrument setting. This means that the corresponding instrument setting is automatically loaded when working with the job, and that the operator has only a few possibilities left to operate the instrument functions.

 **Notes:**

- An instrument setting can be used for one or several jobs.
- A job, however, can only be linked with one instrument setting.
- When creating jobs, the instrument setting that was last generated is automatically recommended for the linkage.
- If a linked instrument setting is deleted, all jobs using this instrument setting are also automatically deleted – after a warning – including their results.
- Jobs can only be created or deleted
 - a) if the password access of the USLT 2000 is deactivated, or
 - b) if the **Master** has logged in using his name and password at program start.
- An operator cannot create or delete any jobs if password access is activated.
- An operator can only activate or deactivate existing jobs if password access is activated.

Recording inspection data (results) in a job

A job must be activated to be able to use it. In this connection, the instrument setting linked with that job is automatically loaded. At the same time, the display changes to zoomed A-scan representation, and the tabs of instrument settings are deactivated. The inspection can start. If the operator has found an echo indication and would like to store (document) it, he can

- adjust the gain in order to have an optimum display of the echo signal,
- freeze the A-scan,
- if necessary, move the evaluation gate to the echo to be evaluated,
- enter a comment, and
- save the result.

If required, the operator can change back to the normal (small) A-scan display. It is then possible to additionally enter the coordinates (of the flaw, or of the probe), the scanning direction, and the recording length of the indication on the tab **Evaluation**.

As long as the job is active, another result for the job is saved every time the function key **Save** is operated, until the job is deactivated again. The linkage with the instrument setting is now canceled again, and all tabs for the instrument functions can again be accessed and operated.

Viewing jobs and results

In the window **Jobs and results**, you can view all previously processed jobs and their results on the tab **Result**. You can select the required job there by clicking it with your mouse button (highlighted in blue). You will then see the corresponding results in the lower part of the tab.

After selecting the required result, you can view it by clicking the button **Load**, and print it out if necessary.

3.2 Creating individual inspection reports as Excel files

Individual inspection reports in the form of an Excel file can be created on the basis of the jobs and their results. In this process, the user can use almost all design features presented by the program Microsoft® Excel 2000. Individual inspection reports are created in three steps:

1. Creation of a report form (template) using MS Excel, including
 - the page layout,
 - the merging of graphics (if necessary)
 - the formatting of cell contents and border lines
2. Assignment of parameters and values from USLT 2000 to the cells of the Excel report form = Form definition
3. Completion of the form using the data from the selected result(s) = Generate report

Creating a report form

Before starting to create a report form, you have to decide on whether your form should present the data of only a single result, or of several jobs/results.

An inspection report for a single result can only record the data of one result, the job data, and the corresponding instrument setting.

An inspection report for several results must have clear data structures for instrument settings and the job (job data), and for the results (result data). For example, the spreadsheet areas where job and result data should be located must be defined here, as well as the mode in which these areas should be repeated, if necessary, if data from different jobs with their results are meant to be input.

Inspection report for a single result

This type of report is very simple as to its layout and use. The example of the file *Single-report.xls* shows a typical layout of this report type. It consists of a so-called **header area**, where the job-related data are located, the **setting area**, with the ultrasonic setting

data, and the **result area**, with the A-scan on the basis of the result, and all relevant test results.

This blank form (template) can be used for the documentation of an optional number of results from the USLT database. The blank spaces of the form are filled out either by hand or automatically using the selected result, according to your definition when creating the form.

 **Note:**

Please note that the result spaces for data from the USLT 2000 have already been formatted accordingly. Spaces for USLT data must not be combined using several cells.

Ultrasonic – Inspection report										
Order:										Object drawing/Photo
Installation:										
Object:										
Object Thickn.:							mm			
Location:										
Date:										
Testing Co.:										
Order No.:										
Drawing No.:										
Material:										
Object diameter:							mm			
Mat. Velocity:							m/s			
Surface:										
Test Spec. :										
Instrument:						USLT 2000			Instrument Setup:	
Cal. Range:						mm		Comment:		
Total Gain:						dB		Mat. Velocity:		m/s
Probe:								Frequency:		
Probe Serial No.:								Rectification:		
Reference Refl.:								Probe angle:		°
Registr. Curve:						mm		Diam. Reference Refl.:		mm
Transfer correction:						dB		Amplitude Correction:		dB
A scan										
Result:										
s =		mm		Direction:				Operator:		
a =		mm	$\Delta V =$		dB			$G_{\text{actual}} =$	dB	
t =		mm	ERS =		mm			$G_{\text{refl}} =$	dB	Date
L =		mm	$\Delta L =$		mm			Q =	mm	Time:
Comment:										

Example: Single-report.xls

Form definition

The form definition determines the spaces of the Excel spreadsheet in which the function values and readings of the USLT 2000 should be entered. The function values and readings that are available are listed in the corresponding operation sequence step and dragged to the selected form by means of the mouse. The data entered appear in blue characters in the form:

The finished form definition is stored in the USLT database using the name specified by you, and is from then on available for the generation of completed inspection reports.

