

Radar Transmitters

SITRANS LR250 (PROFIBUS PA)

Operating Instructions · 01/2014



SITRANS

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Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens Milltronics Process Instruments.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

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Operating Instructions

<u>Introduction</u>	1
<u>Safety notes</u>	2
<u>Description</u>	3
<u>Installing/mounting</u>	4
<u>Connecting</u>	5
<u>Commissioning</u>	6
<u>Remote operation</u>	7
<u>Parameter reference</u>	8
<u>Service and maintenance</u>	9
<u>Diagnosing and troubleshooting</u>	10
<u>Technical data</u>	11
<u>Dimension drawings</u>	12
<u>Appendix A: Technical reference</u>	A
<u>Appendix B: PROFIBUS PA profile structure</u>	B
<u>Appendix C: Communications via PROFIBUS</u>	C
<u>Appendix D: Certificates and Support</u>	D
<u>List of abbreviations</u>	13
<u>LCD menu structure</u>	14

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.

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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

1	Introduction	9
1.1	The manual	9
1.2	Firmware revision history	10
2	Safety notes	11
2.1	Safety marking symbols	11
2.2	FCC Conformity	11
2.3	CE Electromagnetic Compatibility (EMC) Conformity	12
3	Description	13
3.1	SITRANS LR250 overview	13
3.2	Programming	14
3.3	Applications	14
3.4	Approvals and certificates	14
4	Installing/mounting	15
4.1	Pressure applications	16
4.1.1	Pressure Equipment Directive, PED, 97/23/EC	16
4.2	Mounting location	16
4.2.1	Nozzle design	17
4.2.2	Nozzle location	17
4.2.3	Orientation in a vessel with obstructions	20
4.2.4	Mounting on a Stillpipe or Bypass Pipe	20
4.2.5	Stillpipe or Bypass Pipe requirements	21
4.2.6	Device orientation	21
4.3	Installation instructions	22
4.4	Flange bolting, Flanged encapsulated antenna only	22
5	Connecting	25
5.1	Power	25
5.2	Connecting SITRANS LR250	26
5.2.1	Basic PLC configuration with PROFIBUS PA	28
5.3	Wiring setups for hazardous area installations	28
5.3.1	PLC configuration with PROFIBUS PA for hazardous areas	29
5.3.2	Intrinsically safe wiring	30
5.3.3	Non-sparking wiring	33

5.3.4	Non-incendive wiring (US/Canada only)	33
5.4	Instructions specific to hazardous area installations.....	34
6	Commissioning	35
6.1	Operating via the handheld programmer	35
6.1.1	Power up	35
6.1.2	Handheld programmer functions.....	35
6.1.2.1	The LCD display.....	36
6.1.2.2	Handheld programmer (Part No. 7ML1930-1BK)	38
6.1.3	Programming.....	39
6.1.3.1	Enter program mode	40
6.1.3.2	Navigating: key functions in navigation mode.....	41
6.1.3.3	Editing in program mode	42
6.1.3.4	Quick Start Wizard via the handheld programmer.....	45
6.1.3.5	Auto False Echo Suppression.....	47
6.1.3.6	Requesting an Echo Profile.....	48
6.1.3.7	Device address	49
6.2	Application examples	50
6.2.1	Liquid resin in storage vessel, level measurement	51
6.2.2	Horizontal vessel with volume measurement.....	53
6.2.3	Application with stillpipe	55
7	Remote operation	59
7.1	Operating via SIMATIC PDM	59
7.1.1	Functions in SIMATIC PDM	59
7.1.1.1	Features of SIMATIC PDM Rev. 6.0, SP4 or higher.....	60
7.1.1.2	Features of SIMATIC PDM Rev. 5.2, SP1.....	60
7.1.1.3	SIMATIC PDM Version	60
7.1.2	Electronic Device Description (EDD)	61
7.1.2.1	Updating the Electronic Device Description (EDD).....	61
7.1.2.2	Configuring a new device	61
7.1.3	Quick start wizard via SIMATIC PDM	62
7.1.4	Changing parameter settings using SIMATIC PDM	68
7.1.5	Parameters accessed via pull-down menus	69
7.1.5.1	Echo profile utilities	69
7.1.5.2	Auto false echo suppression.....	73
7.1.5.3	Echo setup	76
7.1.5.4	Maintenance.....	77
7.1.5.5	Acknowledge Faults	78
7.1.5.6	Wear	78
7.1.5.7	Simulation.....	79
7.1.5.8	Write locking.....	81
7.1.5.9	Master reset	82
7.1.5.10	Factory defaults.....	82
7.1.5.11	Diagnostics.....	83
7.2	Operating via FDT	90

7.2.1	Device Type Manager (DTM).....	90
7.2.2	SITRANS DTM.....	90
7.2.3	The device EDD	91
7.2.4	Configuring a new device via FDT	91
8	Parameter reference	93
8.1	Alphabetical parameter list.....	155
9	Service and maintenance.....	159
9.1	Maintenance.....	159
9.2	Unit repair and excluded liability	159
9.3	Part replacement.....	159
10	Diagnosing and troubleshooting	161
10.1	Device status icons	162
10.2	General fault codes	163
10.3	Operation troubleshooting.....	166
11	Technical data	169
11.1	Power	169
11.2	Performance.....	170
11.3	Interface	171
11.4	Mechanical	171
11.5	Environmental	173
11.6	Process	173
11.7	Approvals	174
11.8	Programmer (infrared keypad).....	175
12	Dimension drawings.....	177
12.1	Threaded horn antenna	177
12.2	Threaded horn antenna with extension	180
12.3	Flanged horn antenna	182
12.4	Flanged horn antenna with extension.....	184
12.5	Flanged encapsulated antenna (2"/DN50/50A sizes only)	186
12.6	Flanged encapsulated antenna (3"/DN80/80A sizes and larger).....	188
12.7	Threaded PVDF antenna	190
12.8	Threaded connection markings.....	191
12.9	Raised-Face flange per EN 1092-1 for flanged horn antenna	192

12.10	Raised-Face flange per EN 1092-1 for flanged encapsulated antenna.....	194
12.11	Flat-Face flange	197
12.12	Process connection tag (pressure rated versions).....	200
A	Appendix A: Technical reference.....	201
A.1	Principles of operation.....	201
A.2	Echo processing.....	202
A.2.1	Process Intelligence	202
A.2.2	Echo Selection	203
A.2.3	CLEF Range	206
A.2.4	Echo Threshold	206
A.2.5	Echo Lock.....	206
A.2.6	Auto False Echo Suppression.....	207
A.2.7	Measurement Range.....	209
A.2.8	Measurement Response	209
A.2.9	Damping	210
A.2.10	Loss of Echo (LOE).....	210
A.2.10.1	LOE Timer	210
A.2.10.2	Fail-safe Behavior	211
A.3	Maximum Process Temperature Chart	212
A.4	Process Pressure/Temperature Derating Curves	213
A.4.1	Horn antenna	214
A.4.2	Flanged horn antenna	215
A.4.3	Flanged encapsulated antenna.....	218
A.4.4	PVDF antenna.....	220
B	Appendix B: PROFIBUS PA profile structure	221
B.1	PROFIBUS Level Device Design	221
B.2	Block Model.....	221
B.2.1	Description of the blocks	222
B.2.1.1	Transducer Block function groups	222
B.2.1.2	How the transducer block works:	223
B.2.1.3	Analog Input Function Blocks 1 and 2	225
C	Appendix C: Communications via PROFIBUS	229
C.1	Device configuration.....	229
C.1.1	SIMATIC PDM.....	229
C.1.1.1	Electronic Device Description	229
C.2	Network configuration	230
C.2.1	The GSD file.....	230
C.3	Bus termination	230
C.4	Power demands	230
C.5	PROFIBUS address	231

C.6	Operating as a profile device	232
C.6.1	Configuring a new device.....	232
C.6.2	Configuring PROFIBUS PA with an S7-300/ 400 PLC	232
C.7	Cyclic versus acyclic data	233
C.7.1	Cyclic data.....	233
C.8	Status byte	234
C.9	Condensed status	235
C.10	Diagnostics.....	237
C.10.1	Diagnosis reply (available cyclically).....	237
C.10.2	Diagnosis object (available cyclically or acyclically)	237
C.10.3	Extended mode diagnosis.....	238
C.10.4	Condensed mode diagnosis	239
C.10.5	Acyclic extended diagnostics (general fault codes)	240
C.10.6	Acyclic data	244
D	Appendix D: Certificates and Support.....	245
D.1	Certificates	245
D.2	Technical support.....	245
13	List of abbreviations	247
14	LCD menu structure.....	249
	Glossary	255
	Index.....	261

Table of contents

Introduction

1.1 The manual

This manual will help you set up your radar device for optimum performance. For other Siemens Milltronics level measurement manuals, go to:

Siemens level (<http://www.siemens.com/level>)

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>)

Note

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

Application examples

The application examples used in this manual illustrate typical installations. [See Application examples (Page 50).] Because there is often a range of ways to approach an application, other configurations may also apply.

In all examples, substitute your own application details. If the examples do not apply to your application, check the applicable parameter reference for the available options.

Note

For industrial use only

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

1.2 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	<ul style="list-style-type: none">Initial release.
1.01.00	1.01.00	23 Aug 2007	<ul style="list-style-type: none">EDD^{a)}/SIMATIC PDM: improved rendering of the echo profile and TVT.
1.01.01	1.01.01	26 Sep 2007	<ul style="list-style-type: none">PNO certification release.
1.01.02	1.01.02	10 Jun 2008	<ul style="list-style-type: none">Maintenance release for firmware and EDD^{a)}
1.01.02	1.01.03	17 Jun 2008	<ul style="list-style-type: none">The internal EDD revision has been incremented.
1.02.00	1.02.00	27 May 2009	<ul style="list-style-type: none">Harmonization of menu structures and parameter names across products.Display indicates progress towards first measurement.
1.02.01	1.02.00	7 June 2010	<ul style="list-style-type: none">Display contrast improvement.Antenna type parameter cannot be modified.
1.02.02	1.02.00	24 May 2011	<ul style="list-style-type: none">Threaded PVDF antenna supported.
1.02.03	1.02.01	31 Oct 2012	<ul style="list-style-type: none">Antenna parameter removed.Quickstart on local display enhancements.

^{a)} Electronic Device Description

Safety notes

2.1 Safety marking symbols

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

2.2 FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

 WARNING
Changes or modifications not expressly approved by Siemens Milltronics 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 instruction manual, 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.

Safety notes

2.3 CE Electromagnetic Compatibility (EMC) Conformity

2.3 CE Electromagnetic Compatibility (EMC) Conformity

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

EMC Standard	Title
CISPR 11:2004/EN 55011:1998+A1:1999&A2:2002, CLASS B	Limits and methods of measurements of radio disturbance characteristics of industrial, scientific, and medical (ISM) radio-frequency equipment.
EN 61326:1997+A1:1998+A2:2001+A3:2003 (IEC 61326:2002)	Electrical Equipment for Measurement, Control and Laboratory Use – Electromagnetic Compatibility.
EN61000-4-2:2001	Electromagnetic Compatibility (EMC) Part 4-2:Testing and measurement techniques – Electrostatic discharge immunity test.
EN61000-4-3:2002	Electromagnetic Compatibility (EMC) Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.
EN61000-4-4:2004	Electromagnetic Compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test.
EN61000-4-5:2001	Electromagnetic Compatibility (EMC) Part 4-5: Testing and measurement techniques – Surge immunity test.
EN61000-4-6:2004	Electromagnetic Compatibility (EMC) Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields.
EN61000-4-8:2001	Electromagnetic Compatibility (EMC) Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test.

