SIEMENS

SITRANS

Radar Transmitters
SITRANS LR250 (PROFIBUS PA)

Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> ⚠ **DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> ⚠ **WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> ⚠ **CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

> ⚠ **WARNING**
>
> Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

Introduction

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1.1 LR250 PA manual usage

Note

This manual applies to the SITRANS LR250 (PROFIBUS PA) only.

Follow these operating instructions for quick, trouble-free installation, and maximum accuracy and reliability of your device.

We always welcome suggestions and comments about manual content, design, and accessibility. Please direct your comments to:

Technical publications (mailto:techpubs.smpi@siemens.com)

1.2 Purpose of this documentation

These instructions contain all information required to commission and use the device. It is your responsibility to read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons mechanically installing the device, connecting it electronically, configuring the parameters and commissioning it, as well as service and maintenance engineers.

1.3 Document history

The following table notes major changes in the documentation compared to the previous edition.

Edition	Remark
January 2014	• Flanged encapsulated antenna version added.
August 2014	• Hygienic encapsulated antenna version added.

1.4 Firmware revision history

This history establishes the correlation between the current documentation and the valid firmware of the device.

The documentation of this edition is applicable for the following firmware:

Firmware rev.	EDD rev.	Date	Changes
1.00.04	1.00.05	12 Jun 2007	• Initial release.
1.01.00	1.01.00	23 Aug 2007	• EDD [a)]/SIMATIC PDM: improved rendering of the echo profile and TVT.
1.01.01	1.01.01	26 Sep 2007	• PNO certification release.
1.01.02	1.01.02	10 Jun 2008	• Maintenance release for firmware and EDD[a)]
1.01.02	1.01.03	17 Jun 2008	• The internal EDD revision has been incremented.
1.02.00	1.02.00	27 May 2009	• Harmonization of menu structures and parameter names across products. • Display indicates progress towards first measurement.
1.02.01	1.02.00	7 June 2010	• Display contrast improvement. • Antenna type parameter cannot be modified.
1.02.02	1.02.00	24 May 2011	• Threaded PVDF antenna supported.
1.02.03	1.02.01	31 Oct 2012	• Antenna parameter removed. • Quickstart on local display enhancements.

[a)] Electronic Device Description

1.5   Designated use

Use the device to measure process media in accordance with the information in the operating instructions.

Note

Use in a domestic environment

This is a Class A Group 1 equipment intended for use in industrial areas.

In a domestic environment this device may cause radio interference.

1.6   Checking the consignment

1. Check the packaging and the device for visible damage caused by inappropriate handling during shipping.

2. Report any claims for damages immediately to the shipping company.

3. Retain damaged parts for clarification.

4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

⚠ WARNING
Using a damaged or incomplete device
Danger of explosion in hazardous areas.
• Do not use damaged or incomplete devices.

1.7 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.

- Devices/replacement parts should be returned in their original packaging.

- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

⚠ CAUTION
Insufficient protection during storage
The packaging only provides limited protection against moisture and infiltration. • Provide additional packaging as necessary.

1.8 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.

Safety information

<div style="text-align: right; font-size: 3em;">2</div>

2.1 Preconditions for safe use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.1.1 Safety marking symbols

In manual	On product	Description
⚠	⚠ (Label on product: yellow background.)	WARNING: refer to accompanying documents (manual) for details.

2.1.2 Laws and directives

Observe the test certification, provisions and laws applicable in your country during connection, assembly and operation.

2.1.3 FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

⚠ WARNING
Improper device modifications
Danger to personnel, system and environment can result from improper modifications to the device.   • Changes or modifications not expressly approved by Siemens could void the user's authority to operate the equipment.

Note

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operating instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications, in which case the user will be required to correct the interference at his own expense.

2.1.4   Conformity with European directives

The CE marking on the device symbolizes the conformity with the following European directives:

Electromagnetic compatibility EMC 2004/108/EC	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.
Low voltage directive LVD 2006/95/EC	Directive of the European Parliament and of the Council on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.
Atmosphère explosible ATEX 94/9/EC	Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
Radio and telecommunications terminal equipment R&TTE 1999/5/EC	Directive of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

The applicable directives can be found in the EC conformity declaration of the specific device.

2.1.5 CE Electromagnetic Compatibility (EMC) Conformity

This equipment has been tested and found to comply with the following EMC Standards:

EMC Standard	Title
CISPR 11:2009 + A1:2010/EN 55011:2009 + A1:2010, CLASS A	Limits and methods of measurements of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
EN 61326:2013 (IEC 61326:2012)	Electrical Equipment for Measurement, Control and Laboratory Use – Electromagnetic Compatibility.
EN61000-4-2:2009	Electromagnetic Compatibility (EMC) Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.
EN61000-4-3:2006 + A1:2008 + A2:2010	Electromagnetic Compatibility (EMC) Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test 2006 + A1:2008 + A2:2010.
EN61000-4-4:2004 + A1:2010	Electromagnetic Compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test.
EN61000-4-5:2006	Electromagnetic Compatibility (EMC) Part 4-5: Testing and measurement techniques – Surge immunity test.
EN61000-4-6:2010	Electromagnetic Compatibility (EMC) Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields.
EN61000-4-8:2010	Electromagnetic Compatibility (EMC) Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test.

2.2 Improper device modifications

⚠ WARNING
Improper device modifications
Danger to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.
• Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

2.3 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

Operation under special ambient conditions

We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.

2.4 Use in hazardous areas

Qualified personnel for hazardous area applications

Persons who install, connect, commission, operate, and service the device in a hazardous area must have the following specific qualifications:

● They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.

● They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.

● They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

⚠ **WARNING**

Loss of safety of device with type of protection "Intrinsic safety Ex i"

If the device has already been operated in non-intrinsically safe circuits or the electrical specifications have not been observed, the safety of the device is no longer ensured for use in hazardous areas. There is a danger of explosion.

• Connect the device with type of protection "Intrinsic safety" solely to an intrinsically safe circuit.

• Observe the specifications for the electrical data on the certificate.

Description 3

3.1 SITRANS LR250 overview

⚠ WARNING
Loss of protection
Danger to personnel, system and environment can result from improper use of the device.
• SITRANS LR250 is to be used only in the manner outlined in this manual, otherwise protection provided by the device may be impaired.

SITRANS LR250 is a 2-wire 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels including high pressure and high temperature, to a range of 20 meters (66 feet). It is ideal for small vessels, material such as chemicals, food, beverages, solvents (including those of corrosive or aggressive nature), and low dielectric media.

The device consists of an electronic circuit coupled to an antenna and either a threaded or flange type process connection.

This device supports PROFIBUS PA communication protocol, and SIMATIC PDM software. Signals are processed using Process Intelligence which has been field-proven in over 1,000,000 applications worldwide (ultrasonic and radar). This device supports acyclic communications from both a PROFIBUS Class I and Class II master.
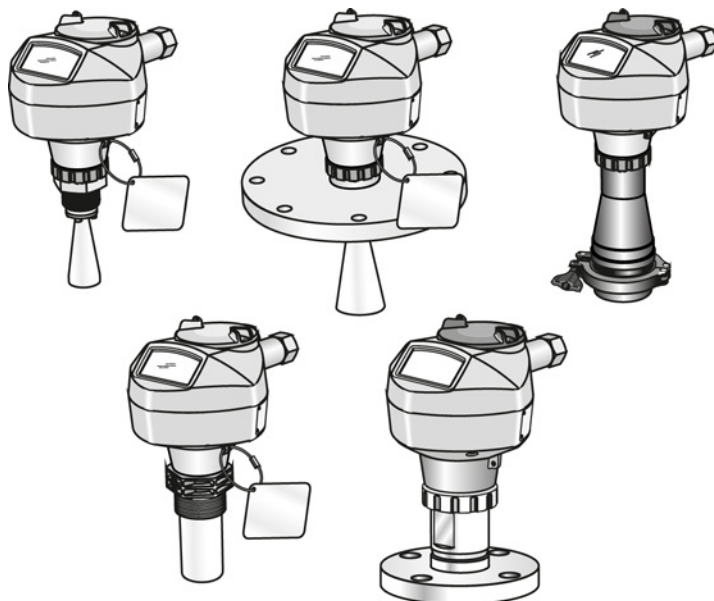
3.2 Programming

This device is very easy to install and configure via a graphical local user interface (LUI). You can modify the built in parameters either locally via the Siemens infrared handheld programmer, or from a remote location using one of the following options:

- SIMATIC PDM
- FDT/DTM platform (such as PACTware™ or FieldCare)

3.3 Applications

- liquids and slurries
- bulk storage vessels
- simple process vessels
- corrosive and aggressive
- hygienic/sanitary

3.4 Approvals and certificates

Note

For further details see Approvals (Page 193).

SITRANS LR250 is available with approvals for General purpose, sanitary or hygienic and for hazardous areas. In all cases, check the nameplate on your device, and confirm the approval rating.

Process Connections
A wide range of process connections and antenna options are available to suit virtually any vessel configuration.

Installing/mounting

4

4.1 Basic safety information

Note

Material compatibility

Siemens can provide you with support concerning selection of sensor components wetted by process media. However, you are responsible for the selection of components. Siemens accepts no liability for faults or failures resulting from incompatible materials.

> ⚠ **WARNING**
>
> **Unsuitable connecting parts**
>
> Danger of injury or poisoning.
>
> In case of improper mounting hot, toxic and corrosive process media could be released at the connections.
>
> - Ensure that connecting parts (such as flange gaskets and bolts) are suitable for connection and process media.

> ⚠ **WARNING**
>
> **Exceeded maximum ambient or process media temperature**
>
> Danger of explosion in hazardous areas.
>
> Device damage.
>
> - Make sure that the maximum permissible ambient and process media temperatures of the device are not exceeded.

> ⚠ **WARNING**
>
> **Open cable inlet or incorrect cable gland**
>
> Danger of explosion in hazardous areas.
>
> - Close the cable inlets for the electrical connections. Only use cable glands or plugs which are approved for the relevant type of protection.

> ⚠ **WARNING**
>
> **Incorrect conduit system**
>
> Danger of explosion in hazardous areas as result of open cable inlet or incorrect conduit system.
>
> - In the case of a conduit system, mount a spark barrier at a defined distance from the device input. Observe national regulations and the requirements stated in the relevant approvals.

4.1.1 Pressure applications

> ⚠ **DANGER**
>
> **Pressure applications**
>
> Danger to personnel, system and environment will result from improper disassembly.
>
> - Never attempt to loosen, remove, or disassemble process connection while vessel contents are under pressure.

> ⚠ **WARNING**
>
> **Pressure applications**
>
> Danger to personnel, system and environment can result from improper installation.
>
> - Improper installation may result in loss of process pressure.

> ⚠ **WARNING**
>
> **Exceeded maximum permissible operating pressure**
>
> Danger of injury or poisoning.
>
> The maximum permissible operating pressure depends on the device version. The device can be damaged if the operating pressure is exceeded. Hot, toxic and corrosive process media could be released.
>
> - Make sure that the device is suitable for the maximum permissible operating pressure of your system.

Note

- The process connection tag shall remain with the process pressure boundary assembly. (The process pressure boundary assembly comprises the components that act as a barrier against pressure loss from the process vessel: that is, the combination of process connection body and emitter, but normally excluding the electrical enclosure). In the event the device package is replaced, the process connection tag shall be transferred to the replacement unit.
- SITRANS LR250 units are hydrostatically tested, meeting or exceeding the requirement of the ASME Boiler and Pressure Vessel Code and the European Pressure Equipment Directive.

Note

- The serial numbers stamped in each process connection body, (flange, threaded, or sanitary), provide a unique identification number indicating date of manufacture. Example: MMDDYY – XXX (where MM = month, DD = day, YY = year, and XXX= sequential unit produced)
- Further markings (space permitting) indicate flange configuration, size, pressure class, material, and material heat code.

4.1.1.1 Pressure Equipment Directive, PED, 97/23/EC

Siemens Level Transmitters with flanged, threaded, or sanitary clamp type process mounts have no pressure-bearing housing of their own and, therefore, do not come under the Pressure Equipment Directive as pressure or safety accessories (see EU Commission Guideline 1/8 and 1/20).

4.2   Installation location requirements

⚠ WARNING
Aggressive atmospheres
Danger to personnel, system and environment can result from unsuitable environment.
• Provide an environment suitable to the housing rating and materials of construction.

⚠ CAUTION
Direct sunlight
Device damage.
The device can overheat or materials become brittle due to UV exposure.
• Protect the device from direct sunlight.
• Make sure that the maximum permissible ambient temperature is not exceeded. Refer to the information in Chapter "Technical data".

①	Ambient temperature
②	Device nameplate
③	Device tag
④	Process temperature (at process connection)
⑤	Process connection tag (contains process connection related information)

Antenna	①	③
Horn	-40 to +80 °C (-40 to +176 °F)	with FKM O-ring:-40 to +200 °C (-40 to 392 °F)
		with FFKM O-ring:-20 to +200 °C (-4 to +392 °F)
PVDF	-40 to +80 °C (-40 to +176 °F)	-40 to +80 °C (-40 to +176 °F)
Flanged encapsulated	-40 to +80 °C (-40 to +176 °F)	-40 to +170 °C (-40 to +338 °F)
Hygienic encapsulated	-40 to +80 °C (-40 to +176 °F)	-40 to +170 °C (-40 to +338 °F)
		with FKM seals used on process connection: -20 to +170 °C (-4 to +338 °F)
		with EPDM seals used on process connection: -40 to +120 °C (-40 to +248 °F)

Note

Details about the process connection, process temperature and materials are laser etched into the body of the flanged and hygienic versions. All other SITRANS LR250 versions have details listed on a tag.

4.3 Proper mounting

Note

- Correct location is key to a successful application.
- Avoid reflective interference from vessel walls and obstructions by following guidelines in this chapter.

NOTICE
Incorrect mounting
The device can be damaged, destroyed, or its functionality impaired through improper mounting. • Before installing ensure there is no visible damage to the device. • Make sure that process connectors are clean, and suitable gaskets and glands are used. • Mount the device using suitable tools. Refer to the information in Installation instructions (Page 34) for installation torque requirements.

Note

- On devices with a removable head, there is no limit to the number of times a device can be rotated without damage.
- When mounting, orient the front or back of the device towards the closest vessel wall or obstruction.
- Do not rotate the enclosure after programming and vessel calibration, otherwise an error may occur, caused by a polarity shift of the transmit pulse.

4.3.1 Nozzle design

Threaded PVDF antenna
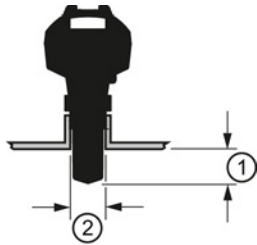
Stainless steel horn antenna
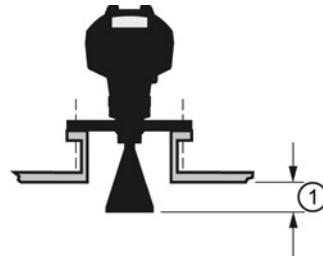
Flanged encapsulated antenna (FEA)
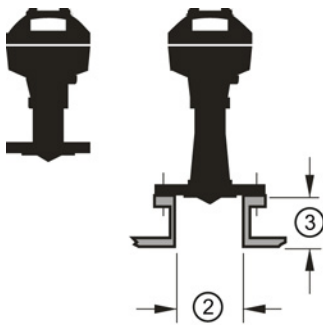
Hygienic encapsulated antenna (HEA)
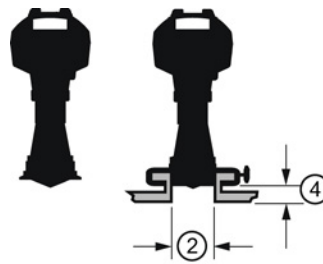
①   Minimum clearance: 10 mm (0.4")

②   Minimum diameter: 50 mm (2")

③   Maximum nozzle length

④   Maximum length/diameter ratio 1:1

- The end of the antenna must protrude a minimum of 10 mm (0.4") to avoid false echoes being reflected from the nozzle[1].

- Minimum recommended nozzle diameter for the threaded PVDF antenna is 50 mm (2").

- An antenna extension (100 mm/3.93") is available for the horn antenna only.

- The maximum nozzle length for the FEA is 500 mm (19.68") when the nozzle diameter is DN150 (6"). Only shorter lengths are recommended for smaller diameters.

- When installing the SITRANS LR250 with hygienic process connection, it is good hygienic practice to install the antenna in a nozzle that has a maximum length/diameter ratio of 1:1. For example, 2" (DN50) diameter nozzle should be no longer than 2" (50 mm).

- When removing any sanitary/hygienic clamp version of the HEA to clean the lens, ensure it is re-installed in the exact position it was removed from, to avoid re-commissioning the device.

[1] Not applicable for FEA or HEA

4.3.2 Nozzle location

- Avoid central locations on tall, narrow vessels

- Nozzle must be vertical and clear of imperfections

✓✓	Preferred
⦸	Undesirable
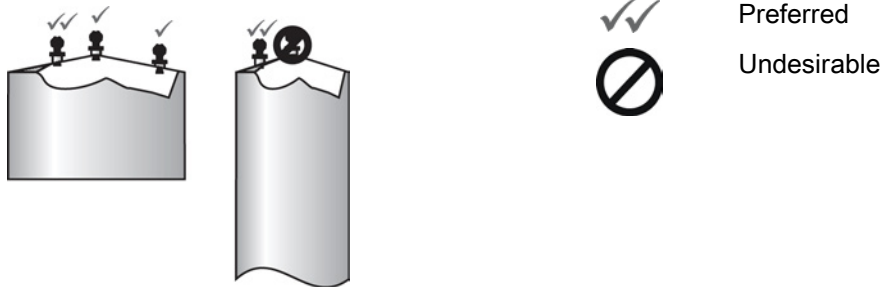
Beam angle

Note

- Beam width depends on antenna size and is approximate: see below.
- For details on avoiding false echoes, see Auto False Echo Suppression.

- Beam angle is the width of the cone where the energy density is half of the peak energy density.

- The peak energy density is directly in front of and in line with the antenna.

- There is a signal transmitted outside the beam angle, therefore false targets may be detected.

Horn antenna
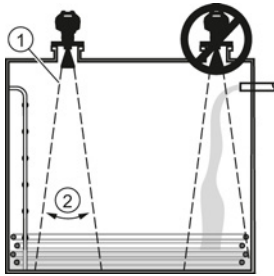
Flanged encapsulated antenna
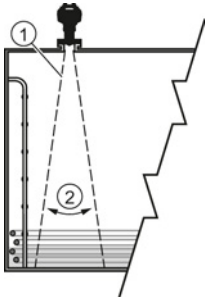
Threaded PVDF antenna
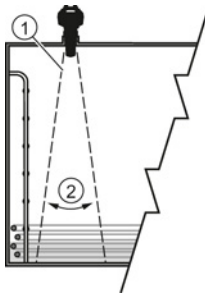
Hygienic encapsulated antenna
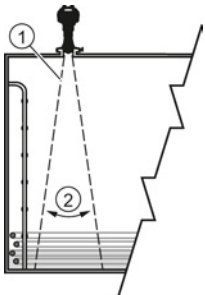
①   Emission cone

②   Beam angle

Emission cone type and beam angle

Antenna type	Antenna size		Beam angle
Horn	1.5"		19°
	2"		15°
	3"		10°
	4"		8°
Threaded PVDF			19°
	Process connection size	Process connection type	
Flanged encapsulated	2"	Class 150 ASME B16.5	12.8°
	3, 4, 6"	Class 150 ASME B16.5	9.6°
	50A	10K JIS B 2220	12.8°
	80A/100A/150A	10K JIS B 2220	9.6°
	DN50	PN10/16 EN1092-1	12.8°
	DN80/DN100/DN150	PN10/16 EN1092-1	9.6°
Hygienic encapsulated	2"	Sanitary Clamp according to ISO 2852	12.8°
	3, 4"		9.6°
	DN50	Aseptic/Hygienic nozzle/slotted nut according to DIN 11864-1 [Form A]	12.8°
	DN80/DN100		9.6°
	DN50	Aseptic/Hygienic flanged according to DIN 11864-2 [Form A]	12.8°
	DN80/DN100		9.6°
	DN50	Aseptic/Hygienic Clamp according to DIN 11864-3 [Form A]	12.8°
	DN80/DN100		9.6°
	DN50	Hygienic nozzle/slotted nut according to DIN 11851	12.8°
	DN80/DN100		9.6°
	Type F (50 mm) and Type N (68 mm)	Tuchenhagen Varivent	12.8°

Emission cone

- Keep emission cone free of interference from obstructions such as ladders, pipes, I-beams, or filling streams.

Access for programming

- Provide easy access for viewing the display and programming via the handheld programmer.

4.3.3 Orientation in a vessel with obstructions

Polarization reference point

For best results on a vessel with obstructions, or a stillpipe with openings, orient the front or back of the device toward the obstructions. For an illustration, see Device orientation (Page 33).
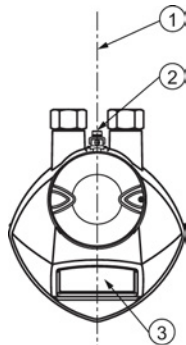
①   Polarization axis
②   Polarization reference point
③   Display

4.3.4   Mounting on a Stillpipe or Bypass Pipe

A stillpipe or bypass pipe is used for products with a low dK, or when vortex or extremely turbulent conditions exist. It can also be used to provide optimum signal conditions on foaming materials. See Dielectric constant of material measured in Performance (Page 187) for more information.

- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe[1]. See Threaded Horn dimensions (Page 195), Raised-Face Flange per EN 1092-1 (Page 230), Flanged encapsulated dimensions or Hygienic encapsulated dimensions.

- One continuous length of metallic pipe is preferred, without joints.

- Any false reflections created by joints/welds/imperfections will lead to inaccuracies of the measurement.

- Joints (if unavoidable) must be machined to ± 0.25 mm (± 0.010") and must have welded connecting sleeve on the outside.

- If using any hygienic process connections in conjunction with a stillpipe/bypass, please ensure that the antenna/lens are cleanable in accordance with the applicable approval.

[1] Mounting in a pipe greater than 100 mm (4") can cause large errors, and therefore is not recommended.

Suitable pipe diameters:	Horn antenna	40 to 100 mm (1.5 to 4")
	PVDF antenna	50 mm (2") only
	Flanged encapsulated antenna	50 to 100 mm (2 to 4")
	Hygienic encapsulated antenna	50 to 100 mm (2 to 4")
Not recommended:	> 100 mm (4")	
Bypass vent:	Required at the upper end of the bypass [1]	

[1] To equalize pressure and keep the liquid level in the bypass constant with the liquid level in the vessel.

4.3.5 Device orientation

Bypass pipe installation

Stillpipe installation
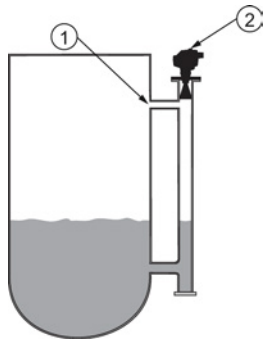
| ① Vent | ① Align front or back of device with stillpipe slots[1] |
| ② Align front or back of device with vents[1] | ② Slots |

[1] Horn antenna version shown as example

4.4　　　Installation instructions

⚠ WARNING
Pressure applications
Danger to personnel, system and environment can result from improper installation.
• Improper installation may result in loss of process pressure.

⚠ WARNING
Improper installation
Danger to personnel, system and environment can result from improper installation.
• Installation shall only be performed by qualified personnel and in accordance with local governing regulations.

NOTICE
Device handling
Damage to device may result from improper handling.
• Handle the device using the enclosure, not the process connection or tag, to avoid damage.
• Take special care when handling the threaded PVDF and Hygienic or Flanged encapsulated antennas. Any damage to the antenna surface, particularly to the tip/lens, could affect performance. (For example, do not sit device on its lens antenna.)

Note

• For European Union and member countries, installation must be according to ETSI EN 302372.
• Refer to the device nameplate for approval information.

Note

The outer part of the lens on the flanged encapsulated antenna version may not appear to lie flush before installation and this is normal. This will flatten after installation and will not impact the performance of the device.

> **⚠ WARNING**
>
> **Pressure applications**
>
> Danger of injury or poisoning.
>
> It will be necessary to use PTFE tape or other appropriate thread sealing compound, and to tighten the process connection beyond hand-tight. (The maximum recommended torque for Threaded versions is 40 N-m (30 ft.lbs.) See Flanged versions (Page 36) for FEA recommended torque values.)

Note

- On devices with a removable head, there is no limit to the number of times a device can be rotated without damage.
- When mounting, orient the front or back of the device towards the closest vessel wall or obstruction.
- Do not rotate the enclosure after programming and vessel calibration, otherwise an error may occur, caused by a polarity shift of the transmit pulse.

4.4.1 Threaded versions

> **⚠ WARNING**
>
> **Pressure applications**
>
> Danger of injury or poisoning.
>
> It may be necessary to use PTFE tape or other appropriate thread sealing compound, and to tighten the process connection beyond hand-tight. (The maximum recommended torque for Threaded versions is 40 N-m (30 ft.lbs.)

1. Before inserting the device into its mounting connection, check to ensure the threads are matching, to avoid damaging them.
2. Simply screw the device into the process connection, and hand tighten, or use a wrench.

4.4.2   Flanged versions

NOTICE
Improper materials
The user is responsible for the selection of bolting and gasket materials (except for Flanged encapsulated antenna) which will fall within the limits of the process connection and its intended use, and which are suitable for the service conditions.