Result:										
s =	A: S. path	mm	Direction:	Result Scan direction	Operator:	Result Operator				
a =	A: Surf. dist.	mm	$\Delta V =$	A: [dB] Ampl.DAC	dB	$G_{actual} =$	Result actual gain	dB		
t =	A: Depth	mm	ERS =	A: ERS	mm	$G_{total} =$	Result total gain	dB	Date:	Result Date
L =	Result X-Coordinate	mm	$\Delta L =$		mm	Q =	Result Y-Coordinate	mm	Time:	Result Time
Comment:		Result Comment								

Detail from the form definition

 **Note:**

Existing form definitions can be edited at a later time. In this connection, you will see the cells which already have function values from the USLT 2000 assigned to them (blue). New links, added by you, appear in red.

Edited form definitions can be saved using a new name, or you can overwrite the previous version.

**Attention:**

You should **only** change the **cell format** of the Excel blank forms (templates)!

Apart from this, please pay attention to the following exceptional features:

Any **insertion** or **deletion** of cells, rows, or columns has fatal consequences with regard to the assignment of USLT functions. They have been assigned to the row and column numbers of the Excel spreadsheet in the form definition. The values are inserted at the wrong positions if the spreadsheet is subsequently edited!

It is not allowed to **combine** several cells if a USLT value should be entered there. Cells containing cell descriptions, or ones edited by the operator may, however, consist of connected cells.

If a blank form has been modified, it should be saved using a new name, and consequently create a new form definition.

In the comment space of the USLT, long texts including line feeds can be entered. You should nevertheless already keep in mind at this point that the space in the Excel spreadsheet is often limited for these entries. If you allow a line feed for the destination cells in the Excel spreadsheet in the case of long comment texts, the height of the entire row is automatically adjusted to the text length consequently leading to an extension of the complete inspection report. An inspection report planned to fit on one page is then possibly printed out on two pages.

Line feeds in the comment spaces of the USLT 2000 are shown by a special character in the Excel sheet.

3.3 Generating an inspection report for a single result

An inspection report is generated on the condition that you have created at least one form definition and that at least one job with a result has been saved to the database of the USLT 2000. The individual steps are as follows:

1. When calling the function **Generate report**, you are firstly requested to select the **Form definition** that you would like to use.
2. In the following step, you will see the **Excel template** on which this form is based and the **Destination file** used for the final report.

If you do not enter any new name here, or if you change the directory, the report generated in the Excel file will be filed in the directory `C:\KK\USLT2000\REPORTS` using the name *report.xls*. If applicable, the file already existing there will be overwritten after a warning.

3. You should now choose the job containing the required result from the list of **Jobs**.
4. After finally selecting the **Result**, confirm with **OK**, and the report is automatically generated without opening the Excel application during this.
5. In order to view or print out the inspection report generated in this way, you have to start Excel and load the file. We recommend that you enter the directory path of your reports in the program options of Excel for this purpose. To print out the report, you have to open the corresponding Excel file. If necessary, you can enter more data in the file before printing it out. Don't forget to save the finished report file once again so that the current additions are not lost.

 **Note:**

We recommend that you create a directory structure on the hard disk of the USLT system for the reports and blank forms that you have generated to make it easier to find and assign finished inspection reports at a later date.

If a network interface is available, all required files can be transferred to other systems archived, or sent by e-mail.

3.4 Multiple inspection reports

Multiple inspection reports contain the data of several results, or even of several jobs. It will then be possible e.g. to represent the test results of a job in tabular form, and to administer them in an Excel spreadsheet together with the instrument data of the job. The steps for the realization of such a documentation are:

1. As with a single report, a template (Excel spreadsheet) is first designed which, unlike the single report, now consists of several data areas:
 - area for general information (title, company logo, general header data)
 - area for information about the job which is repeated as many times as there are jobs to be represented (form area for job data)
 - area for information based on the results of the job which has to be within the area for the job data and is repeated as many times as there are results to be represented (form for result data)

2. As data basing on several jobs/results should be represented in one Excel spreadsheet, you have to define the number of times the data areas should be repeated in the Excel spreadsheet, and the mode in which they should be arranged.
3. This is followed by the assignment of function values and readings from the USLT 2000 to the cells (form definition).
4. Finally, the inspection report is completed with the required data of the jobs and results. The multiple inspection report is finished and can be printed out if required.

Organization of Excel sheets

An Excel file consists of one or several spreadsheets having a maximum of 65536 (216) rows and 256 (28) columns. Each cell, described by its row and column number, can contain any information required, e.g. text, numbers or graphics. Moreover, a size and formatting is assigned to each cell. The following default data apply to the basic setting:

- Cell size: 80 pixels wide, 17 pixels high
- Display of text without line feed, i.e. text which is longer than the cell width overlaps the right-hand cell(s) if there are no contents there. Text position: left-justified, below
- The display of numbers is without numerical format, right-justified
- Graphics are displayed in their original size and overlap neighboring cells if necessary

For a special display of the cell contents, another type of formatting is usually necessary. This refers to the cell size, the borders, and the type of display of text and numbers. In addition, you have other design options for the display of text, such as font, font size, color, line feed, and positioning.