Description

3.1 SITRANS LR250 overview

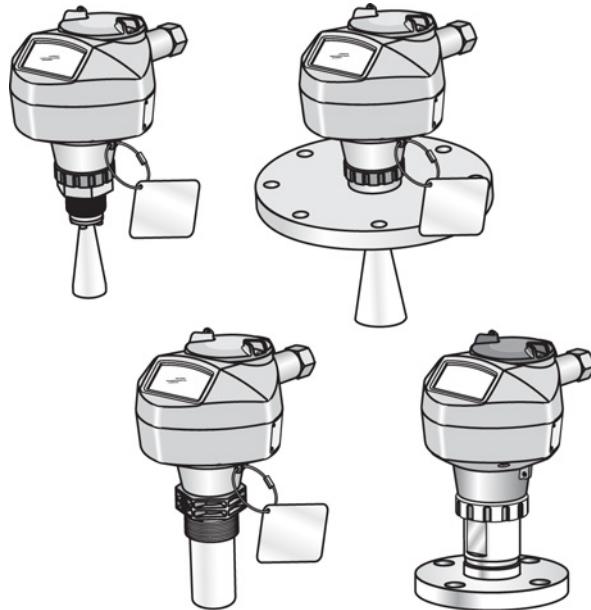
WARNING

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 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

3.4 Approvals and certificates

Note

For further details see Approvals (Page 174).

SITRANS LR250 is available with General Purpose approval, or 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.

4

Installing/mounting



WARNING

- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- Handle the device using the enclosure, not the process connection tag, to avoid damage.
- Take special care when handling the threaded PVDF and Flanged encapsulated antennas. Any damage to the antenna surface, particularly to the tip/lens, could affect performance.
- Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

Note

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

4.1 Pressure applications



Pressure applications

- Never attempt to loosen, remove, or disassemble process connection or device housing while vessel contents are under pressure.
- The user is responsible for the selection of bolting and gasket (except for Flanged encapsulated antenna) materials which will fall within the limits of the process connection and its intended use and which are suitable for the service conditions.
- For Flanged encapsulated antenna, lens acts as integral gasket, no other required
- Use spring washers for Flanged encapsulated antenna.
- Improper installation may result in loss of process pressure.

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).
- SITRANS LR250 units are hydrostatically tested, meeting or exceeding the requirements of the ASME Boiler and Pressure Vessel Code and the European Pressure Equipment Directive.

4.1.1

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

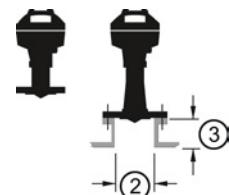
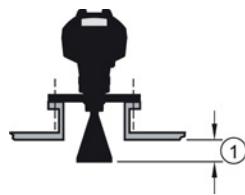
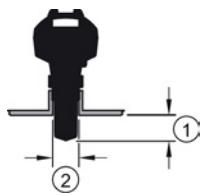
Mounting location

Note

- Correct location is key to a successful application.
- Avoid reflective interference from vessel walls and obstructions by following the guidelines below:

4.2.1 Nozzle design

Threaded PVDF antenna Stainless steel horn antenna Flanged encapsulated antenna



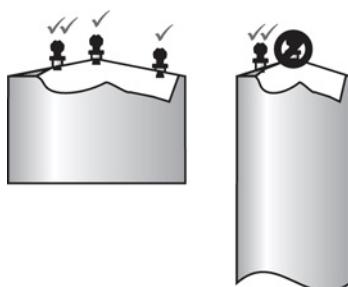
- ① Minimum clearance: 10 mm (0.4")
- ② Minimum diameter: 50 mm (2")
- ③ Maximum nozzle length: 500 mm (20")

- The end of the antenna must protrude a minimum of 10 mm (0.4") to avoid false echoes being reflected from the nozzle¹⁾.
- Minimum recommended nozzle diameter for the threaded PVDF antenna is 50 mm (2").
- An antenna extension (100 mm/3.93") is available for any version except the Threaded PVDF and Flanged encapsulated antenna (FEA).
- The maximum nozzle length for the FEA is 500 mm (20").

¹⁾ Not applicable for FEA

4.2.2 Nozzle location

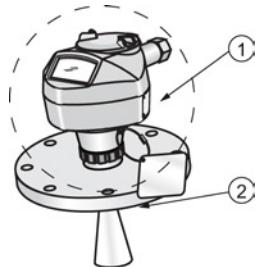
- Avoid central locations on tall, narrow vessels
- Nozzle must be vertical



Preferred
Undesirable

Environment

- Provide an environment suitable to the housing rating and materials of construction.
- Provide a sunshield if the device will be mounted in direct sunlight.



① Ambient temperature
② Process temperature (at process connection)

Antenna	①	②
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)

Access for programming

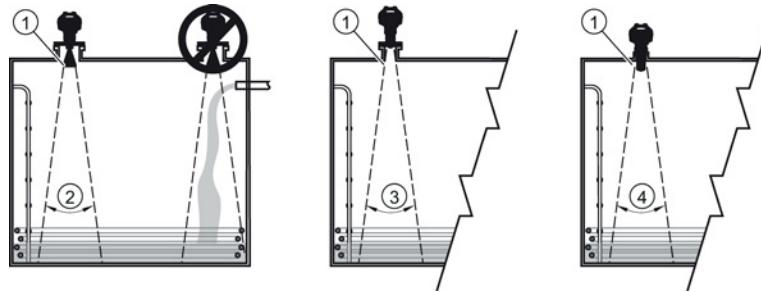
- Provide easy access for viewing the display and programming via the handheld programmer.

Beam angle

Note

- Beam width depends on antenna size: see below.
- For details on avoiding false echoes, see Auto False Echo Suppression (Page 207).

- 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.



① Emission cone

	Size	Beam angle
② Horn	1.5"	19°
	2"	15°
	3"	10°
	4"	8°
③ Flanged encapsulated	2"/DN50/50A	12.8°
	3"/DN80/80A	9.6°
	4"/DN100/100A	9.6°
	6"/DN150/150A	9.6°
④ Threaded PVDF		19°

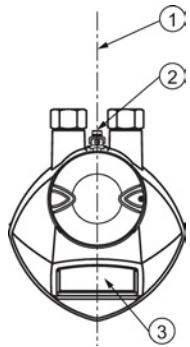
Emission cone

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

4.2.3 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 21).



- ① Polarization axis
- ② Polarization reference point
- ③ Display

4.2.4 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 170) for more information.

4.2.5 Stillpipe or Bypass Pipe requirements

- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe¹⁾. See Threaded Horn dimensions (Page 177) or Raised-Face Flange per EN 1092-1 (Page 194).
- One continuous length of metallic pipe is preferred, without joints. Bad joints create reflections.
- Joints (if unavoidable) must be machined to ± 0.25 mm ($\pm 0.010"$) and must have welded connecting sleeve on the outside.

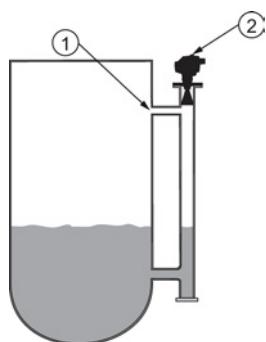
¹⁾ Mounting in a pipe greater than 100 mm (4") can cause large errors, and therefore is not recommended.

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")
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.

4.2.6 Device orientation

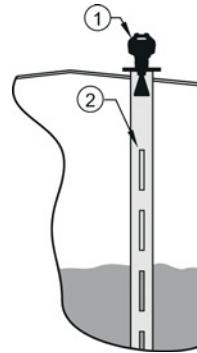
Bypass pipe installation



① Vent

② Align front or back of device with vents¹⁾

Stillpipe installation



① Align front or back of device with stillpipe slots¹⁾

② Slots

¹⁾ Horn antenna version shown as example

4.3 Installation instructions



WARNING

For pressure applications, 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 Flange bolting, Flanged encapsulated antenna only (Page 22) 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 wall.
- Do not rotate the enclosure after programming and vessel calibration, otherwise an error may occur, caused by a polarity shift of the transmit pulse.

Threaded versions

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. For pressure applications see Warning above.

Flanged versions

See Flanged Horn with extension (Page 182), Raised-Face Flange per EN 1092-1 (Page 194), Flat-Face Flange (Page 197), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger) (Page 188) for dimensions.

4.4 Flange bolting, Flanged encapsulated antenna only

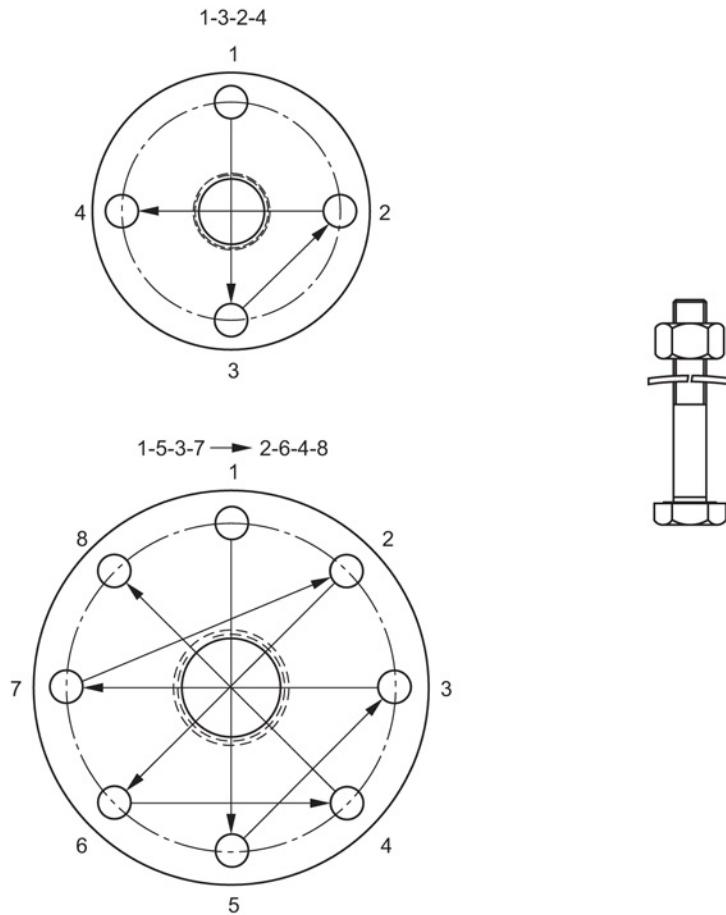
Note

- Use spring washers
- Do not use additional gasket
- Use recommended torque values for tightening bolts

4.4 Flange bolting, Flanged encapsulated antenna only

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	



4.4 Flange bolting, Flanged encapsulated antenna only

Recommendations for flange bolting:

- Use cross-pattern sequence as shown
- Check uniformity of the flange gap
- Apply adjustments by selective tightening if required
- Torque incrementally until desired value is reached
- Check/re-torque after 4 to 6 hours
- 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 159).

