SIEMENS

DRAFT

SITRANS

Radar Transmitters SITRANS LR250 (FOUNDATION FIELDBUS)

Operating Instructions

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Legal information

Warning notice system

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

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

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

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

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

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

Trademarks

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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.

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Introduction 1

1.1 LR250 FF manual usage

Note

This manual applies to the SITRANS LR250 (FOUNDATION™ Fieldbus) only.
FOUNDATION™ Fieldbus is a trademark of Fieldbus Foundation.

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

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

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

1.2 Purpose of this documentation

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

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

1.3 Document history

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

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

1.4 Firmware revision history

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

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

Firmware rev.	PDM EDD rev.	Date	Changes
1.01.00	1.01.00	25 Feb 2010	• Initial release.
1.01.04	1.01.00	2 Aug 2011	• Threaded PVDF antenna supported.
1.01.05	1.01.00	31 Oct 2012	• Antenna parameter removed. • Quickstart on local display enhancements.

1.5 Designated use

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

Note

Use in a domestic environment

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

In a domestic environment this device may cause radio interference.

1.6 Checking the consignment

1. Check the packaging and the device for visible damage caused by inappropriate handling during shipping.
2. Report any claims for damages immediately to the shipping company.
3. Retain damaged parts for clarification.
4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

WARNING

Using a damaged or incomplete device

Danger of explosion in hazardous areas.

- Do not use damaged or incomplete devices.

1.7 Transportation and storage

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

- Keep the original packaging for subsequent transportation.
- Devices/replacement parts should be returned in their original packaging.
- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

CAUTION

Insufficient protection during storage

The packaging only provides limited protection against moisture and infiltration.

- Provide additional packaging as necessary.

1.8 Notes on warranty

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

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

Safety information 2

2.1 Preconditions for safe use

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

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

2.1.1 Safety marking symbols

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

2.1.2 Laws and directives

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

2.1.3 FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

⚠ WARNING
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.

2.1.4 Conformity with European directives

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

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

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

2.1.5 CE Electromagnetic Compatibility (EMC) Conformity

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

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

2.2 Improper device modifications

WARNING

Improper device modifications

Danger to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.

- Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

2.3 Requirements for special applications

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

Note

Operation under special ambient conditions

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

2.4 Use in hazardous areas

Qualified personnel for hazardous area applications

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

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.
- They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

⚠ WARNING

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

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

- Connect the device with type of protection "Intrinsic safety" solely to an intrinsically safe circuit.
- Observe the specifications for the electrical data on the certificate.

Description

3

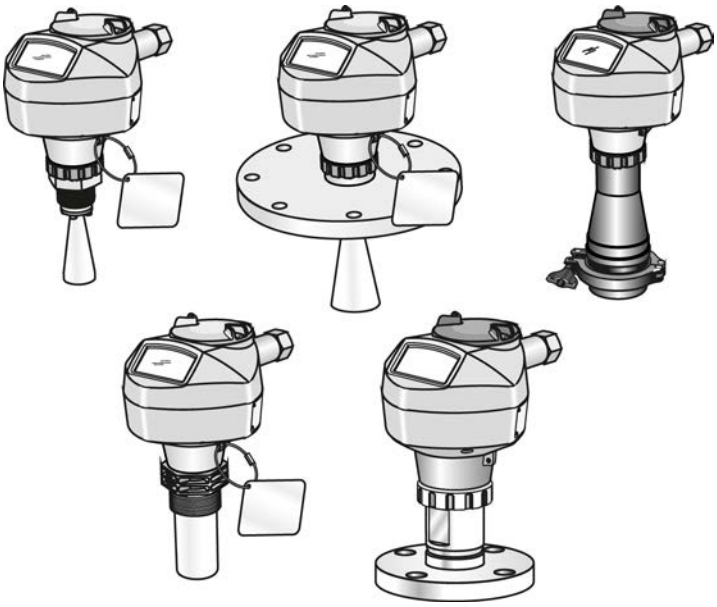
3.1 SITRANS LR250 overview

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

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

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

This device supports Foundation Fieldbus (FF) communication protocol. Signals are processed using Process Intelligence which has been field proven in over 1,000,000 applications worldwide (ultrasonic and radar). This device can be configured as an FF (H1) Link 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:

- FF host system
- AMS Device Manager

3.3 Applications

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

3.4 Approvals and certificates

Note

For further details see Approvals (Page 219).

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

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

Installing/mounting

4

4.1 Basic safety information

Note

Material compatibility

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

WARNING

Unsuitable connecting parts

Danger of injury or poisoning.

In case of improper mounting hot, toxic and corrosive process media could be released at the connections.

- Ensure that connecting parts (such as flange gaskets and bolts) are suitable for connection and process media.

WARNING

Exceeded maximum ambient or process media temperature

Danger of explosion in hazardous areas.

Device damage.

- Make sure that the maximum permissible ambient and process media temperatures of the device are not exceeded.

WARNING

Open cable inlet or incorrect cable gland

Danger of explosion in hazardous areas.

- Close the cable inlets for the electrical connections. Only use cable glands or plugs which are approved for the relevant type of protection.

WARNING

Incorrect conduit system

Danger of explosion in hazardous areas as result of open cable inlet or incorrect conduit system.

- In the case of a conduit system, mount a spark barrier at a defined distance from the device input. Observe national regulations and the requirements stated in the relevant approvals.

4.1.1 Pressure applications

DANGER

Pressure applications

Danger to personnel, system and environment will result from improper disassembly.

- Never attempt to loosen, remove, or disassemble process connection while vessel contents are under pressure.

WARNING

Pressure applications

Danger to personnel, system and environment can result from improper installation.

- Improper installation may result in loss of process pressure.

WARNING

Exceeded maximum permissible operating pressure

Danger of injury or poisoning.

The maximum permissible operating pressure depends on the device version. The device can be damaged if the operating pressure is exceeded. Hot, toxic and corrosive process media could be released.

- Make sure that the device is suitable for the maximum permissible operating pressure of your system.

Note

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

Note

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

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

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

4.2 Installation location requirements

WARNING

Aggressive atmospheres

Danger to personnel, system and environment can result from unsuitable environment.

- Provide an environment suitable to the housing rating and materials of construction.

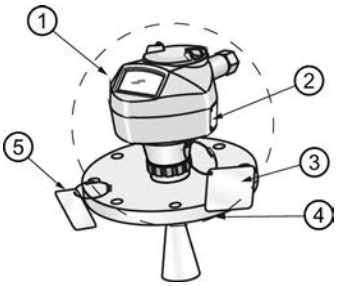
CAUTION

Direct sunlight

Device damage.

The device can overheat or materials become brittle due to UV exposure.

- Protect the device from direct sunlight.
- Make sure that the maximum permissible ambient temperature is not exceeded. Refer to the information in Chapter "Technical data".



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

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

Note

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

4.3 Proper mounting

Note

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

NOTICE

Incorrect mounting

The device can be damaged, destroyed, or its functionality impaired through improper mounting.

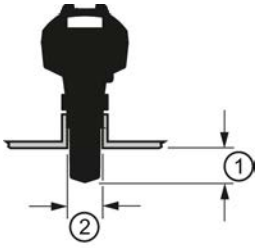
- Before installing ensure there is no visible damage to the device.
- Make sure that process connectors are clean, and suitable gaskets and glands are used.
- Mount the device using suitable tools. Refer to the information in Installation instructions (Page 34) for installation torque requirements.

Note

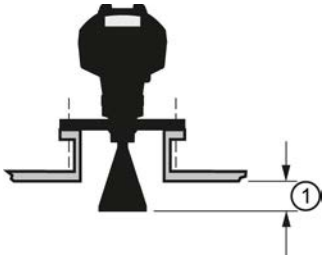
- On devices with a removable head, there is no limit to the number of times a device can be rotated without damage.
- When mounting, orient the front or back of the device towards the closest vessel wall or obstruction.
- Do not rotate the enclosure after programming and vessel calibration, otherwise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

4.3.1 Nozzle design

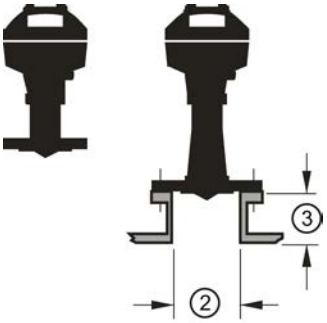
Threaded PVDF antenna



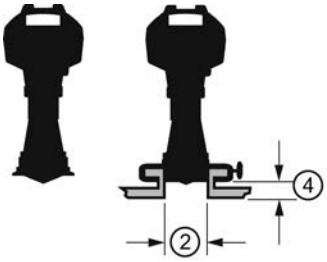
Stainless steel horn antenna



Flanged encapsulated antenna (FEA)



Hygienic encapsulated antenna (HEA)



① Minimum clearance: 10 mm (0.4")

② Minimum diameter: 50 mm (2")

③ Maximum nozzle length

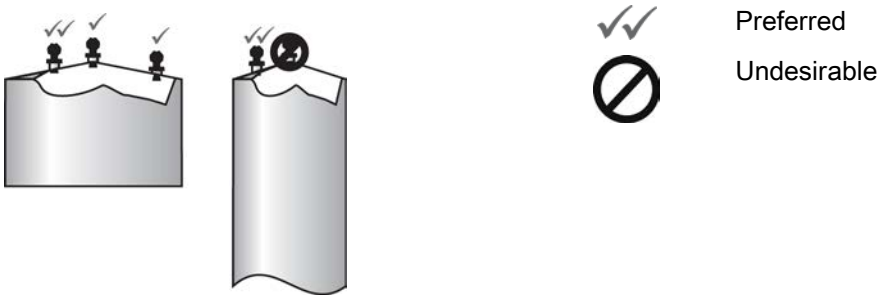
④ Maximum length/diameter ratio 1:1

- The end of the antenna must protrude a minimum of 10 mm (0.4") to avoid false echoes being reflected from the nozzle[1)].
- Minimum recommended nozzle diameter for the threaded PVDF antenna is 50 mm (2").
- An antenna extension (100 mm/3.93") is available for the horn antenna only.
- The maximum nozzle length for the FEA is 500 mm (19.68") when the nozzle diameter is DN150 (6"). Only shorter lengths are recommended for smaller diameters.
- When installing the SITRANS LR250 with hygienic process connection, it is good hygienic practice to install the antenna in a nozzle that has a maximum length/diameter ratio of 1:1. For example, 2" (DN50) diameter nozzle should be no longer than 2" (50 mm).
- When removing any sanitary/hygienic clamp version of the HEA to clean the lens, ensure it is re-installed in the exact position it was removed from, to avoid re-commissioning the device.

[1)] Not applicable for FEA or HEA

4.3.2 Nozzle location

- Avoid central locations on tall, narrow vessels
- Nozzle must be vertical and clear of imperfections



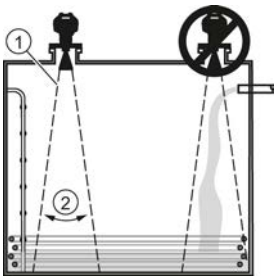
Beam angle

Note

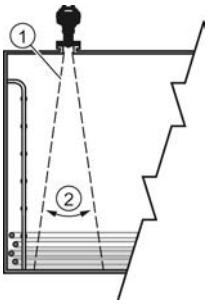
- Beam width depends on antenna size and is approximate: see below.
- For details on avoiding false echoes, see Auto False Echo Suppression (Page 271).

- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside the beam angle, therefore false targets may be detected.

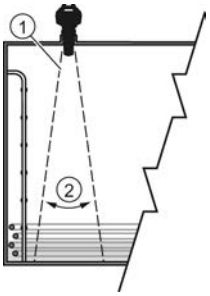
Horn antenna



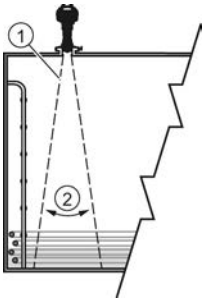
Flanged encapsulated antenna



Threaded PVDF antenna



Hygienic encapsulated antenna



① Emission cone

② Beam angle

Emission cone type and beam angle

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

Emission cone

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

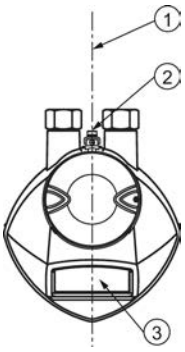
Access for programming

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

4.3.3 Orientation in a vessel with obstructions

Polarization reference point

For best results on a vessel with obstructions, or a stillpipe with openings, orient the front or back of the device toward the obstructions. For an illustration, see Device orientation (Page 33).



① Polarization axis
② Polarization reference point
③ Display

4.3.4 Mounting on a Stillpipe or Bypass Pipe

A stillpipe or bypass pipe is used for products with a low dK, or when vortex or extremely turbulent conditions exist. It can also be used to provide optimum signal conditions on foaming materials. See Dielectric constant of material measured in Performance (Page 213) for more information.

- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe[1]. See Threaded Horn dimensions (Page 221), Raised-Face Flange per EN 1092-1 (Page 255), Flanged encapsulated dimensions or Hygienic encapsulated dimensions.
- One continuous length of metallic pipe is preferred, without joints.
- Any false reflections created by joints/welds/imperfections will lead to inaccuracies of the measurement.
- Joints (if unavoidable) must be machined to ± 0.25 mm (± 0.010") and must have welded connecting sleeve on the outside.
- If using any hygienic process connections in conjunction with a stillpipe/bypass, please ensure that the antenna/lens are cleanable in accordance with the applicable approval.

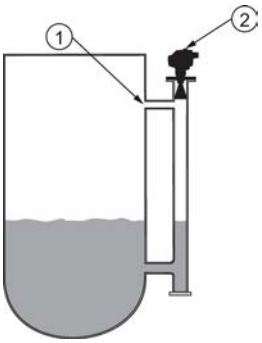
[1] Mounting in a pipe greater than 100 mm (4") can cause large errors, and therefore is not recommended.

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

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

4.3.5 Device orientation

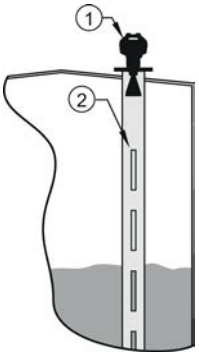
Bypass pipe installation



① Vent

② Align front or back of device with vents[1)]

Stillpipe installation



① Align front or back of device with stillpipe slots[1)]

② Slots

[1)] Horn antenna version shown as example

4.4 Installation instructions

WARNING

Pressure applications

Danger to personnel, system and environment can result from improper installation.

- Improper installation may result in loss of process pressure.

WARNING

Improper installation

Danger to personnel, system and environment can result from improper installation.

- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.

NOTICE

Device handling

Damage to device may result from improper handling.

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

Note

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

Note

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

WARNING

Pressure applications

Danger of injury or poisoning.

It will be necessary to use PTFE tape or other appropriate thread sealing compound, and to tighten the process connection beyond hand-tight. (The maximum recommended torque for Threaded versions is 40 N-m (30 ft.lbs.) See Flanged versions (Page 37) for FEA recommended torque values.)

Note

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

4.4.1 Threaded versions

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

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

4.4.2 Flanged versions

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

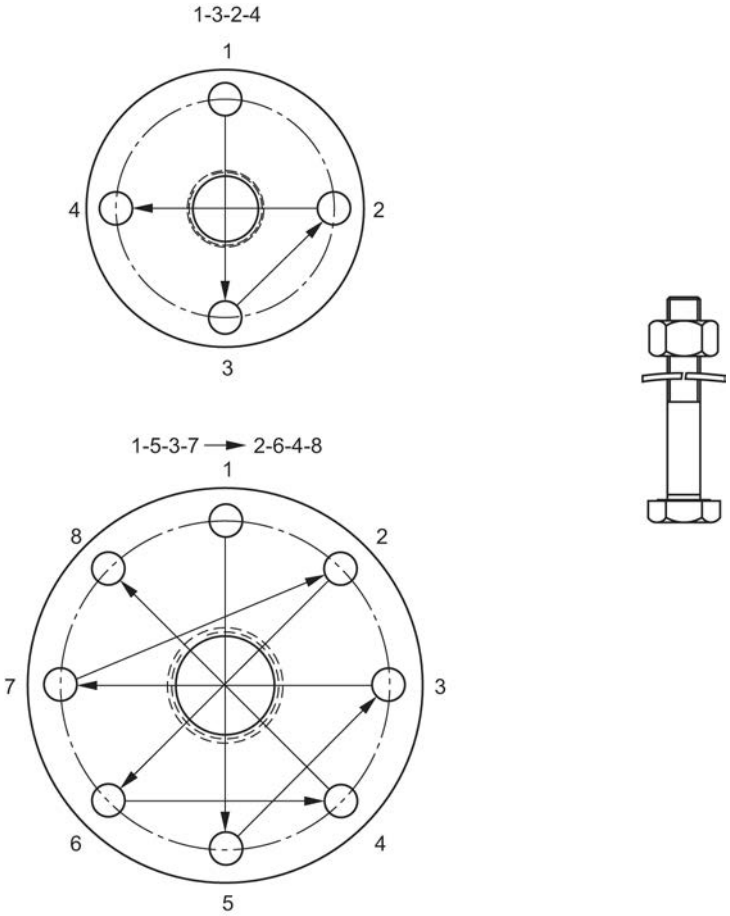
Special Instructions for Flanged encapsulated antenna only

Note

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

Flange bolting: recommended torque

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



Flange bolting instructions:

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

Recommendations for flange bolting:

- Check bolts periodically, re-torque as required.
- Use new lens, O-ring and spring washers after removal from installation.
  For instructions on replacing the lens, see Part replacement (Page 199).

See Flanged Horn with extension (Page 226), Raised-Face Flange per EN 1092-1 (Page 255), Flat-Face Flange (Page 258), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger) (Page 232) for dimensions.

4.4.3 Hygienic versions

WARNING

Loss of sanitary approvals

Loss of sanitary approvals can result from improper installation/mounting.

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

NOTICE

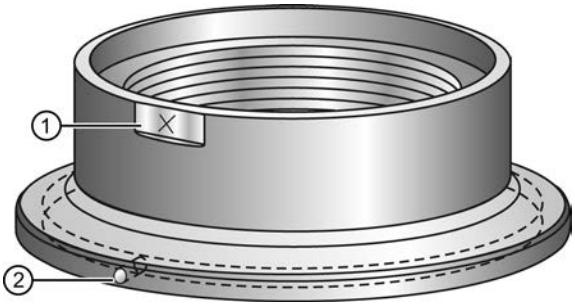
Loss of sanitary approvals

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

Note

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

Hygienic encapsulated antenna leak detection port



① Orientation mark for leak detection port

② Leak detection port

4.5 Disassembly

DANGER

Pressure applications

Danger to personnel, system and environment will result from improper disassembly.

- Never attempt to loosen, remove, or disassemble process connection while vessel contents are under pressure.

WARNING

Incorrect disassembly

The following dangers may result through incorrect disassembly:

- Injury through electric shock

- Danger through emerging media when connected to the process

- Danger of explosion in hazardous area

In order to disassemble correctly, observe the following:

- Before starting work, make sure that you have switched off all physical variables such as pressure, temperature, electricity etc. or that they have a harmless value.
- If the device contains dangerous media, it must be emptied prior to disassembly. Make sure that no environmentally hazardous media are released.
- Secure the remaining connections so that no damage can result if the process is started unintentionally.

Connecting

5

5.1 Basic safety information

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

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

5.2 Connecting SITRANS LR250

WARNING

Incorrect connection to power source

Danger to personnel, system and environment can result from improper power connection.

- The DC input terminals shall be supplied from a source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1.
- All field wiring must have insulation suitable for rated voltages.

WARNING

Loss of protection

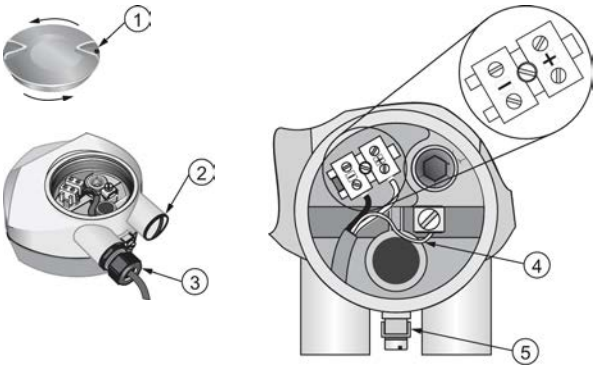
Loss of approvals can result from improper installation.

- Check the nameplate on your device, to verify the approval rating.
- Use appropriate conduit seals to maintain IP or NEMA rating.
- See Wiring setups for hazardous area installation (Page 46).

NOTICE

Improper cables and conduit

- Separate cables and conduits may be required to conform to standard instrumentation wiring practices or electrical codes.



①	Use a 2 mm Allen key to loosen the lid-lock set screw [c)]	④	Cable shield
②	Plug (IP68)	⑤	Ground terminal
③	Optional cable gland[a)] [b)](or NPT cable entry)[b)]		

[a)]May be shipped with the device.

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

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

Wiring instructions

1. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland. (If cable is routed through conduit, use only approved suitable-size hubs for waterproof applications.)
2. Connect the wires to the terminals as shown: SITRANS LR250 (FF) is not polarity sensitive.
3. Ground the device according to local regulations.
4. Tighten the gland to form a good seal.
5. Close the lid and secure the locking screw before programming and device configuration.

Note

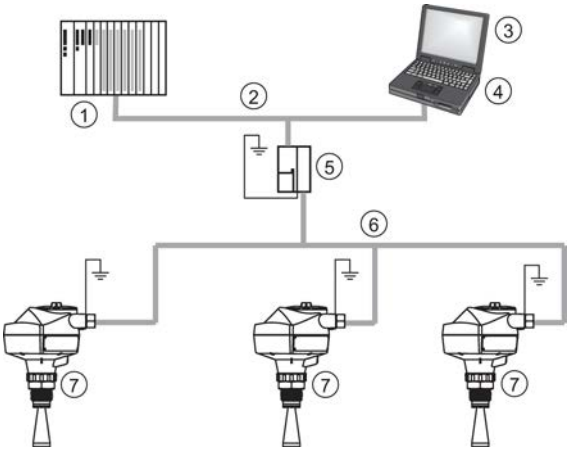
Lid-lock set screw not applicable to 3-A Sanitary approved device.

Note

- Foundation Fieldbus (H1) must be terminated at both extreme ends of the cable for it to work properly.
- For optimum EMC protection, it is recommended that the FF H1 cable shield be connected to ground at every node.
- Please refer to the Foundation Fieldbus System Engineering Guidelines (AG-181) Revision 2.0, for information on installing FF (H1) devices available from: Foundation Fieldbus (http://www.fieldbus.org/)
- 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.

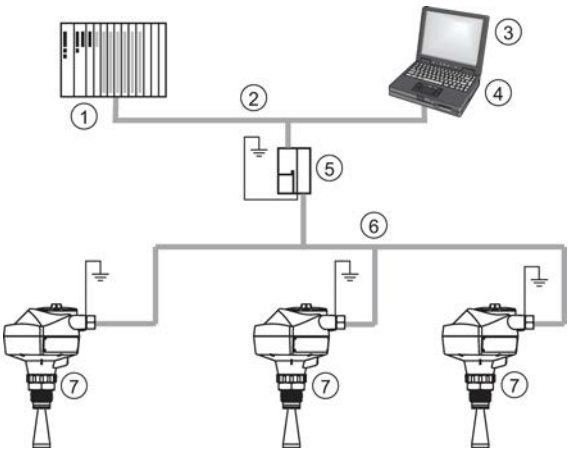
Basic Configuration with Foundation Fieldbus (H1)

Configuration via Gateway



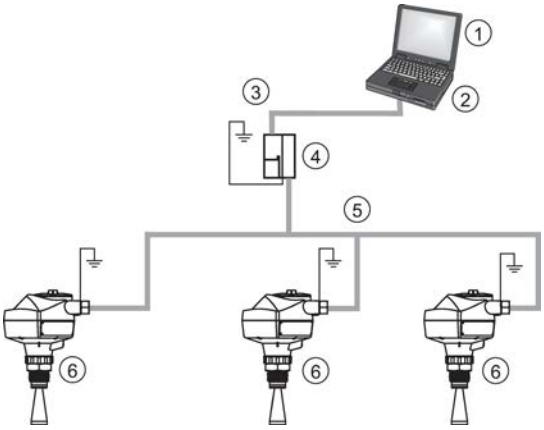
①	Controller	⑤	Rosemount 3420 HSE/H1Gateway
②	FF (HSE)	⑥	FF (H1)
③	Configurator software	⑦	LR250 FF
④	PC/laptop		

Configuration via Linking Device



①	Controller	⑤	HSE/H1 Linking Device
②	FF (HSE)	⑥	FF (H1)
③	Configurator software	⑦	LR250 FF
④	PC/laptop		

Configuration via PCI/PCMCIA Card



①	Configurator software	④	H1 Interface
②	PC/laptop	⑤	FF (H1)
③	PCI/PCMCIA bus	⑥	LR250 FF

