HAZARDOUS LOCATION SAFETY GUIDE

LLT series
Intrinsically Safe version
Laser level transmitter

Disclaimer

This Guide and any accompanying software are copyrighted and all rights are reserved by ABB Inc. This product, including software and documentation, may not be copied, photocopied, reproduced, translated, or reduced, in whole or in part, to any electronic medium or machine-readable format without prior written consent from ABB.

This document contains product specifications and performance statements that may be in conflict with other ABB published literature, such as product fliers and catalogs. All specifications, product characteristics, and performance statements included in this document are given as indications only. In case of discrepancies between specifications given in this document and specifications given in the official ABB product catalogs, the latter takes precedence.

ABB reserves the right to make changes to the specifications of all equipment and software, and contents of this document, without obligation to notify any person or organization of such changes. Every effort has been made to ensure that the information contained in this document is current and accurate. However, no guarantee is given or implied that the document is error-free or that the information is accurate.

ABB makes no representations or warranties with regard to the product and instructional and reference materials, including, but not limited to, all implied warranties of merchantability and fitness for a particular purpose.

ABB does not warrant, guarantee, or make any representations regarding the use, or the results of the use, of any software or written materials in terms of correctness, accuracy, reliability, currentness, or otherwise. ABB shall not be liable for errors or omissions contained in its software or guides, any interruptions of service, loss of business or anticipatory profits and/or for incidental or consequential damages in connection with the furnishing, performance or use of these materials, even if ABB has been advised of the possibility of such damages.

All equipment, software, and guides are sold as is. The entire risk as to the results and performance of the equipment and software is assumed by the user.

The software or hardware described in this document is distributed under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

Table of Contents

Page intentionally left blank

CHAPTER 1

General

This guide provides an overview of the safety aspects that must be observed for the installation and operation of the LLT100 series of laser level transmitters.

Product description

The LLT100 series of level transmitters is a modular range of field-mounted, microprocessor-based electronic transmitters relying on laser technology. It provides accurate and reliable measurements of liquid, solid, and slurry levels in even the most difficult and hazardous industrial environments. The LLT100 series can be configured to provide specific industrial output signals over a 4–20 mA current loop, via HART.

General safety information

The instrument has been manufactured in accordance with international and local regulations. It is deemed operationally safe. Additionally, it has been tested and was shipped from the factory in perfect working condition.

Only by observing all of the safety information can you minimize the risks of hazards to personnel and/or the environment. Full compliance with all general safety requirements must be observed during handling, installation, operation, and maintenance of the instrument.

The information contained in this safety guide, as well as all applicable documentation and certification, must be observed and adhered to in order to maintain the factory-deployed condition throughout the instrument's period of operation.

In addition to providing general information, individual sections within this guide contain descriptions, processes and/or procedural instructions to which specific safety information has been associated. The provided instructions are intended as an overview only. They do not contain detailed information on all available models or every conceivable scenario that may arise during setup, operation and/or maintenance work. This document shall be used in conjunction with the accompanying user guide. For additional information, or in the event of specific issues not covered within these operating instructions, contact the manufacturer.

ABB declares that the content of this guide is not part of any prior, or existing, agreements, commitments or legal relationships, and is not intended to amend those that are already in place.

Moreover, you must observe all relevant safety regulations regarding the installation and operation of electrical systems and the relevant standards, regulations and guidelines concerning explosion protection.

Information on WEEE directive 2012/19/EU (WEEE2)

Dispose of the instrument at a specialized recycling facility. Municipal garbage collection points should not be used for this purpose.

According to WEEE Directive 2012/19/EU, only products that are used in private applications may be disposed of at municipal garbage facilities. Proper disposal prevents negative effects on both individuals and the environment and also supports the reuse of valuable raw materials.

ABB can accept and dispose of returns for a fee.

Pressure equipment directive (2014/68/EU)

As allowed under article 4.3 of the PED, this instrument has been designed and manufactured in accordance with sound engineering practices to meet state-of-the-art safety requirements, has been tested, and has left the factory in a condition in which it is safe to operate and use. Read and understand all these instructions before the instrument is put in service.

Symbol description

This document uses the following symbols to bring attention to key technical and safety-related information.

DANGER—SERIOUS DAMAGE TO HEALTH/RISK TO LIFE

Indicates a hazardous situation that, if not avoided, **will** result in death or serious injury.