Connecting

5.1 Power

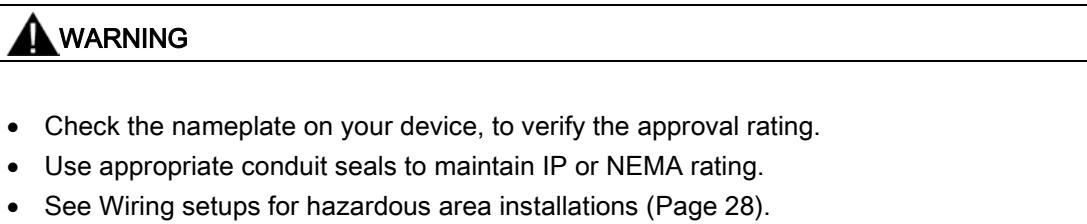
WARNING

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.

Note

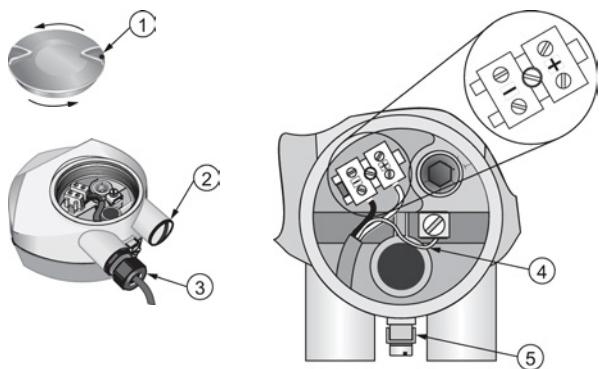
All field wiring must have insulation suitable for rated voltages.

5.2 Connecting SITRANS LR250



Note

- 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	④	Cable shield
②	Plug (IP 68)	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.

Wiring instructions

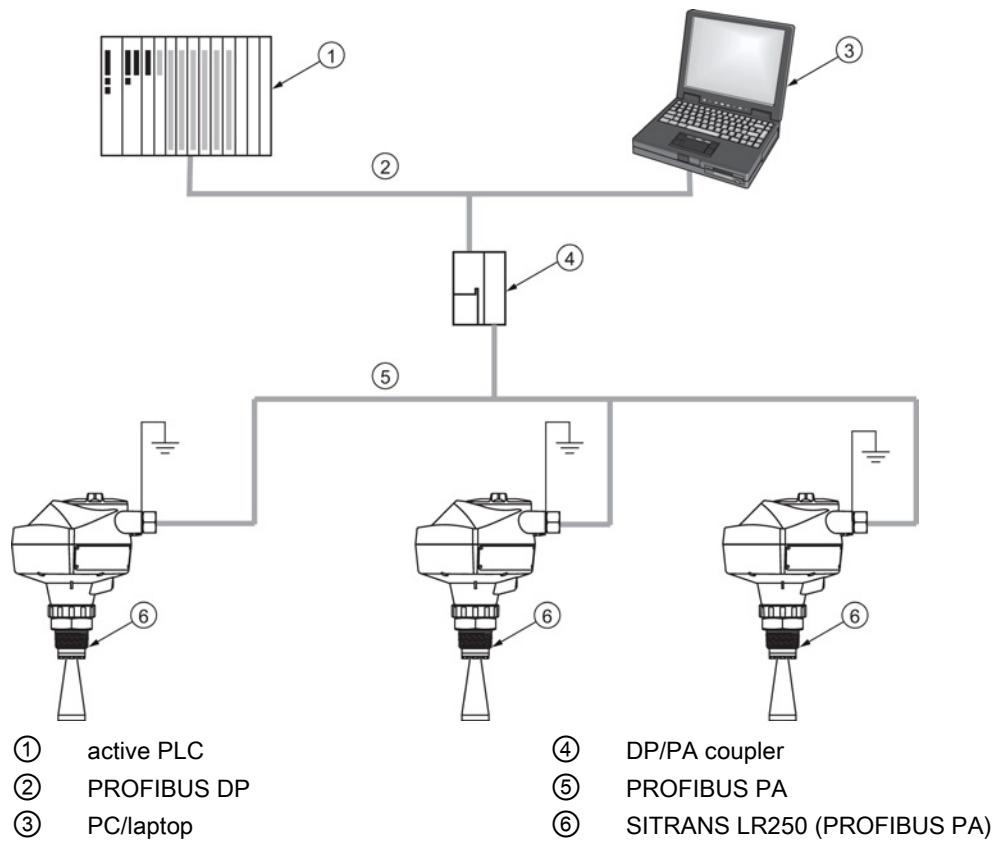
1. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland. (If cable is routed through conduit, use only approved suitable-size hubs for waterproof applications.)
2. Connect the wires to the terminals as shown: the polarity is identified on the terminal block.
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

- 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/>)

5.2.1 Basic PLC configuration with PROFIBUS PA



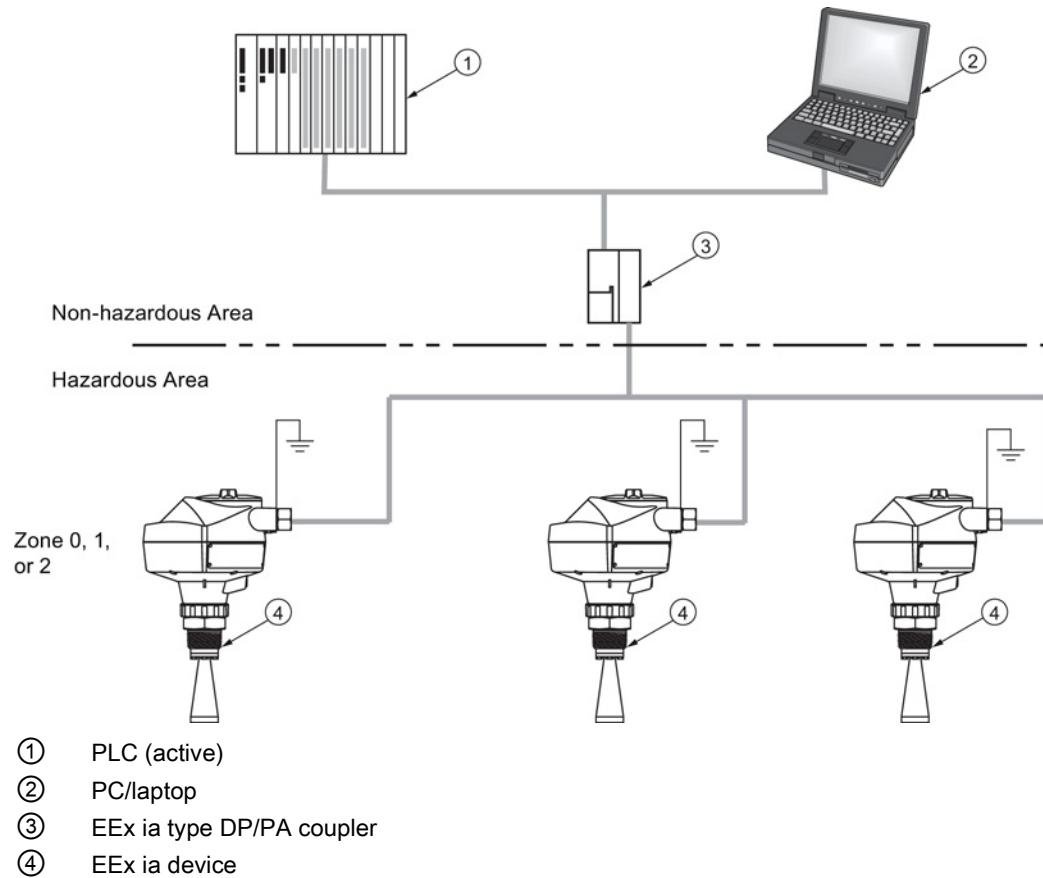
5.3 Wiring setups for hazardous area installations

There are three wiring options for hazardous area installations:

- Intrinsically safe wiring (Page 30)
- Non-sparking wiring (Page 33)
- Non-incendive wiring (US/Canada only) (Page 33)

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

5.3.1 PLC configuration with PROFIBUS PA for hazardous areas

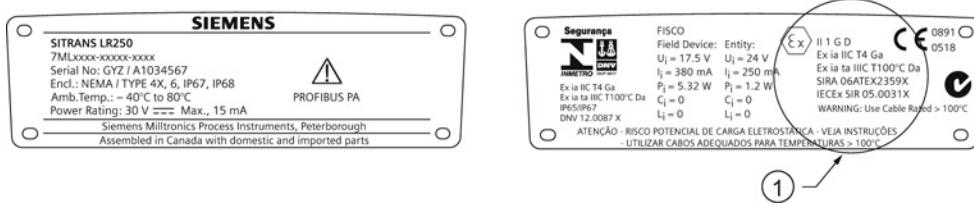


Connecting

5.3 Wiring setups for hazardous area installations

5.3.2 Intrinsically safe wiring

Device nameplate (ATEX/IECEx/INMETRO/C-TICK)



① nameplate

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

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

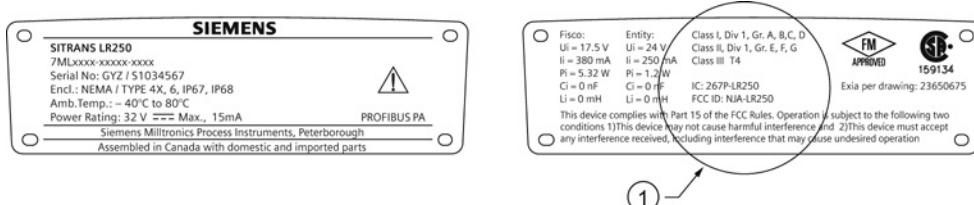
Go to **Support > Approvals / Certificates**.

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**.

Device nameplate (FM/CSA)



① nameplate

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**.

- 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 34).

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 (U_o) and output current (I_o) 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 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) C_i	= 0
(internal inductance) L_i	= 0

Connecting

5.3 Wiring setups for hazardous area installations

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.**

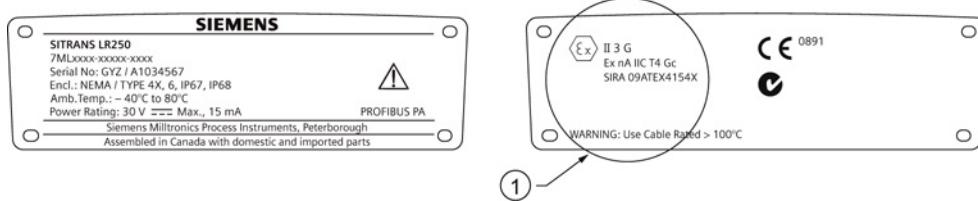
The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (U_i or V_{max}), the current (I_i , or I_{max}) and the power (P_i , or P_{max}) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (U_o or V_{oc} or V_i), the current (I_o or I_{sc} or I_i), and the power (P_o or P_{max}) 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 μ H 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 U_o (or V_{oc} or V_t) 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 μ A 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

5.3.3 Non-sparking wiring



① nameplate

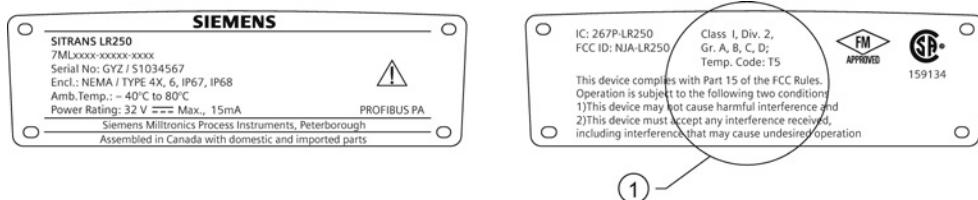
The ATEX certificate listed on the nameplate can be downloaded from our website:

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

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

- 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.