5.3 Wiring setups for hazardous area installation

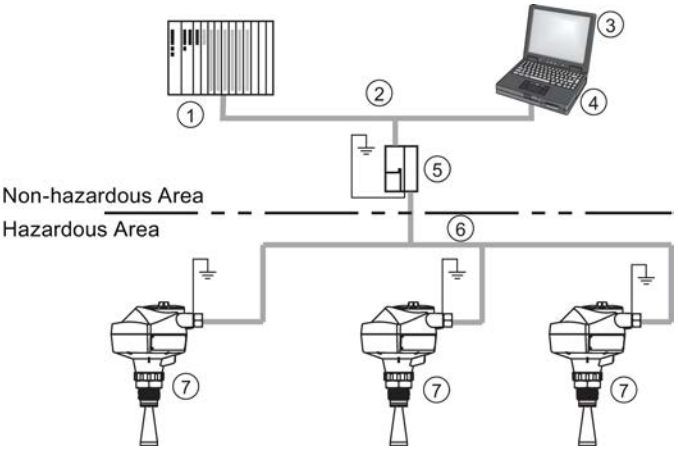
There are three wiring options for hazardous area installations:

- Intrinsically safe wiring (Page 48)
- Non-sparking wiring (Page 51)
- Non-incendive wiring (US/Canada only) (Page 51)

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

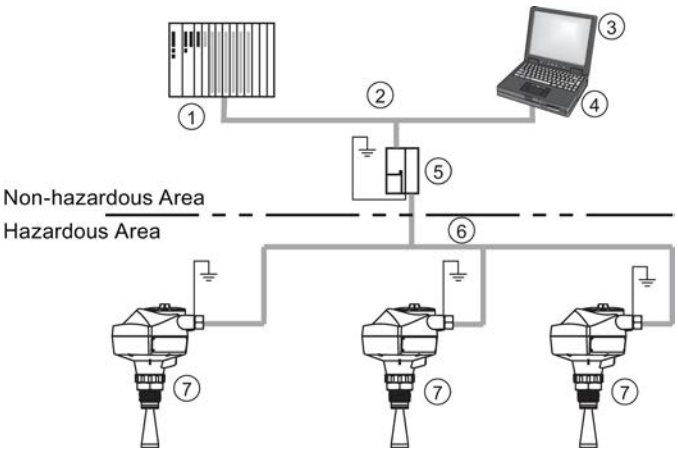
5.3.1 Configuration with Foundation Fieldbus for hazardous areas

Configuration via Gateway



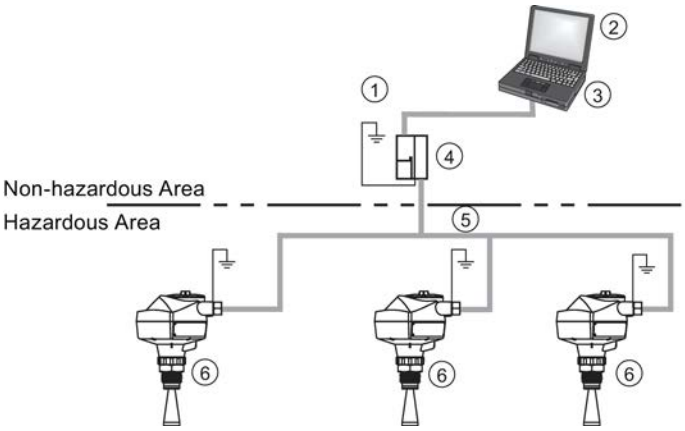
① Controller
② FF (HSE)
③ Configurator software
④ PC/laptop
⑤ Ex ia type HSE/H1
⑥ FF (H1)
⑦ LR250 FF

Configuration via Linking Device



① Controller
② FF (HSE)
③ Configurator software
④ PC/laptop
⑤ Ex ia type HSE/H1 Linking Device
⑥ FF (H1)
⑦ LR250 (FF)

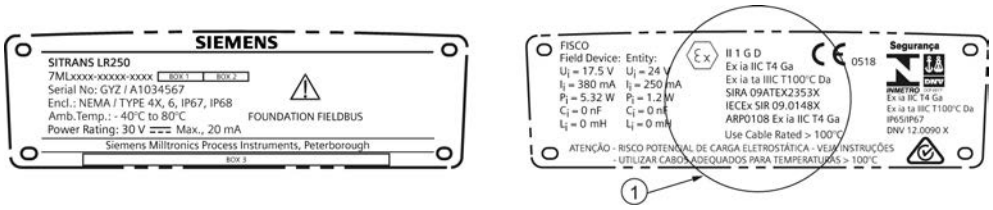
Configuration via PCI/PCMCIA Card



① PCI/PCMCIA bus
② Configurator software
③ PC/laptop
④ Ex ia type H1 Interface
⑤ FF (H1)
⑥ LR250 FF

5.3.2 Intrinsically safe wiring

Device nameplate (ATEX/IECEx/RCM)



① ATEX certificate

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

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

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

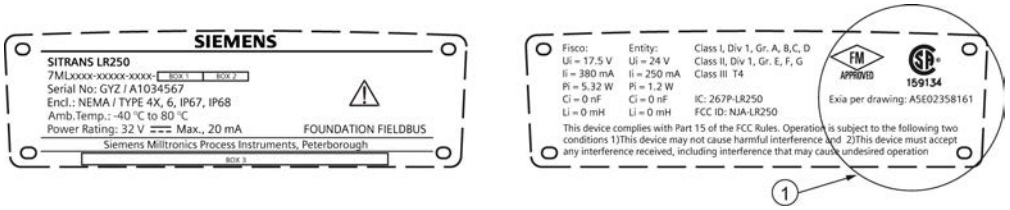
The IECEx certificate listed on the nameplate can be viewed on the IECEx website. Go to:

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

Click on **Certified Equipment** and enter the certificate number **IECEx SIR 09.0148X.**

5.3.2.1 Intrinsically safe wiring (FM/CSA)

Device nameplate (FM/CSA)



① Connection drawing number

The FM/CSA Intrinsically Safe 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**.

- 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 52).

Entity concept:

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

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

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

FISCO Concept

Note

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

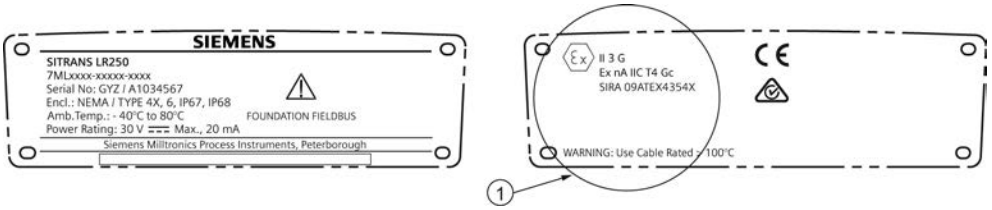
The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (Ui or Vmax), the current (Ii, or Imax) and the power (Pi, or Pmax) which intrinsically safe apparatus can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

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

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

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

5.3.3 Non-sparking wiring



① ATEX certificate

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

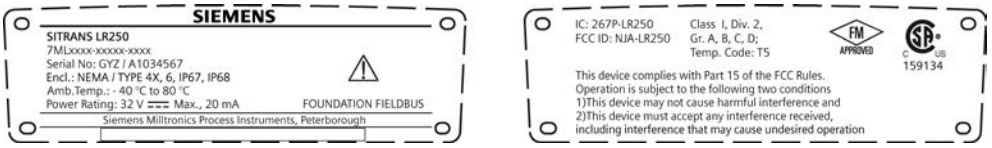
Product page (http://www.siemens.com/LR250)

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.

5.3.4 Non-incendive wiring (US/Canada only)

FM/CSA Class 1, Div 2 connection drawing number 23650673 can be downloaded from our website:



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

Go to **Support > Installation Drawings > Level Measurement > SITRAINS 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 52).

5.4 Instructions specific to hazardous area installations

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

The following instructions apply to equipment covered by certificate number SIRA 06ATEX2353X and 09ATEX4354X:

1. For use and assembly, refer to the main instructions.
2. The equipment is certified for use as Category 1GD equipment per SIRA 06ATEX2353X, and Category 3G equipment per SIRA 09ATEX4354X.
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.

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

- Parts of the enclosure may be non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam), which might cause a build-up of electrostatic charge on non-conducting surfaces.
- Aluminium, magnesium, titanium or zirconium may be used at the accessible surface of the equipment. In the event of rare incidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the SITRANS LR250 FF is being installed in locations that specifically require Equipment Protection level Ga or Da.
- The equipment shall be infallibly bonded according to the relevant code of practice.
- The end use must ensure that the explosion protection and ingress protection of IP64 is maintained at each entry to the enclosure by use of a blanking element or cable entry device that meets the requirements of the protection concepts type 'n' or increased safety 'e' or flameproof 'd'.

Commissioning 6

6.1 Basic safety information

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

6.2 Operating via the handheld programmer

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

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

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

6.2.1 Power up

Power up the device. A transition screen showing first the Siemens logo and then the current firmware revision is displayed while the first measurement is being processed. SITRANS LR250 automatically starts up in Measurement mode. The first time the device is configured, you will be prompted to select a language (English, German, French, Spanish or Chinese).To change the language again, see **Language (7.)**.

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

[If the SITRANS LR250 FF is to be used in an FF application, configure using a network configuration tool, such as DeltaV or NI-FBUS Configurator. See Quick Start Wizard via AMS Device Manager (Page 85).]

Follow these steps to configure the device via the LUI:

- Complete the Quick Start Wizard [see Quick Start Wizard via the handheld programmer (Page 65)]. Completing the Quick Start Wizard or writing any parameter via the LUI causes the device to begin measuring. The Resource Block (RES) and Level Transducer Block (LTB) will move to Automatic mode.
- AIFB 1 and AIFB 2 will remain Out of Service (as displayed on the LCD). These blocks can only be configured and scheduled using a network configuration tool. For more details, see System Integration in manual Foundation Fieldbus for Level Instruments (7ML19985MP01).

Note

The last step of the Quick Start run from the LUI will place the RESOURCE block in Automatic mode.

6.2.2 Handheld programmer functions

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

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

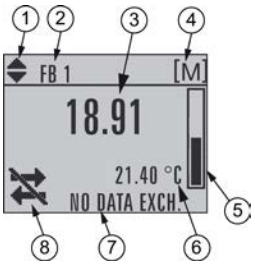
- locally [see Quick Start Wizard via the handheld programmer (Page 65)]
- or from a remote location [see Quick Start Wizard via AMS Device Manager (Page 85)]

For more complex setups see Application Examples (Page 71), and for the complete range of parameters see Parameter Reference (Page 143).

6.2.2.1 The LCD display

Measurement mode display

Normal operation

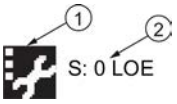


① toggle indicator [a] for analog input function blocks (AIFB 1/AIFB 2, displayed as FB1/FB2)
② identifies which block is source of displayed value
③ Measured value (level, space, distance, or volume)
④ Units
⑤ Bar graph indicates level
⑥ Secondary region indicates on request [b] electronics temperature, echo confidence, loop current, or distance
⑦ Text area displays status messages
⑧ Device status indicator, see Device status icons (Page 204)

[a] Press **UP** or **DOWN** arrow to switch.

[b] In response to a key press request. For details, see Handheld programmer (Part No. 7ML1930-1BK) (Page 59) for key functions in Measurement mode.

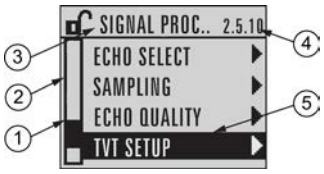
Fault present



① service required icon appears
② Device status indicator, see Device status icons (Page 204)

PROGRAM mode display

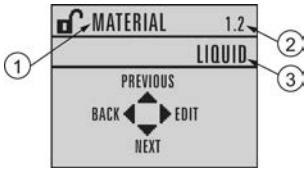
Navigation view



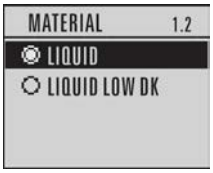
① Item band
② Menu bar
③ Current menu
④ Current item number
⑤ Current item

- A visible menu bar indicates the menu list is too long to display all items.
- A band halfway down the menu bar indicates the current item is halfway down the list.
- The depth and relative position of the item band on the menu bar indicates the length of the menu list, and approximate position of the current item in the list.
- A deeper band indicates fewer items.

Parameter view



Edit view



① Parameter name ② Parameter number ③ Parameter value/selection

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

The programmer is ordered separately.

Key functions in measurement mode

Key	Function	Result
6	Updates internal enclosure temperature reading.	New value is displayed in LCD secondary region.
8	Updates echo confidence value.	
	Updates distance measurement.	
	Mode opens PROGRAM mode.	Opens the menu level last displayed in this power cycle, unless power has been cycled since exiting PROGRAM mode or more than 10 minutes have elapsed since PROGRAM mode was used. Then top level menu will be displayed.
	RIGHT arrow opens PROGRAM mode.	Opens the top level menu.
	UP or **DOWN arrow** toggles between AIFB 1 and AIFB 2.	Identifies which AIFB is the source of the displayed value.