WARNING—DAMAGE TO HEALTH/RISK TO LIFE

Indicates a hazardous situation that, if not avoided, **could** result in death or serious injury.

CAUTION—DAMAGE TO HEALTH

Indicates a hazardous situation that, if not avoided, could result in **minor or moderate injury.**

NOTICE

Indicates information considered important, but not hazard related, that could impact things **other than personal injury,** like property damage.

WARNING—HIGH VOLTAGE

Indicates the presence of electrical energy at voltages high enough **to inflict harm on living organisms.**

CHAPTER 2

Installation in hazardous locations

Explosive atmospheres installation

For installation requirements in explosive atmosphere applications, refer to international standard IEC 60079-14 as well as any mandatory local safety or electrical code regulations.

For specific conditions for safe use, see Chapter 3 on page 9.

WARNING

The instrument can be operated at high levels of pressure and with aggressive media. Serious injury or significant property damage may occur if this instrument is operated incorrectly.

CAUTION

Only qualified and authorized personnel are to be tasked with the installation, electrical connection, commissioning, and maintenance of the instrument. Qualified personnel are those individuals who have experience in the installation, electrical connection, commissioning, and operation of this instrument or similar devices and hold the necessary qualifications.

These qualifications include:

- Training or instruction authorization to operate and maintain devices or systems according to safety engineering standards for electrical circuits, high pressures, and aggressive media;
- Training or instruction in accordance with safety engineering standards regarding maintenance and use of adequate safety systems.

For reasons of safety, ABB recommends that only sufficiently insulated tools be used (i.e., conforming to international standard IEC EN 60900). In the event of use in a hazardous area, only non-sparking tools shall be used.

Since the transmitter may form a link within a safety chain, it is recommended that the instrument be replaced immediately if defects are detected.

Safety information for electrical installation

WARNING

Electrical connections may only be established by authorized personnel in accordance with the provided electrical circuit diagrams. The electrical connection information in the user guide must be observed. Otherwise, the application protection type may be affected. Ground the instrument according to requirements.

Safety information for inspection and maintenance

Corrective maintenance work may only be performed by trained personnel.

Before removing the instrument, depressurize the vessel and any adjacent lines or containers.

Check whether hazardous materials have been used as measured materials before opening the device. Residual amounts of hazardous substances may still be present in the instrument and could escape when the instrument is removed from the vessel.

Within the scope of operator responsibility, check the following as part of a regular inspection:

- Pressure-bearing walls/lining of the level instrument
- Measurement-related functions
- Leak-tightness
- Wear (corrosion)

Operator liability

In instances where corrosive and/or abrasive materials are being measured, the user must check the level of resistance of all parts that are coming into contact with these materials. ABB can offer guidance in the selection of materials, but does not accept liability in performing this service. The user must strictly observe the applicable national regulations with regards to installing, functional testing, repairing and maintaining electrical devices.

Qualified personnel

Installing, commissioning and maintaining the instrument may only be performed by trained personnel authorized by the plant operator. This trained personnel must have read and understood this guide and must comply with its instructions.

Mounting

Read the installation instructions carefully before proceeding. Failure to observe the warnings and instructions may create a malfunction or a personal hazard. Before installing the instrument, ensure that the instrument design meets the requirements of the measurement point from both measurement technology and safety standpoints.

This applies with respect to:

- Explosion-protection certification
- Measuring range

- Pressure
- Temperature
- Operating voltage

Check the suitability of the materials with regards to their resistance to the media. This applies to the:

- Gasket
- Process connection and seals
- Probe
- End connection

In addition, the relevant directives, regulations, standards and accident prevention regulations must be observed. Measurement accuracy is largely dependent on proper installation of the level transmitter and, if applicable, mounting arrangement. In instances where it is possible, the measuring setup should be free from critical ambient conditions such as large variations in temperature, vibrations, or shocks.

Certification nameplates

See Chapter 3 on page 9 of this guide for details.

NOTICE

Read this guide thoroughly before using the instrument.

IP Protection and designation

The housing for the LLT100 series transmitters is certified as conforming to protection type IP66 and IP67 (according to international standard IEC 60529) or Type 4X (according to the NEMA 250 standard).