Special Instructions for Flanged encapsulated antenna only

Note
- Use spring washers
- Lens assembly acts as integral gasket, no other required
- Use recommended torque values for tightening bolts

Flange bolting: recommended torque

Pressure class	Nominal pipe size (NPS)	Number of bolts	Recommended torque (Nm)
ASME B16.5, Class 150	2"	4	30 – 50
	3"		50 – 70
	4"	8	40 – 60
	6"		70 – 90
EN1092-1, PN16 / JIS B 2220, 10K	DN50/50A	4	30 – 50
	DN80/80A	8	
	DN100/100A		
	DN150/150A		60 – 80
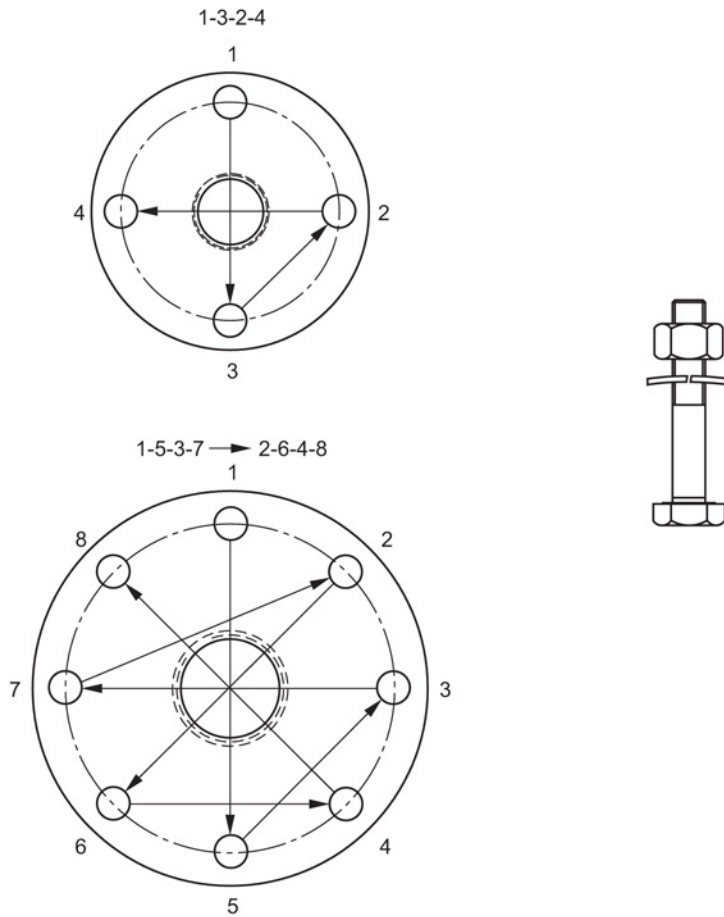
Flange bolting instructions:

1. Use cross-pattern sequence as shown.

2. Check uniformity of the flange gap.

3. Apply adjustments by selective tightening if required.

4. Torque incrementally until desired value is reached.

5. Check/re-torque after 4 to 6 hours.

Recommendations for flange bolting:

● Check bolts periodically, re-torque as required.

● Use new lens, O-ring and spring washers after removal from installation.
  For instructions on replacing the lens, see Part replacement (Page 175).

See Flanged Horn with extension (Page 200), Raised-Face Flange per EN 1092-1 (Page 230), Flat-Face Flange (Page 233), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger) (Page 206) for dimensions.

4.4.3 Hygienic versions

⚠ WARNING
Loss of sanitary approvals
Loss of sanitary approvals can result from improper installation/mounting. • Take special care when installing in hygienic or sanitary applications. Comply with installation/mounting guidelines to ensure cleanliness and the ability to keep the wetted parts in a position to be readily cleanable. (See relevant EHEDG/3A documentation - not supplied).

NOTICE
Loss of sanitary approvals
• For 3-A Sanitary Approved device installation where the customer tank process connection exists, a leak detection port of minimum 2.4 mm diameter must be provided at the lowest point in the process connection where leakage can occur. • If leakage is detected at any time while the device is installed, then the device process connection parts must be disassembled and thoroughly cleaned prior to gasket replacement and reassembly.

Note

• For Hygienic encapsulated antenna, the lens acts as a gasket/seal and should be used in conjunction with a cleanable seal as required by the specific process connections (for example, DIN 11864-3).

Hygienic encapsulated antenna leak detection port
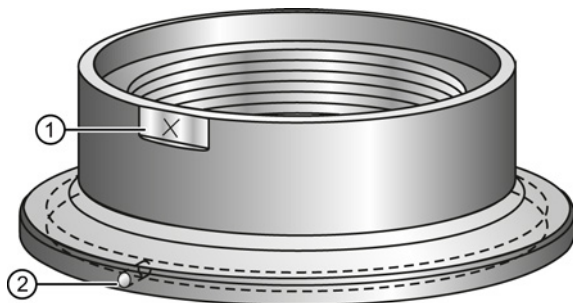
①   Orientation mark for leak detection port

②   Leak detection port

4.5   Disassembly

> ⚠ **DANGER**
>
> **Pressure applications**
>
> Danger to personnel, system and environment will result from improper disassembly.
> - Never attempt to loosen, remove, or disassemble process connection while vessel contents are under pressure.

> ⚠ **WARNING**
>
> **Incorrect disassembly**
>
> The following dangers may result through incorrect disassembly:
>
> - Injury through electric shock
>
> - Danger through emerging media when connected to the process
>
> - Danger of explosion in hazardous area
>
> In order to disassemble correctly, observe the following:
> - Before starting work, make sure that you have switched off all physical variables such as pressure, temperature, electricity etc. or that they have a harmless value.
> - If the device contains dangerous media, it must be emptied prior to disassembly. Make sure that no environmentally hazardous media are released.
> - Secure the remaining connections so that no damage can result if the process is started unintentionally.

Connecting

<div style="text-align: right; font-size: 3em;">5</div>

5.1 Basic safety information

NOTICE
Condensation in the device
Damage to device through formation of condensation if the temperature difference between transportation or storage and the mounting location exceeds 20 °C (68°F). • Before taking the device into operation let the device adapt for several hours in the new environment.

⚠ WARNING
Missing PE/ground connection
Danger of electric shock. Depending on the device version, connect the power supply as follows: • **Power plug**: Ensure that the used socket has a PE/ground conductor connection. Check that the PE/ground conductor connection of the socket and power plug match each other. • **Connecting terminals**: Connect the terminals according to the terminal connection diagram. First connect the PE/ground conductor.

5.2 Connecting SITRANS LR250

⚠ WARNING
Incorrect connection to power source
Danger to personnel, system and environment can result from improper power connection. • The DC input terminals shall be supplied from a source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1. • All field wiring must have insulation suitable for rated voltages.

> ⚠ **WARNING**
>
> **Loss of protection**
>
> Loss of approvals can result from improper installation.
>
> - Check the nameplate on your device, to verify the approval rating.
> - Use appropriate conduit seals to maintain IP or NEMA rating.
> - See Wiring setups for hazardous area installations (Page 45).

> **NOTICE**
>
> **Improper cables and conduit**
>
> - Separate cables and conduits may be required to conform to standard instrumentation wiring practices or electrical codes.
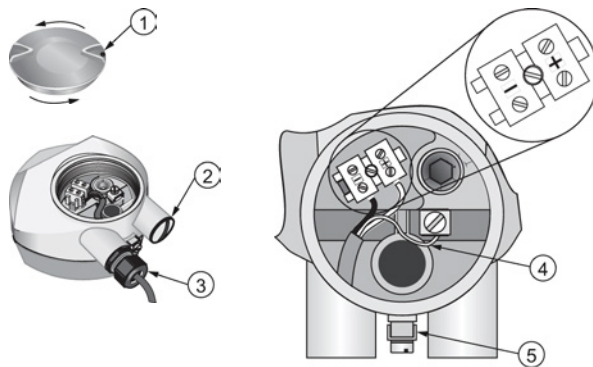
①	Use a 2 mm Allen key to loosen the lid-lock set screw [c]	④	Cable shield
②	Plug (IP68)	⑤	Ground terminal
③	Optional cable gland[a] [b](or NPT cable entry)[b]		

[a]May be shipped with the device.

[b]If cable is routed through conduit, use only approved suitable-size hubs for waterproof applications.

[c]Not applicable to 3-A Sanitary approved device.

Wiring instructions

1. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland. (If cable is routed through conduit, use only approved suitable-size hubs for waterproof applications.)

2. Connect the wires to the terminals as shown: SITRANS LR250 (PROFIBUS PA) is not polarity sensitive.

3. Ground the device according to local regulations.

4. Tighten the gland to form a good seal.

5. Close the lid and secure the locking screw before programming and device configuration.

Note

Lid-lock set screw not applicable to 3-A Sanitary approved device.

Note

- PROFIBUS PA cable shield must be terminated at both ends of the cable for it to work properly.
- If a Weidmüller or other current limiting junction box is connected to this device, please ensure that the current limit is set to 40 mA or higher.
- Please refer to the PROFIBUS PA User and Installation Guidelines (order number 2.092) for information on installing PROFIBUS devices at:

  PROFIBUS PA (http://www.profibus.com/)

Basic PLC configuration with PROFIBUS PA

①	Active PLC	④	DP/PA coupler
②	PROFIBUS DP	⑤	PROFIBUS PA
③	PC/laptop	⑥	SITRANS LR250 (PROFIBUS PA)
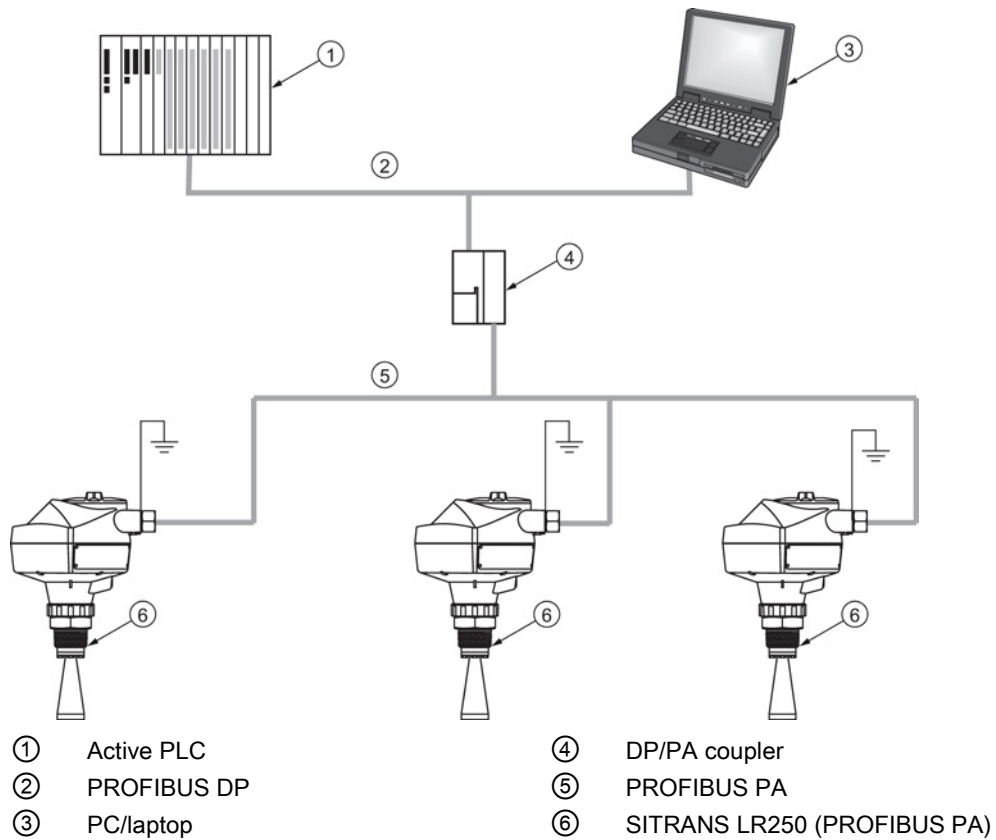
5.3   Wiring setups for hazardous area installations

There are three wiring options for hazardous area installations:

- Intrinsically safe wiring (Page 46)

- Non-sparking wiring (Page 49)

- Non-incendive wiring (US/Canada only) (Page 49)

In all cases, check the nameplate on your device, confirm the approval rating, and perform installation and wiring according to your local safety codes.

PLC configuration with PROFIBUS PA for hazardous areas

①	PLC (active)
②	PC/laptop
③	Ex ia type DP/PA coupler
④	Ex ia device
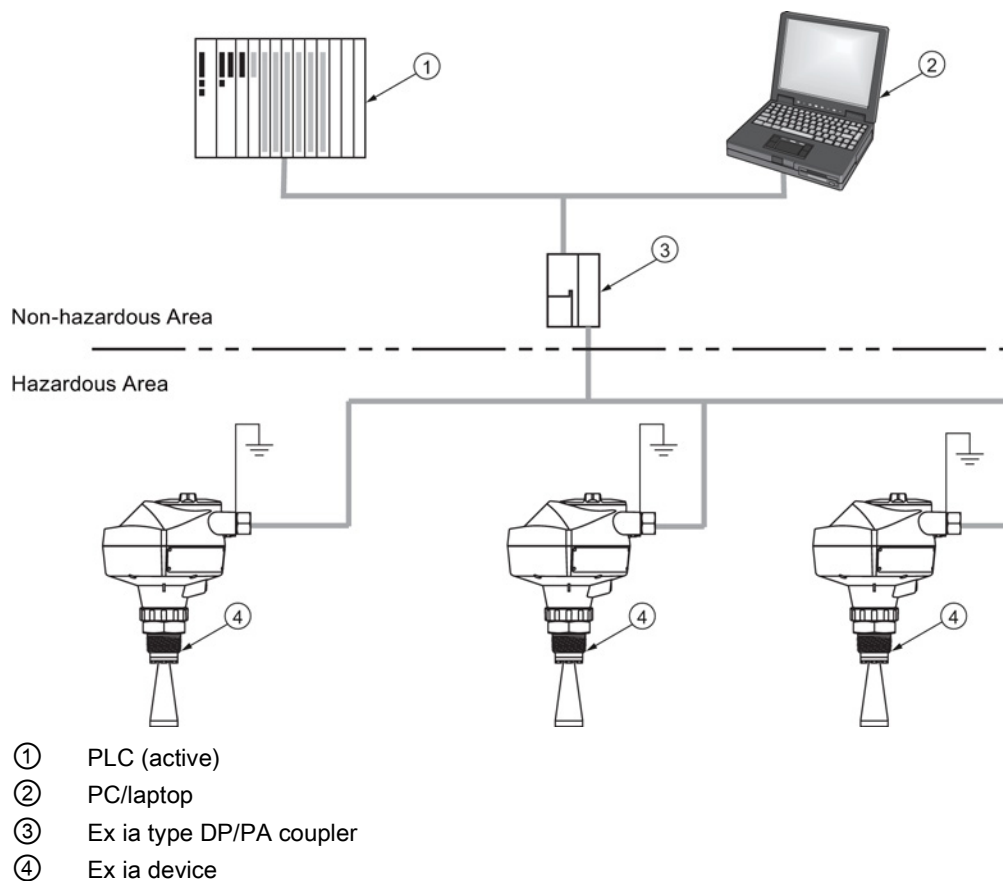
5.3.1 Intrinsically safe wiring

Device nameplate (ATEX/IECEx/INMETRO/RCM)
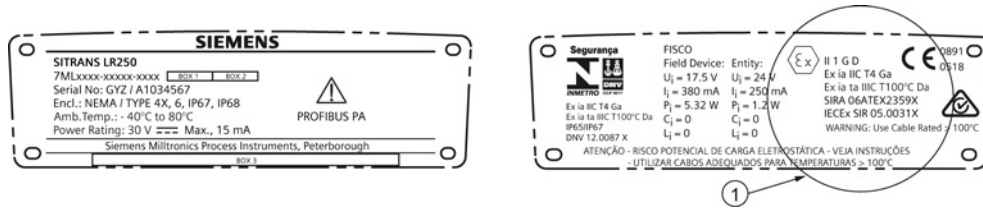
① ATEX certificate

The ATEX and INMETRO certificates listed on the nameplate can be downloaded from our website:

Product page (http://www.siemens.com/LR250)

Go to **Support > Approvals / Certificates.**

The IECEx certificate listed on the nameplate can be viewed on the IECEx website. Go to:

IECEx (http://iecex.iec.ch/)

Click on **Certified Equipment** and enter the certificate number **IECEx** SIR 05.0031X.

5.3.1.1   Intrinsically safe wiring (FM/CSA)

Device nameplate (FM/CSA)
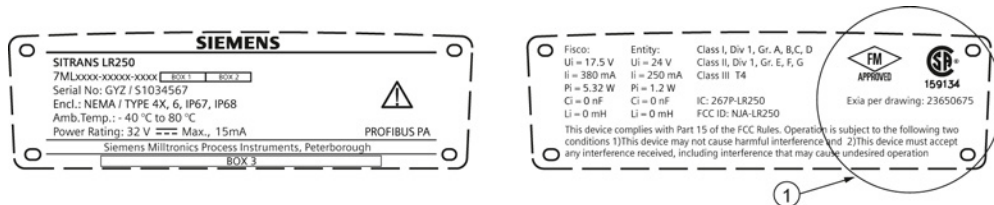
①   Connection drawing number

The FM/CSA Intrinsically Safe connection drawing number 23650675 can be downloaded from our website at:

Product page (http://www.siemens.com/LR250)

Go to **Support > Installation Drawings > Level Measurement > SITRANS LR250.**

5.3.1.2   Intrinsically safe wiring (notes)

- For wiring requirements: follow local regulations.
- Approved dust-tight and water-tight conduit seals are required for outdoor NEMA 4X / type 4X / NEMA 6, IP67, IP68 locations.
- Refer to Instructions specific to hazardous area installations (Page 50).

Entity concept:

The Entity Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage and current which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the output voltage (Uo) and output current (Io) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and Inductance (Li) of the intrinsically safe apparatus, including interconnecting wiring, must be equal to or less than the capacitance and inductance which can be safely connected to associated apparatus.

Under the entity evaluation concept, SITRANS LR250 has the following characteristics:

(input voltage) U_i	= 24 V
(input current) I_i	= 250 mA
(input power) P_i	= 1.2 W
(internal capacitance) Ci	= 0
(internal inductance) Li	= 0

FISCO Concept

> **Note**
>
> For complete details and instructions regarding the FISCO Concept The FM/CSA connection drawing number A5E02358161 can be downloaded from our website at:
> Product page (http://www.siemens.com/LR250)
> Go to **Support > Installation Drawings > Level Measurement > SITRANS LR250**.

The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (U_i or Vmax), the current (I_i, or Imax) and the power (P_i, or Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (Uo or Voc or Vi), the current (lo or Isc or li), and the power (Po or Pmax) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C_i) and inductance (L_i) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 µH respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The allowed voltage Uo (or Voc or Vt) of the associated apparatus is limited to the range of 14V dc to 24V dc. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except for a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the Intrinsically Safe fieldbus circuit remains passive.

Under the FISCO evaluation concept, SITRANS LR250 has the following characteristics:

(input voltage) U_i	= 17.5 V
(input current) I_i	= 380 mA
(input power) P_i	= 5.32 W
(internal capacitance) C_i	= 0
(internal inductance) L_i	= 0

5.3.2 Non-sparking wiring
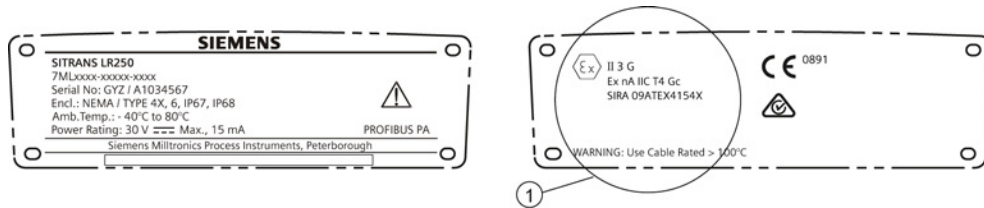
①   ATEX certificate

The ATEX certificate listed on the nameplate can be downloaded from our website:

Product page (http://www.siemens.com/LR250)

5.3.3 Non-incendive wiring (US/Canada only)
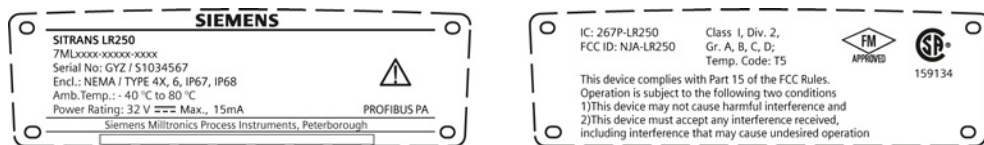
FM/CSA Class 1, Div 2 connection drawing number 23650673 can be downloaded from our website:

Product page (http://www.siemens.com/LR250)

Go to **Support > Installation Drawings > Level Measurement > SITRANS LR250.**

- For wiring requirements: follow local regulations.
- Approved dust-tight and water-tight conduit seals are required for outdoor NEMA 4X / type 4X / NEMA 6, IP67, IP68 locations.
- Refer to Instructions specific to hazardous area installations (Page 50).

5.4 Instructions specific to hazardous area installations

5.4.1 (Reference European ATEX Directive 94/9/EC, Annex II, 1/0/6)

The following instructions apply to equipment covered by certificate number SIRA 06ATEX2359X and SIRA 09ATEX4154X:

1. For use and assembly, refer to the main instructions.

2. The equipment is certified for use as Category 1GD equipment per SIRA 06ATEX2359X, and Category 3G equipment per SIRA 09ATEX4154X.

3. The equipment may be used with flammable gases and vapors with apparatus group IIC, IIB and IIA and temperature classes T1, T2, T3 andT4.

4. The equipment has a degree of ingress protection of IP67 and a temperature class of T100 °C and may be used with flammable dusts.

5. The equipment is certified for use in an ambient temperature range of –40 °C to +80 °C.

6. The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).

7. Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (EN 60079-14 and EN 60079-17 in Europe).

8. The equipment is non-repairable.

9. The certificate numbers have an 'X' suffix, which indicates that special conditions for safe use apply. Those installing or inspecting this equipment must have access to the certificates.

10. If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

   – Aggressive substances: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.

   – Suitable precautions: e.g. establishing from the material's data sheet that it is resistant to specific chemicals.

Special conditions for safe use (denoted by X after the certificate number)

- Parts of the enclosure may be non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam), which might cause a build-up of electrostatic charge on non-conducting surfaces.

- Aluminium, magnesium, titanium or zirconium may be used at the accessible surface of the equipment. In the event of rare incidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the SITRANS LR250 PROFIBUS PA is being installed in locations that specifically require Equipment Protection level Ga or Da.

- The equipment shall be infallibly bonded according to the relevant code of practice.

- The end use must ensure that the explosion protection and ingress protection of IP64 is maintained at each entry to the enclosure by use of a blanking element or cable entry device that meets the requirements of the protection concepts type 'n' or increased safety 'e' or flameproof 'd'.

Commissioning 6

6.1 Basic safety information

⚠ WARNING
Loss of explosion protection
Danger of explosion when device is not properly commissioned
If opening device
• Isolate from power.
- or -
• Ensure that the atmosphere is explosion-free (hot work permit).
Ensure device is properly closed before returning to operation.

6.2 Operating via the handheld programmer

The handheld programmer used with this device contains lithium batteries that are non-replaceable.

Lithium batteries are primary power sources with high energy content designed to provide the highest possible degree of safety.

⚠ WARNING
Potential hazard
Lithium batteries may present a potential hazard if they are abused electrically or mechanically. Observe the following precautions when handling and using lithium batteries:
• Do not short-circuit, recharge or connect with false polarity.
• Do not expose to temperatures beyond the specified temperature range.
• Do not incinerate.
• Do not crush, puncture or open cells or disassemble.
• Do not weld or solder to the battery's body.
• Do not expose contents to water.

6.2.1 Power up

Power up the device. A transition screen showing first the Siemens logo and then the current firmware revision is displayed while the first measurement is being processed.

Press **Mode** 📑 to toggle between Measurement and Program mode.

6.2.2 Handheld programmer functions

The radar device carries out its level measurement tasks according to settings made via parameters. The settings can be modified locally via the Local User Interface (LUI) which consists of an LCD display and a handheld programmer.

A Quick Start Wizard provides an easy step-by-step procedure to configure the device for a simple application. Access the wizards:

- locally [see Quick Start Wizard via the handheld programmer (Page 63)]

- or from a remote location [see Quick Start Wizard via SIMATIC PDM (Page 78)]

For more complex setups see Application Examples (Page 67), and for the complete range of parameters see Parameter Reference (Page 107).

6.2.2.1   The LCD display

Measurement mode display

Normal operation
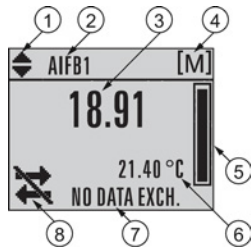
①   Toggle indicator [a)] for analog input function   ⑤   Bar graph indicates level
blocks (AIFB 1 or AIFB 2)

②   Identifies which AIFB is source of   ⑥   Secondary region indicates on request [b)]
displayed value   electronics
temperature, echo confidence, or distance

③   Measured value (level, space, distance, or   ⑦   Text area displays status messages
volume)

④   Units   ⑧   Device status indicator, see Device status
icons (Page 180)

[a)] Press **UP** and **DOWN** arrow to switch.

[b)] In response to a key press request. For details, see Handheld programmer (Part No. 7ML1930-1BK) (Page 57) for key functions in Measurement mode.

Fault present
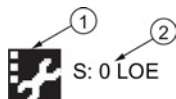
①   Device status indicator, see Device status icons (Page 180)
②   Text area displays a fault code and a status message

Program mode display

Navigation view
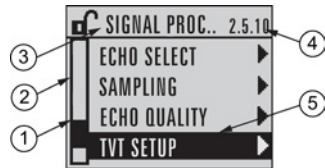
①	Item band	④	Current item number
②	Menu bar	⑤	Current item
③	Current menu		

- A visible menu bar indicates the menu list is too long to display all items.

- A band halfway down the menu bar indicates the current item is halfway down the list.

- The depth and relative position of the item band on the menu bar indicates the length of the menu list, and approximate position of the current item in the list.

- A deeper band indicates fewer items.

Parameter view   **Edit view**
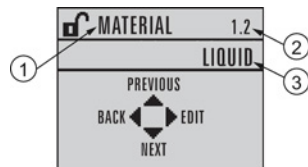
① Parameter name   ② Parameter number   ③ Parameter value/selection
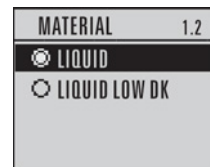
6.2.2.2 Handheld programmer (Part No. 7ML1930-1BK)

The programmer is ordered separately.

Key functions in measurement mode

Key	Function	Result
6	Updates internal enclosure temperature reading.	New value is displayed in LCD secondary region.
8	Updates echo confidence value.	
	Updates distance measurement	
	Mode opens PROGRAM mode	Opens the menu level last displayed in this power cycle, unless power has been cycled since exiting PROGRAM mode or more than 2 minutes have elapsed since PROGRAM mode was used. Then top level menu will be displayed.
	RIGHT arrow opens PROGRAM mode	Opens the top level menu.
	UP or **DOWN** arrow toggles between AIFB 1 and AIFB 2.	Identifies which AIFB is the source of the displayed value.