5.3.4 Non-incendive wiring (US/Canada only)



① nameplate

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 34).

5.4 Instructions specific to hazardous area installations

(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 and T4.
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.

6

Commissioning

6.1 Operating via the handheld programmer

6.1.1 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.

6.1.2 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 45)]
- or from a remote location [see Quick Start Wizard via SIMATIC PDM (Page 62)]

For more complex setups see Application Examples (Page 50), and for the complete range of parameters see Parameter Reference (Page 93).

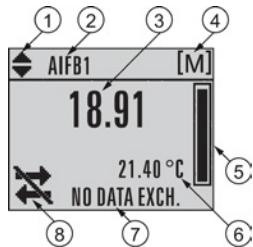
Commissioning

6.1 Operating via the handheld programmer

6.1.2.1 The LCD display

Measurement mode display

Normal operation

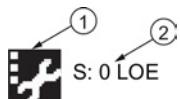


①	toggle indicator ^{a)} for AIFB 1 or AIFB 2	⑤	bar graph indicates level
②	identifies which AIFB is source of displayed value	⑥	secondary region indicates on request ^{b)} electronics temperature, echo confidence, or distance
③	measured value (level, space, distance, or volume)	⑦	text area displays status messages
④	units	⑧	device status indicator

^{a)} Press **UP** and **DOWN** arrow to switch.

^{b)} In response to a key press request. For details, see Programming (Page 39).

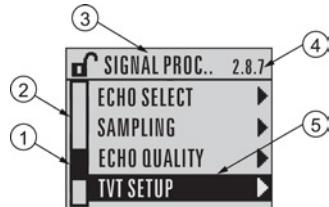
Fault present



①	service required icon appears
②	text area displays a fault code and an error message

Program mode display

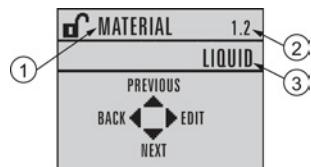
Navigation view



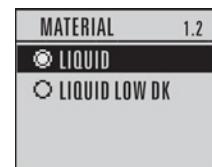
①	Item band	④	Current item number
②	Menu bar	⑤	Current item
③	Current menu		

- 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

Commissioning

6.1 Operating via the handheld programmer

6.1.2.2 Handheld programmer (Part No. 7ML1930-1BK)

The programmer is ordered separately.



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.

6.1.3 Programming

Note

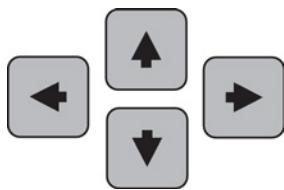
- While the device is in PROGRAM mode the output remains active and continues to respond to changes in the device.
- The device automatically returns to Measurement mode after a period of inactivity in PROGRAM mode (between 15 seconds and 2 minutes, depending on the menu level).

Change parameter settings and set operating conditions to suit your specific application. For remote operation see Operating via SIMATIC PDM (Page 59).

Note

For the complete list of parameters with instructions, see Parameter Reference (Page 93).

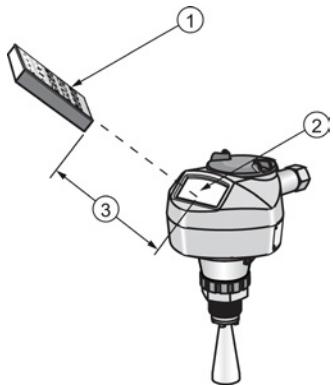
Parameters are identified by name and organized into function groups. See LCD menu structure (Page 249).



- 1. QUICK START
- 2. SETUP
 - 2.1. IDENTIFICATION
 -
 - 2.6. LINEARIZATION
 - 2.6.1. VOLUME
 - 2.6.1.1. VESSEL SHAPE

6.1.3.1 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 Max. 300 mm (1 ft)

6.1.3.2 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**.

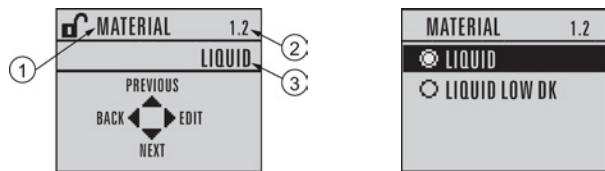
Key	Name	Menu level	Function
	UP or DOWN arrow	menu or parameter	Scroll to previous or next menu or parameter.
	RIGHT arrow	menu	Go to first parameter in the selected menu, or open next menu.
		parameter	Open Edit mode.
	LEFT arrow	menu or parameter	Open parent menu.
	Mode	menu or parameter	Change to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

6.1.3.3 Editing in program mode

Selecting a listed option

1. Navigate to the desired parameter.
2. Press **RIGHT arrow**  to open parameter view.
3. Press **RIGHT arrow**  again to open **Edit mode**. The current selection is highlighted. Scroll to a new selection.
4. Press **RIGHT arrow**  to accept it.

The LCD returns to parameter view and displays the new selection.

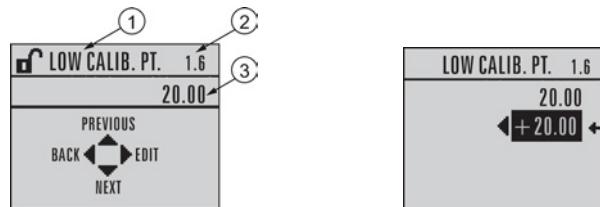


- ① Parameter name
- ② Parameter number
- ③ Current selection

Changing a numeric value

1. Navigate to the desired parameter.
2. Press **RIGHT arrow**  to open parameter view. The current value is displayed.
3. Press **RIGHT arrow**  again to open **Edit** mode. The current value is highlighted.
4. Key in a new value.
5. 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 value

Key functions in edit mode

Key	Name	Function	
	UP or DOWN arrow	Selecting options	Scrolls to item.
		Numeric editing	<ul style="list-style-type: none"> Increments or decrements digits Toggles plus and minus sign
	RIGHT arrow	Selecting options	<ul style="list-style-type: none"> Accepts the data (writes the parameter) Changes from Edit to Navigation mode
		Numeric editing	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	Numeric editing	Enters the corresponding character.

6.1.3.4 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 93). (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

1. 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.
2. Press **RIGHT arrow**  twice to navigate to menu item 1.1 and open parameter view.
3. Press **RIGHT arrow**  to open Edit mode or **DOWN arrow**  to accept default values and move directly to the next item.
4. To change a setting, scroll to the desired item or key in a new value.
5. After modifying a value, press **RIGHT arrow**  to accept it and press **DOWN arrow**  to move to the next item.
6. Quick Start settings take effect only after you select **Yes** to **Apply changes** in step 1.8.

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)} $dK < 3.0$

Commissioning

6.1 Operating via the handheld programmer

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

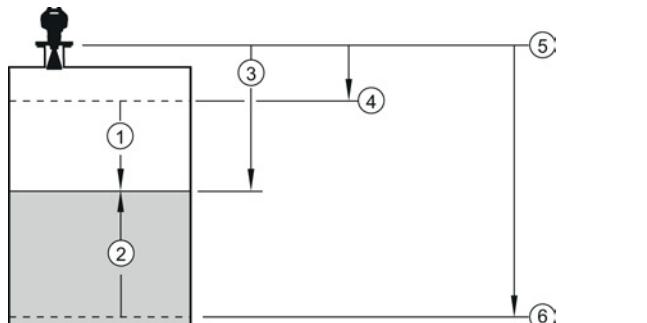
Sensor measurement units.

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 Dimensions (Page 177).

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.

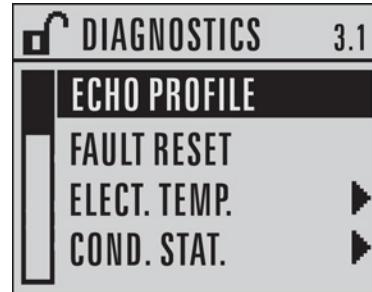
6.1.3.5 Auto False Echo Suppression

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.

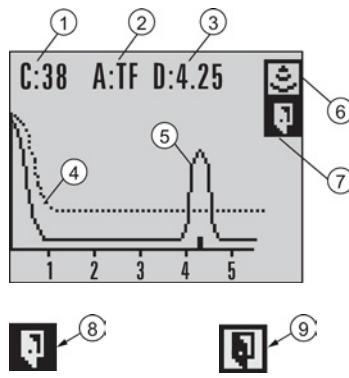
This feature can also be used if the display shows a false high level, or the reading is fluctuating between the correct level and a false high level.

6.1.3.6 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		

6.1.3.7 Device address

Note

See Master Reset (Page 82) 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.

6.2 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.

6.2.1 Liquid resin in storage vessel, level measurement

Note

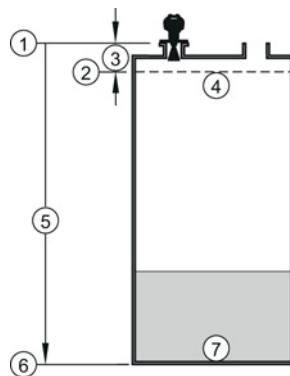
Minimum distance from flange face to target is limited by **Near Range (2.5.1.)**.

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

Parameter type	Parameter No. /Name	Options/ Values	Function
	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. .

6.2.2 Horizontal vessel with volume measurement

Note

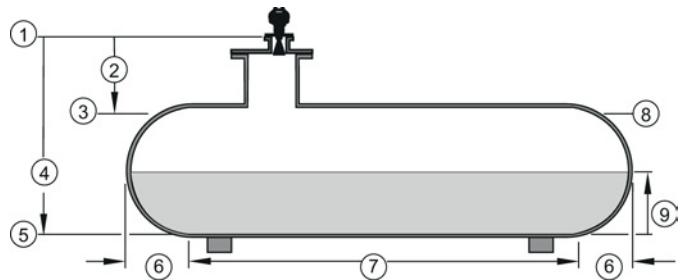
The minimum distance from the flange face to the target is limited by **Near Range (2.5.1.)**.

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.

Parameter type	Parameter No./Name	Options/Values	Function
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.

6.2.3 Application with stillpipe

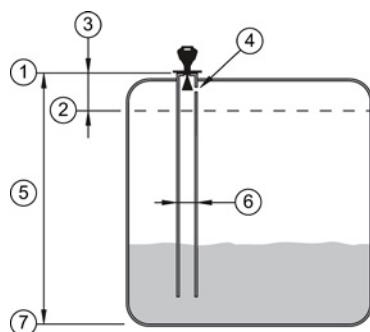
A stillpipe is recommended for products with a dK of less than 3, or if extremely turbulent or vortex conditions exist. This mounting arrangement can also be used to provide optimum signal conditions on foaming materials.

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 177).
- See Mounting on a Stillpipe or Bypass Pipe (Page 20) 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.