 **Note:**

You will find detailed information on formatting in the documentation of MS Excel 2000.

Arrangement of areas for job data and for result data

When creating a template, you also have to adjust the size and arrangement of cells in addition to the cell formatting with regard to the print area of a printable page in order to avoid accidentally printing out the finished inspection report on two or more pages.

As the USLT 2000 can be used to process an optional number of results from an optional number of jobs in an Excel file, special importance is attached to the arrangement of data areas from the jobs and results in the Excel spreadsheet.

The following tools for the design of multiple inspection reports during form definition (**Create form**) at your disposal:

1. Determination of the **Area for job data** (starting cell = top left-hand cell, number of columns and rows)
2. **Arrangement of areas for job data** if more than one job should be documented: in cascading mode or tiled next to each other.

3. **Maximum number per spreadsheet** indicates the number of times the area for job data is repeated in a spreadsheet if several jobs should be documented.
- 0: An unlimited number of areas can be created for job data per spreadsheet.
 - 1: A separate spreadsheet is created for each job in the Excel file in which the job area is documented once together with the corresponding results.
 - n: A separate spreadsheet is created for each job (n = number of jobs) in the Excel file in which the result areas are documented together with the corresponding results.
4. Determination of the **Area for result data** (starting cell = top left-hand cell, number of columns and rows). Note: The result area must be located within the job area.
5. **Arrangement of the areas for result data** if more than one result should be documented: in cascading mode or tiled next to each other.

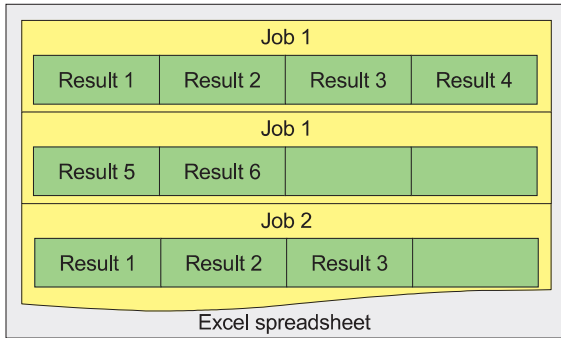
6. **Maximum number per job** indicates the number of result areas to be repeated in a job area if the selected job contains several results.
- 0: As many result areas are repeated per one job area in cascading mode or tiled next to each other as there is space in the job area. If the number of results is higher than the possibly existing space, a new job area is created containing the other result areas.
 - 1: The job area is also repeatedly displayed for each result in cascading mode or tiled next to each other in a spreadsheet.
 - n: n result areas are documented together with the job area in cascading mode or tiled next to each other in a spreadsheet.

The following pages show examples of the options described above.

Example 1

Number of jobs per spreadsheet = 0, cascading
 Number of results per job = 4, tiled

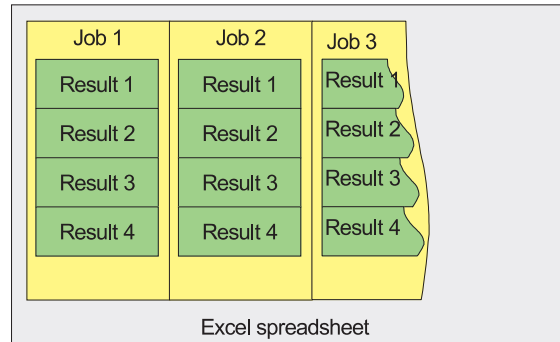
Job 1 contains 6 results; job 2 contains 3 results



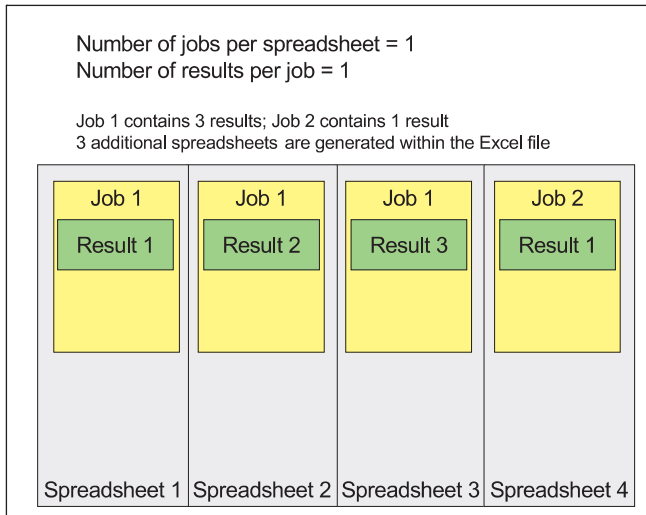
Example 2

Number of results per spreadsheet = 0, tiled
 Number of results per job = 4, cascading