Cable connection

The electrical connection is established via a cable entry, ½ – 14 NPT thread, or by M20 × 1.5 mm.

WARNING

Cables, cable glands, and plugs for unused ports must be certified for the intended type of protection (for example, intrinsically safe and/or explosion-proof) and degree of protection (for example, IP6x according to IEC EN 60529 or Type 4X according to NEMA 250). See also the addendum for Ex Safety Aspects and IP Protection.

More specifically, for explosion-proof installations, remove the red temporary plastic cap and close the unused port with a plug certified for explosion containment.

CAUTION

Cable entry devices, where used, shall be Certified/Listed for the explosive atmosphere/ hazardous location, local temperatures, and required enclosure environmental (ingress protection [IP] or Type) rating. Field wiring shall be rated for at least 90 °C.

NOTICE

For transmitters with a flame-proof enclosure (Ex d type of protection), the housing covers must be secured using the locking screws. The screw plug that may have been supplied with the transmitter must be lubricated at the plant using Molykote DX. The installer assumes responsibility for any other type of lubricating medium used.

Increased force is required to unscrew the housing cover after an interval of several weeks. This is not caused by the threads but is due to the type of gasket.

Housing configurations

Housings (direct or remote installation) come in the following materials:

- Aluminum
- 316L stainless steel

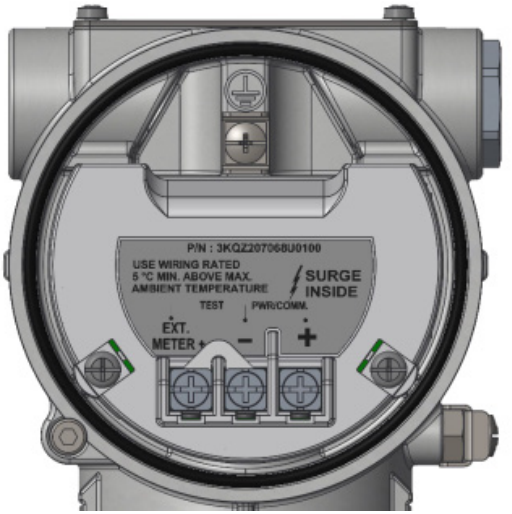
They also come configured with either of the following ports:

- Two M20 × 1.5 mm (housing codes AM and SM)
- Two ½-inch – 14 NPT (housing codes AI and SI)

Grounding

Grounding terminals are available inside (protective earth [PE]) and outside the transmitter housing. Both terminals are electrically connected to one another (see Figure 1).

Figure 1 Ground connection on transmitter housing



Protective grounding

All transmitters are supplied with an external ground connection for protective grounding. Wire this ground connection to a suitable earth ground. For a transmitter measuring loop, an earth ground should maintain a resistance of 5 ohms or less. Use a heavy-duty conductor, at least 15 AWG/1.6 mm² Ø.

WARNING

To ensure personnel protection, to protect against surges (in case of installation of this option) and to prevent explosions in potentially explosive environments, **the use of a protective grounding connection is mandatory.**

General guidelines

WARNING

Make sure that all circuits are de-energized prior to installation.

The LLT100 series has been evaluated as an installation (overvoltage) category 1/pollution degree 4 device, per international standard IEC 61010.

The maximum operating altitude is 2000 meters (6560 feet).

The LLT100 series is designed with both internal and external protective earth (ground) terminals.

All field wiring connected to the LLT100 series transmitters must comply with the user's national electrical code or any other applicable regional electrical codes.

Flame-proof/explosion-proof installations

Installation requirements

The LLT100 series of level transmitters is designed for use in Division 1, or at the boundary of a Zone 0 and Zone 1, hazardous area for instruments with marking Ga/Gb, and Zone 1 only for instruments marked Gb.

CAUTION

Flameproof joints on the instrument are not designed to be repaired. Contact the manufacturer if repair of the flameproof joints is necessary.

Cable or conduit entries must be fitted with a suitably certified cable entry device, with or without the use of a suitably approved thread adapter. Where conduit is used in the installation, a conduit seal may or may not be required depending on the mode of protection used and the standard applied. Refer to appropriate standard for installation and marking on the product.

CAUTION

Cable entry devices, where used, shall be Certified/Listed for the explosive atmosphere/ hazardous location, local temperatures, and required enclosure environmental (ingress protection [IP] or Type) rating.