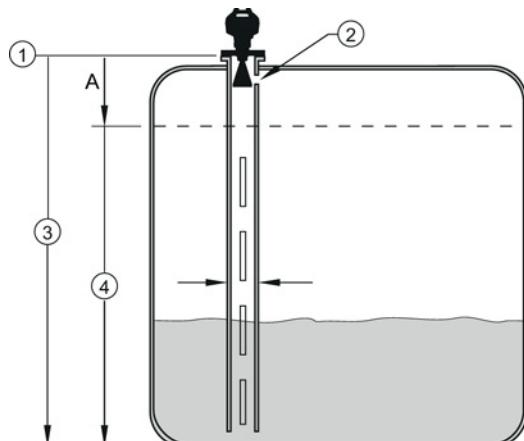
- Low Calibration Pt. is 5 m (16.4 ft) from the sensor reference point.
- High Calibration Pt. is 0.5 m (1.64 ft) from the sensor reference point.
- The stillpipe inside diameter is 50 mm (1.96").
- The maximum rate of filling or emptying is about 0.1 m (4")/min.



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.
	Propagation Factor (2.5.3.) ^{a)}	0.988	P.F. for a 50 mm (1.96") I.D. stillpipe
Independent parameters	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

Note

Flanged encapsulated antenna

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

Remote operation

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 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 93).
- 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 249) for a chart and Changing parameter settings using SIMATIC PDM (Page 68) 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 69) for parameters that do not appear in the menu structure in SIMATIC PDM.

7.1 Operating via 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 62)	Device configuration for simple applications
Echo Profile Utilities (Page 69)	Easy access to echo profile viewing/comparison, TVT shaping, auto false echo suppression and echo setup
Auto False Echo Suppression (Page 73)	Screen out false echoes
TVT Shaper (Page 72)	Manual TVT adjustment
Process Variables (Page 83)	Monitor process variables and level trend
Security (Page 89)	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>).

1. Check that you have the most recent EDD, and if necessary update it. [See Updating the Electronic Device Description (EDD) (Page 61)].
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**.

7.1 Operating via SIMATIC PDM

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.

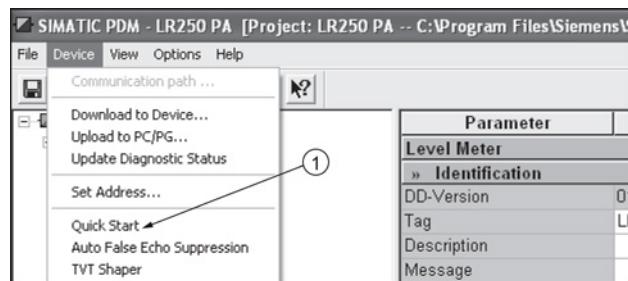
1. If you have not already done so, check that you have the most up-to-date Electronic Device Description (EDD) for your device. [See Configuring a new device (Page 61).]
2. Launch SIMATIC Manager and create a new project. Application Guides for setting up HART and PROFIBUS PA devices with SIMATIC PDM 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 82).
- 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 70) or see Parameter Reference (Page 93) 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 73).

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 55) for a Low Dielectric Liquid application.

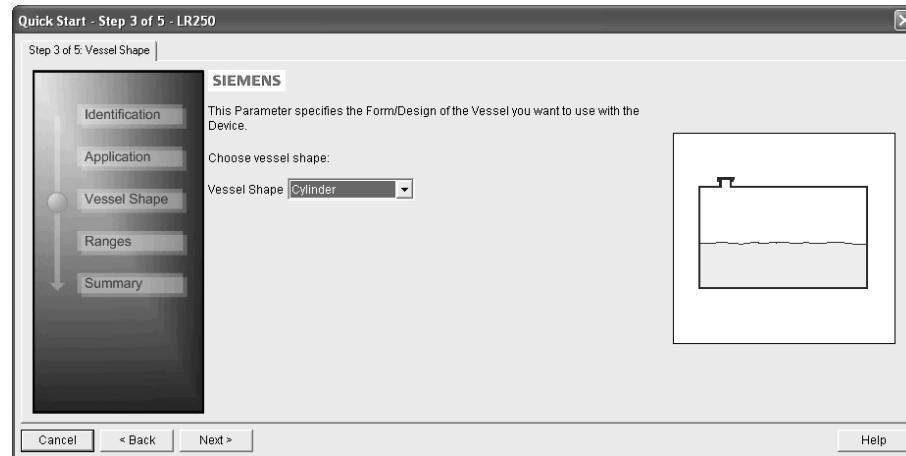
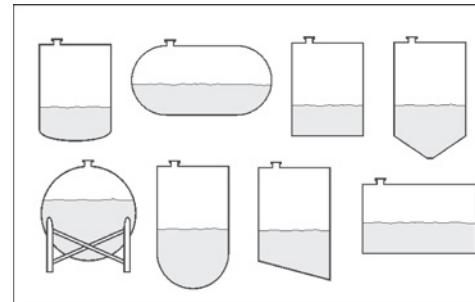


Step 3 – Vessel Shape

The vessel shapes shown are predefined.

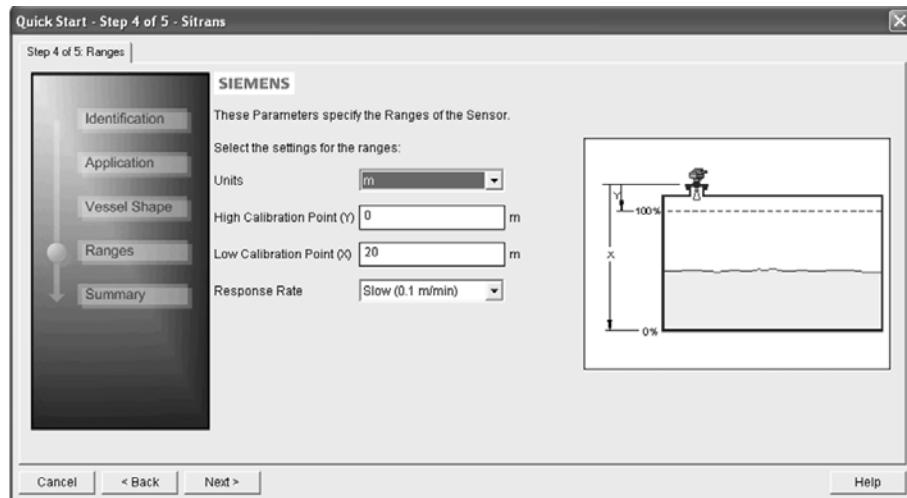
For a vessel with obstructions, see Auto False Echo Suppression via SIMATIC PDM (Page 73).

Select the vessel shape, and click on **NEXT**.



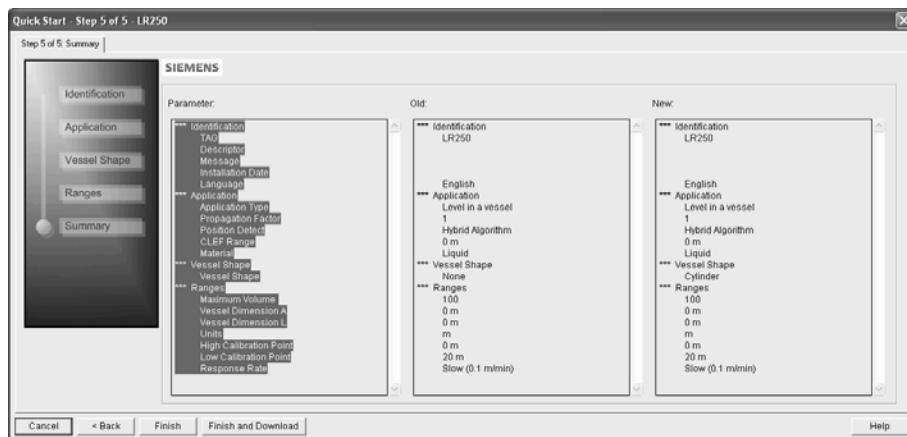
Step 4 – Ranges

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**.

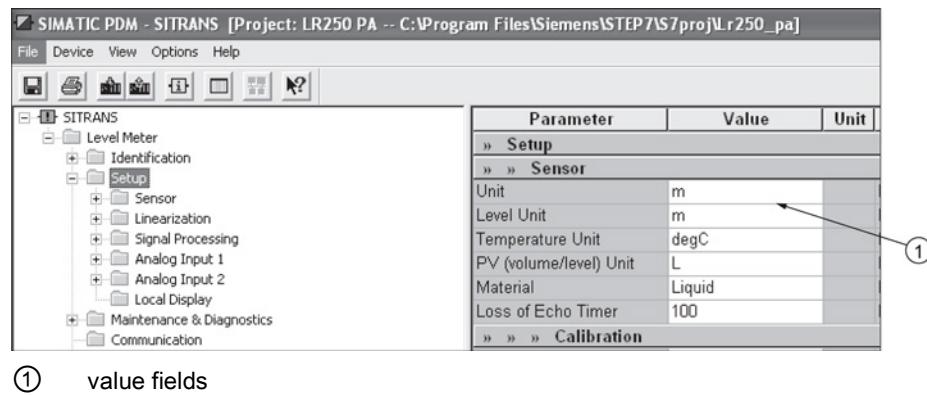
7.1.4 Changing parameter settings using SIMATIC PDM

Note

- For a complete list of parameters, see Parameter Reference (Page 93).
- Clicking on **Cancel** during an upload from device to SIMATIC PDM will result in some parameters being updated.

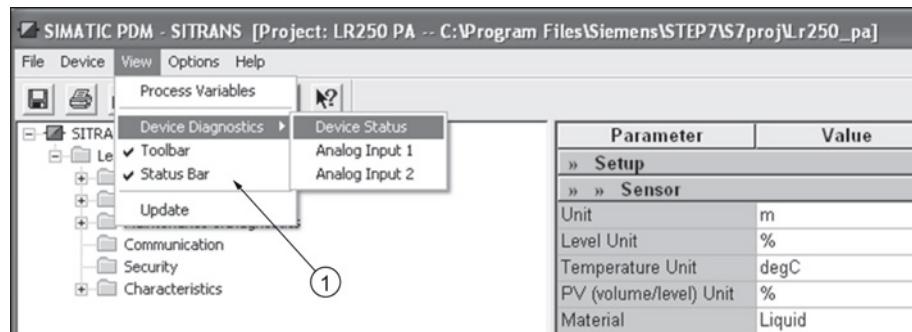
Many parameters are accessed via pull-down menus in PDM. See Parameters accessed via pull-down menus (Page 69) for others.

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.