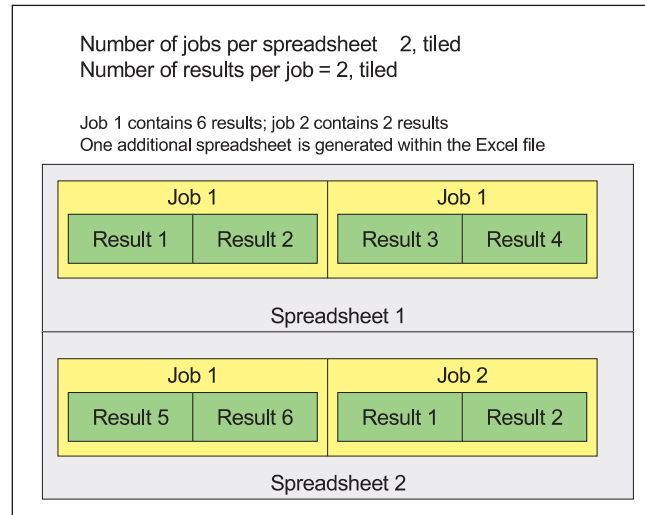
Job 1 contains 4 results; Job 2 contains 4 results
 Job 3 contains 4 results



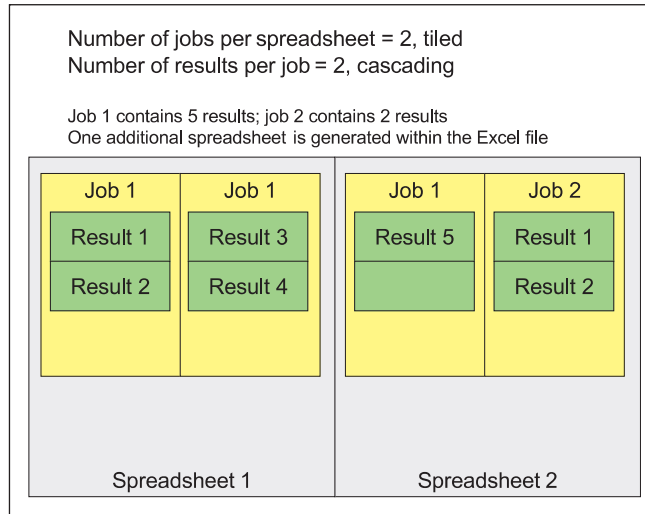
Example 3



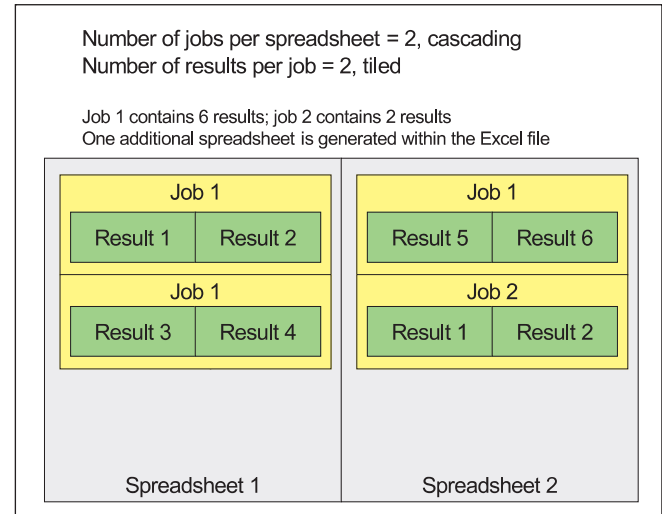
Example 4



Example 5



Example 6



Example: Multiple inspection report on a job

This report is the form most frequently used. It generally consists of

- a general area which describes the job and the test object, and which should not be displayed repeatedly,
- an area describing the parameters of the instrument, and finally,
- the result area where the data based on the different results of a job are mostly shown in tabular form.

Templates

Typical representatives of this report form are the templates **10R_e.xls** and **4R&Ascan_e.xls** in the template list.

In the case of the file **10R_e.xls**, the result data of a maximum of 10 results are arranged on the first page of the report together with the general data, and the data of the job. The result data are in this case located in one row each. If more than 10 results are selected for the documentation at a later date, a second (third,

etc.) page is generated on which the next 10 results are then repeated together with the job area. The ten result rows here contain the typical result data of a weld inspection without the corresponding A-scan.

The template **4R&Ascan_e.xls** contains, besides the general part, 4 identical result areas including the corresponding A-scan.

Creating the form definition

Please find below a step-by-step description of how to create a form definition taking the template **4R&Ascan_e.xls** as an example.

1. Choose the function **Create form** from the menu **Report**. The window **Form wizard – step 1: Select basis** appears. You have three options available now:
 - Editing an already existing form
 - Using an existing template
 - Creating a template and a form
2. Since the template already exists, choose the second option.