Field wiring shall be rated for at least 90 °C.

Installation and use of instruments in hazardous locations shall be made in accordance with an IEC 60079-14 international standard or applicable regional standard.

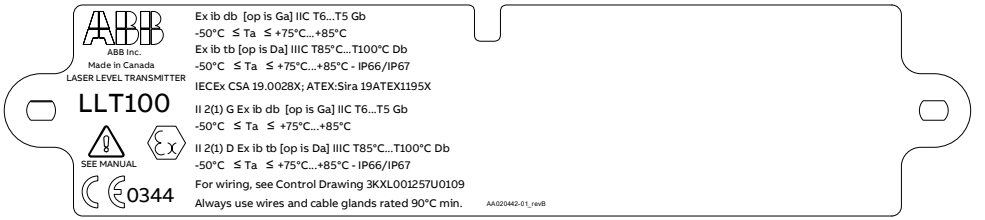
CAUTION

The housing cover can only be removed when the unit is installed in a non-hazardous area, when installed with intrinsically safety barriers, or when power is removed from the transmitter.

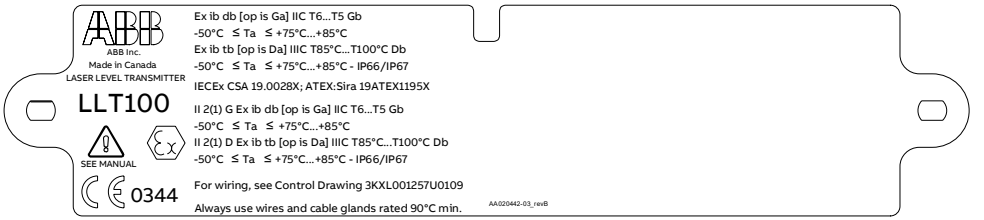
CHAPTER 3

Explosive atmosphere markings

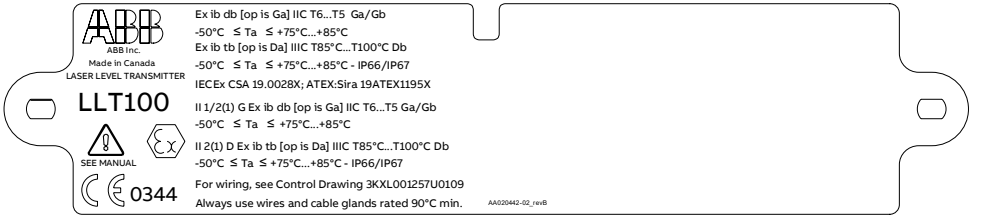
ATEX/IECEx markings (imperial entry port/cemented window)



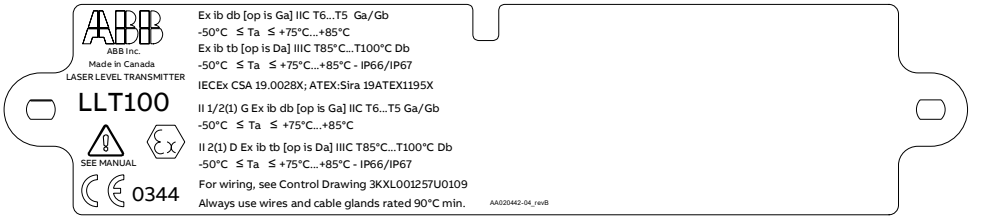
ATEX/IECEx markings (metric entry port/cemented window)



ATEX/IECEx markings (imperial entry port/fused window)



ATEX/IECEx markings (metric entry port/fused window)



CHAPTER 4

Temperature tables and wiring diagrams

For temperature tables and wiring diagrams for ATEX/IECEx, please refer to document 3KXL001257U0109 on ABB website at the LLT100 page.

CHAPTER 5

Declaration of conformity

For the declaration of conformity for ATEX/IECEx, please refer to document 3BOM000142D0890 on ABB website at the LLT100 page.

ABB Inc.
Measurement & Analytics

3400, rue Pierre-Ardouin
Québec (Québec)
Canada G1P 0B2

Phone:
North America: 1 800 858 3847
Worldwide: +1 418 877 8111

www.abb.com/level

P/N AA024271-01 Rev. A

SM_LLT100-EN_A