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 83)
Download to device	Device Diagnostics
Upload to PC/PG	Toolbar
Update Diagnostic Status	Status bar
Wizard - Quick Start (Page 62)	Update
Echo Profile Utilities (Page 69)	
Maintenance (Page 77)	
Acknowledge Faults (Page 78)	
Wear (Page 78)	
Simulation (Page 79)	
Write Locking (Page 81)	
Master Reset (Page 82)	

7.1.5.1 Echo profile utilities

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

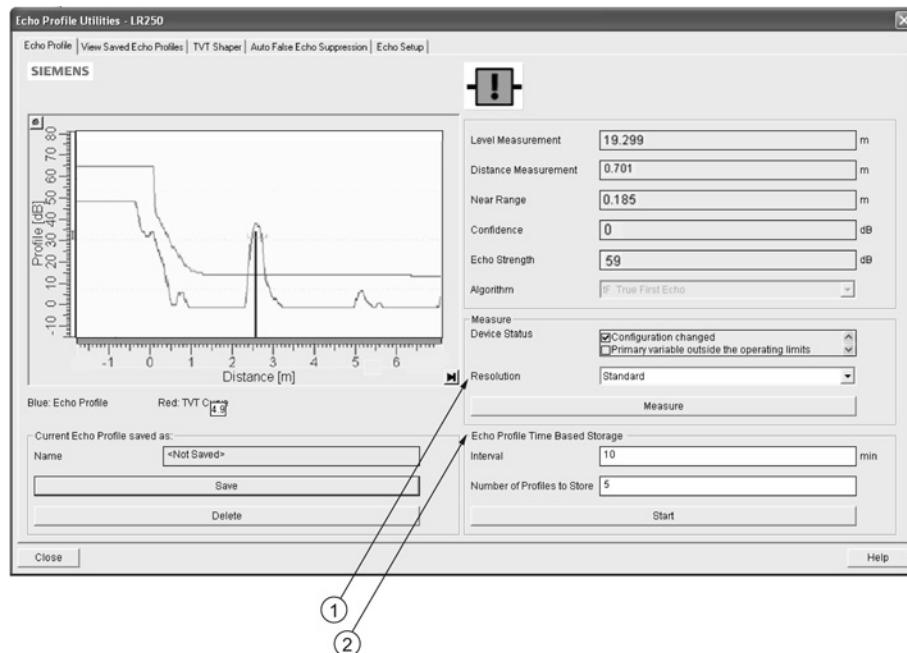
- Echo profile (Page 70)
- View Saved Echo Profiles (Page 71)
- TTV Shaper (Page 72)
- Auto False Echo Suppression (Page 73)
- Echo Setup (Page 76)

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.

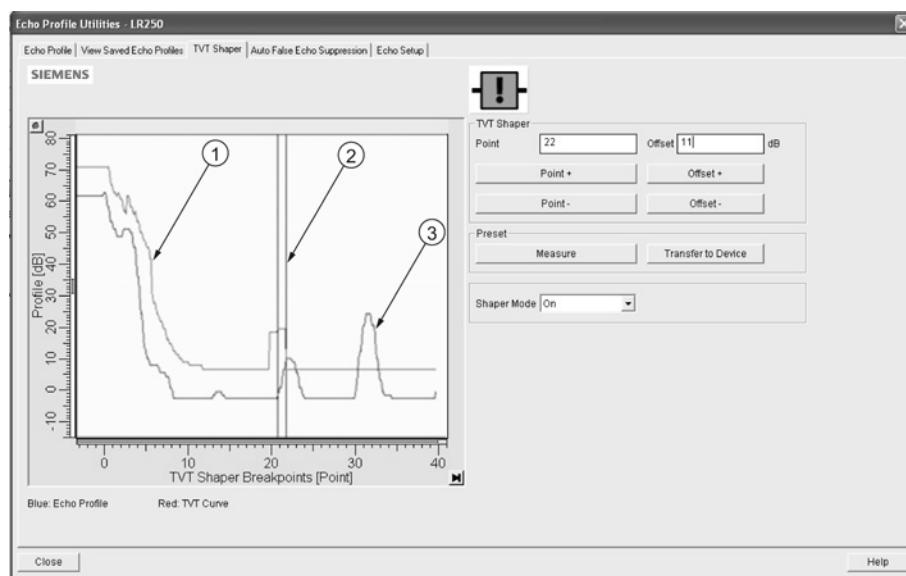
TVT Shaper

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 207).

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).

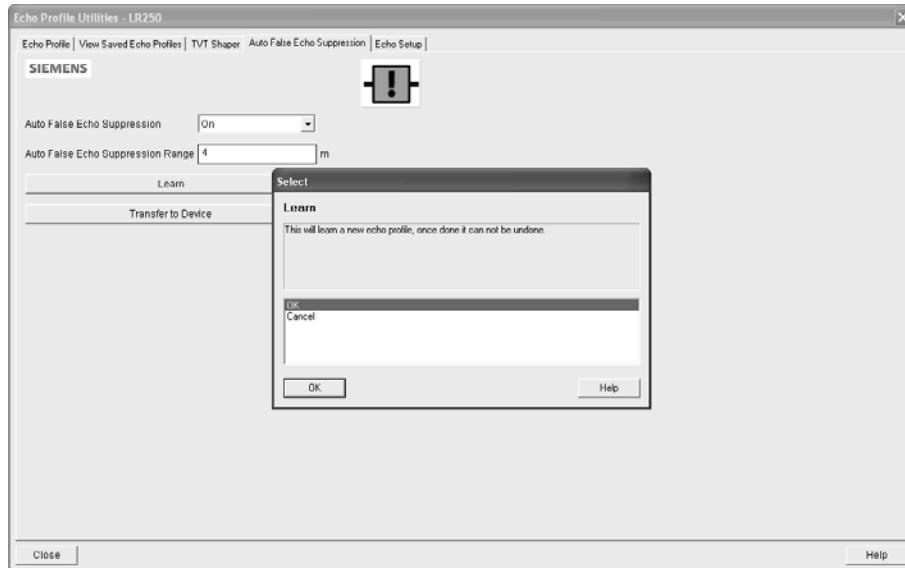
If you have a vessel with known obstructions, use Auto False Echo Suppression to prevent false echo detection. This feature can also be used if the device displays a false high level, or the reading is fluctuating between the correct level and a false high level.

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 207) for a more detailed explanation.

The learned TTV will be applied over a specified range. The default TTV is applied over the remainder of the measurement range.

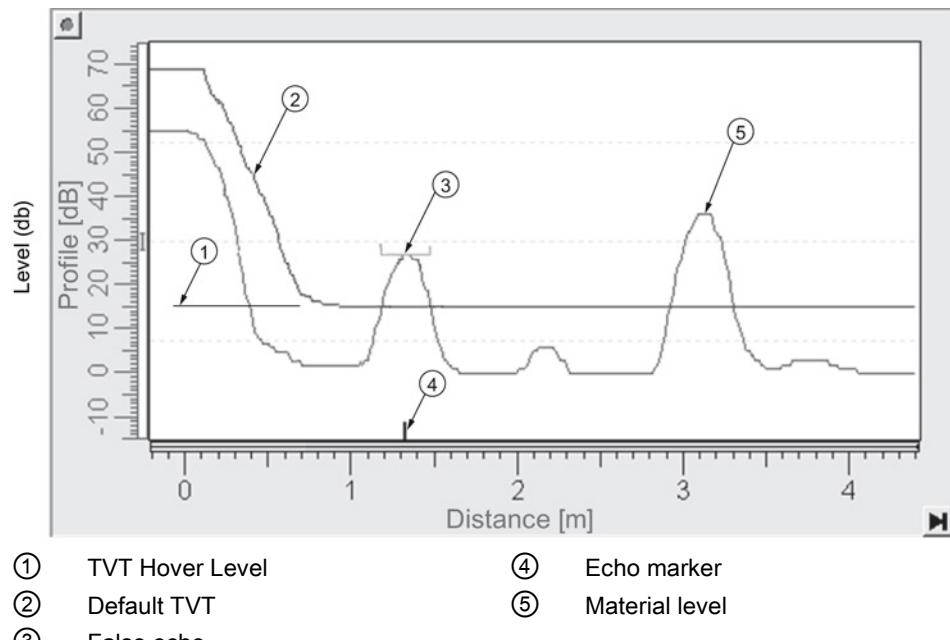
Remote operation

7.1 Operating via SIMATIC PDM

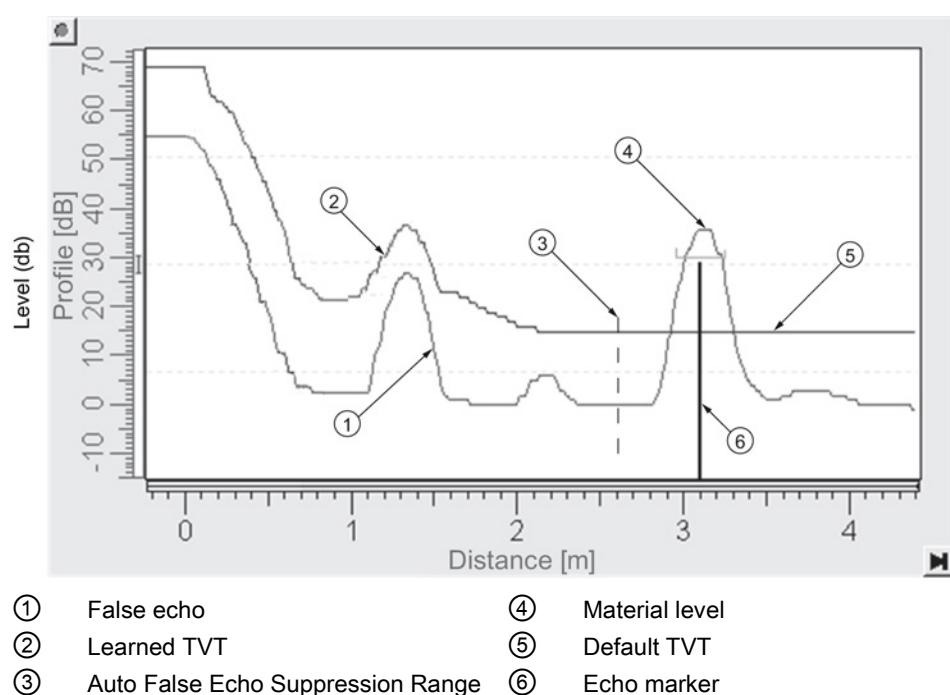


1. Make sure the material level is below all known obstructions.
2. Determine **Auto False Echo Suppression Range**. Measure the actual distance from the sensor reference point to the material surface using a rope or tape measure. Subtract 0.5 m (20") from this distance, and use the resulting value.
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 TTV is complete click **Transfer to Device**. To exit click **Close**. Auto TTV is enabled and the learned TTV 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