3. In the window **Form wizard – step 2: Select template**, click the button **Select**. As in Windows Explorer, you can now search for the template **4R&Ascan_e.xls** and mark it. Click the button **Open**. The name of the selected file is entered in the text box **Template for the new form**.
4. As you want to edit several results in this form, select Report on several inspections, and click the button **Next**. Two windows appear: on the left, **Form wizard – step 3: Data assignment**, and on the right, the open Excel file corresponding to the selected template **4R&Ascan_e.xls**.
5. The window **Form wizard – step 3** contains three tabs that you have to edit one after the other.
6. **Job data** tab: This is where you determine the area where job and result data are entered and the mode in which they are arranged if repeated:
 - The area can be determined by entering the top left-hand cell of this area in the space reserved for it, and by specifying below it the width (number of columns) and the height (number of rows). Alternatively, click the box **Select area in the table**. You can now mark the area in the Excel file using the mouse. The area is automatically entered in the corresponding cells. Select the area by starting from the cell A20, 13 columns wide, and 10 rows high. This is exactly the area in the Excel file where the data of the job results are entered later on. The job data should not be entered repeatedly.
 - After that, determine the mode in which the job data should be arranged if repeated. **In cascading mode** means that all data areas of every result are entered, together with the job data, following the previous area in downward direction. **Tiled next to each other** means that all data areas of every result are entered, together with the job data, to the right of the previous area.
 - If you enter **0** in the last cell **Maximum number per spreadsheet**, all data areas are entered in the first spreadsheet of the Excel file. If you en-

ter **1** here, a new spreadsheet (copy of the first one) is later automatically generated within the Excel file for every result, together with the job data, and the data are entered there if the tiled arrangement of job data was selected at the same time. If you enter **2** or a higher number (n) there, 2 (or n) results are arranged, together with the job data, in an Excel spreadsheet each.

 **Note:**

In the case of a multiple arrangement of result and job data in a spreadsheet, the cell names, the cell formats, and the column widths are not automatically copied to other spreadsheets. In such cases, you have to copy the same manually a corresponding number of times next to and below one another.

7. **Result data** tab: This tab is set up analogously to the tab **Job data**.

- Select the area in the Excel file where the result data should be entered, in this case again 13 columns and 10 rows, starting from the cell A20.
- Determine the arrangement of the data areas, in this case in cascading mode. If the arrangement tiled is selected, no new spreadsheets are created for other results but the areas are arranged next to each other in one spreadsheet.
- Specify 4 result data areas as **Maximum number per job**.

8. **Assignment** tab: In this tab, you will find all the functions and readings from the database of the USLT 2000 that you can use for the entries in the Excel file. To have a better overview of these functions, they are divided into 4 areas, and listed alphabetically there:

- **Instrument setting:** This is where you will find all the functions of the instrument setting used
- **Job:** This is where you will find all the data of the job

- **Result:** This is where you will find all the data of the result
- **Result set.:** This is where you will find the individual setup parameters that the operator can change when saving a result, e.g. the current gain value.

On the basis of these spreadsheets, you can now create a link with your form, i.e. move the mouse pointer to the required function, press the left mouse button, drag this function to the cell of your choice on the Excel form by keeping the mouse button pressed down and by releasing the mouse button again. The function name will then appear in red characters in the Excel spreadsheet. The destination coordinates of the function are entered in the assignment table in the left window, e.g. \$F\$12, which in this case means the cell F12 (the characters \$ mean that this is a fixed link).

If you have the result data displayed in the job area, they are only shown for the corresponding job area in the same cell, separated by a semicolon if different values exist.

You can create all other links required in the Excel file in the same way.

Below the tables, you will find the functions:

- **Detach cells:** In case your Excel file contains connected cells in which you want to enter a value from the database, you have to undo the cell connection using this function.
- **Delete:** You can use this function to cancel an assignment which is no longer required.
- **Delete all:** You can use this function to cancel all assignments.

Finally, click the button **Next**. You will then see the window **Form wizard – step 4: Save new form**.

9. Type the required name of the form definition. If this definition only refers to the selected template, it's advisable to select the same name here.

After you have confirmed your entry, all windows are closed, and you will again see the normal program interface of the USLT 2000.

Generating a report

After creating a form definition and saving it to the database, you can now generate inspection reports using the data of the stored jobs and their results. In this process, the data are automatically entered in the Excel files corresponding to your templates.

Proceed as described below.

1. Choose the function **Generate report** from the menu **Report**. The window of the same name appears.
2. Select the required form. At the same time, you will see in the window to the right the template that this form refers to.
3. Determine the destination file for the report. The file **Report.xls** is always automatically entered here in the USLT 2000 directory. If necessary, click the button **Select...** to select another file name or another directory.
4. Choose the jobs that you want to use for generating reports from the box **Select jobs**.
 - To do this, click the name of your choice, and then click the button **>**. The name of the job is selected and can now be seen in the right window half.
 - Click the button **>>** in order to select all jobs.
 - If necessary, click the buttons **<** or **<<** in order to again exclude single or all jobs.
5. Choose the results required for the documentation likewise from the box **Select results**.
6. If the order of jobs and results is important to the reports, you can sort them by means of the arrow buttons at the right-hand window edge.
7. If you have selected at least one job and one result, you can start generating the report. To do this, click the button **OK**.
8. After finishing the file, the window is automatically closed, and you can continue working with the USLT 2000.