6.2.3 Programming

Note

- While the device is in PROGRAM mode the output remains active and continues to respond to changes in the device.
- The device automatically returns to Measurement mode after a period of inactivity in PROGRAM mode (between 15 seconds and 2 minutes, depending on the menu level).

Change parameter settings and set operating conditions to suit your specific application. For remote operation see Operating via SIMATIC PDM (Page 75).

Parameters menu

Note

For the complete list of parameters with instructions, see Parameter Reference (Page 107).

Parameters are identified by name and organized into function groups. See LCD menu structure (Page 295).
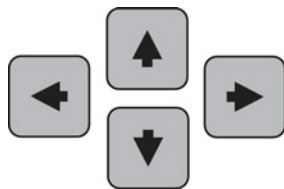
1. QUICK START

2. SETUP

    2.1. IDENTIFICATION

    ....

    2.4. LINEARIZATION

        2.4.1. VOLUME

            2.4.1.1. VESSEL SHAPE

1. Enter PROGRAM mode

- Point the programmer at the display from a maximum distance of 300 mm (1 ft).

- **RIGHT arrow** ▶ activates PROGRAM mode and opens menu level 1.

- **Mode** 🔲 opens the menu level last displayed in PROGRAM mode within the last 30 minutes, or menu level 1 if power has been cycled since then.
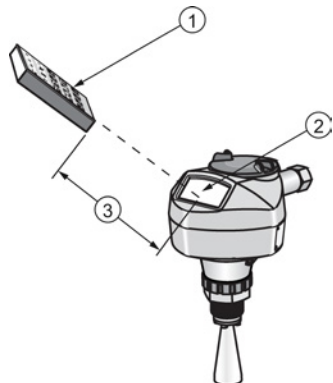
① Handheld programmer	② Display	③ Maximum distance: 300 mm (1 ft)

2. Navigating: key functions in Navigation mode

Note

- In navigation mode **ARROW keys** move to the next menu item in the direction of the arrow.

- For Quick Access to parameters via the handheld programmer, press Home 🔲 , then enter the menu number, for example: **(2.4.1.) Volume.**

Key	Name	Menu level	Function
⬆⬇	**UP** or **DOWN arrow**	menu or parameter	Scroll to previous or next menu or parameter.
➡	**RIGHT arrow**	menu	Go to first parameter in the selected menu, or open next menu.
		parameter	Open **Edit** mode.
⬅	**LEFT arrow**	menu or parameter	Open parent menu.
☰	**Mode**	menu or parameter	Change to **MEASUREMENT** mode.
🏠	**Home**	menu or parameter	Open top level menu: menu 1.

3. Editing in PROGRAM mode

- Navigate to the desired parameter.

- Press **RIGHT arrow** ➡ to open parameter view.

- Press **RIGHT arrow** ➡ again to open **Edit** mode. The current selection is highlighted. Scroll to a new selection.

- Press **RIGHT arrow** ➡ to accept it.

The LCD returns to parameter view and displays the new selection.
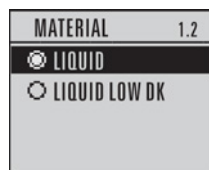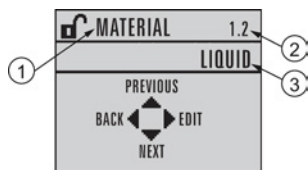
① Parameter name   ② Parameter number   ③ Current selection

4. Changing a numeric value

- Navigate to the desired parameter.

- Press **RIGHT arrow** ▶ to open parameter view. The current value is displayed.

- Press **RIGHT arrow** ▶ again to open **Edit** mode. The current value is highlighted.

- Key in a new value.

- Press **RIGHT arrow** ▶ to accept it.

The LCD returns to parameter view and displays the new selection.
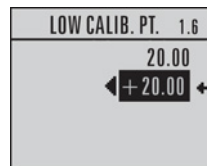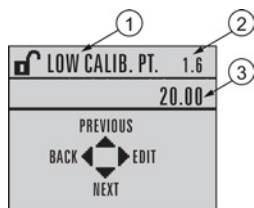
①Parameter name   ② Parameter number   ③ Current value

Key functions in edit mode

Key	Name	Function	
	UP or **DOWN arrow**	Selecting options	Scrolls to item.
		Numeric editing	• Increments or decrements digits • Toggles plus and minus sign
	RIGHT arrow	Selecting options	• Accepts the data (writes the parameter) • Changes from **Edit** to **Navigation** mode
		Numeric editing	• Moves cursor one space to the right • or, with cursor on Enter sign, accepts the data and changes from **Edit** to **Navigation** mode
	LEFT arrow:	Selecting options	Cancels **Edit** mode without changing the parameter.
		Numeric editing	• Moves cursor to plus/minus sign if this is the first key pressed • or moves cursor one space to the left
	Clear	Numeric editing	Erases the display.
	Decimal point	Numeric editing	Enters a decimal point.
	Plus or minus sign	Numeric editing	Changes the sign of the entered value.
	Numeral 0 to 9	Numeric editing	Enters the corresponding character.

6.2.3.1 Quick Start Wizard via the handheld programmer

Note

- A reset to factory defaults should be performed before running the Quick Start Wizard if the device has been used in a previous application. See **Master Reset (4.1.)**.
- The Quick Start wizard settings are inter-related and changes apply only after you select **YES** in **(1.8) Apply? (Apply changes)** in the Wizard Complete step.
- Do not use the Quick Start wizard to modify parameters: see instead Parameter reference (Page 107). (Perform customization for your application only after the Quick Start has been completed).
- Default settings in the parameter tables are indicated with an asterisk (*).

---

1. Quick Start

- Point the programmer at the display from a maximum distance of 300 mm (1 ft), then press **RIGHT arrow** ▶ to activate PROGRAM mode and open menu level 1.

- Press **RIGHT arrow** ▶ twice to navigate to menu item 1.1 and open parameter view.

- Press **RIGHT arrow** ▶ to open Edit mode or **DOWN arrow** ▼ to accept default values and move directly to the next item.

- To change a setting, scroll to the desired item or key in a new value.

- After modifying a value, press **RIGHT arrow** ▶ to accept it and press **DOWN arrow** ▼ to move to the next item.

- Quick Start settings take effect only after you select **Yes** to **Apply changes** from previous steps**.**

1.1 Language

Selects the language to be used on the LCD and takes effect immediately.

Options	English, Deutsch, Français, Español

1.2 Material

Selects the appropriate echo processing algorithms for the material [see **Position Detect (2.5.7.2.)** for more detail].

Options	*	LIQUID
		LIQUID LOW DK [a] (low dielectric liquid – CLEF algorithm enabled)

[a] dK < 3.0

1.3 Response Rate

Sets the reaction speed of the device to measurement changes in the target range. Use a setting just faster than the maximum filling or emptying rate (whichever is greater).

Options	Response Rate (2.3.8.1.)	Fill rate (2.3.8.2.)/Empty rate per Minute (2.3.8.3.)
	SLOW	0.1 m/min (0.32 ft/min)
	MED	1.0 m/min (3.28 ft/min)
	FAST	10.0 m/min (32.8 ft/min)

1.4 Units

Sensor measurement units.

Options	m, cm, mm, ft, in.

1.5 Operating mode

Operation	Description
NO SERVICE	Measurement and associated loop current are not updated, and the device defaults to Fail-safe mode [a].
LEVEL	Distance to material surface referenced from Low Calibration Point
SPACE	Distance to material surface referenced from High Calibration Point
DISTANCE	Distance to material surface referenced from Sensor reference point

[a] See **Material Level (2.5.1.)** for more detail.
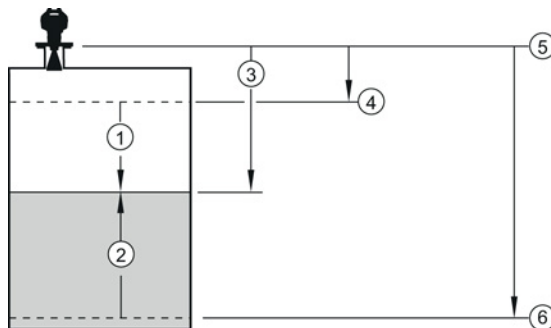
①	Space	④	High Calibration Point (process full level)
②	Level	⑤	Sensor reference point [a]
③	Distance	⑥	Low Calibration Point (process empty level)

[a] The point from which High and Low Calibration points are referenced: see **Dimension Drawings**.

1.6 Low Calibration Point

Distance from Sensor Reference to Low Calibration Point: usually process empty level. (See **Operating mode** for an illustration.)

Values	Range: 0.00 to 20.00 m

1.7 High Calibration Point

Distance from Sensor reference point to High Calibration Point: usually process full level. (See **Operating mode** for an illustration.)

Values	Range: 0.00 to 20.00 m

1.8 Apply? (Apply changes)

Options	YES, NO, DONE (Display shows DONE when Quick Start is successfully completed.)

Press **Mode** 🖫 to return to **Measurement** mode. SITRANS LR250 is now ready to operate.

6.2.3.2   Auto False Echo Suppression

If you have a vessel with known obstructions, we recommend using Auto False Echo Suppression to prevent false echo detection. See **(2.5.10.) TVT setup** for instructions.

This feature can also be used if the display shows a false high level, or the reading is fluctuating between the correct level and a false high level.

6.2.3.3 Requesting an Echo Profile

- In **PROGRAM** mode, navigate to: **Level Meter > (3.) > Diagnostics > (3.1.) > Echo Profile**
- Press **RIGHT arrow** [▶] to request a profile.
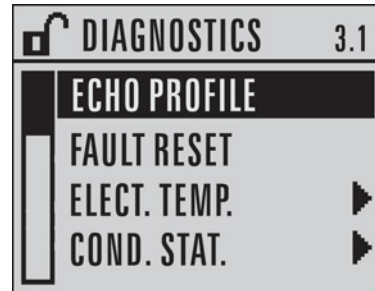
- Use **UP** [▲] or **DOWN** [▼] **arrow** to scroll to an icon. When an icon is highlighted, that feature becomes active.
- To move a cross-hair, press **RIGHT** [▶] **arrow** to increase the value, **LEFT** [◀] **arrow** to decrease.
- To Zoom into an area, position the intersection of the cross-hairs at the center of that area, select **Zoom**, and press **RIGHT** [▶] **arrow**. Press **LEFT** [◀] **arrow** to Zoom out.
- To update the profile, select **Measure** and press **RIGHT** [▶] **arrow**.
- To return to the previous menu, select **Exit** then press **RIGHT** [▶] **arrow.**
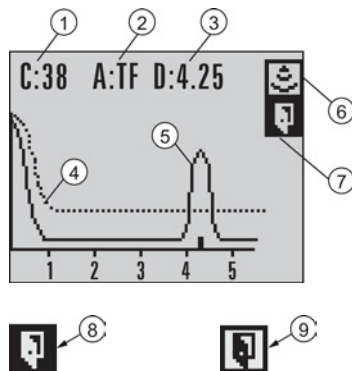
①	confidence	⑥	measure
②	algorithm: tF (trueFrist)	⑦	exit
③	distance	⑧	exit icon selected/highlighted
④	TVT	⑨	exit icon deselected
⑤	echo		

6.2.3.4 Device address

> **Note**
>
> See Master Reset (Page 97) to reset Device Address to 126.

The unique address of the device on the network (also called PROFIBUS address).

Values	0 - 126. Default: 126

1. In PROGRAM mode, navigate to: **Level Meter > (5.) Communication > (5.1.) Device Address**.

2. Press **RIGHT arrow** [▶], **RIGHT arrow** [▶], to open parameter view and enable Edit mode.

3. If required, key in a new value and press **RIGHT arrow** [▶] to accept it. The LCD displays the new value.

4. Press **Mode** [▦] to return to Measurement mode.

6.3 Application examples

> **Note**
>
> In the applications illustrated below, values are for example purposes only.

You can use these examples as setup references. Enter the values in the parameter tables to select the corresponding functions.

Configure the basic settings using the Quick Start wizard parameters. (These parameters are inter-related, and changes take effect only after you select **YES** to apply changes in the final step.)

In each example, after performing a Quick Start, navigate to the other required parameters either via the handheld programmer or via SIMATIC PDM and enter the appropriate values.

6.3.1 Liquid resin in storage vessel, level measurement

Note

Minimum distance from flange face to target is limited by **Near Range (2.5.1.)**.

To obtain level measurement proportional to resin levels:

- Low Calibration Pt. = 5 m (16.4 ft) from sensor reference point
- High Calibration Pt.= 0.5 m (1.64 ft) from sensor reference point
- Max.fill/empty rate = 0.2 m/min (0.65 ft/min)

In the event of a loss of echo:

- SITRANS LR250 is to report a user-defined value of 4.5 m (14.76 ft) after 2 minutes.
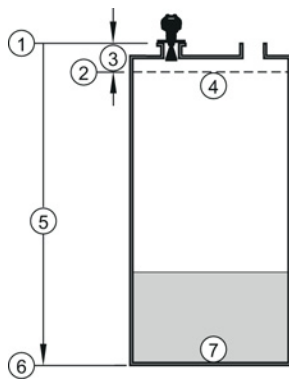
①	Sensor reference point	⑤	5 m
②	High calibration point	⑥	Low calibration point
③	0.5 m	⑦	0% level
④	100% level		

Parameter type	Parameter No. /Name	Options/ Values	Function
Quick Start Wizard parameters	Material (1.2.)	LIQUID	
	Response Rate (1.3.)	MED	Medium =1 m/minute
	Units (1.4.)	M	meters
	Operating mode (1.5.)	LEVEL	Level
	Low Calibration Point (1.6.)	5	5 m (16.4 ft)
	High Calibration Point (1.7.)	0.5	0.5 m (1.64 ft)
	Apply? (Apply changes) (1.8.)	YES	Transfers Quick Start settings to device.
Independent parameters	LOE Timer (2.3.6.)	2	2 minutes
	Mode (2.6.9.1.)	Substitute value	User-defined value to be used.
	Value (2.6.9.2)	4.5	4.5 m (14.76 ft)

Press **Mode** 🔳 to return to **Measurement** mode. .

6.3.2 Horizontal vessel with volume measurement

Note

The minimum distance from the flange face to the target is limited by **Near Range (2.5.1.)**.

To obtain level measurement proportional to vessel volume in a chemical vessel:

- Low Calibration Point = 3.5 m (11.48 ft) from sensor reference point
- High Calibration Point = 0.5 m (1.64 ft) from sensor reference point
- Max. fill/empty rate = 0.2 m/min (0.65 ft/min)

Select vessel shape, Parabolic Ends, and enter values for A and L, to obtain a volume reading instead of level.

In the event of a loss of echo: SITRANS LR250 is to report a user-defined value of 4.5 m (14.76 ft) after 2 minutes.

① Sensor reference point   ⑥ A = 0.8 m
② 0.5 m   ⑦ L = 6 m
③ High calibration point   ⑧ 100% = 8000 L
④ 3.5. m   ⑨ Volume reading
⑤ Low calibration point

Parameter type	Parameter No./Name	Options/ Values	Function
Quick Start Wizard parameters	Material (1.2.)	LIQUID	
	Response Rate (1.3.)	MED	Medium =1 m/minute
	Units (1.4.)	M	meters
	Operating Mode (1.5.)	LEVEL	Level is reported as Volume when a vessel shape is selected.
	Low Calibration Point (1.6.)	3.5	3.5 m (11.48 ft)
	High Calibration Point (1.7.)	0.5	0.5 m (1.64 ft)
	Apply? (Apply changes) (1.8)	YES	Transfers Quick Start settings to device.
Independent parameters	Vessel Shape (2.4.1.1.)	PARABOLIC ENDS	Defines vessel shape.
	Maximum Volume (2.4.1.2.)	8000	8000 liters
	Vessel Dimension A (2.4.1.3.)	0.8	0.8 m (2.62 ft)
	Vessel Dimension L (2.4.1.4.)	6	6 m (19.68 ft)
	LOE Timer (2.3.6.)	2	2 minutes
	Mode (2.6.9.1.)	Substitute value	User-defined value to be used.
	Value (2.6.9.2.)	4.5	4.5 m (14.76 ft)

Return to **Measurement:** press **Mode** 📱 to start normal operation.

6.3.3 Application with stillpipe

A stillpipe is recommended for products with a dK of less than 3, or if extremely turbulent or vortex conditions exist. This mounting arrangement can also be used to provide optimum signal conditions on foaming materials.

Note

- **Near Range (2.5.1.)** (Blanking) will be set at the factory. Check the process connection tag for specific values.
- Suitable pipe diameters are 40 mm (1.5") to 100 mm (4").
- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe. See Dimension drawings (Page 195).
- See Mounting on a Stillpipe or Bypass Pipe (Page 32) for installation guidelines.

This application is to obtain a level measurement and corresponding 4 to 20 mA output proportional to the oil level in a fuel storage vessel.

- Low Calibration Pt. is 5 m (16.4 ft) from the sensor reference point.
- High Calibration Pt. is 0.5 m (1.64 ft) from the sensor reference point.
- The stillpipe inside diameter is 50 mm (1.96").
- The maximum rate of filling or emptying is about 0.1 m (4")/min.
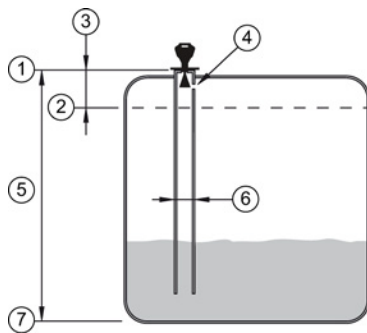
①	Sensor reference point	⑤	5 m
②	High calibration point	⑥	50 mm I.D.
③	0.5 m	⑦	Low calibration point
④	Vent hole		

Parameter type	Parameter No./Name	Options/Values	Function
Quick Start Wizard parameters	Introduction	**NEXT**	Continue with Wizard.
	Language (1.1)	**NEXT**	Continue with current language.
	Material (1.2)	**LIQUID LOW DK**	
	Response Rate (1.3)	**MED**	Medium =1 m/minute
	Units (1.4)	**M**	meters
	Operating mode (1.5)	**LEVEL**	Level is reported as Volume when a vessel shape is selected.
	Low Calibration Point (1.6)	**5**	5 m (16.4 ft)
	High Calibration Point (1.7)	**0.5**	0.5 m (1.64 ft)
	Apply? (Apply changes) (1.8)	**YES**	Transfers Quick Start settings to device.
Independent parameters	Propagation Factor (2.5.3.)[a]	**0.988**	P.F. for a 50 mm (1.96") I.D. stillpipe
	Position Detect (2.5.7.2.)	**HYBRID**	
	CLEF Range (2.5.7.4.)[a]	4.3	Low calibration point - 0.7 m = 4.3 m (14.1 ft)

[a] The recommended values for the propagation factor and for CLEF range are dependent on the stillpipe diameter. See Propagation Factor/Stillpipe Diameter for values.
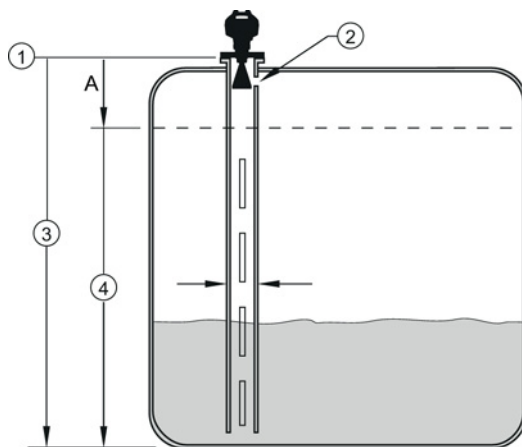
① sensor reference point   ③ low calibration point
② air gap   ④ CLEF range 2.5.7.4.
A   700 or 1000 mm (see CLEF Range settings in table below)

Propagation Factor/Stillpipe Diameter

Values	Range	0.3 to 1.0 depending on pipe size		
	Default	1.0000		
Nominal Pipe Size [a]	40 mm (1.5")	50 mm (2")	80 mm (3")	100 mm (4")
Propagation Factor	0.9844	0.988	0.9935	0.9965
CLEF Range (2.5.7.4.) settings	Low calibration point - 700 mm (2.29 ft)[b]	Low calibration point - 700 mm (2.29 ft)[b]	Low calibration point - 1000 mm (3.28 ft)[b]	Low calibration point - 1000 mm (3.28 ft)[b]

[a]   Since pipe dimensions may vary slightly, the propagation factor may also vary.

[b]   CLEF range covers the whole measurement range except first 700 or 1000 mm from sensor reference point

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Note

Flanged and Hygienic encapsulated antenna

For Flanged encapsulated antenna (7ML5432) and Hygienic encapsulated antenna (7ML5433) match the process connection size to the pipe diameter. For example, DN80/3" flange to DN80/3" pipe.

Remote operation

7

7.1   Operating via SIMATIC PDM

SIMATIC PDM is a software package used to commission and maintain process devices. Please consult the operating instructions or online help for details on using SIMATIC PDM. You can find more information on versions and compatibility at our website:

SIMATIC PDM (www.siemens.com/simatic-pdm).

7.1.1   Functions in SIMATIC PDM

Note

- For a complete list of parameters see Parameter Reference (Page 107).
- While the device is in PROGRAM mode the output remains active and continues to respond to changes in the device.

SIMATIC PDM monitors the process values, alarms and status signals of the device. It allows you to display, compare, adjust, verify, and simulate process device data; also to set schedules for calibration and maintenance.

Parameters are identified by name and organized into function groups. See LCD menu structure (Page 295) for a chart and Changing parameter settings using SIMATIC PDM (Page 83) for more details. The menu structure for SIMATIC PDM is almost identical to that for the LCD.

See Parameters accessed via pull-down menus (Page 83) for parameters that do not appear in the menu structure in SIMATIC PDM.

7.1.1.1 Features of SIMATIC PDM Rev. 6.0, SP4 or higher

The graphic interface in the device makes monitoring and adjustments easy.

Feature	Function
Quick Start (Page 78)	Device configuration for simple applications
Echo Profile Utilities (Page 84)	Easy access to echo profile viewing/comparison, TVT shaping, auto false echo suppression and echo setup
Auto False Echo Suppression (Page 88)	Screen out false echoes
TVT Shaper (Page 86)	Manual TVT adjustment
Process Variables (Page 98)	Monitor process variables and level trend
Security (Page 104)	Protect security and communication parameters from modification by the maintenance user

7.1.1.2 Features of SIMATIC PDM Rev. 5.2, SP1

SIMATIC PDM Rev. 5.2 SP1 is supported only for basic configuration and troubleshooting. For advanced features such as the Quick Start wizard, Rev. 6.0 SP3 HF2 or higher is required.

7.1.1.3 SIMATIC PDM Version

Check the support page of our website to make sure you have the latest version of SIMATIC PDM, the most recent Service Pack (SP) and the most recent hot fix (HF): SIMATIC PDM Version (https://support.automation.siemens.com). Browse to **Product Information > Automation Technology > Process control systems > SIMATIC PCS 7 > System components > SIMATIC PDM.**

7.1.2 Electronic Device Description (EDD)

7.1.2.1 Updating the Electronic Device Description (EDD)

You can locate the EDD in Device Catalog, under **Sensors/Level/Echo/SiemensMilltronics/SITRANS LR250**. The EDD revision must match the Firmware revision in the device.

To install a new EDD:

1. Download the most current EDD from our website: Product page
   (http://www.siemens.com/LR250)

2. Save files to your computer, and extract the zipped file to an easily accessed location.

3. Launch **SIMATIC PDM – Manage Device Catalog**, browse to the unzipped EDD file and
   select it.

7.1.2.2 Configuring a new device

Note

- Clicking on **Cancel** during an upload from device to SIMATIC PDM will result in some
  parameters being updated.

- Application Guides for setting up PROFIBUS PA devices with SIMATIC PDM can be
  downloaded from our website:
  Product page (http://www.siemens.com/LR250).

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1. Check that you have the most recent EDD, and if necessary update it. [See Updating the
   Electronic Device Description (EDD) (Page 76)].

2. Set Address via handheld programmer (default for PROFIBUS PA is 126). [See **Device
   Address (5.1.)** to use SIMATIC PDM.]

   – In PROGRAM mode, navigate to: **Level Meter > Communication (5.) > Device Address
     (5.1.)**.

   – Press **RIGHT arrow** ▶, **RIGHT arrow** ▶, to open parameter view and enable Edit mode.

   – If required, key in a new value and press **RIGHT** ▶ arrow to accept it. The LCD displays
     the new value.

   – Press **Mode** ▮ to return to Measurement mode.

3. Launch SIMATIC Manager and create a new project for the device.

4. Open the menu **Device – Master Reset** and click on **Factory Defaults.**

5. After the reset is complete click on **Close**, then upload parameters to the PC/PG.

6. Configure the device via the Quick Start wizard.

7.1.3 Quick start wizard via SIMATIC PDM

The graphic Quick Start Wizard provides an easy step-by-step procedure that configures the device for a simple application.

Please consult the operating instructions or online help for details on using SIMATIC PDM.

1. If you have not already done so, check that you have the most up-to-date Electronic Device Description (EDD) for your device. [See Configuring a new device (Page 77).]

2. Launch SIMATIC Manager and create a new project. Application Guides for setting up HART and PROFIBUS PA devices with SIMATIC PDM can be downloaded from the product page of our website:
Product page (http://www.siemens.com/LR250)

Quick start

Note

- A reset to **Factory Defaults** should be performed before running the Quick Start Wizard if device has been used in a previous application. See Master Reset via SIMATIC PDM (Page 97).

- The Quick Start wizard settings are inter-related and changes apply only after you click on **FINISH AND DOWNLOAD** at the end of the last step to save settings offline and transfer them to the device.

- Do not use the Quick Start Wizard to modify individual parameters: for quick access to echo profile parameters, see Echo Profile via SIMATIC PDM (Page 85) or see Parameter Reference (Page 107) for a complete list. (Perform customization only after the Quick Start has been completed.)

- Click on **BACK** to return and revise settings or **CANCEL** to exit the Quick Start.

- For a vessel with obstructions see Auto False Echo Suppression via SIMATIC PDM (Page 88).