6.2.3 Programming

Note

- While the device is in PROGRAM mode the output remains active and continues to respond to changes in the device.
- The device automatically returns to Measurement mode after a period of inactivity in PROGRAM mode (between 15 seconds and 10 minutes, depending on the menu level).

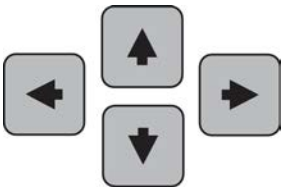
Change parameter settings and set operating conditions to suit your specific application. For remote operation see Operating via AMS Device Manager (Page 79).

Parameter menus

Note

For the complete list of parameters with instructions, see Parameter reference (Page 143).

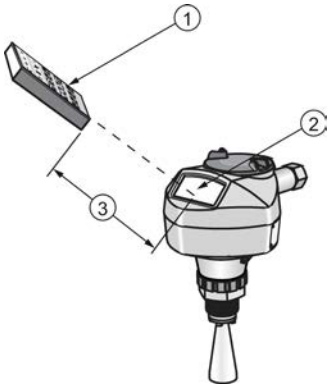
Parameters are identified by name and organized into function groups. See LCD menu structure (Page 296).



1. QUICK START
2. SETUP
    - 2.1. IDENTIFICATION
    - 2.2. DEVICE
    - .....
    - 2.4. LINEARIZATION
        - 2.4.1. VOLUME
            - 2.4.1.1. VESSEL SHAPE

1. Enter PROGRAM mode

- Point the programmer at the display from a maximum distance of 300 mm (1 ft).
- RIGHT arrow activates PROGRAM mode and opens menu level 1.
- Mode opens the menu level last displayed in PROGRAM mode within the last 10 minutes, or menu level 1 if power has been cycled since then.



① Handheld programmer ② Display ③ Maximum distance: 300 mm (1 ft)

2. Navigating: key functions in Navigation mode

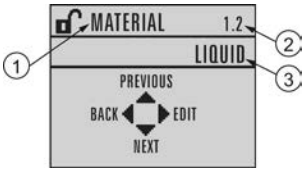
Note

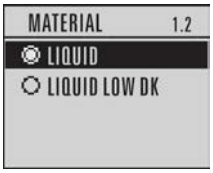
- In Navigation mode **ARROW** keys move to the next menu item in the direction of the arrow.
- For Quick Access to parameters via the handheld programmer, press Home , then enter the menu number, for example: **Volume (2.4.1.), press 2.4.1.**

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

3. Editing in PROGRAM mode

- Navigate to the desired parameter.
- Press **RIGHT arrow** to open parameter view.
- Press **RIGHT arrow** again to open **Edit** mode. The current selection is highlighted. Scroll to a new selection.
- Press **RIGHT arrow** to accept it. The LCD returns to parameter view and displays the new selection.

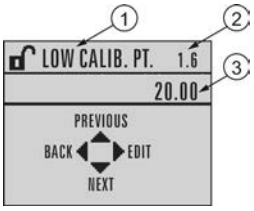


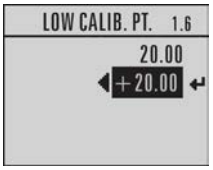


① Parameter name ② Parameter number ③ Current selection

4. Changing a numeric value

- Navigate to the desired parameter.
- Press **RIGHT arrow** to open parameter view. The current value is displayed.
- Press **RIGHT arrow** again to open **Edit** mode. The current value is highlighted.
- Key in a new value.
- Press **RIGHT arrow** to accept it. 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

Key functions in edit mode

Key	Name	Function	
	UP or DOWN arrow	Selecting options	Scrolls to item.
		Numeric editing	• Increments or decrements digits • Toggles plus and minus sign
	RIGHT arrow	Selecting options	• Accepts the data (writes the parameter) • Changes from **Edit** to **Navigation** mode
		Numeric editing	• Moves cursor one space to the right • or, with cursor on Enter sign, accepts the data and changes from **Edit** to **Navigation** mode
	LEFT arrow:	Selecting options	Cancels **Edit** mode without changing the parameter.
		Numeric editing	• Moves cursor to plus/minus sign if this is the first key pressed • or moves cursor one space to the left • or with cursor on the Enter sign, cancels the entry.
C	Clear	Numeric editing	Erases the display.
•	Decimal point	Numeric editing	• Enters a decimal point • Captures the current path [see **Secondary Value (4.11.)**]
−/+	Plus or minus sign	Numeric editing	Changes the sign of the entered value.
0 to 9	Numeral	Numeric editing	Enters the corresponding character.

6.2.3.1 Quick Start Wizard via the handheld programmer_note

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 **Finish** in the Wizard Complete step.
- Do not use the Quick Start wizard to modify parameters: see instead Parameter reference (Page 143). (Perform customization for your application only after the Quick Start has been completed).
- Default settings in the parameter tables are indicated with an asterisk (*).

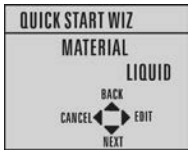
1. Quick Start

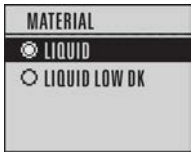
1.1. Quick Start Wiz

- Point the programmer at the display from a maximum distance of 300 mm (1 ft), then press **RIGHT arrow** to activate PROGRAM mode and open menu level 1.
- Press **RIGHT arrow** twice to navigate to menu item 1.1 and open parameter view.
- Press **RIGHT arrow** to open Edit mode or **DOWN arrow** to accept default values and move directly to the next item.
- To change a setting, scroll to the desired item or key in a new value.
- After modifying a value, press **RIGHT arrow** to accept it and press **DOWN arrow** to move to the next item.
- Quick Start settings take effect only after you select **Finish.**

Material

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



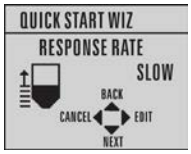


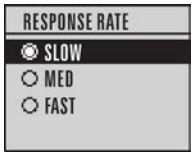
Options	*	LIQUID
		LIQUID LOW DK [a] (low dielectric liquid – CLEF algorithm enabled)

[a] dK < 3.0

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).

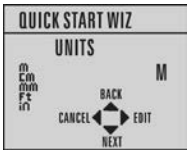


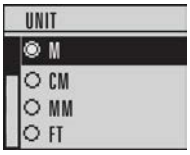


Options		**Response rate (2.3.8.1.)**	**Fill rate per Minute (2.3.8.2.)/ Empty rate per Minute (2.3.8.3.)**
	*	SLOW	0.1 m/min (0.32 ft/min)
		MED	1.0 m/min (3.28 ft/min)
		FAST	10.0 m/min (32.8 ft/min)

Units

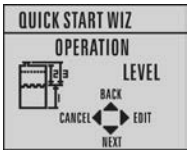
Sensor measurement units.





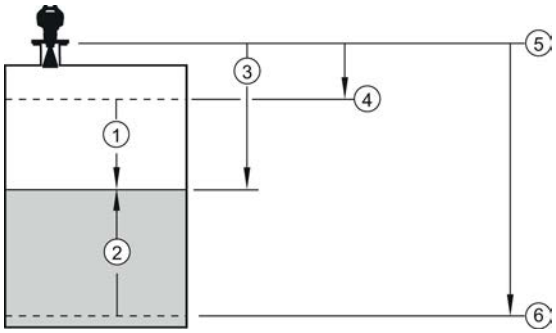
Options	m, cm, mm, ft, in Default: m

Operation



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 (2.3.5.)** for more detail.

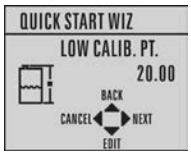


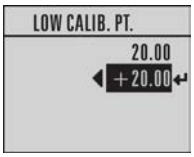
①	Space	④	High calibration point (process full level)
②	Level	⑤	Sensor reference point [a)]
③	Distance	⑥	Low calibration point (process empty level)

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

Low calibration point

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

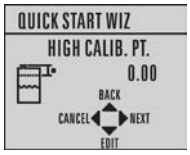


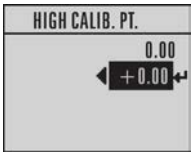


Values	Range: 0.00 to 20.00 m

High calibration point

Distance from Sensor Reference Point to High Calibration Point: usually process full level. (See **Operation** for an illustration.)





Values	Range: 0.00 to 20.00 m

Wizard complete

Options	BACK, CANCEL, FINISH (Display returns to 1.1 Quick Start Wiz menu when Quick Start is successfully completed.)

Press **DOWN arrow** [▼] **(Finish).** Then press **LEFT arrow** [◄] to return to **Measurement** mode. SITRANS LR250 is now ready to operate.

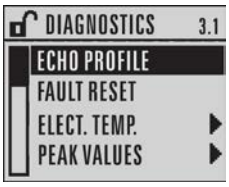
6.2.3.2 Auto False Echo Suppression

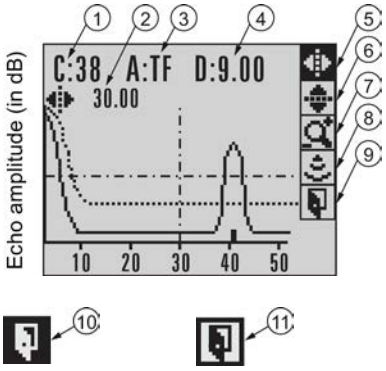
If you have a vessel with known obstructions, we recommend using Auto False Echo Suppression to prevent false echo detection. See **TVT (Auto False Echo Suppression) Setup (2.5.10.)** for instructions.

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

6.2.3.3 Requesting an Echo Profile

- In **PROGRAM** mode, navigate to: **Level Meter > Diagnostics (3.) > Echo Profile (3.1.)**
- Press **RIGHT arrow** to request a profile.





①	Confidence	⑦	Zoom
②	Distance from Low Calibration Point to vertical cross-hair	⑧	Measure
③	Algorithm: t**F** (trueFirst)	⑨	Exit
④	Distance from flange face to target	⑩	Exit icon selected
⑤	Pan left/right - selected	⑪	Exit icon deselected
⑥	Pan up/down		

- 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.**

6.2.3.4 Device Address

Note

The address can only be changed from a remote master such as NI-FBUS Configurator or DeltaV. See Addressing in manual Foundation Fieldbus for Level Instruments (7ML19985MP01) for further details.

Read only. The unique address of the device on the network.

Values	Temporary range during initial commissioning: 248 - 251. Permanent range after commissioning complete (written to non-volatile memory in the device): 16-247

- In PROGRAM mode, navigate to: **Level Meter > Communication (5.) > Device Address (5.2.)** to view the device address.
- Press **Mode** to return to Measurement mode.

6.3 Application examples

Note

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

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

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

In each example, after performing a Quick Start, navigate to the other required parameters (either via the handheld programmer or via AMS Device Manager) and enter the appropriate values.

6.3.1 Liquid resin in storage vessel, level measurement

Note

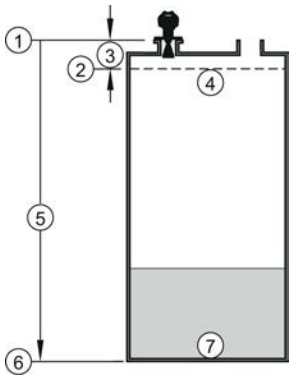
Minimum distance from flange face to target is limited by **Near Range (2.5.1.)**.

To obtain level measurement/4 to 20 mA output proportional to resin levels:

- Low Calibration Pt. = 5 m (16.5 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 go into Fail-safe High after 2 minutes.



① Sensor reference point
② High calibration point
③ 0.5 m
④ 100% level
⑤ 5 m
⑥ Low calibration point
⑦ 0% level

Parameter type	Parameter No. /Name	Options/ Values	Function
Quick Start Wizard parameters	Introduction	NEXT	Continue with Wizard.
	Language	NEXT	Continue with current language.
	Material	LIQUID	
	Response Rate	MED	Medium =1 m/minute
	Units	M	meters
	Low Calibration Point	5	5 m (16.4 ft)
	High Calibration Point	0.5	0.5 m (1.64 ft)
	Wizard Complete	FINISH	Transfers Quick Start settings to device.
Independent parameters	Loss of Echo (LOE) Timer (2.3.6.)	120	120 seconds

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

6.3.2 Horizontal vessel with volume measurement

Note

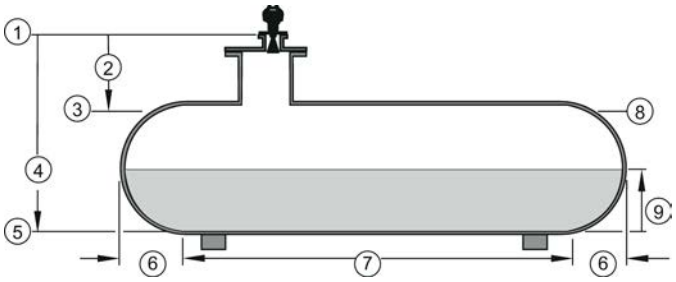
The minimum distance from the flange face to the target is limited by **Near Range (2.5.1.)**.