Editing and printing inspection reports

The inspection reports generated as described above are stored as Excel files in the directory specified by you.

You can use the program Microsoft® Excel to further edit these reports, e.g. add or delete data or graphics.

You can print out the inspection reports from Excel as any other Excel files.

Care, maintenance, errors **4**

4.1 Cleaning the instrument

The care of the USLT USB is limited to the regular outside cleaning. Use a moist cloth to clean the housing.

If the instrument is very dirty, use a mild domestic cleanser.



Attention:

Do not use any methyl alcohol, solvents, or dye penetrant cleaners! The plastic parts can be damaged or embrittled by this.

Clean the power supply unit and the cables using only a dry cloth.

4.2 Maintenance

Check the pins of the connectors at regular intervals. The pins must not be damaged.

No other maintenance work is in principle required on the USLT USB.

4.3 Errors



Attention:

Do not open the housing of the USLT USB. The unit does not contain any user-serviceable parts. If you are unable to resolve a malfunction, please contact the technical service of GE Sensing & Inspection Technologies.

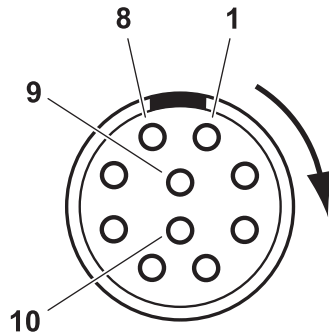
Repair work may only be carried out by members of authorized Service staff of GE Sensing & Inspection Technologies.

Technical specifications **5**

5.1 Specification of the interfaces

10-pin LEMO 1B connection I/O

Top view of the interface

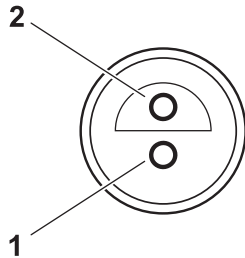


Pin assignment and signals

Pin	Signal	Function	Level	Direction
1	GND_EXT	ground encoder		
2	+5V_EXT	power encoder	+5 V \pm 5%	output
3	SAP	trigger pulse transmitter		output
4	INDX_Y	encoder Y index		input
5	Y_B	encoder Y phase B		input
6	PDF	test data release		input
7	X_A	encoder X phase A		input
8	X_B	encoder X phase B		input
9	INDX_X	encoder X index		input
10	Y_A	encoder Y phase A		input

2-pin LEMO 0S connection +5V

Top view of the interface

**Pin assignment and signals**

Pin	Signal	Function	Level	Direction
1	GND_EXT	ground encoder		
2	+5V_EXT_IN	power encoder	+5 V \pm 5 %	input

5.2 Specifications USLT USB

Enclosure

Storage temperature	-20 ... +60 °C
Operating temperature	-10 ... +50 °C
Dimensions (W × H × D)	25 × 183 × 85 mm; 0.98" × 7.2" × 3.35"
Weight	approx. 0.6 kg
Protection rating	IP 41
Shock resistance	max. 15 g, 11 ms, according to IEC 60068-2-27
Vibration resistance	5 ... 150 Hz, max. 2 g, 1 oct./min, according to IEC 60068-2-6 Fc

Connections

Probes	2 × LEMO 00 Triax
I/O interface	LEMO 1B, 10-pin socket
Power supply connector	LEMO 0S, 2-pin socket
USB	USB socket type B

Power supply

Operating voltage	5 V DC, via USB interface of the computer
Encoder power supply	external power supply unit 100 ... 230 V AC, max. 5 W
Power consumption	max. 2.5 W

Ultrasound

Pulser type	Spike pulse
Pulse repetition frequency (PRF)	max. 1,000 Hz, 3 settings (depending on the calibration range), continuous setting approx. 8 ... 1,000 Hz., no continuous pulse sequence.
Voltage	max. 400 V
Charging capacitor	1 nF, 220 pF
Initial pulse rise time	< 15 ns
Damping	50 Ohm, 1 kOhm
Probe mode (TR)	On/Off, through-transmission

Settings and evaluation

Calibration ranges	min. 0 ... 2.5 mm; 0 ... 0.1" (steel); max. 0 ... 9,700 mm; 0 ... 381" (steel)
Sound velocity range	500 ... 15,000 m/s; 0.02 ... 0.59 "/μs; integrated, editable material table
Pulse shift	-10 ... 1,500 mm; -0.39 ... 50" (steel)
Probe delay	0 ... 100 μs
Frequency range	0.5 ... 20 MHz (-3 dB); 4 filter ranges
Pulse repetition frequency	1 ... 1,000 Hz, automatically or manually adjustable
Gain	110 dB, adjustable in steps of 0.5/1/2/6 dB
Operating modes	pulse-echo, dual, through-transmission
Rectification	full-wave, positive half-wave, negative half-wave, RF display (up to 150 mm/5.9" steel)
Suppression	0 ... 90% linear
DAC/TCG	DAC with up to 16 curve points (reference reflectors), dynamic range 37 dB, maximum slope 6 dB/μs; 3 additional curves at adjustable dB distances, can be changed to TCG (time-corrected gain) mode (horizontal recording threshold); meets national and international test specifications