Launch SIMATIC PDM, open the menu **Device – Wizard - Quick Start**, and follow steps 1 to 5.
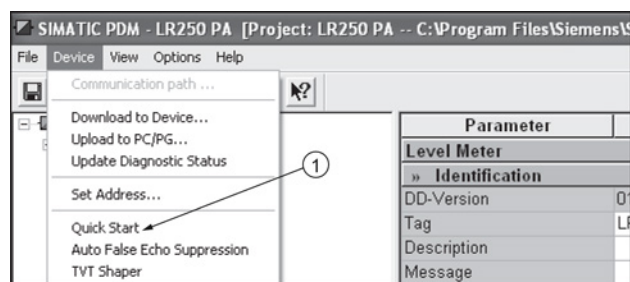
① Quick Start

Step 1 – Identification

Note
- The layout of the dialog boxes shown may vary according to the resolution setting for your computer monitor.
- SITRANS PDM limits the TAG field to a maximum of 24 characters.

1. Click on **Read Data from Device** to upload Quick Start parameter settings from the device to the PC/PG and ensure PDM is synchronized with the device.

2. If required, change the language for the local user interface.

3. Click on **NEXT** to accept the default values. (Description, Message, and Installation Date fields can be left blank.)

Step 2 – Application

Select the application type (level or volume) and the material, then click on **NEXT**.

See Application with Stillpipe (Page 71) for a Low Dielectric Liquid application.
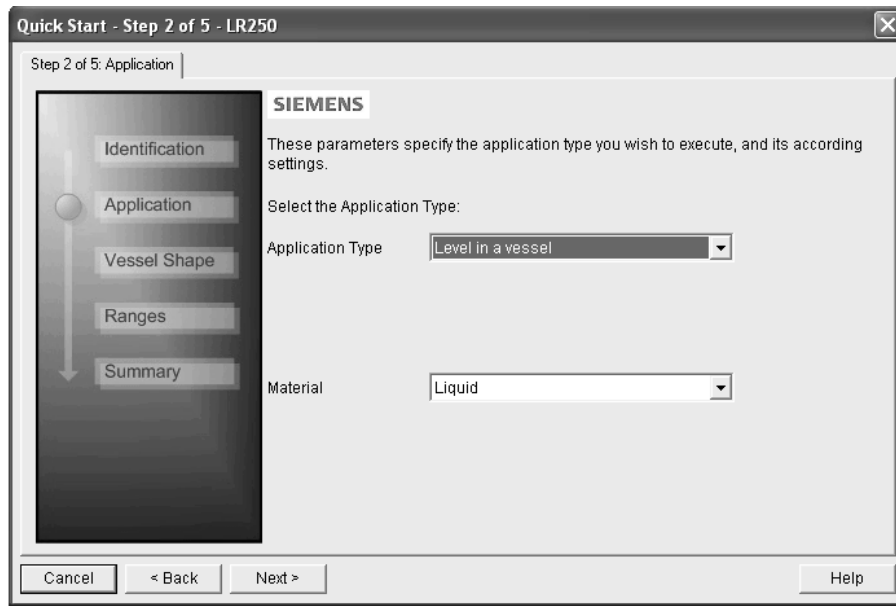
Step 3 – Vessel Shape

The vessel shapes shown are predefined.

For a vessel with obstructions, see Auto False Echo Suppression via SIMATIC PDM (Page 88).

Select the vessel shape, and click on **NEXT**.
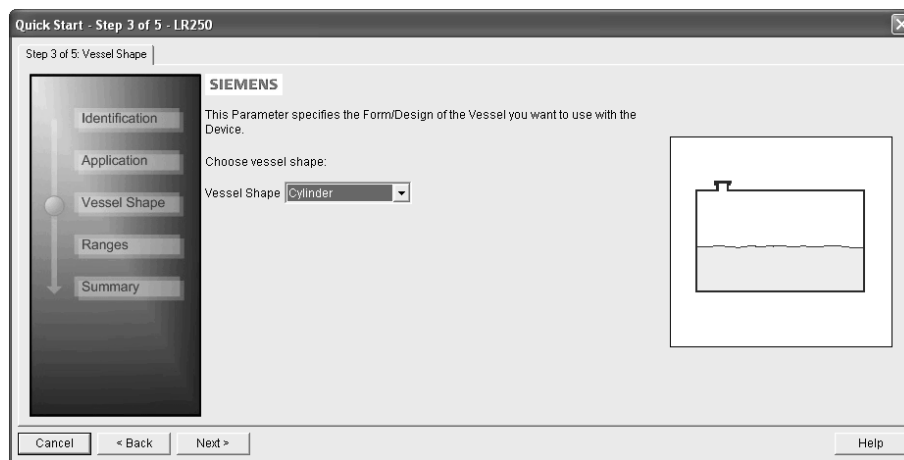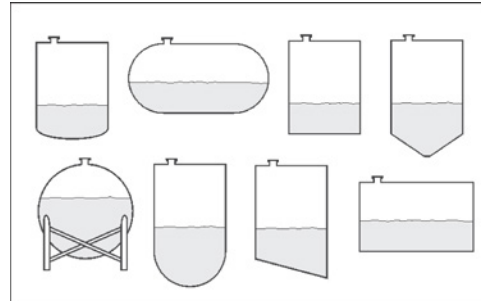
Step 4 – Ranges

Set the parameters, and click on **NEXT**.
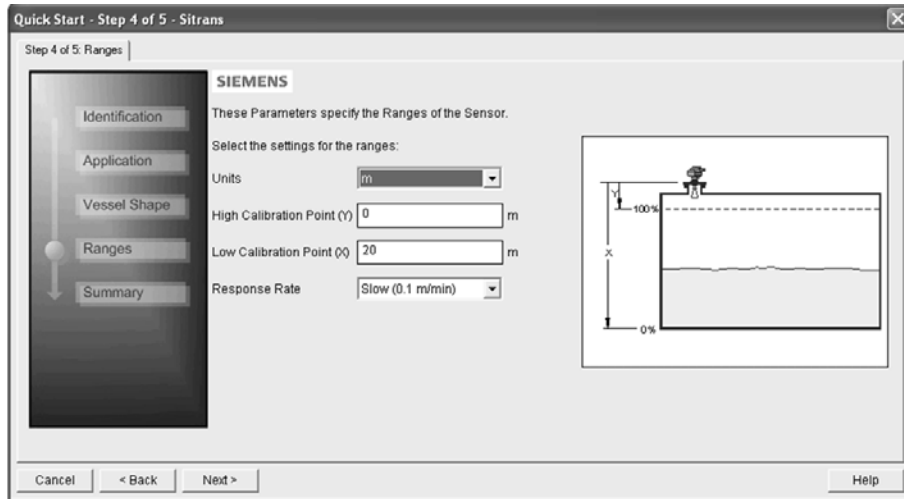
Step 5 – Summary

Check parameter settings, and click on **BACK** to return and revise values, **FINISH** to save settings offline, or **FINISH AND DOWNLOAD** to save settings offline and transfer them to the device.
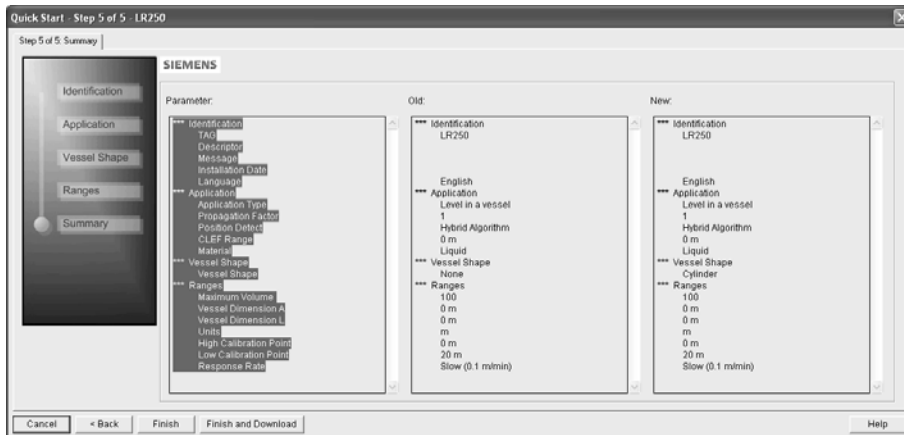
The message **Quick Start was successful** will appear. Click on **OK**.

7.1.4   Changing parameter settings using SIMATIC PDM

Note
- For a complete list of parameters, see Parameter Reference (Page 107).
- Clicking on **Cancel** during an upload from device to SIMATIC PDM will result in some parameters being updated.

Many parameters are accessed via pull-down menus in PDM. See Parameters accessed via pull-down menus (Page 83) for others.

1. Launch SIMATIC PDM, connect to device, and upload data from device.

2. Adjust parameter values in the parameter value field then **Enter**. The status fields read **Changed**.

3. Open the Device menu, click on **Download to device**, then use **File - Save** to save settings offline. The status fields are cleared.
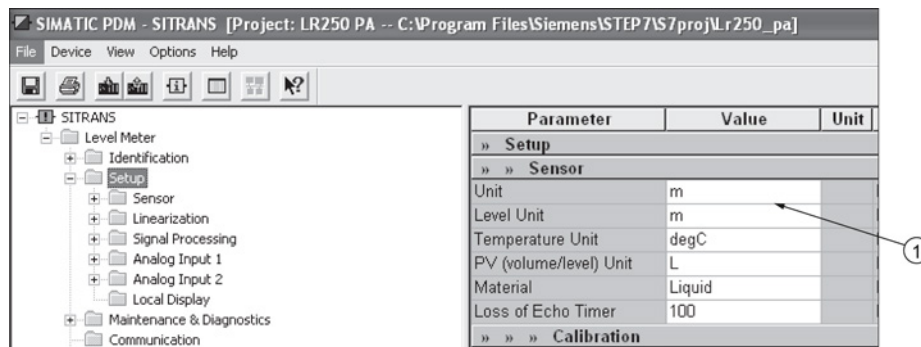
①   value fields

7.1.5   Parameters accessed via pull-down menus

Click on **Device** or **View** to open the associated pull-down menus.
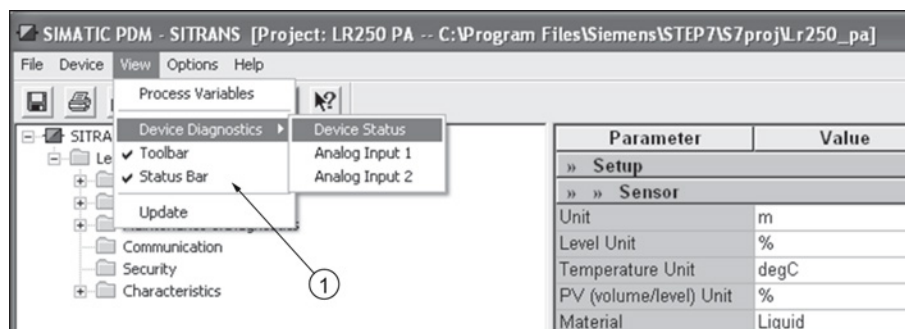
Pull-down menus

Device menus	View menus
Communication path	Process Variables (Page 98)
Download to device	
Upload to PC/PG	Device Diagnostics
Update Diagnostic Status	Toolbar
	Status bar
Wizard - Quick Start (Page 78)	Update
Echo Profile Utilities (Page 84)	
Maintenance (Page 91)	
Acknowledge Faults (Page 93)	
Wear (Page 93)	
Simulation (Page 93)	
Write Locking (Page 96)	
Master Reset (Page 97)	

7.1.5.1 Echo profile utilities

Open the menu **Device – Echo Profile Utilities** and click on the appropriate tab for easy access to:

- Echo profile (Page 85)
- View Saved Echo Profiles (Page 86)
- TVT Shaper (Page 86)
- Auto False Echo Suppression (Page 88)
- Echo Setup (Page 91)

Echo profile

Note

- Double click on each axis to see the Xscale and Data Scale values.
- To zoom in to a section of the profile, left-click and drag a marquee around it. Right click inside the window to zoom out.
- Expand or compress the x and/or y axes:
  – Left-click on the axis and drag in either direction to reposition the low end of the scale.
  – Right-click on the axis and drag in either direction to reposition the high end of the scale.
- After saving a profile click on **OK**, not the **x** button, to close the Echo Profile Utilities window, otherwise the profile will not be saved.

- In the **Echo Profile Utilities** window click the **Echo Profile** tab.
- Initial profile graph is blank upon entry to dialog. Click **Measure** to update the profile.
- It is recommended to use the **Detailed** resolution view of the echo profile for troubleshooting. For faster and more coarse views, the **Standard** resolution may be used.
- Click **Save** and in the new window enter a name and click **OK**.
- Click **OK** to exit.
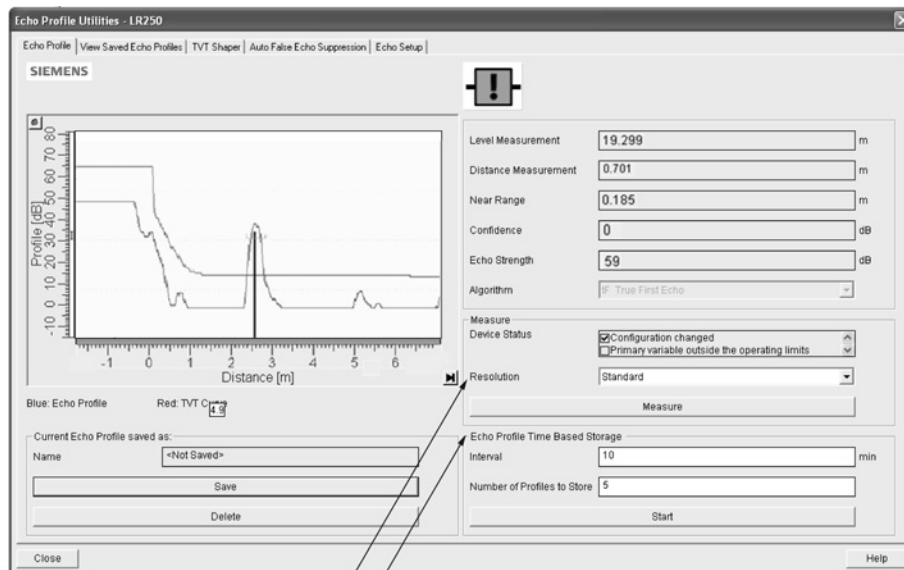
①   Resolution
②   Echo Profile Time Based Storage

View saved echo profiles

To view a saved profile, click on the tab **View Saved Echo Profiles**.

Echo profile data logging

You can store up to 60 profiles at a selected interval (maximum 60 minutes). Inside Echo Profile Utilities, in the **Echo Profile Time Based Storage** window:

- Enter the desired interval between stored profiles.

- Enter the maximum number of profiles to be stored (maximum 60).

- Click on **Start**. A message appears warning of the time delay and warning that all previous saved profiles will be overwritten. Click on **OK** to proceed. The new profiles will be saved with their date and time.

- Click on the tab **View Saved Echo Profiles** to view the stored profiles.

TVT Shaper

Note

Double click on each axis to see the X scale and data scale values. Right-click or Left-click on the axis and drag to reposition the scale.

This feature allows you to manually adjust the TVT to avoid false echoes caused by obstructions. For an explanation see Auto False Echo Suppression (Page 246).

Open the menu **Device – Echo Profile Utilities** and click the tab **TVT Shaper**.
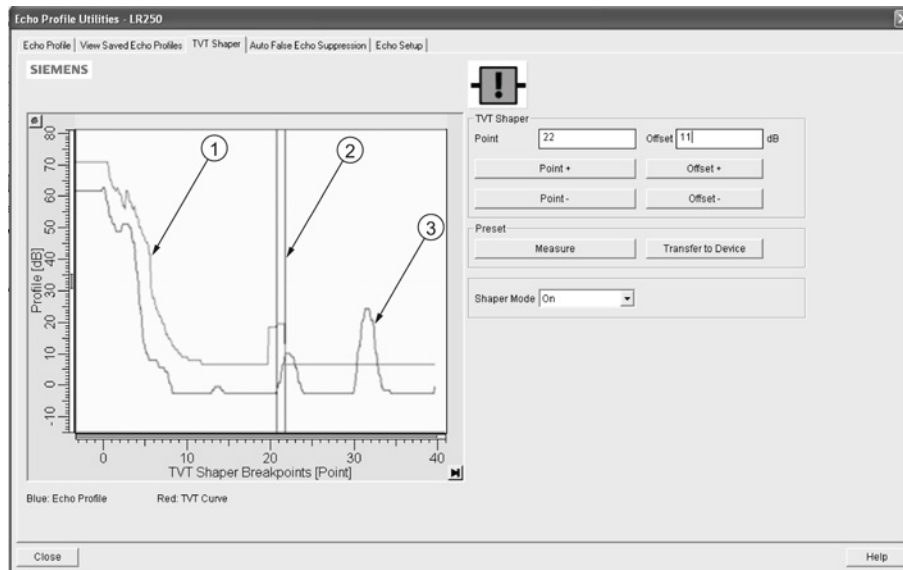
① TVT

② Cursor

③ Echo profile

- Initial profile graph is blank upon entry to dialog. Click on **Measure** to view and upload the current TVT from device.

- Change the position of the cursor on the TVT using the **Point+** and **Point–** buttons: raise and lower the TVT using **Offset+** and **Offset**-.

- Alternatively, enter values for **Point** and **Offset** directly into the dialog boxes.

- Click on **Transfer to Device**.

7.1.5.2 Auto false echo suppression

Note

- Ensure material level is below all known obstructions when using Auto False Echo Suppression to learn the echo profile. An empty or almost empty vessel is recommended.
- Note the distance to material level when learning the echo profile, and set Auto False Echo Suppression Range to a shorter distance to avoid the material echo being screened out.
- Set Auto False Echo Suppression and Auto False Echo Suppression Range during startup, if possible.
- If the vessel contains an agitator it should be running.
- Before adjusting these parameters, rotate the device for best signal (lower false-echo amplitude).

If you have a vessel with known obstructions, use Auto False Echo Suppression to prevent false echo detection. This feature can also be used if the device displays a false high level, or the reading is fluctuating between the correct level and a false high level.

The device learns the echo profile over the whole measurement range and the TVT is shaped around all echoes present at that moment. See Auto False Echo Suppression (Page 246) for a more detailed explanation.

The learned TVT will be applied over a specified range. The default TVT is applied over the remainder of the measurement range.
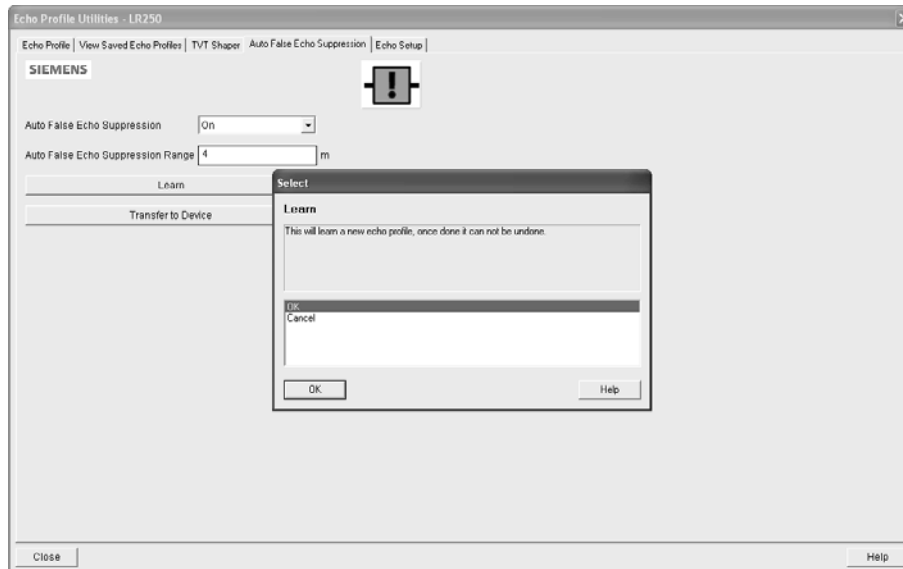
1. Make sure the material level is below all known obstructions.

2. Determine **Auto False Echo Suppression Range**. Measure the actual distance from the sensor reference point to the material surface using a rope or tape measure. Subtract 0.5 m (20") from this distance, and use the resulting value.

3. Open the menu **Device – Echo Profile Utilities** and click on the tab **Auto False Echo Suppression**.

4. Make sure **Auto False Echo Suppression Range** is **On**.

5. Enter the value for **Auto False Echo Suppression Range.**

6. Click **Learn**. The message appears: **'This will learn a new echo profile. Once done it cannot be undone'**. Click **OK**.

7. Once Auto TVT is complete click **Transfer to Device**. To exit click **Close**. Auto TVT is enabled and the learned TVT will be used.

8. To turn **Auto False Echo Suppression** off or on, reopen the **Auto False Echo Suppression** window, change the Auto False Echo Suppression to **Off** or **On**, click on **Transfer to Device.**

Before Auto False Echo Suppression
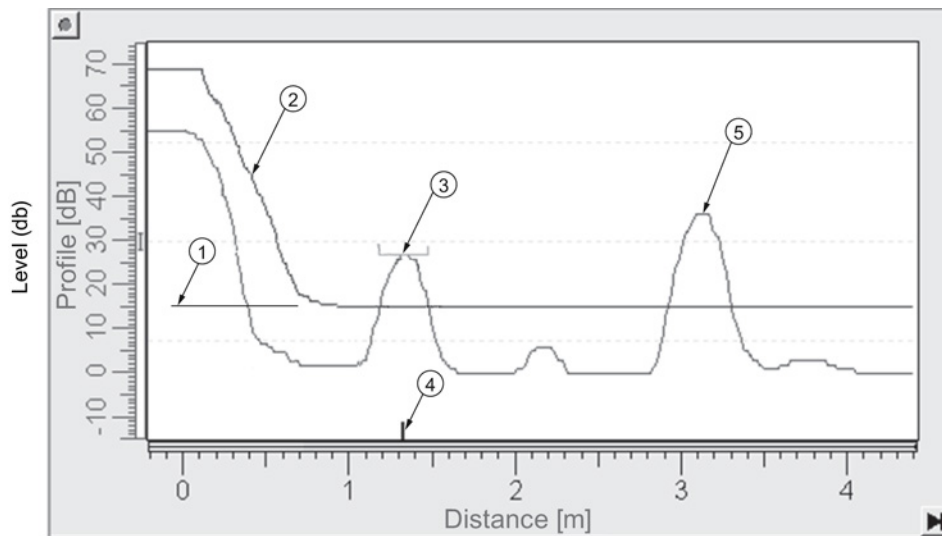
①	TVT Hover Level	④	Echo marker
②	Default TVT	⑤	Material level
③	False echo		

After Auto False Echo Suppression
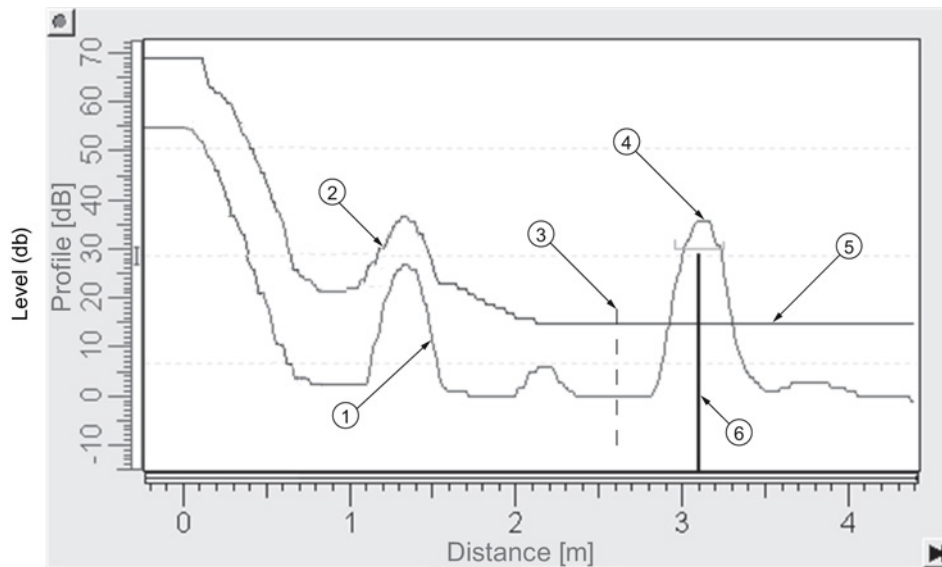
①	False echo	④	Material level
②	Learned TVT	⑤	Default TVT
③	Auto False Echo Suppression Range	⑥	Echo marker

7.1.5.3 Echo setup

Provides quick access to echo selection, filtering, and response rate parameters.

Open the menu **Device – Echo Profile Utilities** and click on **Echo Setup**.

7.1.5.4 Maintenance

You can set schedules and reminders for:

- device maintenance based on its projected lifetime
- sensor maintenance based on its projected lifetime
- service
- calibration
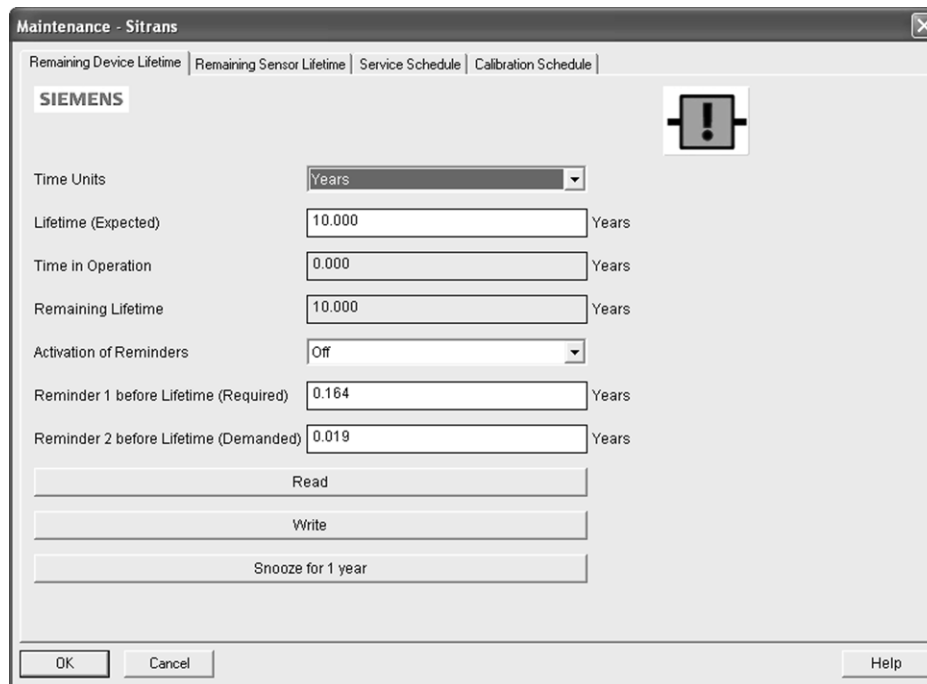
To set Device/Sensor Maintenance schedules:

1. Open the menu **Device – Maintenance**, and click on the **Remaining Device/Sensor Lifetime** tab.

2. Modify desired values, and if desired, set reminders for either or both of **Reminder 1 before Lifetime (Required)/Reminder 2 before Lifetime (Demanded)**.