After Auto False Echo Suppression

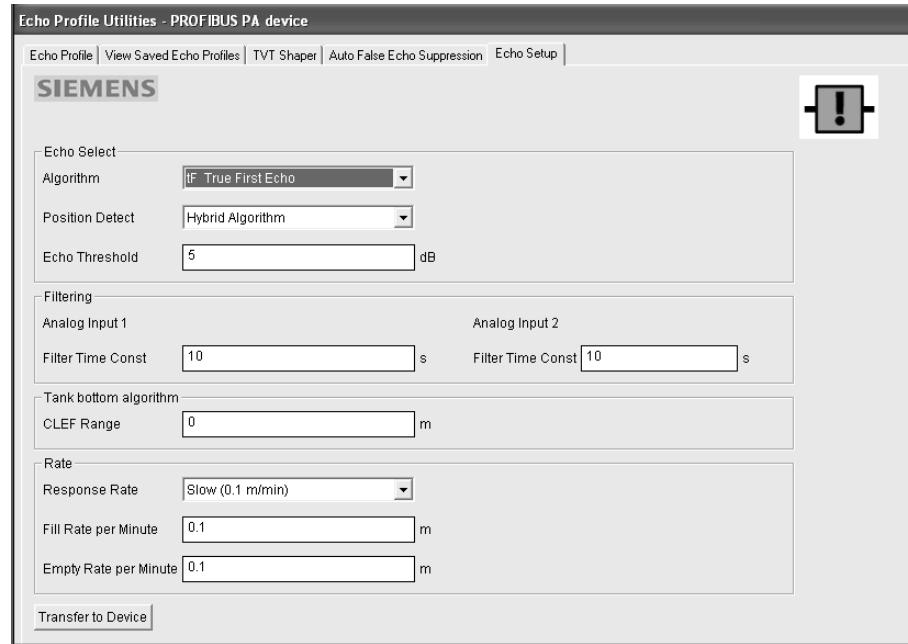


7.1 Operating via SIMATIC PDM

7.1.5.3 Echo setup

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

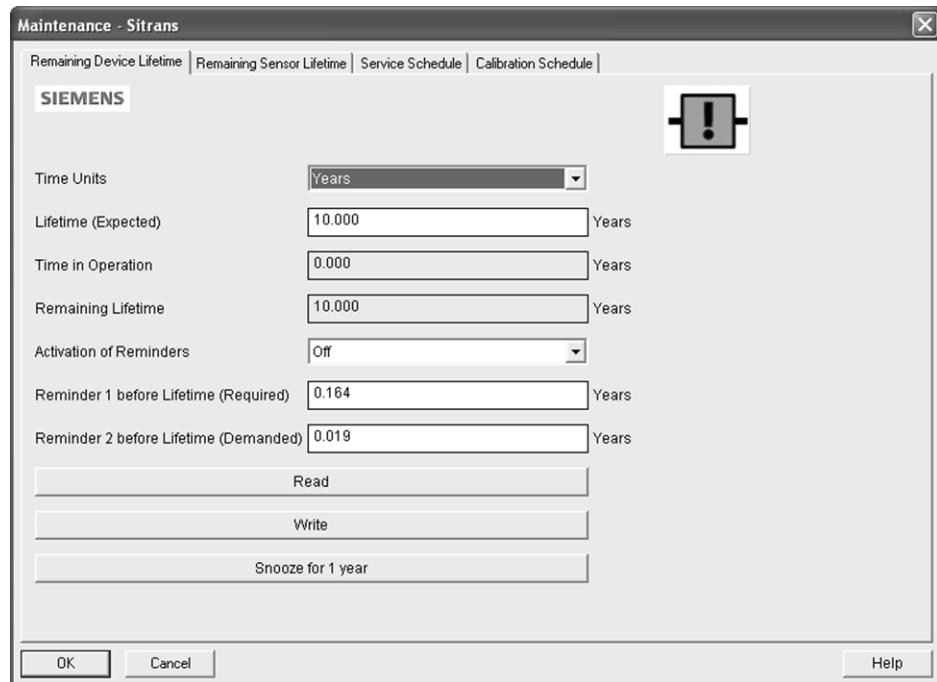
Open the menu **Device – Echo Profile Utilities** and click on **Echo Setup**.



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



7.1 Operating via SIMATIC PDM

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 225).

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)**.

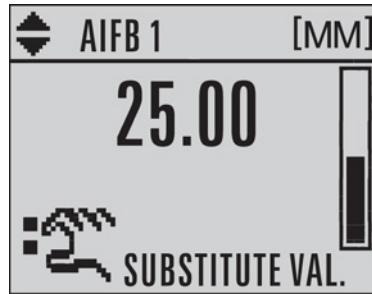


3. Enable simulation, enter a percentage value, set the desired quality and status, and click on **Transfer**. See Status Byte (Page 234) for more information on status and quality.

Remote operation

7.1 Operating via SIMATIC PDM

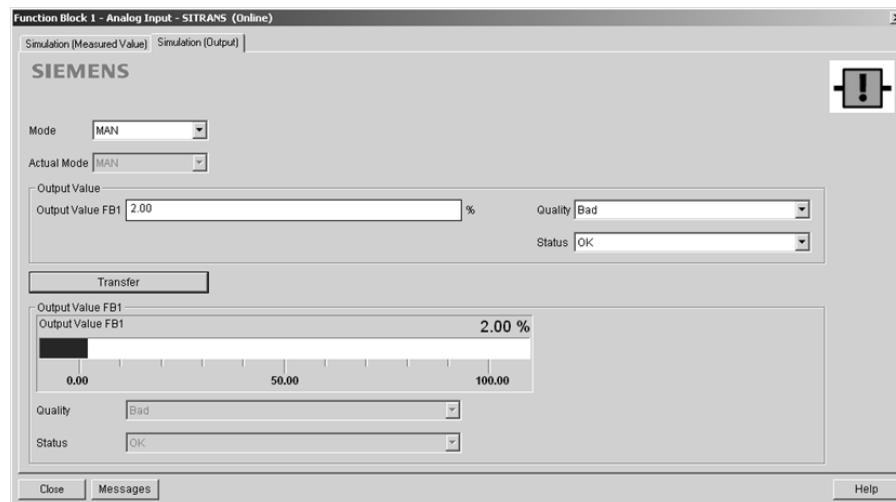
4. The Output value from the desired function block is displayed in PDM, and the LCD displays the substitute value. See Simulate Output below, to set the output mode.



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

Simulate output

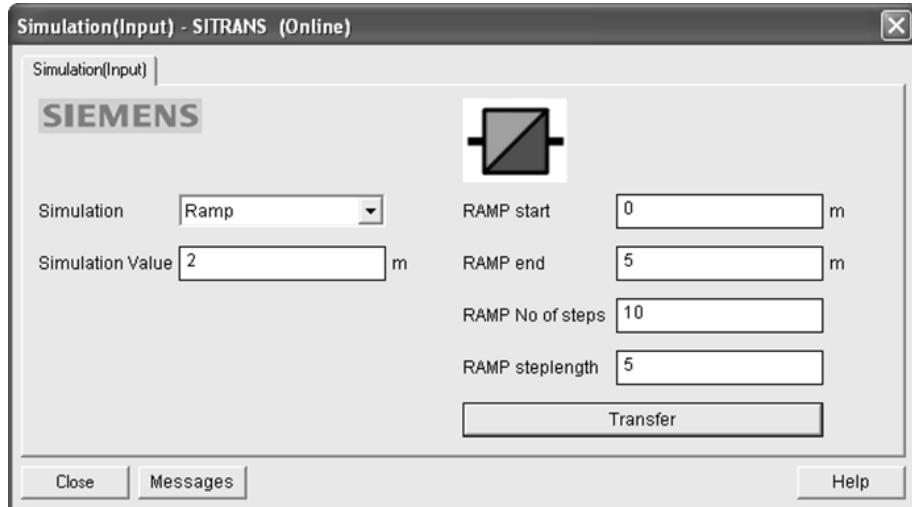
1. Open the menu **Device – Simulation**, select function block 1 or 2, and click on the tab **Simulation (Output)**.
2. Select Manual Mode (from options AUTO, Manual, or Out of Service) and click on **Transfer**.



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 82).
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 TTV

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.

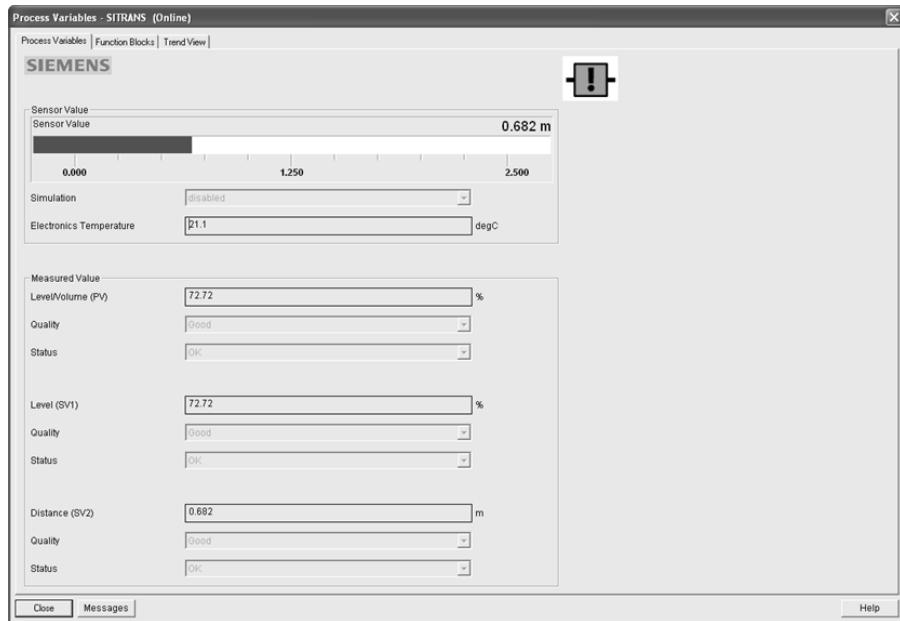
Process variables

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 \(Page 86\)](#).