DGS	recording curves for all valid equivalent reflector sizes and probes with DGS capability; setting as DAC or TCG; evaluation in dB related to curve, ERS or class (JIS); sound attenuation and transfer correction; reference reflectors used: back-wall, circular disk reflector and side-drilled hole
Monitor gates	2 independent monitor gates, adjustable over the entire maximum calibration range; evaluation on the basis of A-scan at display refresh rate; gate alarm: off, coincidence, anticoincidence; visual and/or acoustic alarm
Distance measurement	individually selectable for each gate at the echo flank or peak, in the RF mode additionally at the zero transition of the increasing or decreasing echo flank – initial pulse and measurement point in gate A or B – measuring points: gate B – gate A (differential measurement)
Measurement resolution	sound path/time of flight: up to 12.6 mm: 0.01 mm; otherwise 0.2% of display width
Amplitude	0.5% screen height or 0.2 dB
A-scan digitization	1,024 × 1,024 pixels
Display freeze	static A-scan freeze, dynamic A-scan freeze (peak value, echo dynamics + real-time signal), average freeze via 2 to 32 ultrasonic pulse cycles
Echo comparison	simultaneous display of the currently active signal and a stored A-scan
Dialog languages	German, English, French, Spanish, Italian, Chinese, Japanes
Units	mm, inch, μ s




Data storage database for storing and managing instrument settings, test jobs and test results, including A-scan, DAC and alphanumeric comments, export to Microsoft Excel; limited only by the hard disk size

Encoder interface

Number 2 quadratures or puls and direction

Annex 6

6.1 EC declaration of conformity

EC Declaration of Conformity											
<p>Manufacturer:</p>  <p>GE Sensing & Inspection Technologies GmbH Robert-Bosch-Str. 3 50354 Hürth GERMANY</p>	<p>We, the undersigned, declare that the following instruments confirm with the essential requirements of the following directives:</p> <ul style="list-style-type: none"> • 2004/108/EC, EMC Directive The accordance with the requirements of the directive 2004/108/EC is proved by compliance of following standards: • EN 61000-6-2:2005 • EN 55011:2007 + A2:2007 Group 2, Class A <p>Remark: „Group 2 contains all ISM equipment in which radio-frequency energy is intentionally generated and/or used in the form of electromagnetic radiation for the treatment of material and EDM and arc welding equipment.</p> <p>Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.</p> <p>Class A equipment is only for use in industrial environment.“</p> <ul style="list-style-type: none"> • 2006/95/EC, Low Voltage Directive The accordance with the requirements of the directive 2006/95/EC is proved by compliance of following standard: • EN 60950-1:2001 + A11 										
<p>Name: Dipl. Ing. Johannes Büchler</p> <p>Position: Manager UT Development</p> <p>Signature: </p> <p>Name: Dr. Stefan Frank</p> <p>Position: Product Manager</p> <p>Signature: </p> <p>Date: 17.02.2009</p>	<table border="1"> <thead> <tr> <th colspan="2">Device:</th> </tr> <tr> <th>Type</th> <th>Id-No.</th> </tr> </thead> <tbody> <tr> <td>USLT USB IO</td> <td>036751</td> </tr> <tr> <td>USLT USB</td> <td>036752</td> </tr> <tr> <td>SpotChecker</td> <td>036763</td> </tr> </tbody> </table>	Device:		Type	Id-No.	USLT USB IO	036751	USLT USB	036752	SpotChecker	036763
Device:											
Type	Id-No.										
USLT USB IO	036751										
USLT USB	036752										
SpotChecker	036763										

6.2 Manufacturer/Service addresses

The instrument USLT USB is manufactured by:

GE Sensing & Inspection Technologies GmbH

Robert-Bosch-Straße 3
50354 Hürth
GERMANY

Phone +49 (0) 22 33 - 601 111

Fax +49 (0) 22 33 - 601 402

Should you detect an error on your product, inform your local GE Sensing & Inspection Technologies service indicating the error and describing it.

If there is anything special that you would like to know about the use, handling, operation and specifications of the instrument, please contact your nearest GE Sensing & Inspection Technologies representative or directly:

GE Sensing & Inspection Technologies GmbH

Service-Center
Robert-Bosch-Straße 3
50354 Hürth
GERMANY

or:

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50330 Hürth
GERMANY

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Fax +44 845 - 130 5775

USA

GE Sensing & Inspection Technologies, LP
50 Industrial Park Road
Lewistown, PA 17044
USA

Phone +1 717 - 242 03 27
Fax +1 717 - 242 26 06

6.3 Disposal

GE Inspection Technologies is an active participant in Europe's Waste Electrical and Electronic Equipment (WEEE) take-back initiative, directive 2002/96.