3. Click **Write.**

4. Click **Read**, to see the effects of your modification.

5. Click **Snooze** to add a year to the Total Expected Device Life.

To set Service/Calibration schedules:

1. Open the menu **Device – Maintenance**, and click on the **Service/Calibration Schedule** tab.

2. Modify desired values and if desired, set reminders for either or both of **Reminder 1 before Lifetime (Required)/Reminder 2 before Lifetime (Demanded)**.

3. Click **Write.**

4. Click **Read**, to see the effects of your modification.

5. Click **Service/Calibration Performed** to reset the schedule.

7.1.5.5 Acknowledge Faults

Open the menu **Device – Acknowledge Faults**, select the appropriate item from the Extended Diagnostics pull-down menu, and click on **Transfer**.

7.1.5.6 Wear

Reports the number of hours the device has been operating, and the number of times it has been powered up.

Open the menu **Device – Wear** to view:

- Powered Hours
- Power-on Resets

7.1.5.7 Simulation

Note

The Simulation parameter influences output to the control system.

Two options enable you to test the functioning of the Analog Input Function Blocks or the functioning of everything between the Transducer Block and Output. For more details see Analog Input Function Blocks 1 and 2 (Page 270).

Simulate analog input to AIFB1 or AIFB2

Allows you to input a simulated measured value, status, and quality, in order to test the functioning of an Analog Input Function Block.

1. Open the menu **Device – Simulation**, and select the desired function block.

2. Click on the tab **Simulation (Measured value)**.
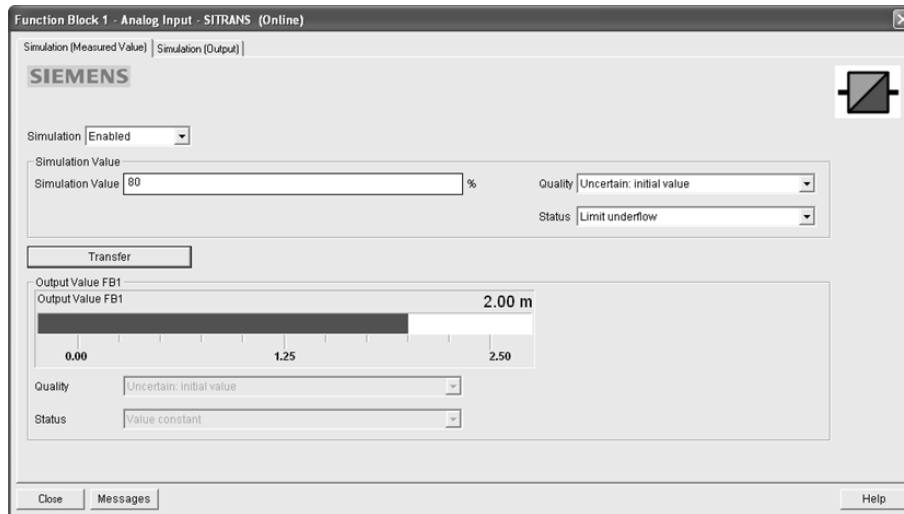
3. Enable simulation, enter a percentage value, set the desired quality and status, and click on **Transfer**. See Status Byte (Page 280) for more information on status and quality.

4. The Output value from the desired function block is displayed in PDM, and the LCD displays the substitute value. See Simulate Output below, to set the output mode.
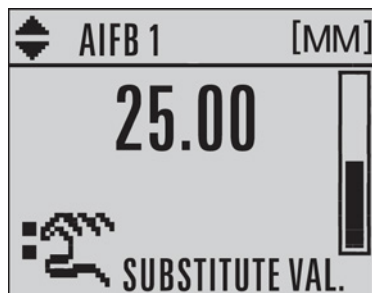
5. After simulation is complete, disable simulation and click on **Transfer**.

Simulate output

1. Open the menu **Device – Simulation**, select function block 1 or 2, and click on the tab Simulation (Output).

2. Select Manual Mode (from options AUTO, Manual, or Out of Service) and click on **Transfer**.
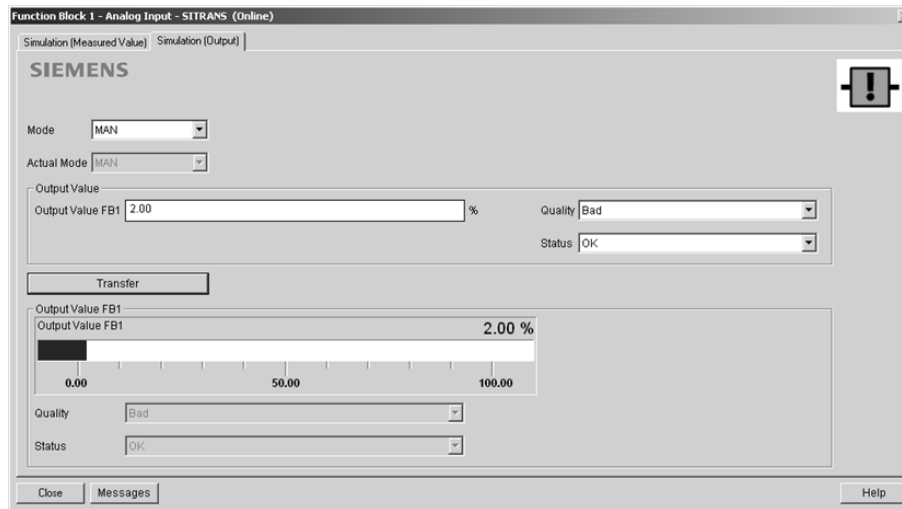
3. Enter simulated value and click on **Transfer**.

4. After simulation is complete, return to Simulate Output, reselect AUTO mode, and click on **Transfer**.

Simulate input

1. Open the menu **Device – Simulation**, and select **Simulation (Input)**.
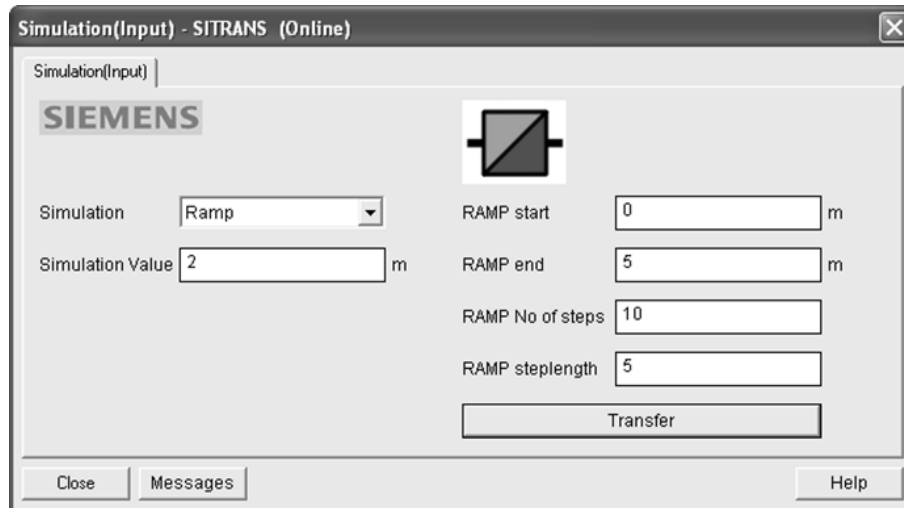
2. To enable simulation select **Fixed** or **Ramp**.

3. If you select Ramp, enter the step length and number of steps.

4. Enter the simulated value and click on **Transfer**.

5. After simulation is complete, disable simulation and click on **Transfer**.

7.1.5.8 Write locking

Prevents any changes to parameters via PDM or the hand-held programmer. If Write Locking is enabled, the data can be viewed but not modified.

To enable/disable Write Locking

1. Open the menu **Device – Write Locking** and turn Write Protection **On** or **Off**.

2. Click on **Transfer.**

7.1.5.9 Master reset

Options	Result
Factory defaults	Resets all parameters to the manufacturer's default settings, with certain exceptions: see Factory defaults (Page 97).
Standard defaults	Resets all resettable parameters excluding device addresses to the PROFIBUS default settings.
Informational	Resets Tag parameter.
Functional	Resets parameters that control device behavior, such as Low Calibration Pt.
Warm start	Has the same effect as recycling power to the device.
Reset address to 126	Resets the PROFIBUS device address to 126. If the address lock was on, will disable the lock.

7.1.5.10 Factory defaults

Factory Defaults resets all user parameters to the default settings, with certain exceptions. The list of exceptions includes, but is not limited to:

- Tag
- Message
- Descriptor
- Installation Data
- Device Address
- Write Protection
- Auto False Echo Suppression Range
- Learned TVT

To perform a reset to Factory Defaults:

1. Open the menu **Device – Master Reset**, and click on **Factory Defaults**.

2. After the reset is complete click on **Close**, then upload parameters to the PC/PG. (If you are performing a reset after replacing the device with a different instrument, do not upload parameters to the PC/PG.)

Resetting the PROFIBUS address to 126

1. Open the menu **Device – Master Reset** and click on **Reset Address to 126**.

2. Click on **OK**: the address will be reset to 126, and if the address lock was on, it will be disabled.

7.1.5.11 Diagnostics

You can monitor level/volume trends, function blocks, electronics temperature, and device status.

Process variables

To compare outputs in real time open the menu **View – Process Variables**.

Note

To view peak sensor values, peak FB1 and FB2 values, or peak electronics temperatures, see Device Diagnostics (Page 101).

- Sensor Value and simulation setting
- Electronics temperature
- Measured Value (level, volume, and distance) together with quality and status.
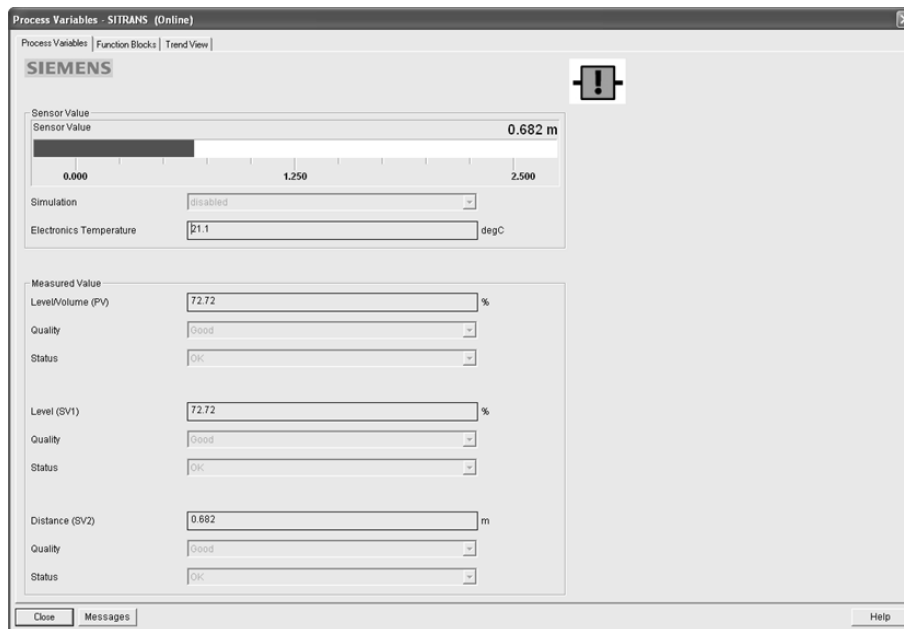
Function blocks

Open the menu View – Process Variables and click on Function Blocks to view the channel (level, volume, space, or distance), operating mode (Auto, Manual, or Out of Service), quality, status, simulation setting, and summary of alarms.
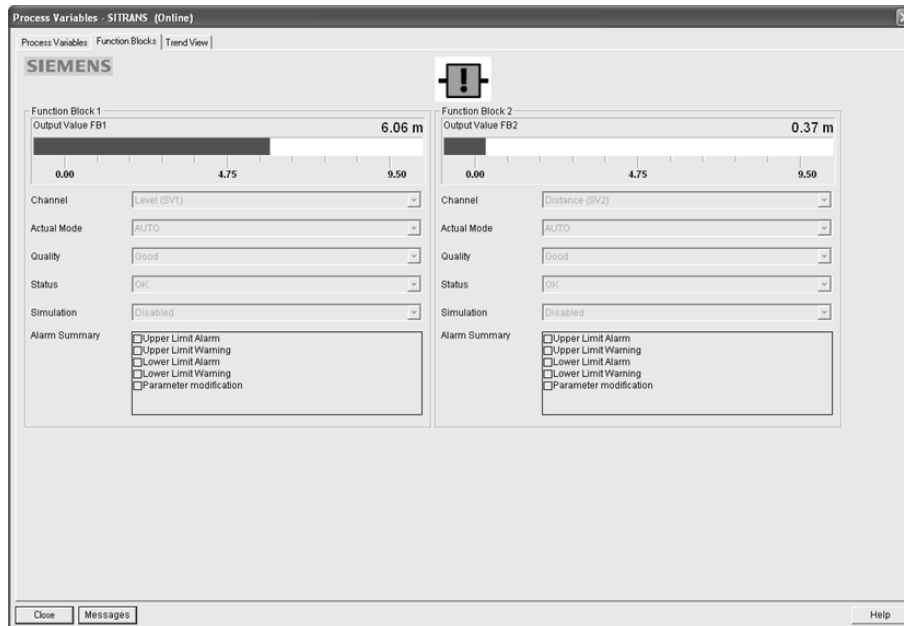
Trend view

Open the menu **View – Process Variables** and click on **Trend View** to monitor Sensor Value and values for AIFB1 and AIFB2.
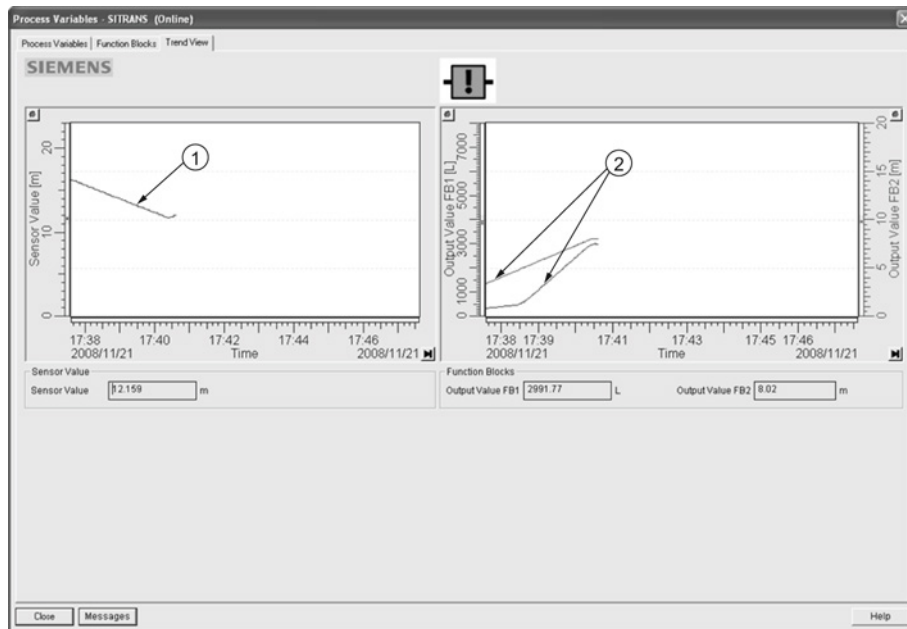
①   trend line
②   trend lines

Device diagnostics

Device status

Open the menu **View** – Device Diagnostics and go to **Device Status** to view Diagnostics, Device Status, Extended Diagnostics, and Maintenance.

Diagnostics

In the Device Status window, click on the **Diagnostics** tab, then on the **Update diagnostics button**, to update diagnostic information and refresh linked icons.
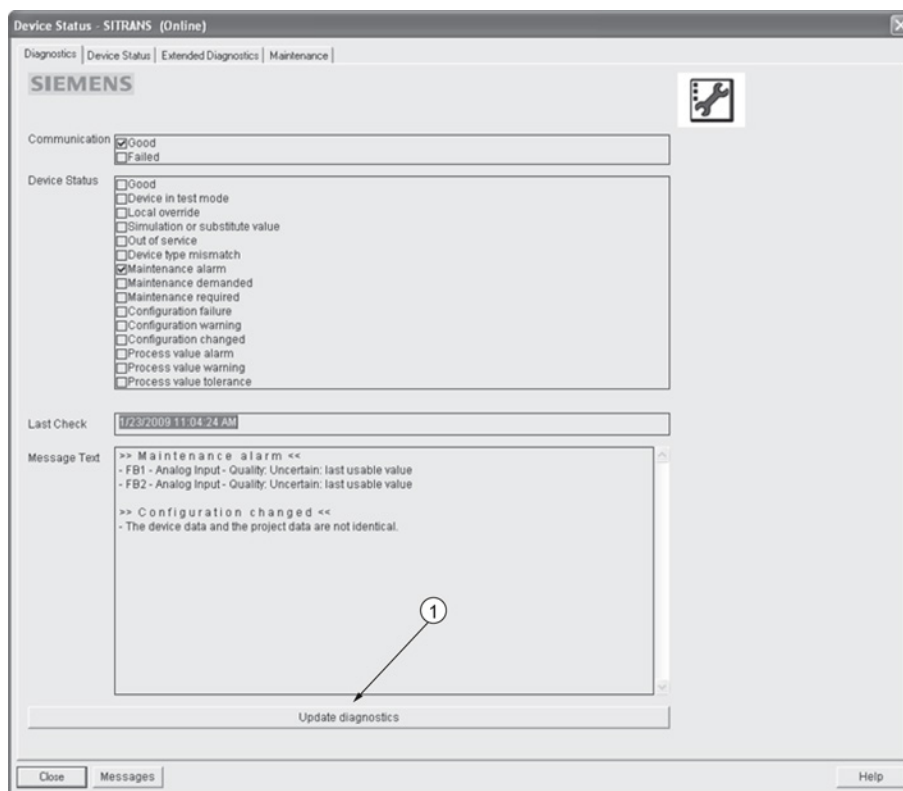
①   Update diagnostics

Device Status

Click on the Device Status tab to view peak sensor values, peak FB1 and FB2 values, and peak electronics temperatures.
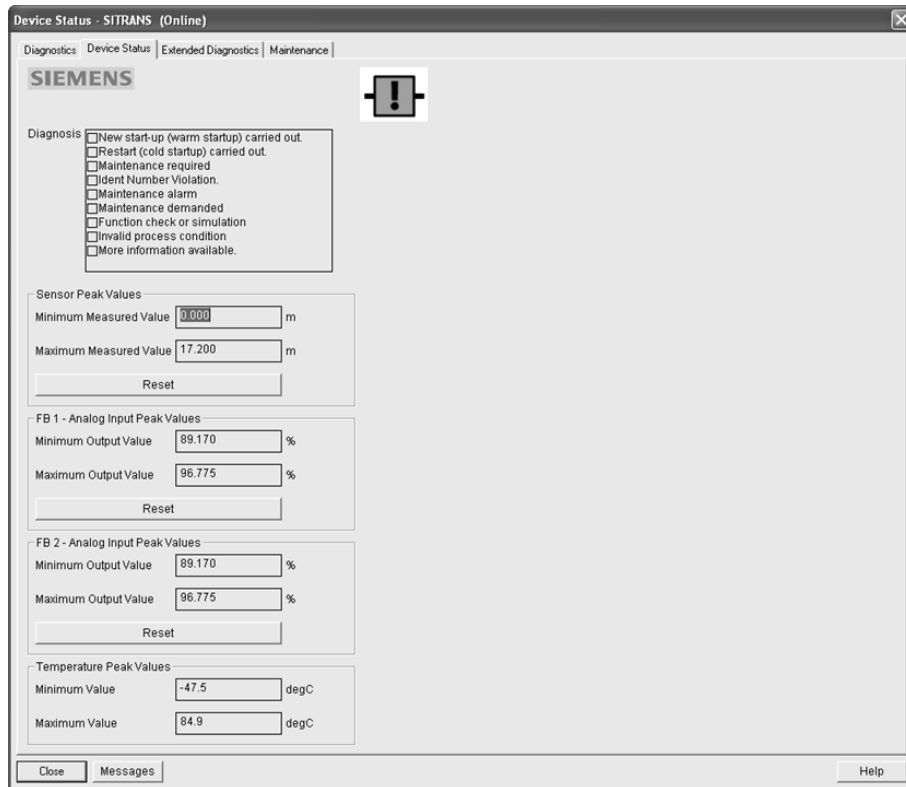
Analog Input 1/Analog Input 2

Open the menu **View – Device Diagnostics** and go to **Analog Input 1/Analog Input 2**. Click on the tab **Overview** to see the status of all warnings and alarms. Click on the tab **Alarms and Warnings** for details.
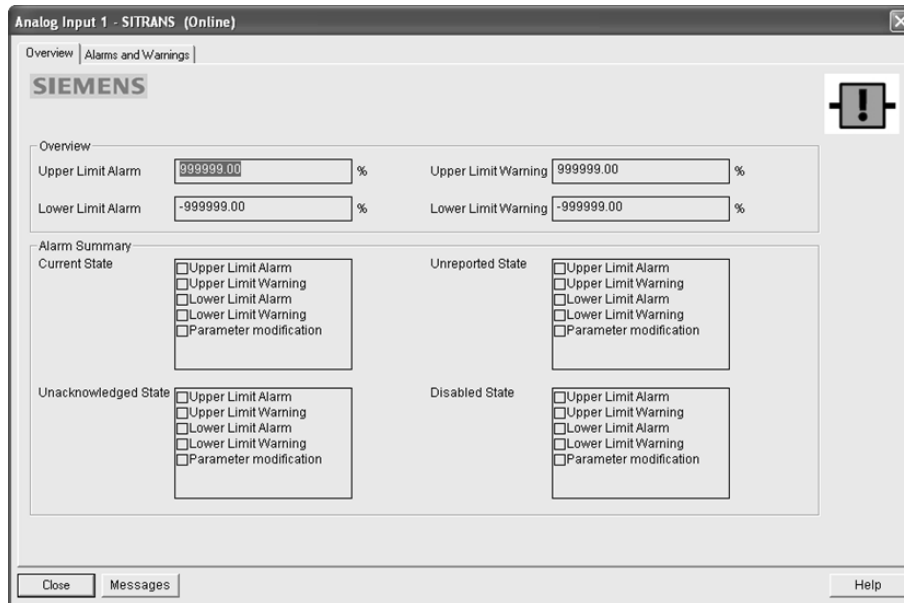
Update
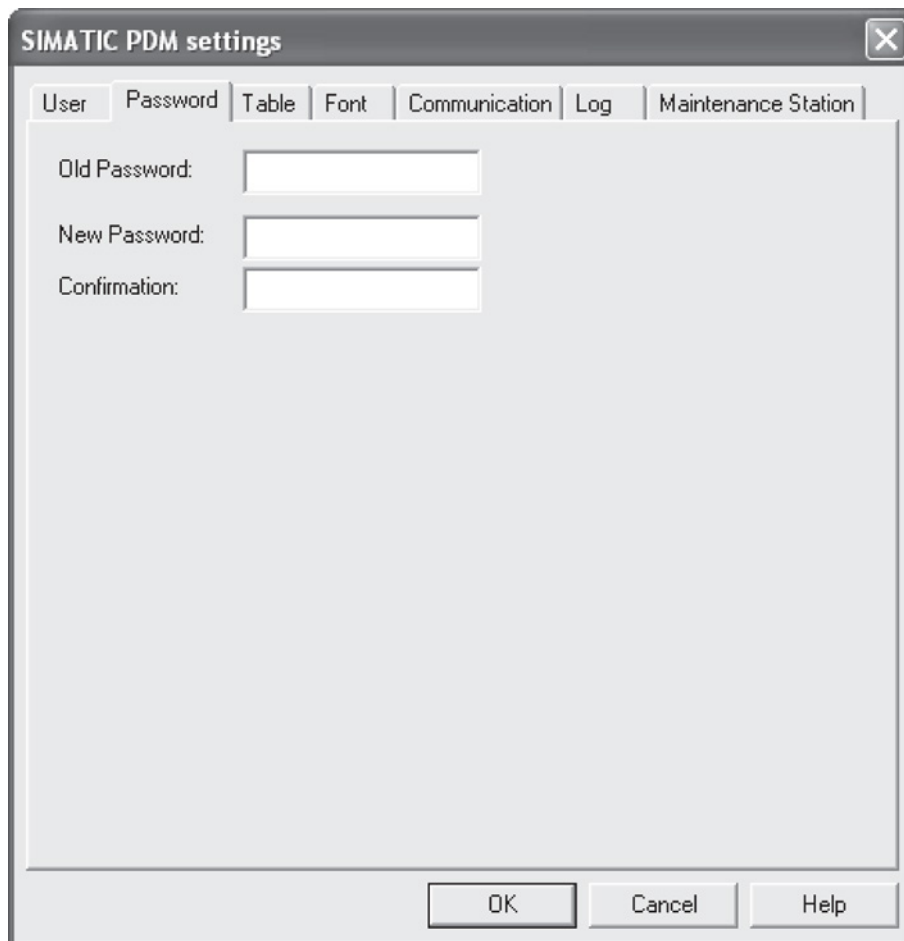
Open the menu **View – Update** to refresh the screen.

Security

A password option protects security and communication control parameters from modification by a maintenance user.

When you open a project the **User** dialog window provides two options: maintenance or specialist. If a password has been set it will not be possible to open the project as a specialist without it. A maintenance user will be able to open the project without a password but will not have access to security and communication control parameters.