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

- Low Calibration Point = 3.5 m (11.48 ft) from sensor reference point
- High Calibration Point = 0.5 m (1.64 ft) from sensor reference point
- Max. fill/empty rate = 0.2 m/min (0.65 ft/min)
- Select vessel shape, Parabolic Ends, and enter values for A and L, to obtain a volume reading instead of level.

In the event of a loss of echo:

- SITRANS LR250 is to report a status of BAD or UNCERTAIN after 120 seconds (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 Name	Options/ Values	Function
Quick Start Wizard parameters	Introduction	NEXT	Continue with Wizard.
	Language	NEXT	Continue with current language.
	Material	LIQUID	
	Response Rate	MED	Medium =1 m/minute
	Units	M	meters
	Low Calibration Point	3.5	3.5 m (11.48 ft)
	High Calibration Point	0.5	0.5 m (1.64 ft)
	Wizard Complete	FINISH	Transfers Quick Start settings to device.
Independent parameters	Vessel Shape (2.4.1.1.)	PARABOLIC ENDS	Defines vessel shape.
	PV (volume/level) Units (2.3.3.)	L	liters
	Level Unit (2.3.2.)	M	meters
	Maximum Volume (2.4.1.2.)	8000	8000 liters
	Dimension A (2.4.1.3.)	0.8	0.8 m (2.62 ft)
	Dimension L (2.4.1.4.)	6	6 m (19.68 ft)
	Loss of Echo (LOE) Timer (2.3.6.)	120	120 seconds

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

6.3.3 Application with stillpipe

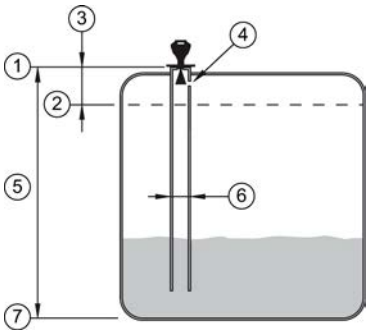
A stillpipe is recommended for products with a dK of less than 3, or if extremely turbulent or vortex conditions exist. This mounting arrangement can also be used to provide optimum signal conditions on foaming materials.

Note

- **Near Range (2.5.1.)** (Blanking) will be set at the factory. Check the process connection tag for specific values.
- Suitable pipe diameters are 40 mm (1.5") to 100 mm (4").
- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe. See Dimension drawings (Page 221).
- See Mounting on a Stillpipe or Bypass Pipe (Page 32) for installation guidelines.

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

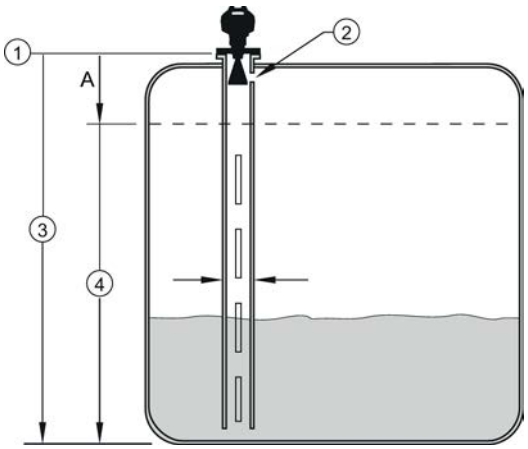
- Low Calibration Pt. is 5 m (16.4 ft) from the sensor reference point.
- High Calibration Pt. is 0.5 m (1.64 ft) from the sensor reference point.
- The stillpipe inside diameter is 50 mm (1.96").
- The maximum rate of filling or emptying is about 0.1 m (4")/min.



①	Sensor reference point	⑤	5 m
②	High calibration point	⑥	50 mm I.D.
③	0.5 m	⑦	Low calibration point
④	Vent hole		

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

a) The recommended values for the propagation factor and for CLEF range are dependent on the stillpipe diameter. See Propagation Factor/Stillpipe Diameter for values.



① sensor reference point
② air gap
③ low calibration point
④ CLEF range 2.5.7.4.
A 700 or 1000 mm (see CLEF Range settings in table below)

Propagation Factor/Stillpipe Diameter

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

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

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

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Note

Flanged and Hygienic encapsulated antenna

For Flanged encapsulated antenna (7ML5432) and Hygienic encapsulated antenna (7ML5433) match the process connection size to the pipe diameter. For example, DN 80/3" flange to DN 80/3" pipe.

Remote operation 7

7.1 Operating via AMS Device Manager

AMS Device Manager is a software package that monitors the process values, alarms and status signals of the device. Please consult the operating instructions or online help for details on using AMS Device Manager. You can find more information at:

Emerson (http://www.emersonprocess.com/AMS/)

7.1.1 Functions in AMS Device Manager

Note

Do not use the handheld programmer at the same time as AMS Device Manager, or erratic operation may result. To disable operation via the handheld programmer, see **Local Operation (6.2.3.).**

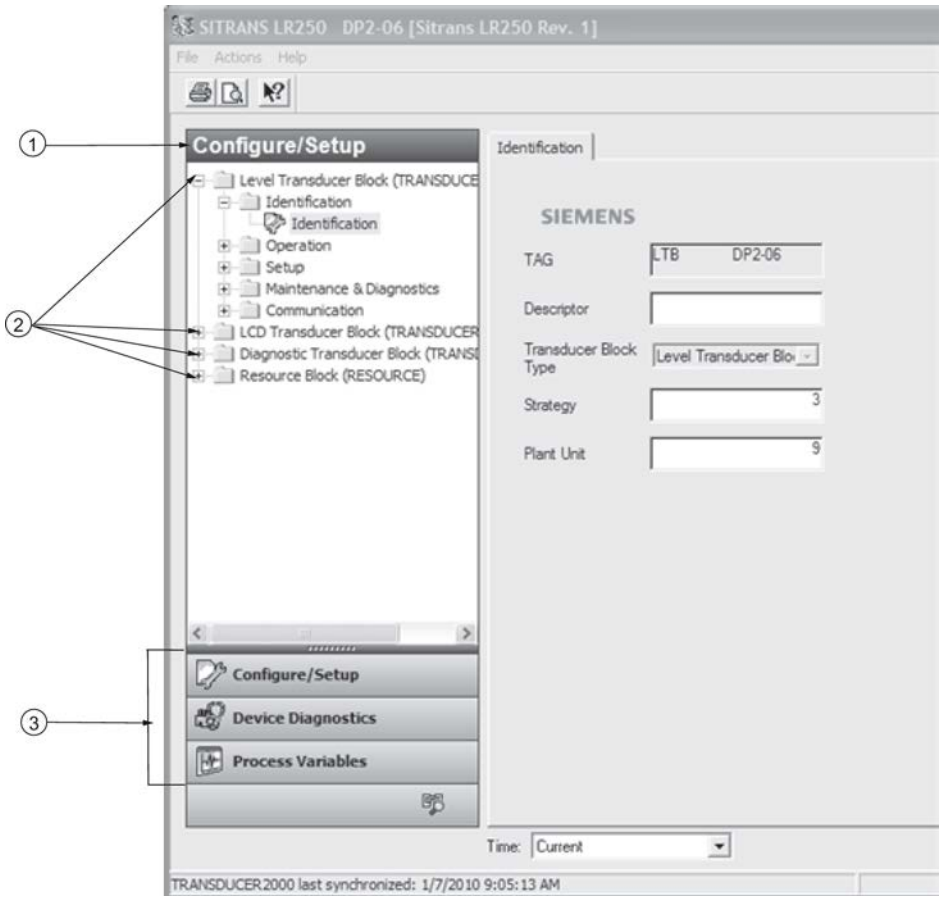
AMS Device Manager can be used to monitor the process values, alarms and status signals of the device. It allows you to display, compare, adjust, verify, and simulate process device data.

Configuration and monitoring of the device is completed via parameters organized into three main function groups:

- Configure/Setup
- Device Diagnostics (read only)
- Process Variables (read only)

Each function group is further divided into four blocks:

- Level Transducer Block (LTB)
- Liquid Crystal Display Block (LCD)
- Diagnostic Block (DIAG)
- Resource Block (RESOURCE)



① Active function group

② Blocks within each function group

③ Functions groups available

In general, process parameters are accessed through the Level Transducer Block, and device parameters are accessed through the Resource Block.

See AMS Menu Structure (Page 130) for a chart, and Changing parameter settings using AMS Device Manager (Page 91) for more details.

7.1.2 Key features of AMS Device Manager Rev. 9.0

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

CONFIGURE/SETUP function group		
Block	**Feature**	**Function**
LTB	Echo Profile (Page 103)	Echo profile viewing
LTB	TVT (time varying threshold) (Page 100)	Screen out false echoes
LTB	Linearization (LTB) (Page 97)	Volume measurement in an irregular vessel
LTB	Maintenance & Diagnostics (LTB) (Page 104)	Set schedules and reminders for sensor maintenance and service
RESOURCE	Quick Start Wizard via AMS Device Manager (Page 85)	Device configuration for simple applications
RESOURCE	Maintenance & Diagnostics (RESOURCE) (Page 116)	Set schedules and reminders for device maintenance and calibration
RESOURCE	Security (RESOURCE) (Page 119)	Protect security and communication parameters from modification by the maintenance user

DEVICE DIAGNOSTICS function group		
Block	**Feature**	**Function**
LTB	Alarms & Errors (LTB) (Page 120)	Monitor process errors and alarms
RESOURCE	Alarms & Errors (RESOURCE) (Page 124)	Monitor device errors and alarms

PROCESS VARIABLES function group		
Block	**Feature**	**Function**
LTB	Process Variables (Level Transducer Block-LTB) (Page 128)	Monitor process variables and level trend

7.1.2.1 Pull-down menu access

① Action menu items

A pull-down menu under **Actions** gives alternative access to several features.

7.1.3 Adding a new device

7.1.3.1 Electronic Device Description (EDD)

Note

SITRANS LR250 requires the EDD for AMS Device Manager version 9.0.

Check the product page of our website at: www.siemens.com/LR250 (http://www.siemens.com/LR250), under **Downloads**, for the latest version of EDD: SITRANS LR250 FF - Foundation Fieldbus - AMS V9.0.

1. Check that you have the latest version of the EDD for AMS Device Manager that matches the firmware revision of your device. See **Firmware Revision (2.2.2.)**, and if necessary download it from the product page listed above. Save the files to your computer, and extract the zipped file to an easily accessed location.
2. Launch **AMS Device Manager – Add Device Type**, browse to the unzipped EDD file and select it.
3. The device is shipped with a unique tag, consisting of a manufacturer id and serial number. The device tag can only be read from the device. It is not necessary to change the device tag to make the device operational, however if you wish to change it, use AMS Device Manager.

Set Device Tag via AMS Device Manager:

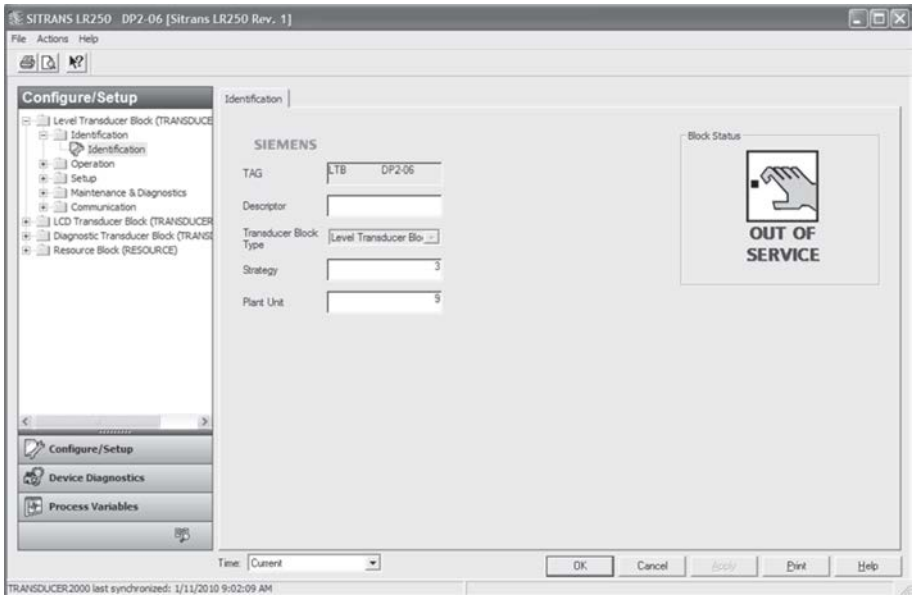
1. Launch **AMS Device Manager – AMS Device Manager**.
2. From the Device Connection View, right click on the FF Network icon and select **Rebuild Hierarchy**.
3. Right click on the device icon, and choose **Rename** from the menu.
4. Enter a device tag and press **Enter**.