The equipment you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

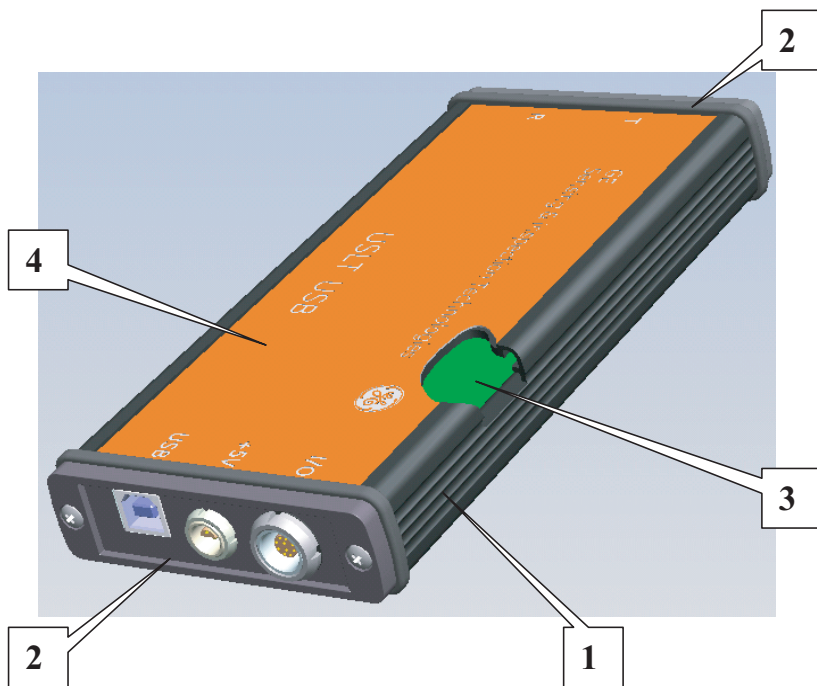
Visit

<http://www.geinspectiontechnologies.com/en/aboutus/ehs/index.html>

for take-back instructions and more information about this initiative.

General view of the device

In the following you find an instrument overview as well as guidelines and notes for recycling and waste disposal of the components.



Pos.	Recycling/materials code	Important information
1	Aluminium	Housing
2	Aluminium	Cover, front & rear end
3	EPG	Printed board
4	PVC	Adhesive label

Index **7**

A

Accessories 19
Address 38
Addresses 82
Ambient temperature 26

B

Basic settings 40
Boundaries of the flaw 14

C

Care 70
Changes in temperature 26
Cleaning 70
Clearance 26
Closing the operation 39
Connecting a receiver probe 25, 32
Connecting a transmitter probe 25, 32
Connecting the encoder 25, 33
Connecting the power supply unit 25
Connections 74

Connectors 70
Context-sensitive help 43

D

Damage 9
Data backup 41
Database 29, 42, 47
Data interface 31
Defects 9
Dialog probes 32
Dirts 26, 70
Disposal 84
Documentation 10, 47
Drivers 9, 30
Dust 26

E

Encoder 8, 33
Encoder interface 25
Encoder power supply 33
Environmental conditions 9
Errors 9, 70

Evaluation 14, 76
Excel 47
Excel files 50
Excel spreadsheet 52

F

Flaw evaluation 14
Form definition 52

H

Heat 26
Help window 43

I

Inspection reports 50
Installing 27
Instrument setting 41, 47

J

Jobs 47

K

Knowledge 11

L

Language 40
LEMO 0S connection 73
LEMO 1B connection 72
License 38
License file 27
Location for installation 26

M

MAC address 38
Maintenance 70
Manufacturer 82
Material 14
Multiple inspection reports 56

N

Network 31

- O**
- Online help 10, 43
 - Operating temperature 74
 - Operation 37
 - Operator 11
 - Overview of instrument 24
- P**
- Pin assignment 72, 73
 - Pins 70
 - Power Off 37
 - Power On 37
 - Power supply 8, 31, 75
 - Power supply unit 33, 70
 - Probe 32
- R**
- Receiver connection 32
 - Receiver remote control 35
 - Remote control 35
 - Repairs 70
 - Report form 50
 - Requirements 12
 - Results 47
- S**
- Safety information 8
 - Service 82
 - Software 8, 15, 27, 38
 - Solvents 70
 - Sound attenuation 14
 - Spare parts requirements 20
 - Specification interfaces 72
 - Specification USLT USB 74
 - Standard package 18
 - Starting the program 38
 - Storage 9
 - Storage temperature 74
- T**
- Technical specifications 71
 - Temperature variations 13
 - Template 50
 - Test equipment 11

Test object's material 13
Test result 11
Test specifications 12
Thousands separator 40
Training 11
Transfer correction 15
Transmitter connection 32
Transmitter remote control 35

U

Ultrasonic inspection 11
Ultrasound 75
Uninstalling 29
Unit of measurement 40
Update 27
USB Y-cable 31
Use 8, 9
USLT 2000 38
USLT USB 16

V

Versions 16

W

Wall thickness measurement 13
Windows Control Panel 40