1. Open a project, double-click on the device icon, and in the **User** window select **Specialist**.

2. Open the menu **Options – Settings** and click on the **Password** tab.

3. Enter a new password and re-enter it in the **Confirmation** window. Click on **OK**.

7.2 Operating via FDT

FDT is a standard used in several software packages designed to commission and maintain field devices. Two commercially available FDTs are PACTware and Fieldcare.

Functionally FDT is very similar to PDM. See Operating via SIMATIC PDM (Page 75) for more detail.

- To configure a field device via FDT you need the DTM (Device Type Manager) for the device.
- To configure a field device via SIMATIC PDM, you need the EDD (Electronic Data Description) for the device.

7.2.1 Device Type Manager (DTM)

A DTM is a type of software that 'plugs into' FDT. It contains the same information as an EDD but an EDD is independent of the operating system.

7.2.2 SITRANS DTM

- SITRANS DTM is an EDDL interpreter developed by Siemens to interpret the EDD for that device.
- To use SITRANS DTM to connect to a device, you must first install SITRANS DTM on your system and then install the device EDD written for SITRANS DTM.
- You can download SITRANS DTM from the Siemens service and support website. Go to Service & Support (http://www.siemens.com/automation/service&support), click on **Product Support**, and drill down to **Product Information/Automation Technology/Sensor systems/Process Instrumentation/Software & Communications**.

7.2.3 The device EDD

The SITRANS LR250 PROFIBUS PA EDD for SITRANS DTM can be downloaded from our website:

Product page (http://www.siemens.com/LR250).

Go to **Support > Software Downloads**.
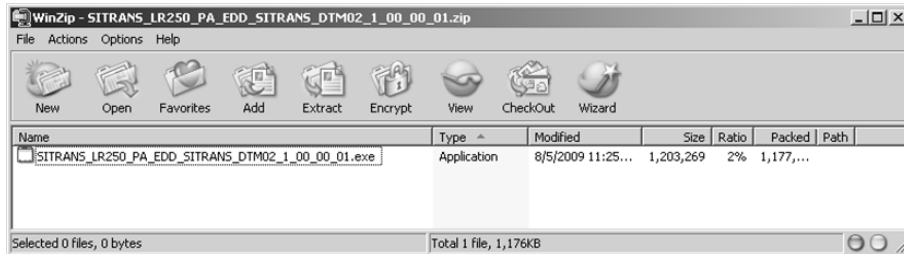
7.2.4 Configuring a new device via FDT

The full process to configure a field device via FDT is outlined in an Application Guide which can be downloaded from our website under **Support > Application Guides**.

Product page (http://www.siemens.com/LR250)

Parameter reference

<div align="right">

8

</div>

Note

- Parameter names and menu structure are almost identical for SIMATIC PDM and the local user interface (LUI).
- Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.
- **Mode** 📱 toggles between **PROGRAM** and **Measurement** Modes.
- For Quick Access to parameters via the handheld programmer, press **Home** 🔲 , then enter the menu number, for example: **2.2.1.**
- In Navigation mode**, ARROW keys** (◀ ▲ ▼ ▶) navigate the menu in the direction of the arrow.
- Press **RIGHT arrow** ▶ to open **Edit** Mode, or to save a modification.

Parameters are identified by name and organized into function groups. See LCD menu structure (Page 295) for a chart.

Parameters accessible via the handheld programmer are followed by the device menu number in parenthesis. Parameters not followed by a number are accessible only via remote operation.

For more details see:

- Operating via SIMATIC PDM (Page 75)

The Quick Start wizard provides an easy step-by-step procedure to configure the device for a simple application.

Quick Start (1.)

Note

- Do not use the Quick Start wizard to modify individual parameters. (Perform customization only after the Quick Start has been completed.)
- For access via remote operation see Quick Start Wizard via SIMATIC PDM (Page 78).
- For detailed instructions see Quick Start Wizard via the handheld programmer (Page 63).

Language (1.1.)

Material (1.2.)

Response Rate (1.3.)

Units (1.4.)

Operating Mode (1.5.)

Low Calibration Point (1.6.)

High Calibration Point (1.7.)

Apply? (Apply changes) (1.8.)

Setup (2.)

Note
- Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.
- Values shown in the following tables can be entered via the handheld programmer.

Identification (2.1.)

Tag (2.1.1.)

Note

SITRANS PDM limits the TAG field to a maximum of 24 characters.

Text that can be used in any way. A recommended use is as a unique label for a field device in a plant. Limited to 32 ASCII characters.

Descriptor (2.1.2.)

Text that can be used in any way. Limited to 32 ASCII characters. No specific recommended use.

Message (2.1.3.)

Text that can be used in any way. Limited to 32 ASCII characters. No specific recommended use.

Device (2.2.)

Hardware Revision (2.2.1.)

Read only. Corresponds to the electronics hardware of the Field Device.

Firmware Revision (2.2.2.)

Read only. Corresponds to the software or firmware that is embedded in the Field Device.

Loader Revision (2.2.3.)

Read only. Corresponds to the software used to update the Field Device.

Order Option (2.2.4.)

Read only. Displays the device type.

Sensor (2.3.)

Unit (2.3.1)

Sensor measurement unit.

Values	m, cm, mm, ft, in
	Default: m

Level Unit (2.3.2.)

Select engineering units for Level.

Options		m, cm, mm, ft, in, %
	*	%

PV Units (volume/level) (2.3.3.)

Note

- A greater selection of volume units is available via SIMATIC PDM.
- Default unit of AIFB1 or 2 is percent.
- You can select a different unit for your application.
- PV (Primary Value): the output from the Level Transducer Block. See Transducer Block function groups (Page 267) and How the Transducer Block works (Page 268) for more details.

Select units for either volume or level.

Level values		m, cm, mm, ft, in
Volume values		liter, gal
Percent value	*	%

Temperature Units (2.3.4.)

Selects the engineering unit to be displayed with the value representing temperature.

Options		DEG C, DEG F, RANKINE, KELVIN
	*	DEG C

Material (2.3.5.)

Automatically configures the device to operate in the chosen application type, by changing one or more of the following parameters: **Propagation Factor (2.5.3.)**, **Position Detect (2.5.7.2.)**, and/or **CLEF Range (2.5.7.4.)**.

Options	*	LIQUID
		LIQUID LOW DK [a)] (low dielectric liquid - CLEF algorithm enabled)
Related parameters	Propagation Factor (2.5.3.)	
	Position Detect (2.5.7.2.)	
	CLEF Range (2.5.7.4.)	

[a)] dK < 3.0

You can configure each of the related parameters, to suit your particular application.

LOE Timer (2.3.6.)

Note

When a Loss of Echo occurs **Value (2.6.9.2.)** determines the material level to be reported when LOE Timer expires. See Loss of Echo (LOE) (Page 250) for more detail.

Sets the time to elapse since the last valid reading, before the Fail-safe material level is reported.

Values	Range: **0** to **720** seconds
	Default: 100 s

Calibration (2.3.7)

Note

We recommend using the Quick Start wizard to configure the device.

Low Calibration Pt. (2.3.7.1.)

Distance from sensor reference point to Low Calibration Point (corresponding to Low Level Point). Units are defined in **Unit (2.3.1.).**

① High level point (default: 100%) ⑥ Level offset (if used)
② Low level point (default: 0%) ⑦ Low calibration point [a]
③ Sensor value ⑧ Sensor reference point
④ High calibration point ⑨ Far range
⑤ Level
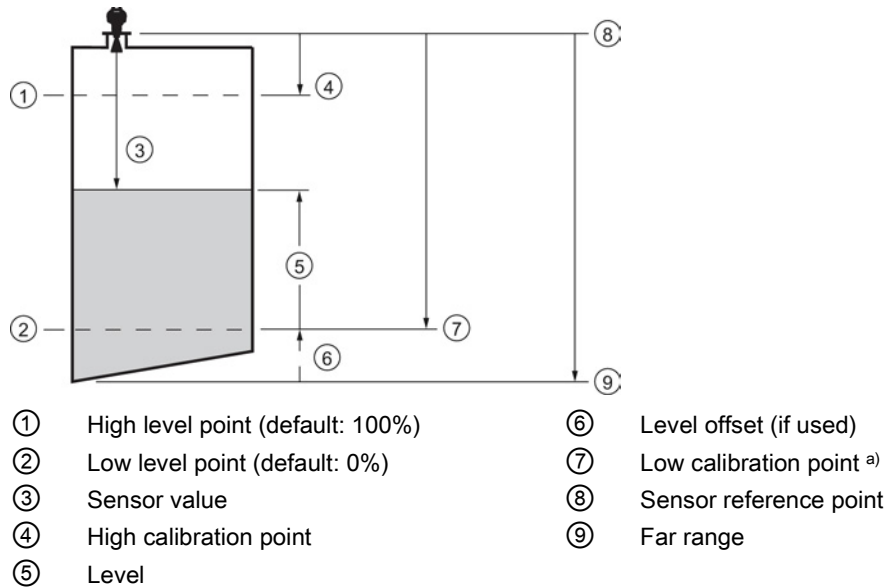
[a] Sensor reference point is the point from which level measurement is referenced. See Threaded Horn Antenna with extension (Page 195), Flanged Horn with extension (Page 200), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger). (Page 206)

Values	Range: **0** to **20** m. Default 20.00 m
Related parameters	Unit (2.3.1.), Far Range (2.5.2.)

High Calibration Pt. (2.3.7.2.)

Distance from sensor reference point [1] to High Calibration Point (corresponding to High Level Point). Units are defined in **Unit (2.3.1.).**

Values	Range: **0** to **20** m. Default 0.00 m
Related parameters	Unit (2.3.1.), Near Range (2.5.1.)

When setting the High Calibration Point value, note that echoes are ignored within **Near Range (2.5.1.).**

[1] The value produced by the echo processing which represents the distance from sensor reference point to the target. [see Threaded Horn Antenna with extension, (Page 198) Flanged Horn with extension (Page 202), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger) (Page 206)].

Sensor Offset (2.3.7.3.)

A constant offset that can be added to or subtracted from the sensor value to compensate for a shifted sensor reference point. (For example, when adding a thicker gasket or reducing the standoff/nozzle height.) Sensor value is the value produced by the echo processing which represents the distance from sensor reference point to the target. (see **Calibration (2.3.7.)** for an illustration).The units are defined in **Unit (2.3.1.)**.

Values	Range: **-99.999** to **99.999.** Default: 0.00 m
Related parameters	Units (2.3.1.)

Low Level Point (2.3.7.4.)

The level when the material is at Low Calibration Point. The unit is defined in Level units.

Values	Range: **-999999.00** to **999999.00**. Default: 0%

High Level Point (2.3.7.5.)

The level when the material is at High Calibration Point. The unit is defined in Level units.

Values	Range: **-999999.00** to **999999.00**. Default: 100%

Level Offset (2.3.7.6.)

A constant offset that can be added to Level. The unit is defined in Level units.

Values	Range: **-999999.00** to **999999.00**. Default: 0%

Rate (2.3.8.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Response Rate (2.3.8.1.)

Note

Changing Response Rate resets **Fill Rate (2.3.8.2)**, **Empty rate (2.3.8.3)**, and **Filter Time Constant (2.6.8.1.)**.

Sets the reaction speed of the device to measurement changes.

Response Rate (2.3.8.1.)		Fill Rate (2.3.8.2.)	Empty rate (2.3.8.3.)	Filter Time Constant (2.6.8.1.)
*	Slow	0.1 m/min (0.32 ft/min)		10 s
	Medium	1.0 m/min (3.28 ft/min)		10 s
	Fast	10.0 m/min (32.8 ft/min)		0 s

Use a setting just faster than the maximum filling or emptying rate (whichever is faster).

Fill Rate (2.3.8.2.)

Defines the maximum rate at which the reported sensor value is allowed to decrease. Allows you to adjust the SITRANS LR250 response to decreases in the actual material level. Fill Rate is automatically updated whenever **Response rate (2.3.8.1.)** is altered.

Options	Range: **0 to 99999** m / min.		
	Response rate (2.3.8.1.)		**Fill rate**
	*	Slow	0.1 m/min (0.32 ft/min)
		Medium	1.0 m/min (3.28 ft/min)
		Fast	10.0 m/min (32.8 ft/min)
Altered by:	Response rate (2.3.8.1.)		
Related parameters	Level unit (2.3.2.)		

Enter a value slightly greater than the maximum vessel-filling rate, in units per minute.

Empty Rate (2.3.8.3)

Defines the maximum rate at which the reported sensor value is allowed to increase. Adjusts the SITRANS LR250 response to increases in the actual material level. Empty Rate is automatically updated whenever **Response Rate (2.3.8.1.)** is altered.

Options	Range: **0 to 999999** m / min.	
	Response Rate (2.3.8.1.)	**Empty Rate**
	* Slow	0.1 m/min (0.32 ft/min)
	Medium	1.0 m/min (3.28 ft/min)
	Fast	10.0 m/min (32.8 ft/min)
Altered by:	Response Rate (2.3.8.1)	
Related parameters	Level Unit (2.3.2.)	
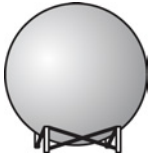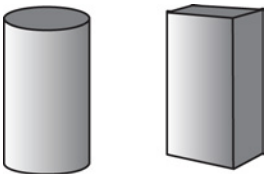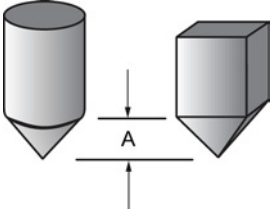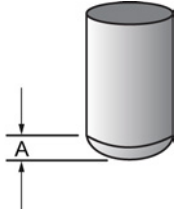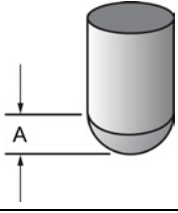
Enter a value slightly greater than the vessel's maximum emptying rate, in units per minute.
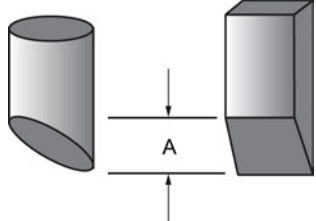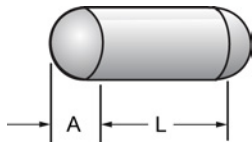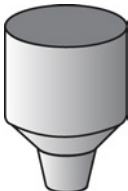
Linearization (2.4.)

Volume (2.4.1.)

Carries out a volume conversion from a level value.

Vessel Shape (2.4.1.1.)

Defines the vessel shape and allows the LR250 to calculate volume instead of level. If **None** is selected, no volume conversion is performed. Select the vessel shape matching the monitored vessel or reservoir.

	Vessel Shape	LCD DISPLAY/ Description	Also required
*	None	NONE/ No volume calculation required	N/A
		CYLINDER/ Flat end horizontal cylinder	Maximum volume
		SPHERE/ Sphere	Maximum volume
		LINEAR/ Upright, linear (flat bottom)	Maximum volume
		CONICAL BOT/ Conical or pyramidal bottom	Maximum volume, dimension A
		PARABOLIC BOT/Parabolic bottom	Maximum volume, dimension A
		HALF SPHERE BOT/ Half-sphere bottom	Maximum volume, dimension A

	Vessel Shape	LCD DISPLAY/ Description	Also required
		FLAT SLOPED BOT/ Flat sloped bottom	Maximum volume, dimension A
		PARABOLIC ENDS/ Parabolic end horizontal cylinder	Maximum volume, dimension A, dimension L
		LINEAR TABLE [a] / Linearization table (level/volume breakpoints)	Maximum volume, tables 1-32 level and volume breakpoints

[a]   Linearization Table must be selected in order for level/volume values [see **XY index (2.4.1.5.)**] to be transferred.

Maximum Volume (2.4.1.2.)

The maximum volume of the vessel. Units are defined in **PV Units (volume/ level) (2.3.3.)**. Enter the vessel volume corresponding to High Calibration Point. The volume calculation is based on the maximum volume and scaled according to the vessel shape selected. If no vessel shape is entered, the default is 100, and the reading will be a percentage value.

Values	Range: **0.0000** to **999999**
	Default: 100.0
Related Parameters	Low Calibration Pt. (2.3.7.1.) High Calibration Pt. (2.3.7.2.) Vessel Shape (2.4.1.1.)

For readings in volumetric units instead of percentage values:

1. Select a volumetric unit from **PV Units (volume/level) (2.3.3.)**.

2. Enter the vessel volume corresponding to High Calibration Point.

Dimension A (2.4.1.3.)

The height of the vessel bottom in Level Units when the bottom is conical, pyramidal, parabolic, spherical, or flat -sloped. If the vessel is horizontal

with parabolic ends, the depth of the end. See **Vessel Shape (2.4.1.1.)** for an illustration.

Values	Range: **0.0000** to **999999** in Level Units
	Default: 0.0
Related Parameters	Vessel Shape (2.4.1.1.)

Dimension L (2.4.1.4.)

Length of the cylindrical section of a horizontal parabolic end vessel, in Level Units. See **Vessel Shape (2.4.1.1.)** for an illustration.

Values	Range: **0.0000** to **999999** in Level Units
	Default: 0.0
Related Parameters	Vessel Shape (2.4.1.1.)

XY index (2.4.1.5.)

Level/Volume breakpoints allow you to define a complex vessel shape as a series of segments. A value is assigned to each level breakpoint and a corresponding value is assigned to each volume breakpoint.

Volume values are defined in volume units and can be percent or volumetric; level values are defined in level units, and can be percent or linear. See **Level Unit (2.3.2.)** and **PV Units (volume/level) (2.3.3.)**.

Level values	Range: **-999999.00** to **999999.00** (m, cm, mm, ft, in, %)
	Default: 0.0
Volume values	Range: **-999999.00** to **999999.00** (% or volumetric units)
	Default: 0.0

Enter up to 32 level breakpoints, where the corresponding volume is known. The values corresponding to 100% and 0% levels must be entered. The breakpoints can be ordered from top to bottom, or the reverse.

Example (values are for example purposes only)
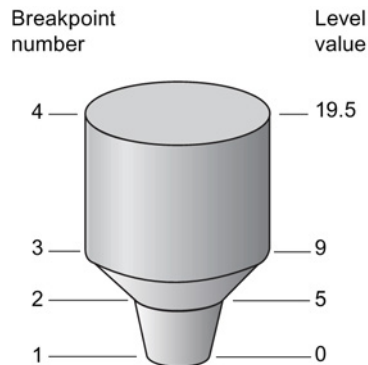
Breakpoint Number	Level value (m)	Volume value (l)
1	0	0
2	5	500
3	9	3000
4	19.5	8000

Entering breakpoints via the hand-held programmer:

1. The default for level values is percent: if you want to select units instead, navigate to **Setup (2.) > Sensor (2.3.) > Level Unit (2.3.2.)**, and select the desired unit.

2. Navigate to **Setup (2.) > Sensor (2.3.) > PV Units (volume/level) (2.3.3.)**, and select the desired volume units.

3. Go to **XY index (2.4.1.5.)** and enter the number of the breakpoint you wish to adjust: for example, for breakpoint **1** enter **1**.

4. Go to **X value (2.4.1.6.)** and enter the level value for the breakpoint just identified.

5. Go to **Y value (2.4.1.7.)** and enter the volume value for the breakpoint just identified.

6. Repeat steps 3 to 5 until values have been entered for all required breakpoints.

X value (2.4.1.6.)

Y value (2.4.1.7.)

Signal Processing (2.5.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Near Range (2.5.1.)

The range in front of the device (measured from the sensor reference point) within which any echoes will be ignored. (This is sometimes referred to as blanking or a dead zone.) The factory setting is 50 mm (2") past the end of the antenna, and the default is dependent on the antenna type and process connection. [See Dimension drawings (Page 195) for antenna heights.]

Values	Range: **0** to **20** m (0 to 65.6 ft)	
	Default depends on antenna type and process connection.	
	Examples:	1.5" threaded horn 185.3 mm (7.3")
		4" horn with stainless steel flange
		100 mm (4") extension 373.3 mm (14.7")
Related parameters	Units (2.3.1.)	

Far Range (2.5.2.)

Note

Far Range can extend beyond the bottom of the vessel.

Allows the material level to drop below Low Calibration Point without generating a Loss of Echo (LOE) state. See **Low Calibration Pt. (2.3.7.1.)** for an illustration.

Values	Range: Min. = **Low Calibration Pt.**
	Max. = **23** m (75.45 ft)
	Default: Value for Low Calibration Pt. + 1 m (3.28 ft)
Related parameters	Units (2.3.1.)

Use this feature if the measured surface can drop below the Low calibration point in normal operation.

Propogation Factor (2.5.3.)

> **Note**
> * When operating in a stillpipe, values for **CLEF Range (2.5.7.4.)**, and for the propagation factor, should be set according to the pipe size. See the table below.
> * For reliable results, the antenna size must be close to the pipe size.

Compensates for the change in microwave velocity due to propagation within a metal stillpipe instead of in free space.

Values	Range:	0.3 to 1.0 depending on pipe size.		
	Default:	1.0000		
Nominal Pipe Size[a]	40 mm (1.5")	50 mm (2")	80 mm (3")	100 mm (4")
Propagation Factor	0.9844	0.988	0.9935	0.9965
CLEF Range (2.5.7.4.)	Low calibration point - 700 mm (2.29 ft)[b]	Low calibration point - 700 mm (2.29 ft)[b]	Low calibration point - 1000 mm (3.28 ft)[b]	Low calibration point - 1000 mm (3.28 ft)[b]

[a] Since pipe dimensions may vary slightly, the propagation factor may also vary.

[b] CLEF range covers the whole measurement range except first 700 or 1000 mm from unit reference point (see A in graphic below)
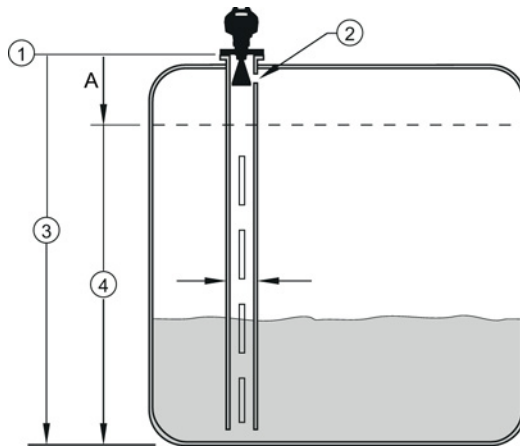
① sensor reference point   ③ low calibration point
② air gap   ④ CLEF range 2.5.7.4.
A 700 or 1000 mm

Note

Flanged encapsulated antenna

For Flanged encapsulated antenna (7ML5432) match the process connection size to the pipe diameter whenever possible (for example, mount a DN80/3" flange on DN80/3" pipe).

Minimum Sensor Value (2.5.4.)

The minimum recorded Sensor value in units defined in **Unit (2.3.1.)**.

1. Open the menu **View – Device Diagnostics**, select Device Status, and click on the **Device Status** tab.

2. Check **Sensor Peak Values**.

Maximum Sensor Value (2.5.5.)

The maximum recorded Sensor value in units defined in **Unit (2.3.1.)**.

1. Open the menu **View – Device Diagnostics**, select Device Status, and click on the **Device Status** tab.

2. Check **Sensor Peak Values**.

Shots (2.5.6.)

The number of echo profile samples averaged to produce a measurement.

Values	Range: **1** to **25**
	Default: 25

Echo Select (2.5.7.)

Algorithm (2.5.7.1.)

Selects the algorithm to be applied to the echo profile to extract the true echo.

Options	*	**tF**	**T**rue **F**irst echo
		L	**L**argest echo
		BLF	**B**est of **L**argest and **F**irst echo

Position Detect (2.5.7.2.)

Note

If a stillpipe is used, the setting for CLEF range is determined by the horn size: see **CLEF Range (2.5.7.4.)** for a table of values.

Defines where on the echo the distance measurement is determined.

Options		Center
	*	Hybrid (Center and CLEF)
		CLEF (Constrained Leading Edge Fit)
Related parameters		CLEF Range (2.5.7.4.)

If the vessel bottom is being reported as the level instead of the actual material level (at low level conditions), or if the dielectric constant of the liquid to be monitored is less than 3, we recommend setting Position Detect to Hybrid and **CLEF Range (2.5.7.4.)** to 0.5 m (1.64 ft).

Echo Threshold (2.5.7.3.)

Sets the minimum echo confidence that the echo must meet in order to prevent a Loss of Echo condition and the expiration of the Fail-safe (LOE) timer. When **Confidence (2.5.9.1.)** exceeds **Echo Threshold (2.5.7.3.)**, the echo is accepted as a valid echo and is evaluated.

Values	Range: **0** to **99**
	Default: 5
Related Parameters	Timer (2.3.6.)

Use this feature when an incorrect material level is reported.

CLEF Range (2.5.7.4.)

Note

CLEF Range is referenced from Low Calibration Point (process empty level).

The CLEF algorithm is used mainly to allow correct level reporting for low dK materials which may otherwise cause an incorrect reading in an empty or almost empty vessel.

It is used from Low Calibration Point (process empty level) up to the level defined by CLEF Range (see illustration below). Above that point the Center algorithm is used. For more detail see CLEF Range (Page 245).

Values	Range: **0** to **20** m (0 to 65.6 ft)
	Default: 0.0 m
Related parameters	Position Detect (2.5.7.2.)
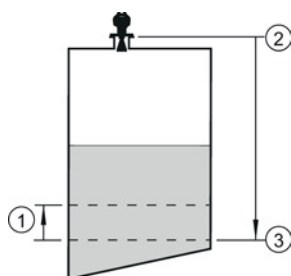
① CLEF Range
② Sensor reference point
③ Low calibration point (process empty level)

In applications with low dK materials we recommend setting CLEF Range to 0.5 m (1.64 ft) and **Position Detect (2.5.7.2.)** to Hybrid.

Sampling (2.5.8.)

Provides a method of checking the reliability of a new echo before accepting it as the valid reading, based on numbers of samples above or below the currently selected echo.

Echo Lock (2.5.8.1.)

Note

Ensure the agitator is always running while SITRANS LR250 is monitoring the vessel, to avoid stationary blade detection.

Selects the measurement verification process. See **Echo Lock (2.5.8.1.)** for more details.