Note

The Device Tag described above is separate from the Tag that describes each block type (as shown in the Identification folder of each block).

Startup

1. Launch **AMS Device Manager – AMS Device Manager**. (If AMS already running, go to step 4.
2. From the Device Connection View, right click on the FF Network icon and select **Rebuild Hierarchy**.
3. Double-click the device icon to open the startup screen. The startup screen shows device identification details, and a navigation window on the left-hand side of the screen. (The Block Status will show Out of Service at initial startup.)

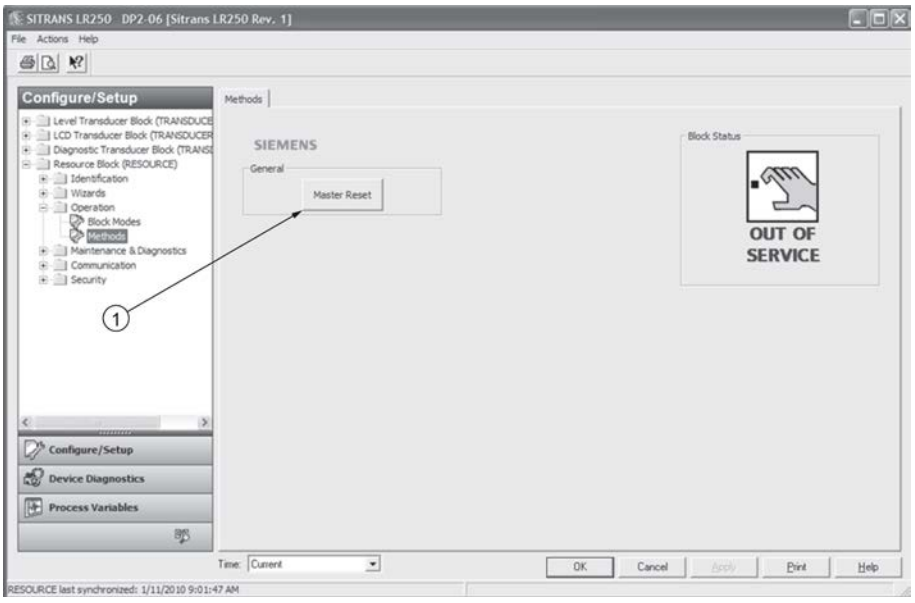


4. Next, complete a master reset.

7.1.4 Master Reset

A master reset is recommended before first configuring a new device. (Block Status must be Out of Service to perform a Master Reset.)

1. Navigate to **Configure/Setup > Resource > Operation > Methods** and click to open the dialog window.
2. In the **General** field, click on **Master Reset** and click Next to perform reset to factory defaults. Click Next to accept default reset to **Factory Defaults**.



① Master Reset

3. Click FINISH then restart AMS to reload settings. Next, scan the device.

7.1.5 Scan Device

Scan Device uploads parameters from the device (synchronizes parameters) to AMS Device Manager.

1. Open the pull-down menu **Actions – Scan Device** (upload parameters from the device to AMS).
2. The next step when adding a new device is to configure and calibrate the device via the Quick Start Wizard.

7.1.6 Sensor calibration

The LR250 FF does not need to be calibrated, only configured using the Quick Start Wizard below.

7.1.7 Configuring a new device

Configure a new device using the Quick Start Wizard, found in the **Resource Block** of the function group **Configure/Setup**.

7.1.7.1 Quick Start Wizard via AMS Device Manager

The Quick Start Wizard groups together all the settings you need to configure a device for most applications.

Please consult the operating instructions or online help for details on using AMS Device Manager.

Note

Use Quick Start Wizard via AMS Device Manager for initial configuration of a device on an FF network. If device is not on an FF network, initial configuration should be completed via the Quick Start Wizard from the LUI. [See Quick Start Wizard via the handheld programmer (Page 65).]

Quick Start Wizard steps

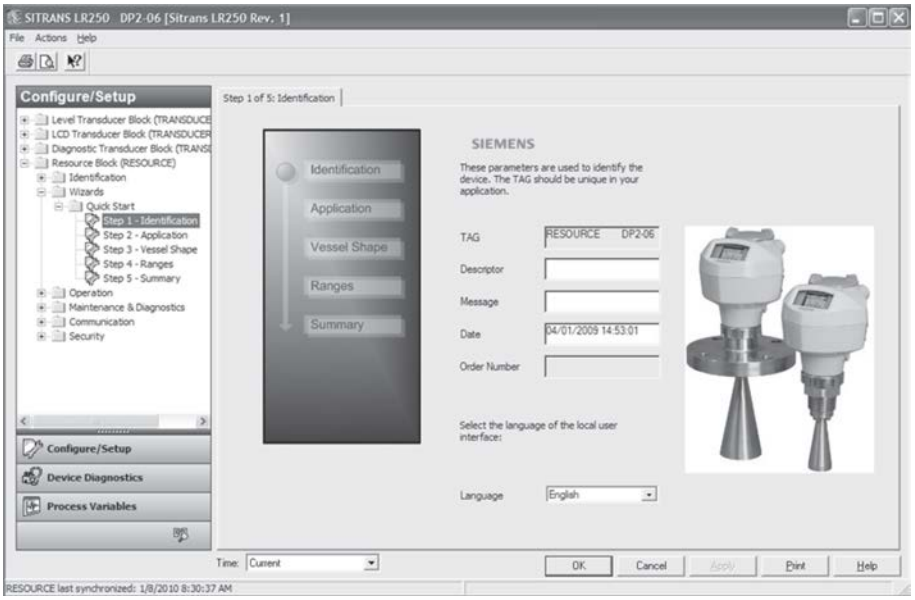
Note

- Complete the steps in order. Click on **Apply** after revising parameters in each step, or **CANCEL** to exit step without saving changes. (Note: **Apply** will write changes to the device. **OK** will write changes to the device and exit to the Device Connection View. **CANCEL** will exit to the Device Connection View without applying changes.)
- Do not use the Quick Start Wizard to modify individual parameters: see instead Changing parameter settings using AMS Device Manager (Page 91). (Perform customization only after the Quick Start has been completed.)
- Values set using the Quick Start Wizard via AMS Device Manager are saved and recalled each time it is initiated (unlike the Quick Start Wizard initiated via the handheld programmer).
- To run the Quick Start Wizard for this device, the RESOURCE block must first be set to Out of Service (OOS) mode, before any configuration changes (changes to parameters affecting block output) can be written. (Setting RESOURCE block to OOS also sets LTB to OOS.)
- After completing steps 1-4, review all settings in Step 5 - Summary. Return to steps1-4 if further changes are required.
- After completing the Quick Start Wizard from AMS, you must manually place the RESOURCE block in Automatic mode.

Launch **AMS Device Manager** and double-click the device icon from the Device Connection View to open the startup screen. Navigate to **Configure/Setup > Resource Block > Wizards > Quick Start**, and click on **Step 1 - Identification**.

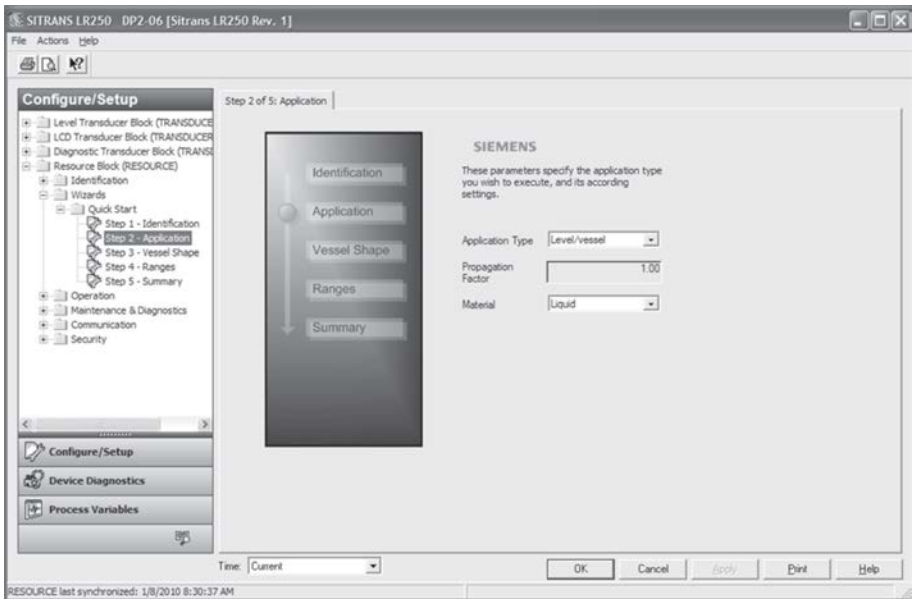
Step 1 - Identification

You can accept the default values without modification. (Descriptor, Message, and Installation **Date** fields can be left blank.) If desired, make changes then click on **Apply**. (The **Apply** button is activated when a parameter is modified.) Go to Step 2.



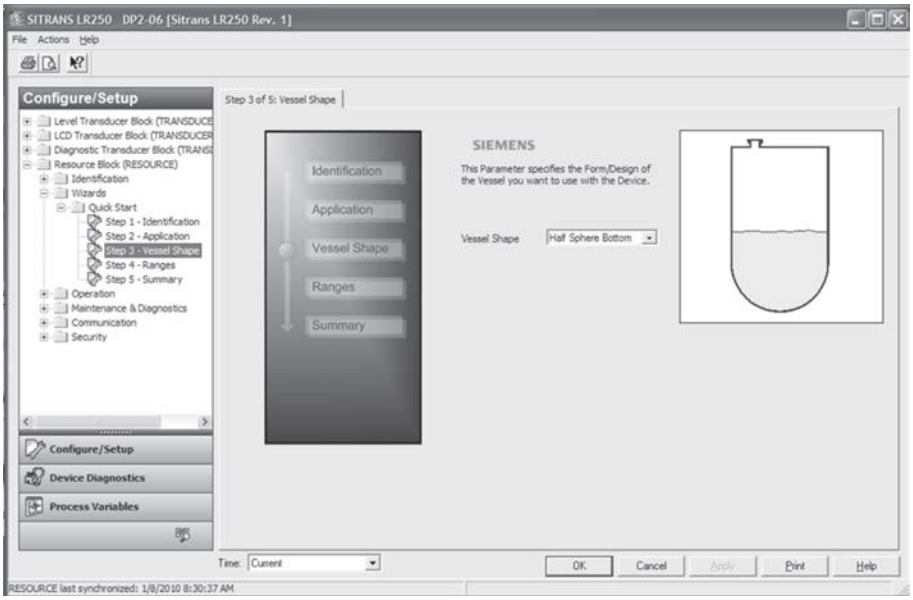
Step 2 - Application Type

Click on **Step 2 - Application Type** in the navigation window. Select the Application Type (level or volume), Propagation Factor (if using a stillpipe application), and the Material. For a Low Dielectric Liquid application in a stilling well, see example Application with Stillpipe. Click on **Apply** to save settings then go to Step 3.



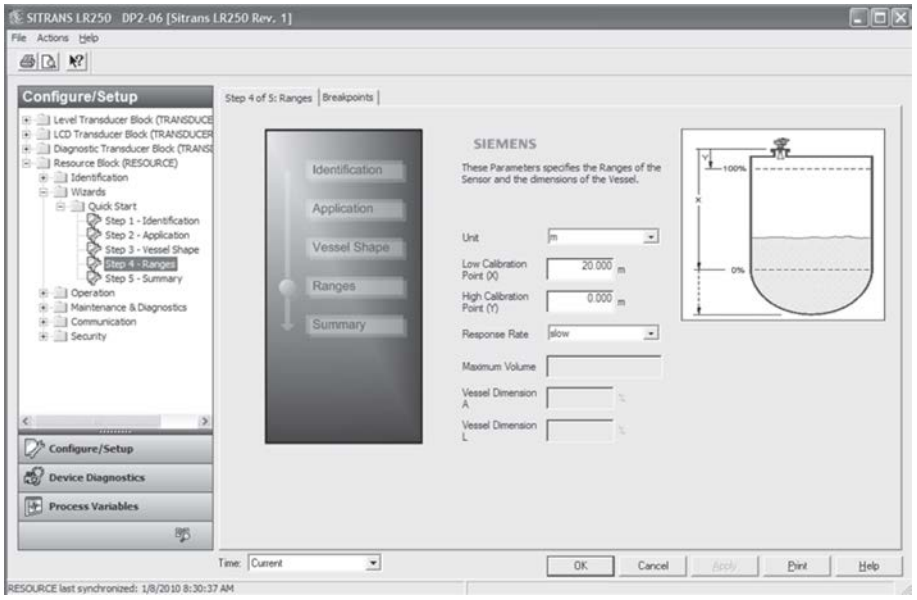
Step 3 - Vessel Shape

Click on **Step 3 - Vessel Shape** in the navigation window. Select the vessel shape. To describe a more complex shape, select **Linearization Table** in the Vessel Shape field and see Linearization (LTB) (Page 97) for more details. Click on **Apply** to save settings then go to Step 4.