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

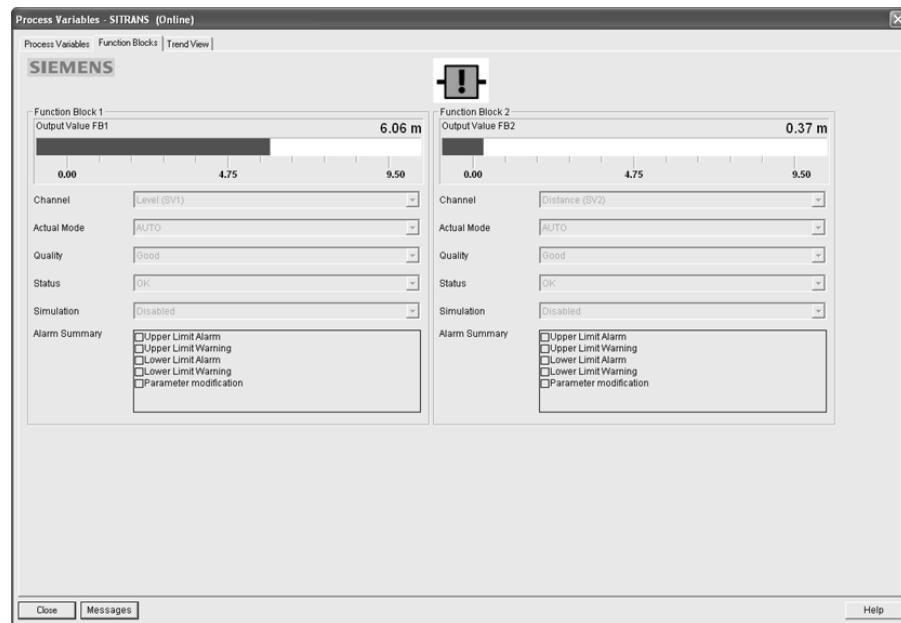


Remote operation

7.1 Operating via SIMATIC PDM

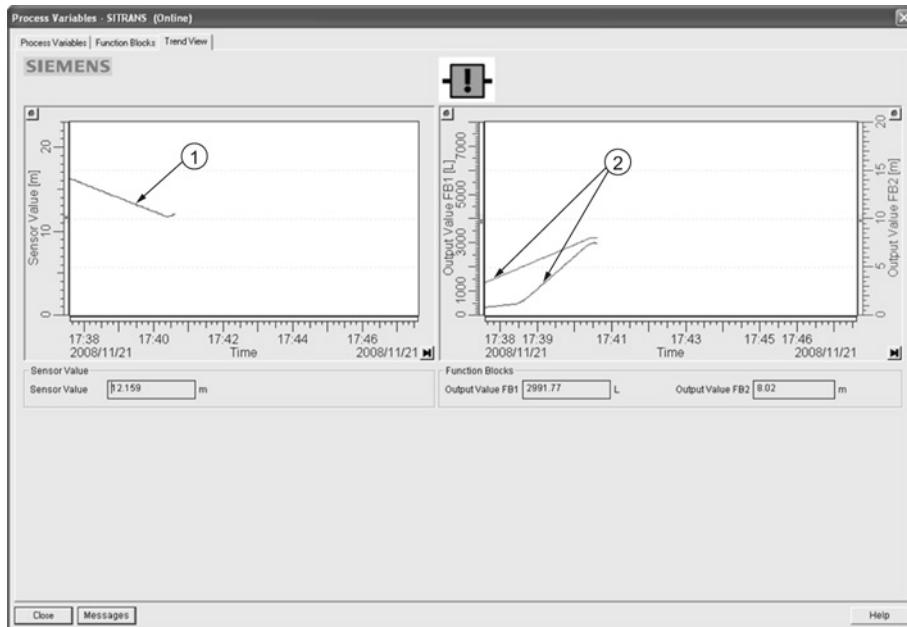
Function blocks

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

Remote operation

7.1 Operating via SIMATIC PDM

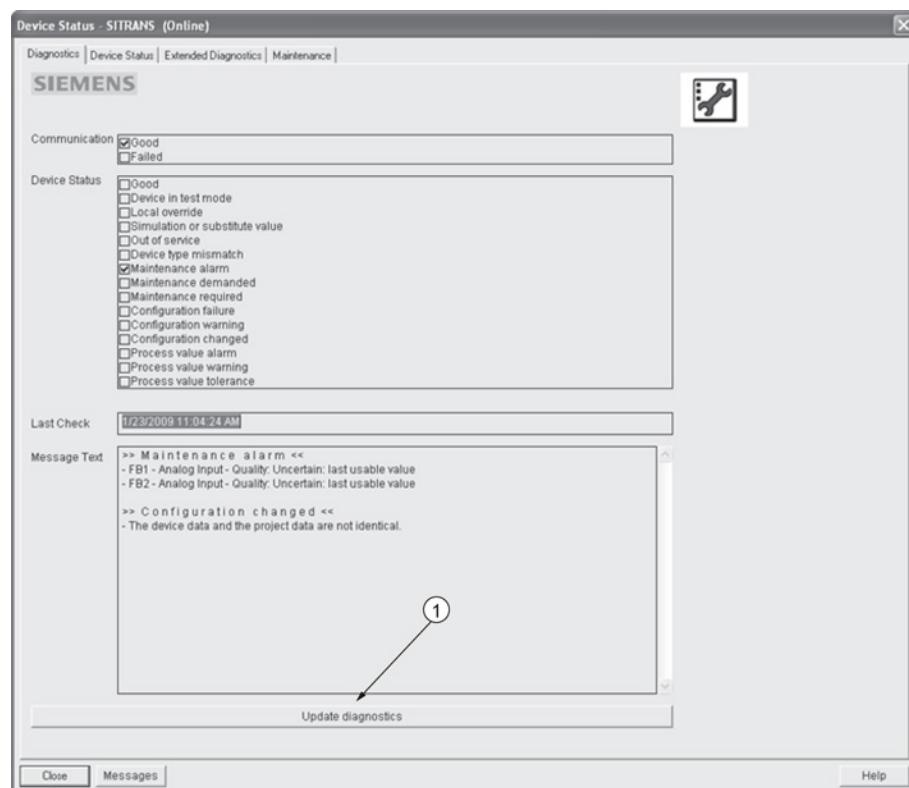
Device diagnostics

Device status

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

Diagnostics

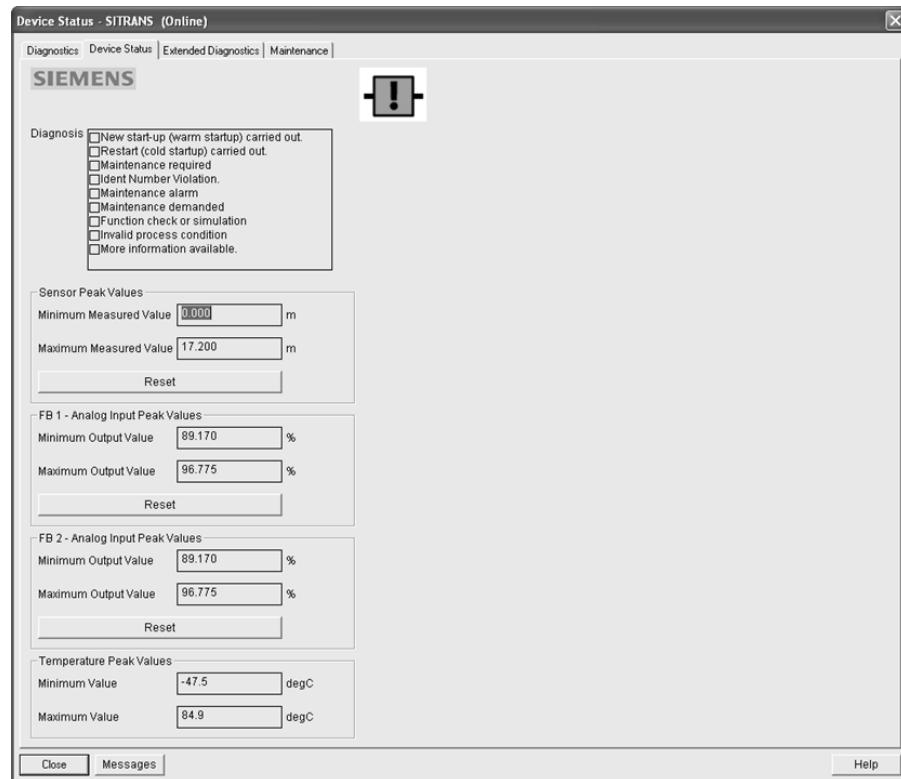
In the Device Status window, click on the **Diagnostics** tab, then on the **Update diagnostics** button, to update diagnostic information and refresh linked icons.



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.

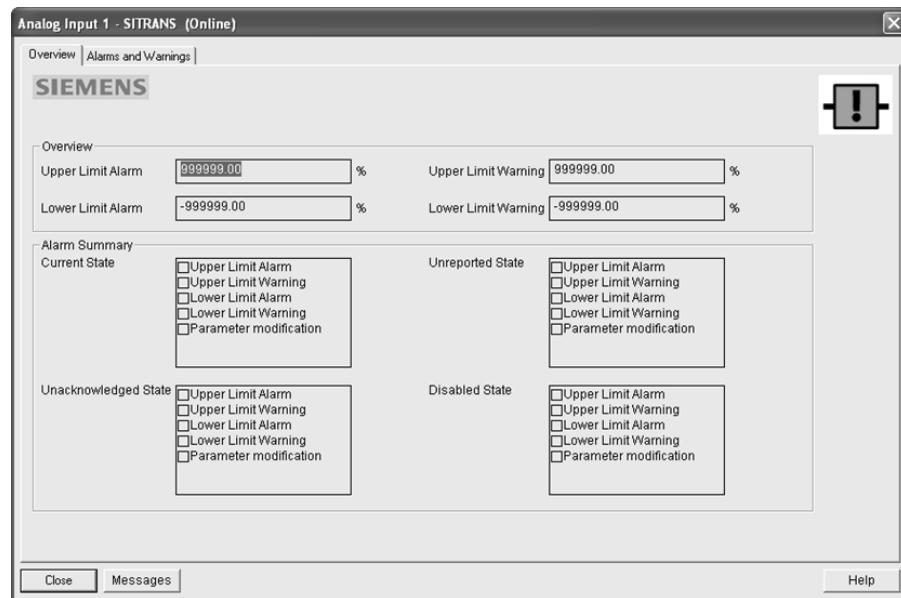


Remote operation

7.1 Operating via SIMATIC PDM

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

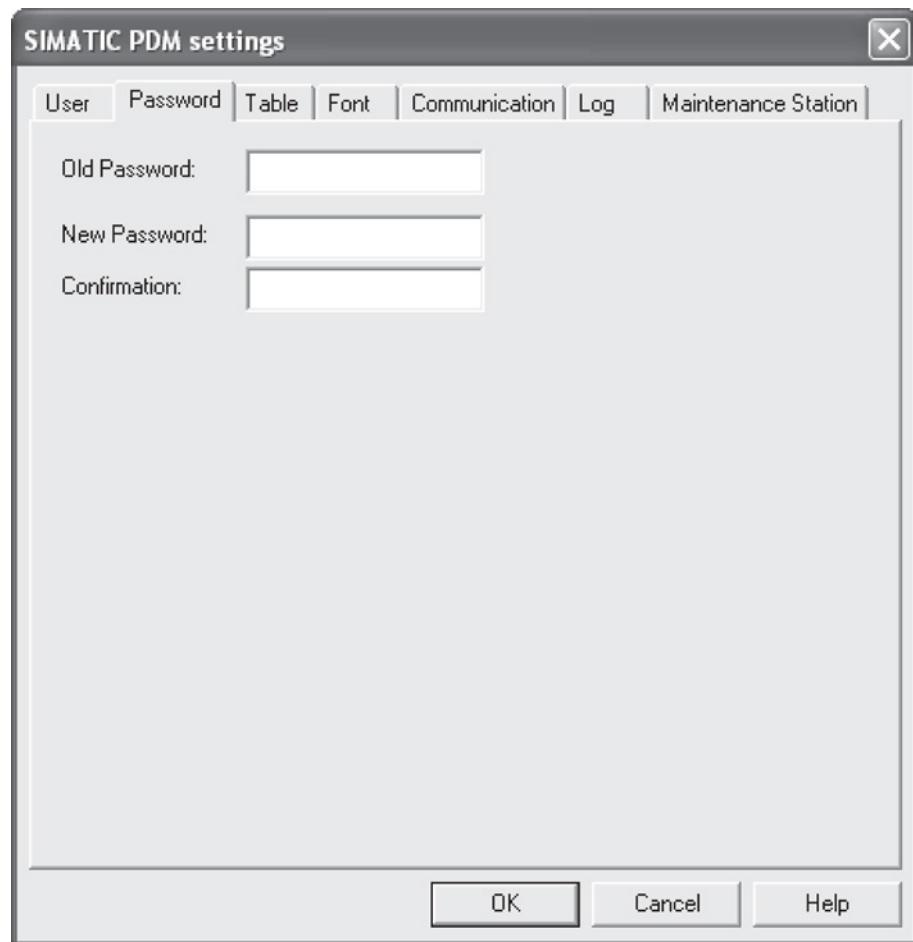
Open the menu **View – Update** to refresh the screen.

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 59) 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

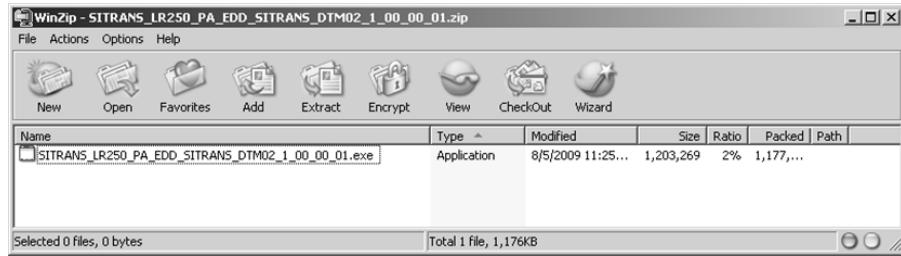
- SITRANS DTM is an EDDL interpreter developed by Siemens to interpret the EDD for that device.
- To use SITRANS DTM to connect to a device, you must first install SITRANS DTM on your system and then install the device EDD written for SITRANS DTM.
- You can download SITRANS DTM from the Siemens service 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>)