Options		Lock Off (no verification)
		Maximum Verification (not recommended for radar)
	*	Material Agitator
		Total Lock (not recommended for radar)
Related parameters		Fill Rate (2.3.8.2.) Empty rate (2.3.8.3.) Sampling up (2.5.8.2.) Sampling down (2.5.8.3.)

For radar applications, Material Agitator is the most often-used setting, to avoid agitator blade detection.

Sampling Up (2.5.8.2.)

Specifies the number of consecutive echoes that must appear above the echo currently selected, before the measurement is accepted as valid.

Values	Range: **1** to **50**
	Default: 5

Sampling Down (2.5.8.3.)

Specifies the number of consecutive echoes that must appear below the echo currently selected, before the measurement is accepted as valid.

Values	Range: **1** to **50**
	Default: 2

Echo Quality (2.5.9.)

Confidence (2.5.9.1.)

Indicates echo reliability: higher values represent better echo quality. The display shows the echo confidence of the last measurement. **Echo Threshold (2.5.7.3.)** defines the minimum criterion for echo confidence.

Values (view only)	0 to 99	
	----	Shot not used
Related Parameters	Echo Threshold (2.5.7.3.)	

Open the menu **Device – Echo Profile Utilities** and click on the tab **Echo Profile**.

Echo Strength (2.5.9.2.)

Displays the absolute strength (in dB above 1 µV rms) of the echo selected as the measurement echo.

Values (view only)	-22 to 99

Open the menu **Device – Echo Profile Utilities** and click on the tab **Echo Profile**.

TVT Setup (2.5.10.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Auto False Echo Suppression (2.5.10.1.)

Used together with **Auto False Echo Suppression Range (2.5.10.2.)** to screen out false echoes in a vessel with known obstructions. A 'learned TVT' (time varying threshold) replaces the default TVT over a specified range. See Auto False Echo Suppression (Page 242) for a more detailed explanation.

Note

- Make sure material level is below all known obstructions when Auto False Echo Suppression is used to learn the echo profile. (An empty or almost empty vessel is recommended.)

- Note the distance to material level when Auto False Echo learns the environment. Set Auto False Echo Suppression Range to a shorter distance to avoid the material echo being screened out.

- Set Auto False Echo Suppression and Auto False Echo Suppression Range during startup, if possible.

- If the vessel contains an agitator it should be running.

- Before adjusting these parameters, rotate the device for best signal (lower false-echo amplitude).

Before Auto False Echo Suppression
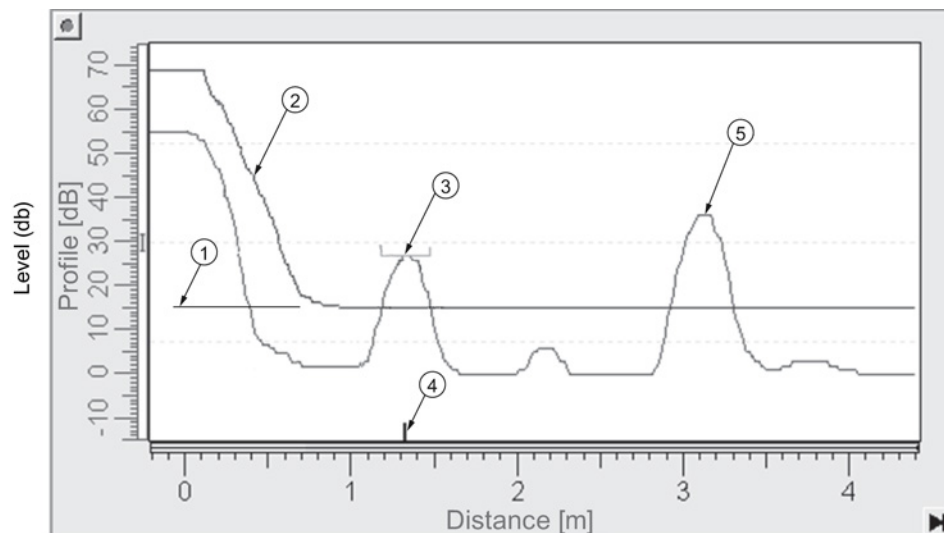
①	TVT Hover Level	④	echo marker
②	default TVT	⑤	material level
③	false echo		

After Auto False Echo Suppression
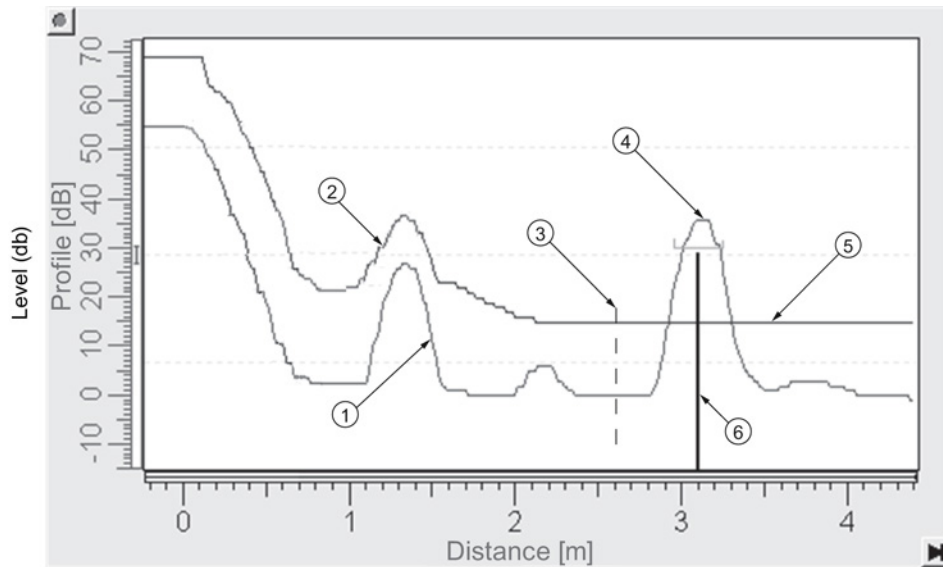
①	false echo	④	material level
②	learned TVT	⑤	default TVT
③	Auto False Echo Suppression Range	⑥	echo marker

To set Auto False Echo Suppression via SIMATIC PDM:

Open the menu **Device – Echo Profile Utilities** and click on the tab **Auto False Echo Suppression**. For more detailed instructions see Auto False Echo Suppression via SIMATIC PDM (Page 246).

To set Auto False Echo Suppression via the handheld programmer:

Options		OFF	Default TVT will be used.
	*	ON	'Learned' TVT will be used.
		LEARN	'Learn' the TVT.

1. Determine Auto False Echo Suppression Range. Measure the actual distance from the sensor reference point to the material surface using a rope or tape measure.

2. Subtract 0.5 m (20") from this distance, and use the resulting value.

3. Go to **Auto False Echo Suppression Range (2.5.10.2.)** and enter the value calculated in step 2.

4. Go to **Auto False Echo Suppression (2.5.10.1.)** and press **RIGHT arrow** to open Edit Mode.

5. Select **Learn**. The device will automatically revert to **On** (Use Learned TVT) after a few seconds.

Auto False Echo Suppression Range (2.5.10.2.)

Defines the endpoint of the Learned TVT distance. Units are defined in **Unit (2.3.1.)**.

Values	Range: **0.00** to **20.00** m
	Default: 1.00 m

1. Press **RIGHT arrow** to open Edit mode.

2. Enter the new value and press **RIGHT arrow** to accept it.

3. Set **Auto False Echo Suppression (2.5.10.1.)**.

Hover Level (2.5.10.3.)

Defines how high the TVT (Time Varying Threshold) is placed above the noise floor of the echo profile, as a percentage of the difference between the peak of the largest echo in the profile and the noise floor. See **Auto False Echo Suppression (2.5.10.1.)** for an illustration.

Values	Range: **0** to **100**%
	Default: 40%

When the device is located in the center of the vessel, the TVT hover level may be lowered to increase the confidence level of the largest echo.

Shaper Mode (2.5.10.4.)

Enables/disables **TVT shaper (2.5.11.)**

Options		ON
	*	OFF

TVT shaper (2.5.11.)

Note

- The range is –50 to 50 dB.
- **Shaper Mode (2.5.10.4.)** must be turned **ON** in order for TVT shaper points to be transferred.

Adjusts the TVT (Time Varying Threshold) at a specified range (breakpoint on the TVT). This allows you to reshape the TVT to avoid unwanted echoes. There are 40 breakpoints arranged in 5 groups. (We recommend using SIMATIC PDM to access this feature.)

To use TVT shaper via SIMATIC PDM:

1. Go to **Level Meter > Setup > Signal Processing > TVT setup > Shaper Mode** and select **On**.

2. Open the menu **Device – Echo Profile Utilities** and click on TVT Shaper. For more detail see TVT Shaper via SIMATIC PDM (Page 86).

To use TVT shaper via LUI (local user interface):

1. Go to **Shaper Mode (2.5.10.4.)** and select **ON**.

2. In TVT shaper, go to **Breakpoints 1-9 (2.5.11.1.)**.

3. Open Breakpoint 1 and enter the TVT Offset value (between –50 and 50 dB).

4. Go to the next Breakpoint and repeat step 3 until all desired breakpoint values have been entered.

Breakpoint 1-9 (2.5.11.1.)

Values	Range: **–50** to **50** dB
	Default: 0 dB

Breakpoint 10-18 (2.5.11.2.)

Values	Range: **–50** to **50** dB
	Default: 0 dB

Breakpoint 19-27 (2.5.11.3.)

Values	Range: **–50** to **50** dB
	Default: 0 dB

Breakpoint 28-36 (2.5.11.4.)

Values	Range: **–50** to **50** dB
	Default: 0 dB

Breakpoint 37-40 (2.5.11.5.)

Values	Range: **–50** to **50** dB
	Default: 0 dB

AIFB1 (2.6.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Static Revision No. (2.6.1.)

The revision level of the static data associated with Analog Input Function Block 1. The Static Revision No. is updated whenever a configuration parameter is changed.

Actual mode (2.6.2.)

Used to request an operating mode from the Analog Input Function Block.

Options	*	Auto Mode (AUTO)
		Manual Mode (MAN)
		Out of Service (O/S)

Allows you to put the SITRANS LR250 into Out of Service Mode and then reset it to Auto Mode.

Manual Mode is used in conjunction with Simulation. See Simulation (Page 93). It should be used only with SIMATIC PDM in order to benefit from all the features available.

Channel (2.6.3.)

Used to select between the different Level Transducer Block outputs.

Options		Level/Volume, Level, Distance
	*	Level/Volume

Label (2.6.4.)

User defined label.

Input Scaling (2.6.5.)

Upper Value (2.6.5.1.)

Defines the operational upper range value of the input value (Process Value Scale) in PV (volume/level) Units. Process Value Scale normalizes the input value to a customer-defined range.

Values	Range: **-999999** to **999999**
	Default: 100%
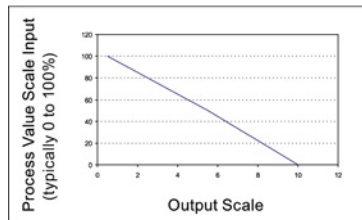
Provides Output values
(Out) to AIFB1 or AIFB2

Lower Value (2.6.5.2.)

Defines the operational lower range value of the input value (Process Value Scale) in PV (volume/level) Units. Process Value Scale normalizes the input value to a customer-defined range.

Values	Range: **-999999** to **999999**
	Default: 0%

Output Scaling (2.6.6.)

Scales the Process Variable. The function block parameter OUT SCALE contains the values of the lower limit and upper limit effective range in AIFB1 units.

Upper Value (2.6.6.1.)

Defines the operational upper range value of the output value in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: 100%

Lower Value (2.6.6.2.)

Defines the operational lower range value of the output value in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: 0%

Alarms and Warnings (2.6.7.)

Upper Limit Alarm (2.6.7.1.)

The setting for the upper alarm limit in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: 999999

Upper Limit Warning (2.6.7.2.)

The setting for the upper warning limit in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: 999999

Lower Limit Warning (2.6.7.3.)

The setting for the lower warning limit in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: -999999

Lower Limit Alarm (2.6.7.4.)

The setting for the lower alarm limit in AIFB1 units.

Values	Range: **-999999** to **999999**
	Default: -999999

Limit Hysteresis (2.6.7.5.)

Hysteresis is used to adjust the sensitivity of the trigger for alarm messages. It is used to compensate when a process variable fluctuates around the same value as a limit. A high level alarm occurs when a value exceeds an upper limit. The alarm's status remains true until the value drops below the limit minus the alarm hysteresis. The directions are reversed for low limit detection.

Values	Range: **-999999** to **999999**
	Default: 0.50

Enter a value for the hysteresis here, to be used for all warnings and alarms. The units are the same as the Output scale, i.e. AIFB1 units.

Display (2.6.8.)

Filter Time Constant (2.6.8.1.)

The time constant for the damping filter. The damping filter smooths out the response to a sudden change in level. This is an exponential filter and the engineering unit is always in seconds. See Damping (Page 249) for more detail.

Values	Range: **0** to **600** s
	Default: 10 s

Unit (2.6.8.2.)

Note

Additional units are available in SIMATIC PDM.

Engineering unit to be displayed with the output value.

Values		m, cm, mm, ft, in, cu m, L, HL, cu in, cu ft, cu yd, gal, imp gal, bushels, Bbl, Bbl liquid, percent, PA, Follow out unit
	*	percent

Out Unit Text (2.6.8.3.)

If the desired unit is not listed in **Unit (2.6.8.2.)** you can define it in **Out Unit Text (2.6.8.3.)**.

Decimal point (2.6.8.4.)

The number of digits to display after the decimal point. (The LCD is limited to displaying two decimal places in Measurement mode. In SIMATIC PDM up to seven decimal places may be used to display measured values.)

Options	Range: 0, 1, 2, 3, 4, 5, 6, 7
	Default: 2

Fail-safe Mode (2.6.9.)

Mode (2.6.9.1.)

Fail-safe Mode occurs if the status of the input value is bad, or if the device has been put into Fail-safe mode using Simulation. **Mode** defines the material level to be reported when the LOE (Loss of Echo) timer expires.

Options		SUB VALUE	Substitute value. Value (2.6.9.2.) used as output value.
	*	LAST VALUE	Last value. (Store last valid output value).
		USE BAD VALUE	Use bad value. (Calculated output value is incorrect).

Value (2.6.9.2.)

Note

Fail-safe Mode (2.6.9.) must be set to **Substitute Value** before **Value (2.6.9.2.)** can be defined.

User-defined default for the Output Value, if sensor or sensor electronic fault is detected. Units are defined in **Unit (2.6.8.2.)**.

Values	Range: **-999999** to **999999**
	Default: 0

AIFB2 (2.7.)

See **AIFB1 (2.6.):** the parameters for AIFB2 are identical.

Measured Values (2.8.)

Read only. Allows you to view measured values for diagnostic purposes. In SIMATIC PDM, open the menu **View – Process Variables**.

Main Output (PV - Primary Value) (2.8.1.)

The value for level, or volume (if volume conversion is selected).

Output, no linearization (SV1 - Secondary Value 1) (2.8.2.)

The value for level.

Output, no level offset (SV2 - Secondary Value 2) (2.8.3.)

The value for distance.

Diagnostics (3.)

Echo Profile (3.1.)

To request a profile via SIMATIC PDM:

Open the menu **Device – Echo Profile Utilities**. [See Echo Profile Utilities via SIMATIC PDM (Page 84) for more detail.]

To request a profile via the handheld programmer:
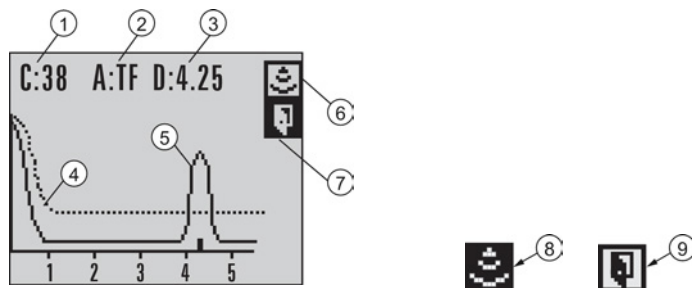
①	Echo confidence value	⑥	Measure icon, deselected
②	Algorithm selection (tFirst echo)	⑦	Exit icon, selected
③	Distance value	⑧	Measure icon, selected
④	TVT curve	⑨	Exit icon, deselected
⑤	Material level		

1. Navigate to **Level Meter > Diagnostics (3.) > Echo Profile (3.1.)**.

2. Press **RIGHT arrow** to request a profile. [See Requesting an Echo Profile (Page 66) for more details.]

Fault Reset (3.2.)

Clears the following faults:

Fault code	Description
S3	Device Lifetime Reminder 1 (Maintenance Required)
S4	Device Lifetime Reminder 2 (Maintenance Demanded)
S6	Sensor Lifetime Reminder 1 (Maintenance Required)
S7	Sensor Lifetime Reminder 2 (Maintenance Demanded)
S8	Device Service Reminder 1 (Maintenance Required)
S9	Device Service Reminder 2 (Maintenance Demanded)
S12	Internal Temperature High
S17	Calibration Schedule Reminder 1 (Maintenance Required)
S18	Calibration Schedule Reminder 2 (Maintenance Demanded)

To clear a fault using the handheld programmer:

- Enter the fault code number then press **RIGHT arrow**.

To clear a fault via SIMATIC PDM:

1. Open the menu **Device – Acknowledge Faults**.
2. Select the fault to be cleared from the pull-down menu in Extended Diagnostics.
3. Click on **Transfer** to clear the fault.

Electronics Temperature (3.3.)

Minimum Value (3.3.1.)

The minimum recorded internal electronics temperature of the SITRANS LR250.

Maximum Value (3.3.2.)

The maximum recorded internal electronics temperature of the SITRANS LR250.

Condensed Status (3.4.)

When **Enable (3.4.1.)** is enabled, you can select the level of severity of errors, and tailor a device response appropriate for your particular process.

- In **Event Index (3.5.1.)** you can select a particular event or error by means of its index number.
- In **Event Status (3.5.2.)** you can assign a status to the selected event.
- In **Event Diagnosis (3.5.3.)** you can assign a diagnosis to the selected event.

Enable (3.4.1.)

Note

When cyclic communication is in progress, Condensed Status Mode cannot be changed.

Options		NO (disabled)
	*	YES (enabled)

Select **Yes** or **No** to enable/disable Condensed Mode.

Features supported (3.4.2.)

Read only. Features supported are:

- Condensed Diagnostics
- Extended Diagnostics
- Application Relationships

Features enabled (view only) (3.4.3.)

Read only. Lists those features that have been enabled.

Allocation (3.5.)

Event Index (3.5.1.)

The numeric component of the Event Code for a Condensed Status event. Use the index number to identify a particular event in the list below.

Event index	Event code	Event description[a]
0	S0	Loss of Echo
2	S2	No Tech Power
10	S10	Level Transducer Block (LTB) Scale
11	S11	Internal Temperature Sensor
12	S12	Internal Temperature High
14	S14	AIFB1 PV Range
15	S15	AIFB2 PV Range
28	S28	Memory RAM
29	S29	Memory EEPROM
30	S30	Memory EEPROM Flags
31	S31	Memory Flash
33	S33	Internal Temperature Calibration
34	S34	Velocity Calibration
35	S35	Receiver Init Calibration
36	S36	Receiver Calibration
37	S37	Technology Module Calibration
38	S38	Technology Module Ramp

[a] See General Fault Codes (Page 181) for the meaning of each event.

For example:

Event Code for Loss of Echo   =   S0

Event Index   =   0

To select a particular event via the handheld programmer:

1. Go to **Enable (3.4.1.)** and select **Yes** to enable Condensed Mode.

2. Go to **Event Index (3.5.1.)** and enter the event index number corresponding to the event.

To select a particular event via SIMATIC PDM:

1. Go to **Diagnostics > Condensed Status Setup > Condensed Status Mode** and select **Yes** to enable Condensed Mode.

2. Go to **Diagnostics > Condensed Status**.

3. For each event, you can select either the Status or the Diagnosis line, then choose a Status or Diagnosis option from the associated pull-down menu.

Event Status (3.5.2.)

Event Status allows you to assign one of the status options listed below, to any of the events listed in **Event Index (3.5.1.).** This allows you to tailor a device response appropriate for your particular process. (Event status affects Condensed status). See Condensed Status (Page 281) for more details.

Event Status options	
	Good
	Good: maintenance required
	Good: maintenance demanded
	Uncertain: maintenance demanded
*	Bad: maintenance alarm
	Uncertain: process related, no maintenance
	Bad: process related, no maintenance
	Bad: function check/local override
	Good: function check

To assign a status to a particular event via the handheld programmer:

1. Go to **Enable (3.4.1.)** and select **Yes** to enable Condensed Mode.

2. Go to **Event Index (3.5.1.)** and enter the event index number corresponding to a particular event.

3. Go to **Event Status (3.5.2.)** and choose a Status option from the table above.

To assign a status to a particular event via SIMATIC PDM:

1. Go to **Level Meter > Diagnostics > Condensed Status Setup**, select **Yes** to enable Condensed Status Mode.

2. Go to **Level Meter > Diagnostics > Condensed Status**.

3. Select the Status line for the selected Event, then choose a Status option from the associated pull-down menu.

Event Diagnosis (3.5.3.)

Allows you to assign one of the diagnostic options listed below to any of the events listed in **Event Index (3.5.1.)**. This allows you to tailor a device response appropriate for your particular process.(Event Diagnosis affects Condensed Acyclic Diagnostics and Cyclic Extended Diagnostics). See Condensed Mode Diagnosis (Page 285) for more detail.

	Event Diagnosis Options
	Status OK
	Maintenance Required
	Maintenance Demanded
*	Maintenance alarm
	Invalid process conditions
	Function check or simulation

To assign a diagnosis to a particular event via the handheld programmer:

1. Go to **Enable (3.4.1.)** and select **Yes** to enable Condensed Mode.

2. Go to **Event Index (3.5.1.)** and enter the event index number corresponding to a particular event.

3. Go to **Event Diagnosis (3.5.3.)** and choose a Diagnosis option from the table above.

To assign a status to a particular event via SIMATIC PDM:

1. Go to **Level Meter > Diagnostics > Condensed Status Setup**, and select **Yes** to enable Condensed Status Mode.

2. Go to **Level Meter > Diagnostics > Condensed Status**.

3. Select the Diagnosis line for the selected Event, then choose a Diagnosis option from the associated pull-down menu.

Peak Values (3.6.)

To view via SIMATIC PDM:

Open the menu **View – Device Diagnostics**, select **Device Status**, and click on the tab **Device Status**. For more details see Device Diagnostics (Page 101).

Min. Measured Value (3.6.1.)

The minimum recorded Sensor value, reported in units defined in **Unit (2.3.1.)**.

Max. Measured Value (3.6.2.)

The maximum recorded Sensor value, reported in units defined in **Unit (2.3.1.)**.

Minimum Output Value - AIFB1 (3.6.3.)

The minimum recorded Output Value from the Analog Input Function Block 1.

Maximum Output Value - AIFB1 (3.6.4.)

The maximum recorded Output Value from the Analog Input Function Block 1.

Minimum Output Value - AIFB2 (3.6.5.)

The minimum recorded Output Value from the Analog Input Function Block 2.

Maximum Output Value - AIFB2 (3.6.6.)

The maximum recorded Output Value from the Analog Input Function Block 2.

Service (4.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Master Reset (4.1.)

> **Note**
>
> Following a Factory Reset, some degree of reprogramming may be required, depending on the option chosen below.

Reset options	Result
Factory Defaults	Resets all user parameters to the manufacturer's default settings, with certain exceptions. The list of exceptions includes, but is not limited to: • Tag • Message • Descriptor • Installation Data • Device Address • Write Protection • Auto False Echo Suppression Range • learned TVT
Standard Defaults	Resets all resettable parameters excluding device addresses to the PROFIBUS standard default settings.
Informational	Resets Tag parameter.
Functional	Resets parameters that control device behavior and functionality (such as calibration points)
Warm Start	Has the same effect as recycling power to the device
Reset Address to 126	Resets the PROFIBUS device address to 126 If the address lock was on, will disable the lock.

To access via SIMATIC PDM:

Open the menu **Device – Master Reset**. For more detail see Master Reset (Page 97).

To perform a reset via the handheld programmer:

1. Press **RIGHT Arrow** to open Edit Mode then scroll down to the desired Reset option and press **RIGHT Arrow** to select it.

2. Press **LEFT Arrow** to exit.

Remaining Device Lifetime (4.2.)

Note

- Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.
- Four sets of parameters allow you to monitor the Device/Sensor Lifetimes and set up Service/Calibration schedules, based on operating hours instead of a calendar-based schedule. See also **Remaining Sensor Lifetime (4.3.)**, **Service Schedule (4.4.)**, and **Calibration Schedule (4.5.)**.
- Performing a reset to **Factory Defaults** will reset all the Maintenance Schedule parameters to their factory defaults.
- The device operates in years. To view Remaining Device Lifetime parameters in hours or days (via SIMATIC PDM only) see **Lifetime Expected (4.2.1.)**.

The device tracks itself based on operating hours and monitors its predicted lifetime. You can modify the expected device lifetime, set up schedules for maintenance reminders, and acknowledge them.

The maintenance warnings and alarms are communicated via the Status byte. This information can be integrated into an Asset Management system. For optimal use, we recommend that you use SIMATIC PCS7 Asset Management Software in conjunction with SIMATIC PDM.

To access these parameters via SIMATIC PDM:

- Open the menu **Device – Maintenance** and select the **Remaining Device Lifetime** tab.

- After modifying values/units as required, click on **Write** to accept the change, and **Read** to view the effect of the change.

- Click on **Snooze** to add a year to the Total Expected Device Life.

Time Units

Options [a]	Hours; days; years
	Default: years

[a] Selectable only via SIMATIC PDM.

Lifetime Expected (4.2.1.)

Note

Note: The device always operates in years. Changing the units affects only the parameter view of the Remaining Device Lifetime parameters in SIMATIC PDM.

Allows you to override the factory default.

Values	Units [a]: hours, days, years
	Range: **0** to **20** years
	Default: 10.00 years

[a] Units are selectable only via SIMATIC PDM.

Time in Operation (4.2.2.)

Read only. The amount of time the device has been operating.

Remaining Lifetime (4.2.3.)

Read only. **Lifetime Expected (4.2.1.)** less **Time in Operation (4.2.2.).**

Reminder Activation (4.2.4.)