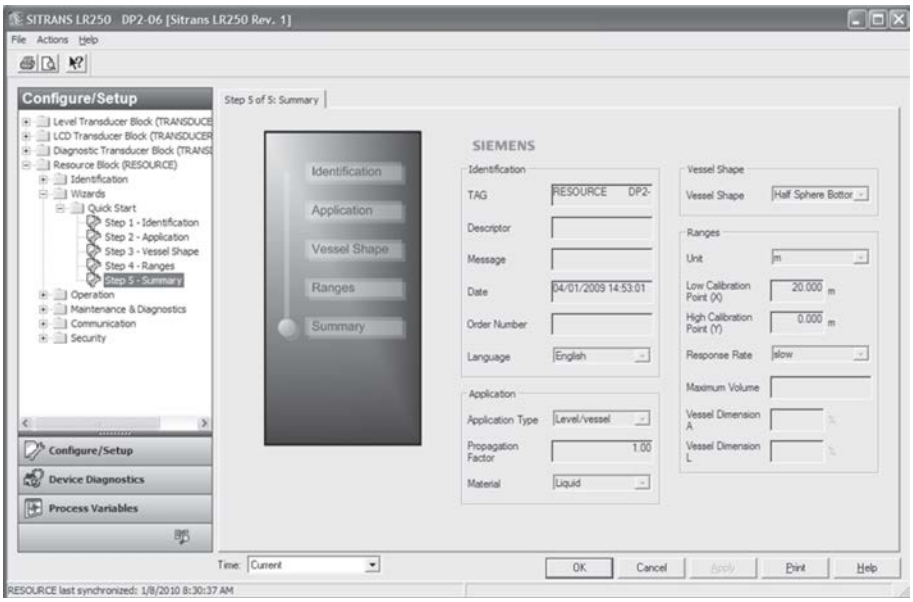
Step 4 - Ranges

Click on **Step 4 - Ranges** in the navigation window. On the tab Step 4 of 5 Ranges: set the parameters, and click on **Apply** to save settings. If necessary, click on the Breakpoints tab, set the parameters, and click on **Apply** to save settings. Go to Step 5.



Step 5 - Summary

Click on **Step 5 - Summary** in the navigation window. Check parameter settings. Return to individual steps if further changes are necessary.



The Quick Start Wizard is now complete.

7.1.8 Changing parameter settings using AMS Device Manager

Note

- For a complete list of parameters, see Parameter Reference (Page 143).
- For more detailed explanations of the parameters listed below see the pages referenced.

1. Adjust parameter values in the parameter value field in **Configure/Setup** view, then click on **Apply** to write the new values to the device. The parameter field will display in yellow until the value has been written to the device.
2. Click on **OK** only if you wish to update all parameters and exit device view.

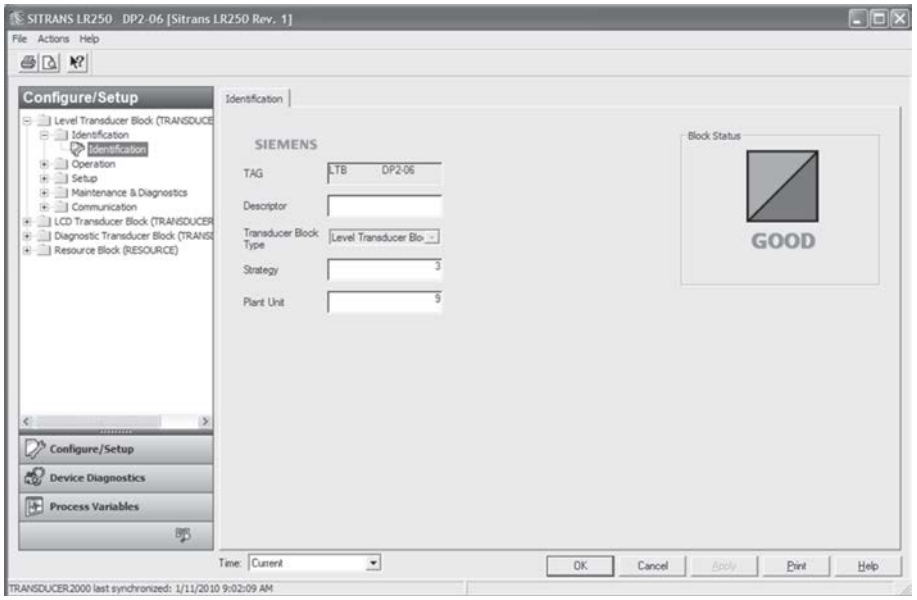
7.1.9 Configure/Setup (Level Transducer Block-LTB)

7.1.9.1 Identification (LTB)

Navigate to **Configure/Setup > LTB > Identification**.

Identification:

- TAG: Read only. Description for the associated block: device tag prefixed by block type.
- Descriptor [see **Descriptor (2.1.2.)**]
- Transducer Block Type: Read only. Identifies the type of transducer block.
- Strategy: Used to identify grouping of blocks.
- Plant Unit: The identification number of the plant unit. For example, can be used in the host for sorting alarms.



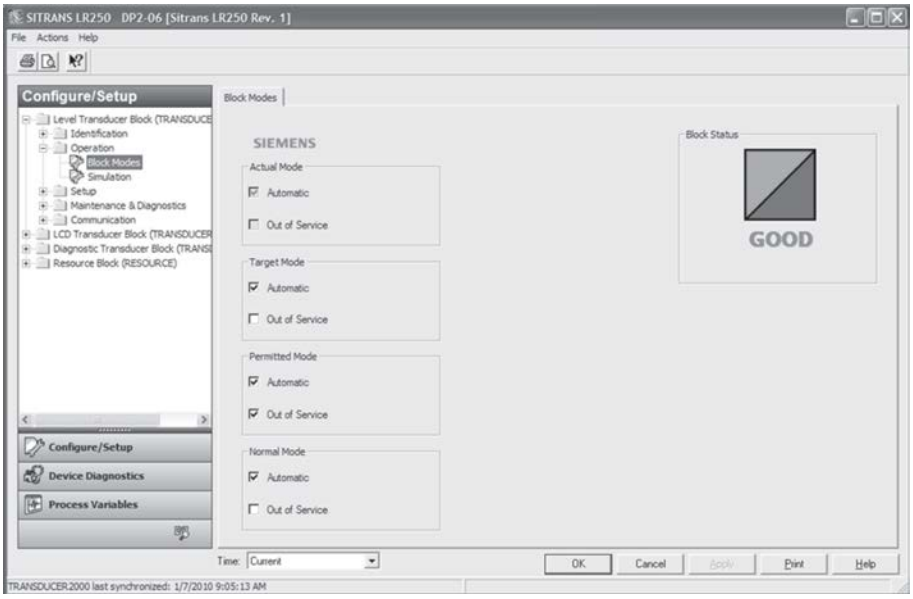
7.1.9.2 Operation (LTB)

Navigate to **Configure/Setup > LTB > Operation**.

Click on Block Modes to open the dialog window for access to:

Block Modes:

- Actual Mode: This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of the block execution.
- Target Mode [see **Mode (2.6.2.)**]
- Permitted Mode: Defines the modes that are allowed for an instance of the block. The permitted mode is configured based on application requirements.
- Normal Mode: This is the mode that the block should be set to during normal operating conditions.



Click on **Simulation** to open the dialog window for access to:

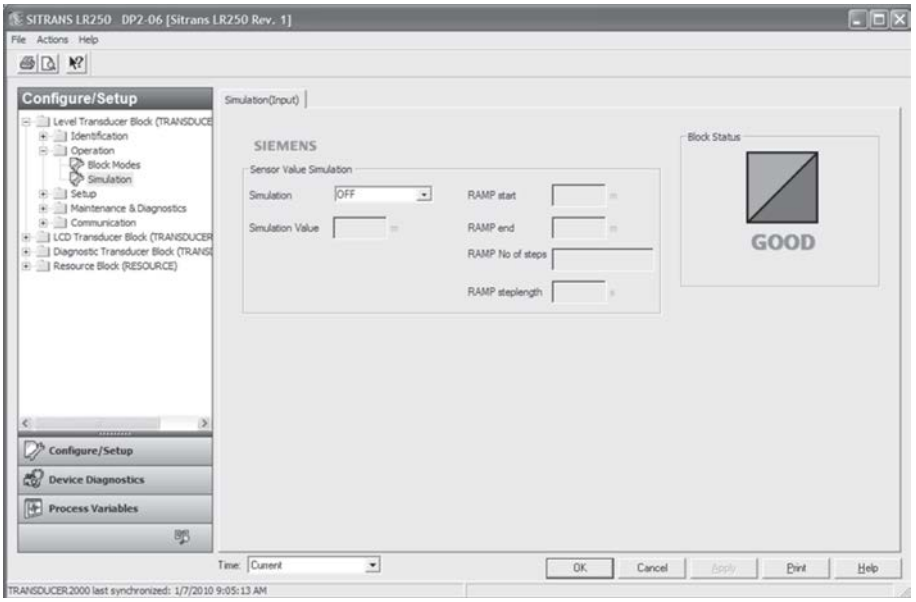
Simulation (Input)

Allows you to simulate the sensor value which is input to the Level Transducer Block. This tests everything between the Level Transducer Block and Output.

Note

To activate simulation via AMS Device Manager or the 375 Field Communicator, simulation must also be set to Enabled on the device. See **Simulate Enable (4.12.)**.

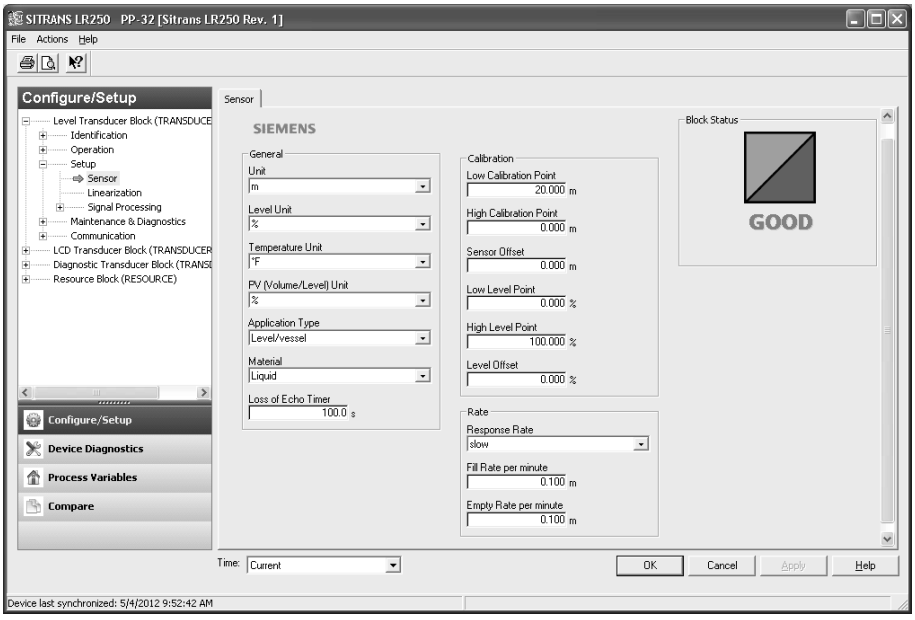
- Simulation
- Simulation Value
- RAMP start
- RAMP end
- RAMP No of steps
- RAMP steplength



1. To enable simulation select **Fixed value** or **Ramp** in the Simulation field.
2. If you select Fixed value, enter a Simulation Value.
3. If you select Ramp, enter the ramp start, end, number of steps, and steplength.
4. Click **Apply**.
5. After simulation is complete, set Simulation to **OFF** and click **Apply**.

7.1.9.3 Setup (LTB)

Sensor (LTB)



Navigate to **Configure/Setup > LTB > Setup** and click on **Sensor** for access to:

General

[see **Sensor (2.3.)** for details]

- Unit [see **Unit (2.3.1.)**]
- Level Unit [see **Level Unit (2.3.2.)**]
- Temperature Unit [see **Temperature Units (2.3.4.)**]
- PV (Volume/Level) Unit [see **PV (volume/level) Units (2.3.3.)**]
- Application Type (available only via AMS Device Manager)

Defines the application type.