Note

To modify this parameter via SIMATIC PDM it must be accessed via the pull-down menu **Device – Maintenance**.

Allows you to enable a maintenance reminder.

Values		Reminder 1 (Maintenance Required)
		Reminder 2 (Maintenance Demanded)
		Reminders 1 and 2
	*	OFF

1. First set the values in **Reminder 1 (Required) (4.2.5.)/Reminder 2 (Demanded) (4.2.6.)**.

2. Select the desired **Reminder Activation** option.

Reminder 1 (Required) (4.2.5.)

If **Remaining Lifetime (4.2.3.)** is equal to or less than this value, the device generates a Maintenance Required reminder.

Values	Range: **0** to **20** years
	Default: 0.164 years

1. Modify values as required.

2. Set **Reminder Activation (4.2.4.)** to the desired option.

Reminder 2 (Demanded) (4.2.6.)

If **Remaining Lifetime (4.2.3.)** is equal to or less than this value, the device generates a Maintenance Demanded reminder.

Values	Range: **0** to **20** years
	Default: 0.019 years

1. Modify limit values as required.

2. Set **Reminder Activation (4.2.4.)** to the desired option.

Maintenance Status (4.2.7.)

Indicates which level of maintenance reminder is active.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab, and check the **Device Lifetime Status** window.

Acknowledge Status (4.2.8.)

Indicates which level of maintenance reminder has been acknowledged.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab, and check the **Device Lifetime Status** window.

Acknowledge (4.2.9.)

Acknowledges the current maintenance reminder.

To acknowledge a reminder via SIMATIC PDM:

1. Open the menu **View – Device Diagnostics,** select **Device Status** and click on the **Maintenance** tab.

2. In the **Device Lifetime** section, click on **Acknowledge Warnings**.

To acknowledge a reminder via the handheld programmer:

1. Press **RIGHT arrow** ▶ twice to open parameter view and activate **Edit** Mode.

2. Press **RIGHT arrow** ▶ to acknowledge the reminder.

Remaining Sensor Lifetime (4.3.)

Note

- Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.
- Four sets of parameters allow you to monitor the Device/Sensor Lifetimes and set up Maintenance/Service schedules, based on operating hours instead of a calendar-based schedule. See also **Remaining Device Lifetime (4.2.), Service Schedule (4.4.)**, and **Calibration Schedule (4.5.)**.
- Performing a reset to **Factory Defaults** will reset all the Maintenance Schedule parameters to their factory defaults.
- The device operates in years. To view Remaining Sensor Lifetime parameters in hours or days (via SIMATIC PDM only) see **Lifetime Expected (4.3.1.)**.

The device monitors the predicted lifetime of the sensor (the components exposed to the vessel environment). You can modify the expected sensor lifetime, set up schedules for maintenance reminders, and acknowledge them.
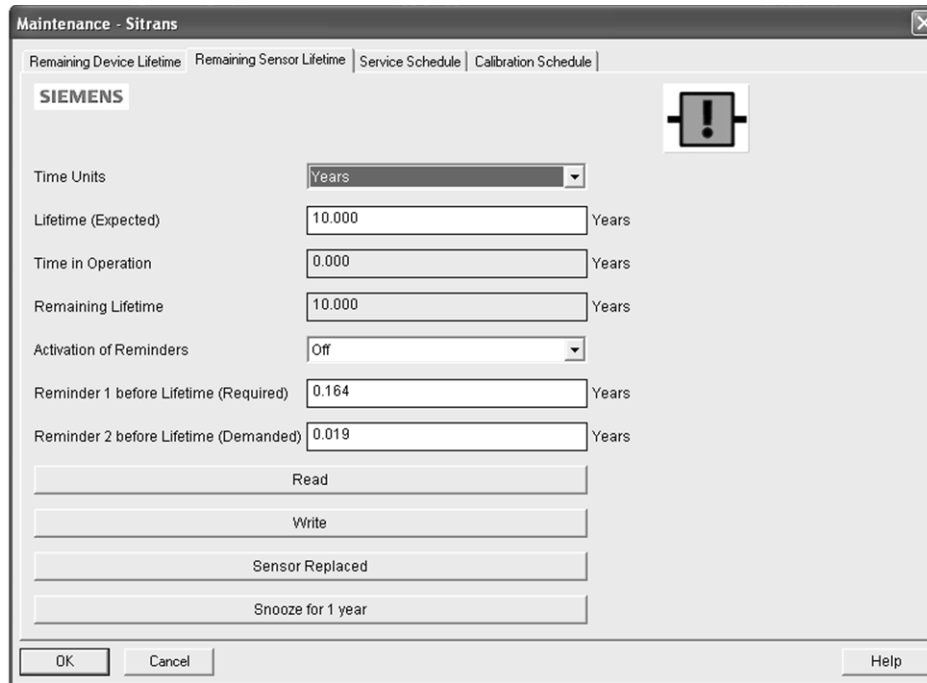
To access these parameters via SIMATIC PDM:

* Open the menu **Device – Maintenance** and select the **Remaining Sensor Lifetime** tab.

* After modifying values/units as required, click on **Write** to accept the change, and **Read** to view the effect of the change.

* Click on **Snooze** to add a year to the Total Expected Sensor Life.

* Click on **Sensor Replaced** to restart the timer and clear any fault messages.

Time Units

Options [a)]	Hours; days; years
	Default: years

[a)] Selectable only via SIMATIC PDM.

Lifetime Expected (4.3.1.)

> **Note**
>
> The device always operates in years. Changing the units affects only the parameter view of Remaining Sensor Life parameters in SIMATIC PDM.

Allows you to override the factory default.

Values	Units [a]: hours, days, years
	Range: **0** to **20** years
	Default: 10.00 years

[a] Units are selectable only via SIMATIC PDM.

Time in Operation (4.3.2.)

The amount of time the sensor has been operating. Can be reset to zero after performing a service or replacing the sensor.

To reset to zero:

- In SIMATIC PDM, open the menu **Device – Maintenance**, click on the **Remaining Sensor Lifetime** tab, and click on **Sensor Replaced** to restart the timer and clear any fault messages.

- Via the handheld programmer, manually reset **Time in Operation (4.3.2.)** to zero.

Remaining Lifetime (4.3.3.)

Read only. **Lifetime Expected (4.3.1.)** less **Time in Operation (4.3.2.)**.

Reminder Activation (4.3.4.)

> **Note**
>
> To modify this parameter via SIMATIC PDM it must be accessed via the pull-down menu **Device – Maintenance**.

Allows you to enable a maintenance reminder.

Options		Reminder 1 (Maintenance Required)
		Reminder 2 (Maintenance Demanded)
		Reminders 1 and 2
	*	OFF

1. First set the values in **Reminder 1 (Required) (4.3.5.)/Reminder 2 (Demanded) (4.3.6.)**.

2. Select the desired **Reminder Activation** option.

Reminder 1 (Required) (4.3.5.)

If **Remaining Lifetime (4.3.3.)** is equal to or less than this value, the device generates a **Maintenance Required** reminder.

Values	Range: **0** to **20** years
	Default: 0.164 years

1. Modify values as required.

2. Set **Activation Reminder (4.3.4.)** to the desired option.

Reminder 2 (Demanded) (4.3.6.)

If **Remaining Lifetime (4.3.3.)** is equal to or less than this value, the device generates a **Maintenance Demanded** reminder.

Values	Range: **0** to **20** years
	Default: 0.019 years

1. Modify values as required.

2. Set **Reminder Activation (4.3.4.)** to the desired option.

Maintenance Status (4.3.7.)

Indicates which level of maintenance reminder is active.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab, and check the **Sensor Lifetime Status** window.

Acknowledge Status (4.3.8.)

Indicates which level of maintenance reminder has been acknowledged.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab, and check the **Sensor Lifetime Status** window.

Acknowledge (4.3.9.)

Acknowledges the current maintenance reminder.

To acknowledge a reminder via SIMATIC PDM:

1. Open the menu **View – Device Diagnostics,** select **Device Status** and click on the **Maintenance** tab.

2. In the **Sensor Lifetime** section, click on **Acknowledge Warnings**.

To acknowledge a reminder via the handheld programmer:

1. Press **RIGHT arrow** ▶ twice to open parameter view and activate **Edit** Mode.

2. Press **RIGHT arrow** ▶ to acknowledge the reminder.

Service Schedule (4.4.)

Note

- Four sets of parameters allow you to monitor the Device/Sensor Lifetimes and set up Service/Calibration schedules, based on operating hours instead of a calendar-based schedule. See also **Remaining Device Lifetime (4.2.)**, **Remaining Sensor Lifetime (4.3.)**, and **Calibration Schedule (4.5.)**.

- Performing a reset to **Factory Defaults** will reset all the Maintenance Schedule parameters to their factory defaults.

- The device operates in years. To view Service Interval parameters in hours or days (via SIMATIC PDM only) see **Service interval (4.4.1.)**.

The device tracks service intervals based on operating hours and monitors the predicted lifetime to the next service. You can modify the Total Service Interval, set schedules for maintenance reminders, and acknowledge them.

The maintenance warnings and alarms are communicated via the Status byte. This information can be integrated into any Asset Management system. For optimal use, we recommend that you use SIMATIC PCS7 Asset Management Software in conjunction with SIMATIC PDM.

To access these parameters via SIMATIC PDM:

- Open the menu **Device – Maintenance** and select the **Service Schedule** tab.

- After modifying values/units as required, click on **Write** to accept the change, and **Read** to view the effect of the change.

- Click on **Service Performed** to restart the timer and clear any fault messages.
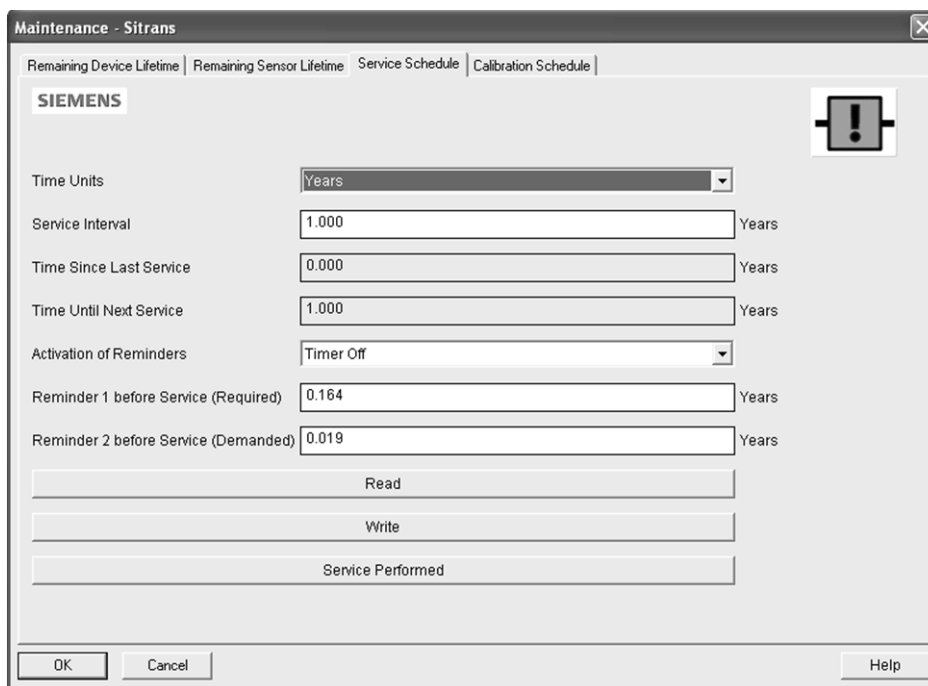
Time Units

Options [a]	Hours; days; years
	Default: years

[a] Selectable only via SIMATIC PDM.

Service Interval (4.4.1.)

Note

The device always operates in years. Changing the units affects only the parameter view of the Service Interval parameters in SIMATIC PDM.

User-configurable recommended time between product inspections.

Values	Units [a]: hours, days, years
	Range: **0** to **20** years
	Default: 1.0 year

[a] Units are selectable only via SIMATIC PDM.

Time since Last Service (4.4.2.)

Time elapsed since last service. Can be reset to zero after performing a service.

To reset to zero:

- In SIMATIC PDM, open the menu **Device – Maintenance**, click on the **Service Schedule** tab, and click on **Service Performed** to restart the timer and clear any fault messages.

- Via the handheld programmer, manually reset **Time since Last Service (4.4.2.)** to zero.

Time until Next Service (4.4.3.)

Read only. **Service Interval (4.4.1.)** less **Time since Last Service (4.4.2.)**.

Reminder Activation (4.4.4.)

Note

To modify this parameter via SIMATIC PDM it must be accessed via the pull-down menu **Device – Maintenance**.

Allows you to enable a maintenance reminder.

Options	*	Timer OFF
		ON - no reminders checked
		ON - Reminder 1 (Maintenance Required) checked
		ON - Reminders 1 and 2 checked
		ON - Reminder 2 (Maintenance Demanded) checked

1. First set the values in **Reminder 1 (Required) (4.4.5.)/Reminder 2 (Demanded) (4.4.6.)**.

2. Select the desired **Reminder Activation** option.

Reminder 1 (Required) (4.4.5.)

If **Time until Next Service (4.4.3.)** is equal to or less than this value, the device generates a **Maintenance Required** reminder.

Values	Range: **0** to **20** years
	Default: 0.164 years

1. Modify values as required.

2. Set **Activation Reminder (4.4.4.)** to the desired option.

Reminder 2 (Demanded) (4.4.6.)

If **Time until Next Service (4.4.3.)** is equal to or less than this value, the device generates a **Maintenance Demanded** reminder.

Values	Range: **0** to **20** years
	Default: 0.019 years

1. Modify values as required

2. Set **Reminder Activation (4.4.4.)** to the desired option.

Maintenance Status (4.4.7.)

Indicates which level of maintenance reminder is active.

Open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab and check the **Service Schedule Status** window.

Acknowledge Status (4.4.8.)

Indicates which level of maintenance reminder has been acknowledged.

Open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab and check the **Service Schedule Status** window.

Acknowledge (4.4.9.)

Acknowledges the current maintenance reminder.

To acknowledge a reminder via SIMATIC PDM:

1. Open the menu **View – Device Diagnostics,** select **Device Status** and click on the **Maintenance** tab.

2. In the **Service Schedule Status** section, click on **Acknowledge Warnings**.

To acknowledge a reminder via the handheld programmer:

1. Press **RIGHT** ▶ **arrow** twice to open parameter view and activate **Edit** Mode.

2. Press **RIGHT** ▶ **arrow** to acknowledge the reminder.

Calibration Schedule (4.5.)

Note

- Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

- Four sets of parameters allow you to monitor the Device/Sensor Lifetimes and set up Service/Calibration schedules, based on operating hours instead of a calendar-based schedule. See also **Remaining Device Lifetime (4.2.)**, **Remaining Sensor Lifetime (4.3.)**, and **Service Schedule (4.4.)**.

- Performing a reset to **Factory Defaults** will reset all the Maintenance Schedule parameters to their factory defaults.

- The device operates in years. To view Calibration Interval parameters in hours or days (via SIMATIC PDM only) see **Calibration Interval (4.5.1.)**.

The device tracks calibration intervals based on operating hours and monitors the predicted lifetime to the next calibration. You can modify the Total Calibration Interval, set schedules for maintenance reminders, and acknowledge them.

To access these parameters via SIMATIC PDM:

- Open the menu **Device – Maintenance** and select the **Calibration Schedule** tab.

- After modifying values/units as required, click on **Write** to accept the change, and **Read** to view the effect of the change.

- Click on **Calibration Performed** to restart the timer and clear any fault messages.

Time Units

Options [a]	Hours; days; years
	Default: years

[a] Selectable only via SIMATIC PDM.

Calibration Interval (4.5.1.)

Note

The device always operates in years. Changing the units affects only the parameter view of the Calibration Interval parameters in SIMATIC PDM.

User-configurable recommended time between product calibrations.

Values	Units [a]: hours, days, years
	Range: **0** to **20** years
	Default: 1.0 year

[a] Units are selectable only via SIMATIC PDM.

Time since Last Calibration (4.5.2.)

Time elapsed since last calibration. Can be reset to zero after performing a calibration.

To reset to zero:

- In SIMATIC PDM, open the menu **Device – Maintenance**, click on the **Calibration Schedule** tab, and click on **Calibration Performed** to restart the timer and clear any fault messages.

- Via the handheld programmer, manually reset **Time since Last Calibration (4.5.2.)** to zero.

Time until Next Calibration (4.5.3.)

Read only. **Calibration Interval (4.5.1.)** less **Time since Last Calibration (4.5.2.)**.

Reminder Activation (4.5.4.)

> **Note**
>
> To modify this parameter via SIMATIC PDM it must be accessed via the pull-down menu **Device – Maintenance**.

Allows you to enable a maintenance reminder.

Options	*	Timer OFF
		ON - no reminders checked
		ON - Reminder 1 (Maintenance Required) checked
		ON - Reminders 1 and 2 checked
		ON—Reminder 2 (Maintenance Demanded) checked

1. First set the values in **Reminder 1 (Required) (4.5.5.)/Reminder 2 (Demanded) (4.5.6.)**.
2. Select the desired **Reminder Activation** option.

Reminder 1 (Required) (4.5.5.)

If **Time until Next Calibration (4.5.3.)** is equal to or less than this value, the device generates a **Maintenance Required** reminder.

Values	Range: **0** to **20** years
	Default: **0.164** years

1. Modify values as required.
2. Set **Reminder Activation (4.5.4.)** to the desired option.

Reminder 2 (Demanded) (4.5.6.)

If **Time until Next Calibration (4.5.3.)** is equal to or less than this value, the device generates a **Maintenance Demanded** reminder.

Values	Range: **0** to **20** years
	Default: **0.019** years

1. Modify values as required.
2. Set **Reminder Activation (4.5.4.)** to the desired option.

Maintenance Status (4.5.7.)

Indicates which level of maintenance reminder is active.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab and check the **Calibration Schedule Status** window.

Acknowledge Status (4.5.8.)

Indicates which level of maintenance reminder has been acknowledged.

In SIMATIC PDM, open the menu **View – Device Diagnostics,** select **Device Status**, click on the **Maintenance** tab and check the **Calibration Schedule Status** window.

Acknowledge (4.5.9.)

Acknowledges the current maintenance reminder.

To acknowledge a reminder via SIMATIC PDM:

1. Open the menu **View – Device Diagnostics,** select **Device Status** and click on the **Maintenance** tab.

2. In the **Calibration Schedule Status** section click on **Acknowledge Warnings**.

To acknowledge a reminder via the handheld programmer:

1. Press **RIGHT** ▶ **arrow** twice to open parameter view and activate **Edit** Mode.

2. Press **RIGHT** ▶ **arrow** to acknowledge the reminder.

Manufacture Date (4.6.)

Read only. The date of manufacture of the SITRANS LR250 (yy mm dd).

Powered Hours (4.7.)

Read only. Displays the number of hours the unit has been powered up since manufacture.

In SIMATIC PDM, open the menu **Device – Wear**.

Power-on Resets (4.8.)

Read only. The number of power cycles that have occurred since manufacture.

In SIMATIC PDM, open the menu **Device – Wear**.

LCD Fast Mode (4.9.)

Note

- LCD Fast Mode takes effect only after 30 minutes of inactivity. (Each time the device is powered up, a further 30 minutes of inactivity is required.)
- LCD Fast Mode affects Measurement mode only; it has no effect on Navigation mode.

Enables a faster rate of measurement from the device by disabling most of the display area. Only the bar graph will be refreshed when LCD Fast Mode is set to ON.

Values		ON
	*	OFF

LCD Contrast (4.10.)

The factory setting is for optimum visibility at room temperature and in average light conditions. Extremes of temperature will lessen the contrast.

Values	Range: **0** (High contrast) to **20** (Low contrast). Default: 10

Adjust the value to improve visibility at different temperatures and in light conditions. Change the value in small steps to ensure you can continue to read the display.

Communication (5.)

Note

Default settings in the parameter tables are indicated with an asterisk (*) unless explicitly stated.

Device Address (5.1.)

Sets the unique address of the device on the network (also called PROFIBUS address).

Values	0 - **126**. Default: 126

To set Device Address via SIMATIC PDM:

- Open the project in **Process Device Network View** then right-click on the device.

- Go to **Object Properties > Connection** to access the field **Short Address.**

To change Device Address via the handheld programmer:

See Device Address for details.

PROFIBUS Ident Number (5.2.)

Identifies the device on the network. The Ident Number must match that in the GSD file (the GSD file provides information on the device to the master).

Options		STD PROFILE	Standard Profile (uses generic GSD for 2 AIFB) [ident # = 0x9701]
	*	MANUFACTURER	Manufacturer-specific (uses Siemens EDD and GSD file, which identifies the LR250 PROFIBUS PA [ident # = 0x8150]
		STD – AIFB 1 ONL.	Standard Profile AIFB 1 only (uses generic GSD for 1 AIFB) [ident # = 0x9700]

Security (6.)

Remote Access (6.1.)

Remote Lockout (6.1.1.)

Note

If access control is changed to limit remote access, it can be reset only via the handheld programmer.

Enables or disables programming via the network and PDM.

Options	*	OFF (Remote operation enabled)
		ON (Remote operation disabled)

Local Access (6.2.)

Write Protection (6.2.1.)

Note

Do not lose this number value.

Prevents any changes to parameters via PDM or the hand-held programmer.

Hand-held programmer values	Range: **0** to **99999.** Default: Off	
	2457 (unlock value)	Off (enables programming)
	any other value	On (disables programming)

Local Operation (6.2.2.)

Enables or disables programming via the hand-held programmer.

Options	*	ENABLED
		DISABLED

In SIMATIC PDM, open the menu **Device – Write Locking**, select **On** or **Off**, and click on **Transfer**.

Language (7.)

Selects the language to be used on the LCD.

Options	*	English
		Deutsch
		Français
		Español

8.1 Alphabetical parameter list

Note

For a detailed list of parameters see Parameter Reference (Page 107).

Actual Mode (2.6.2.)

AIFB1 (2.6.)

AIFB2 (2.7.)

Alarms and Warnings (2.6.7.)

Algorithm (2.5.7.1.)

Allocation (3.5.)

Auto False Echo Suppression (2.5.10.1.)

Auto False Echo Suppression Range (2.5.10.2.)

Calibration (2.3.7.)

Calibration Schedule (4.5.)

Channel (2.6.3.)

CLEF Range (2.5.7.4.)

Condensed Status (3.4.)

Confidence (2.5.9.1.)

Descriptor (2.1.2.)

Device Address (5.1.)

Dimension A (2.4.1.3.)

Dimension L (2.4.1.4.)

Display (2.6.8.)

Echo Lock (2.5.8.1.)

Echo Profile (3.1.)

Echo Quality (2.5.9.)

Echo Select (2.5.7.)

Echo Strength (2.5.9.2.)

Electronics Temperature (3.3.)

Empty rate (2.3.8.3.)

Event Index (3.5.1.)

Event Status (3.5.2.)

Event Diagnosis (3.5.3.)

Fail-safe Mode (2.6.9.)

Far Range (2.5.2.)

Fault Reset (3.2.)

Fill Rate (2.3.8.2.)

Filter Time Constant (2.6.8.1.)

Firmware Revision (2.2.2.)

Hardware Revision (2.2.1.)

High Calibration Pt. (2.3.7.2.)

High Level Point (2.3.7.5.)

Hover Level (2.5.10.3.)

Identification (2.1.)

Input Scaling (2.6.5.)

Label (2.6.4.)

Language (7.)

LCD Contrast (4.10.)

LCD Fast Mode (4.9.)

Level Offset (2.3.7.6.)

Level Unit (2.3.2.)

Limit Hysteresis (2.6.7.5.)

Linearization (2.4.)

Loader Revision (2.2.3.)

Local Access (6.2.)

Local Operation (6.2.2.)

LOE Timer (2.3.6.)

Low Calibration Pt. (2.3.7.1.)

Lower Limit Warning (2.6.7.3.)

Lower Limit Alarm (2.6.7.4.)

Low Level Point (2.3.7.4.)

Main Output (PV– Primary Value) (2.8.1.)

Material (2.3.5.)

Master Reset (4.1.)

Max. Measured Value (3.6.2.)

Maximum Output Value - AIFB1 (3.6.4.)

Maximum Output Value - AIFB2 (3.6.6.)

Maximum Sensor Value (2.5.5.)

Maximum Value (3.3.2.)

Maximum Volume (2.4.1.2.)

Measured Values (2.8.)

Message (2.1.3.)

Min. Measured Value (3.6.1.)

Minimum Output Value - AIFB1 (3.6.3.)

Minimum Output Value - AIFB2 (3.6.5.)

Minimum Sensor Value (2.5.4.)

Minimum Value (3.3.1.)

Mode (2.6.9.1.)

Near Range (2.5.1.)

Order Option (2.2.4.)

Output, no level offset (SV2 – Secondary Value 2) (2.8.3.)

Output, no linearization (SV1 – Secondary Value 1) (2.8.2.)

Output Scaling (2.6.6.)

Peak Values (3.6.)

Position Detect (2.5.7.2.)

Powered Hours (4.7.)

Power-on Resets (4.8.)

PROFIBUS Ident Number (5.2.)

Propagation Factor (2.5.3.)

PV Units (volume/level) (2.3.3.)

Quick Start (1.)

Rate (2.3.8.)

Remaining Device Lifetime (4.2.)

Remaining Sensor Lifetime (4.3.)

Remote Access (6.1.)

Remote Lockout (6.1.1.)

Response Rate (2.3.8.1.)

Sampling (2.5.8.)

Sampling down (2.5.8.3.)

Sampling up (2.5.8.2.)

Sensor (2.3.)

Sensor Offset (2.3.7.3.)

Service Schedule (4.4.)

Shaper Mode (2.5.10.4.)

Shots (2.5.6.)

Signal Processing (2.5.)

Static Revision No. (2.6.1.)

Tag (2.1.1.)

Temperature Units (2.3.4.)

TVT setup (2.5.10.)

TVT shaper (2.5.11.)

Upper Limit Warning (2.6.7.2.)

Upper Limit Alarm (2.6.7.1.)

Unit (2.3.1.)

Value (2.6.9.2.)

Vessel Shape (2.4.1.1.)

Volume (2.4.1.)

Write Protection (6.2.1.)

XY index (2.4.1.5.)

X value (2.4.1.6.)

Y value (2.4.1.7.)