Values	Level/vessel (default)
	Level/stillpipe
	Level/bypass pipe
	Volume/vessel
	Volume/stillpipe
	Volume/bypass pipe

- Material [see **Material (2.3.5.)**]
- Loss of Echo Timer (see **Loss of Echo (LOE) Timer (2.3.6.)**]

Calibration

[see **Calibration (2.3.7.)** for details]

- Low Calibration Point [see **Low Calibration Point (2.3.7.1.)**]
- High Calibration Point [see **High Calibration Point 2.3.7.2.)**]
- Sensor Offset [see **Sensor Offset (2.3.7.3.)**]
- Low Level Point [see **Low Level Point (2.3.7.4.)**]
- High Level Point [see **High Level Point (2.3.7.5)**]
- Level Offset [see **Level Offset (2.3.7.6.)**]

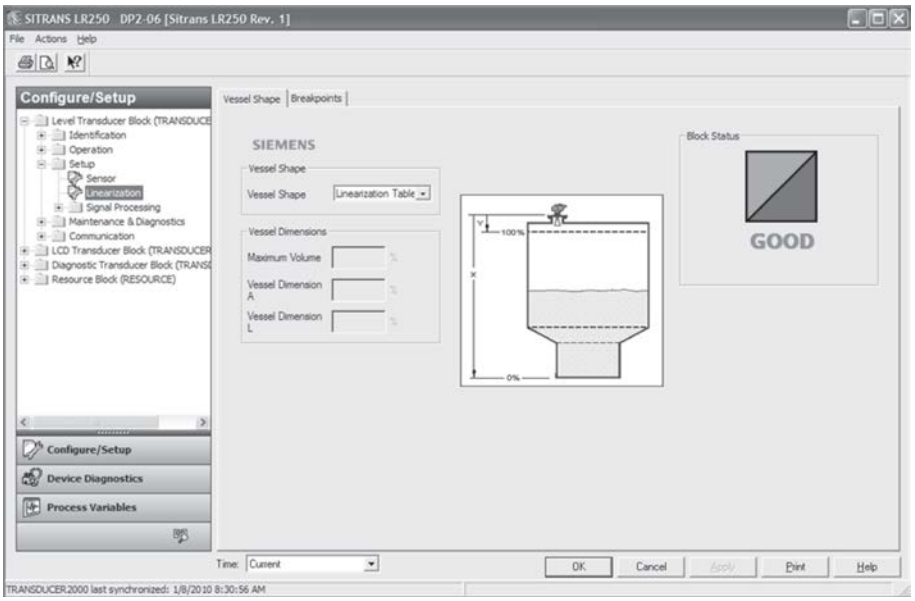
Rate

[see **Rate (2.3.8.)**]

- Response Rate [see **Response Rate (2.3.8.1.)**]
- Fill Rate per Minute [see **Fill Rate per Minute (2.3.8.2.)**]
- Empty Rate per Minute [see **Empty Rate per Minute (2.3.8.3.)**]

7.1.9.4 Linearization (LTB)

You can use the linearization feature to define a more complex vessel shape and enter up to 32 level breakpoints where the corresponding volume is known. See **Linearization (2.4.)**.



Navigate to **Configure/Setup > LTB > Setup > Linearization** and click on **Linearization**. Click on the Vessel Shape tab to access the parameters listed:

Vessel Shape

- Vessel Shape [see **Vessel Shape (2.4.1.1.)**]

Vessel Dimensions

- Maximum Volume [see **Maximum Volume (2.4.1.2.)**]
- Vessel Dimension A [see **Dimension A (2.4.1.3.)**]
- Vessel Dimension L [see **Dimension L (2.4.1.4.)**]

OR

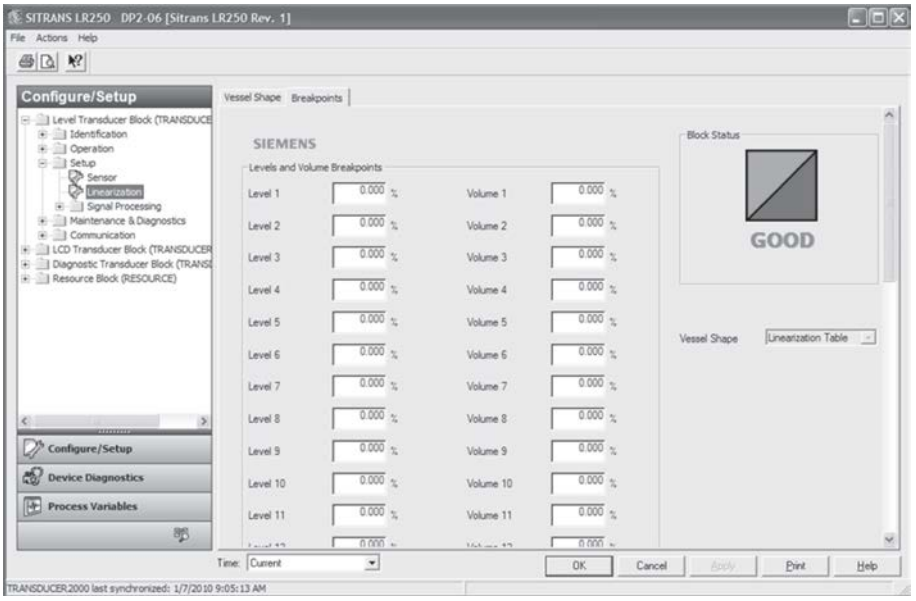
Click on **Breakpoints** tab for access to level and volume breakpoints.

Note

This parameter becomes accessible only after **Linearization Table** has been selected in **Vessel Shape** above.

Level and Volume Breakpoints [see XY Index (2.4.1.5.)]

- Level 1 .... Level 32
- Volume 1 ... Volume 32
- Vessel Shape



1. The default for level values is percent: if you want to select units instead, go to **Configure/Setup > LTB > Setup > Sensor > Level Unit**, and select the desired unit.
2. Go to **Configure/Setup > LTB > Setup > Sensor > PV (Volume/Level) Unit**, and select the desired volume units.
3. From the Vessel Shape tab of **Configure/Setup > LTB > Setup > Linearization**, select **Linearization Table** option in the Vessel Shape field.
4. Click on the Breakpoints tab and enter values for level and volume breakpoints in table.

The values corresponding to 100% and 0% levels must be entered. The breakpoints can be ordered from top to bottom, or the reverse.

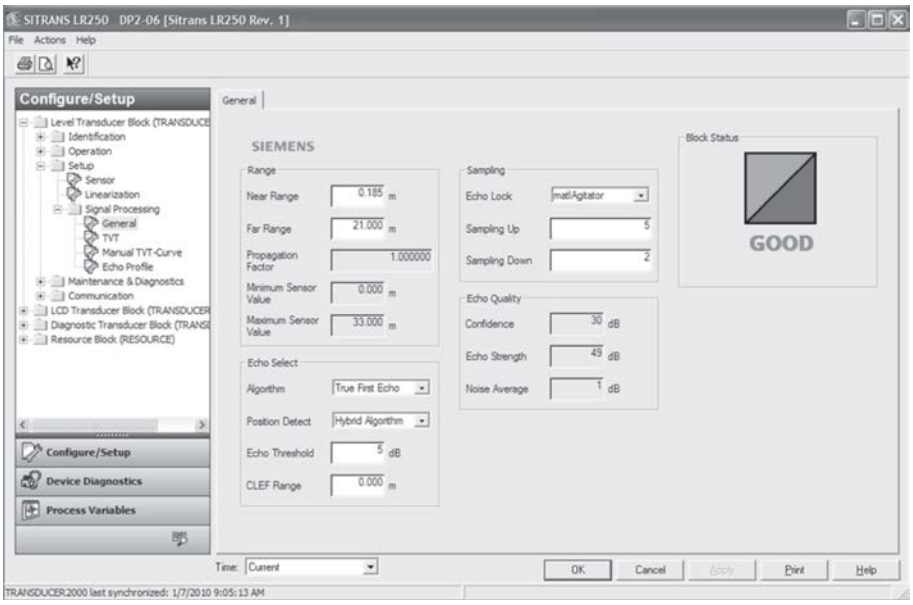
After completing the above steps you will need to configure AIFB 1 and/or AIFB 2. [See **AIFB 1 (2.6.)** and **AIFB 2 (2.7.)**]

7.1.9.5 Signal processing

Signal Processing (LTB)

Note

For more detailed explanations of the parameters listed below see the pages referenced.



General

Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on General for access to:

Range

[see **Signal Processing (2.5.)**]

- Near Range [see **Near Range (2.5.1.)**]
- Far Range [see **Far Range (2.5.2.)**]
- Propogation Factor [see **Propogation Factor (2.5.3.)**]
- Minimum Sensor Value [see **Minimum Sensor Value (2.5.4.)**]
- Maximum Sensor Value [see **Maximum Sensor Value (2.5.5.)**]

Echo Select

[see **Echo Select (2.5.7.)**]

- Algorithm [see **Algorithm (2.5.7.1.)**]
- Position Detect [see **Position Detect (2.5.7.2.)**]
- Echo Threshold [see **Echo Threshold (2.5.7.3.)**]
- CLEF Range [see **CLEF (Contrained Leading Edge Fit) Range (2.5.7.4.)**]

Sampling

[see **Sampling (2.5.8.)**]

- Echo Lock [see **Echo Lock (2.5.8.1.)**]
- Sampling Up [see **Up Sampling (2.5.8.2.)**]
- Sampling Down [see **Down Sampling (2.5.8.3.)**]

Echo Quality

[see **Echo Quality (2.5.9.)**]

- Confidence [see **Confidence (2.5.9.1.)**]
- Echo Strength [see **Echo Strength (2.5.9.2.)**]
- Noise Average

  Displays the average ambient noise (in dB above 1 µV rms) of a noise profile. Noise level is a combination of transient noise and receiving circuitry. After a measurement, the values from the previous noise shot will be displayed.

TVT (time varying threshold)

A time-varying curve that determines the threshold level above which echoes are determined to be valid.

Modify the TVT to screen out false echoes [see Time Varying Threshold (TVT) (Page 266), and **Auto False Echo Suppression (2.5.10.1.)**].

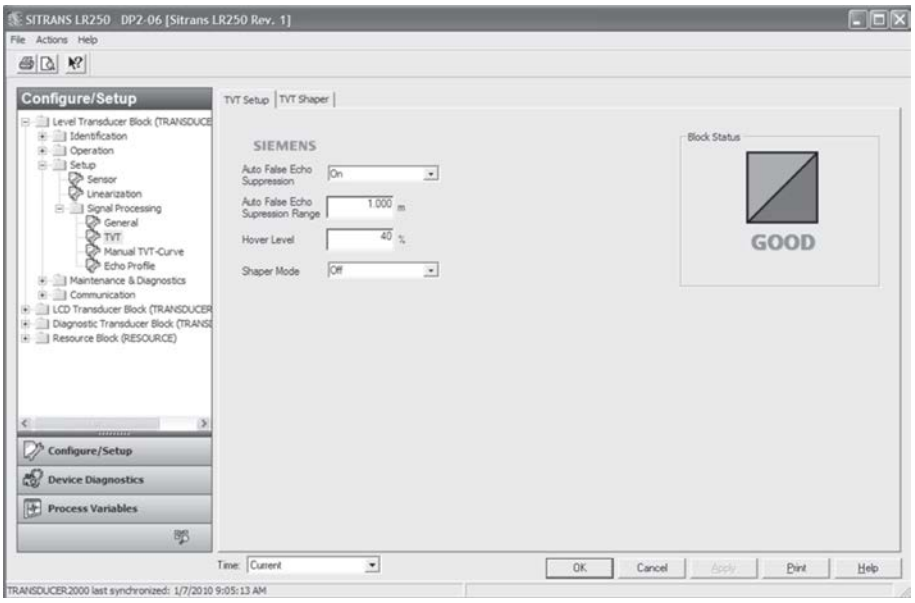
Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on **TVT**. Click on one of the two tabs to access the parameters listed:

TVT Setup

- Auto False Echo Suppression [see **Auto False Echo Suppression (2.5.10.1.)**]
- Auto False Echo Suppression Range [see **Auto False Echo Suppression Range (2.5.10.2.)**]
- Hover Level [see **Hover Level (2.5.10.3.)**]
- Shaper Mode [see **Shaper Mode (2.5.10.4.)**]

Auto False Echo Suppression

1. Determine Auto False Echo Suppression Range. Measure the actual distance from the sensor reference point to the material surface using a rope or tape measure.
2. Subtract 0.5 m (20") from this distance, and use the resulting value.
3. Open the menu **Configure/Setup > LTB > Setup > Signal Processing > TVT** and set Auto False Echo Suppression Range.
4. From the same menu, set Auto False Echo Suppression to learn. The device will automatically revert to On (Use Learned TVT) after a few seconds.



TVT Shaper

[see **TVT Shaper (2.5.11.)**]

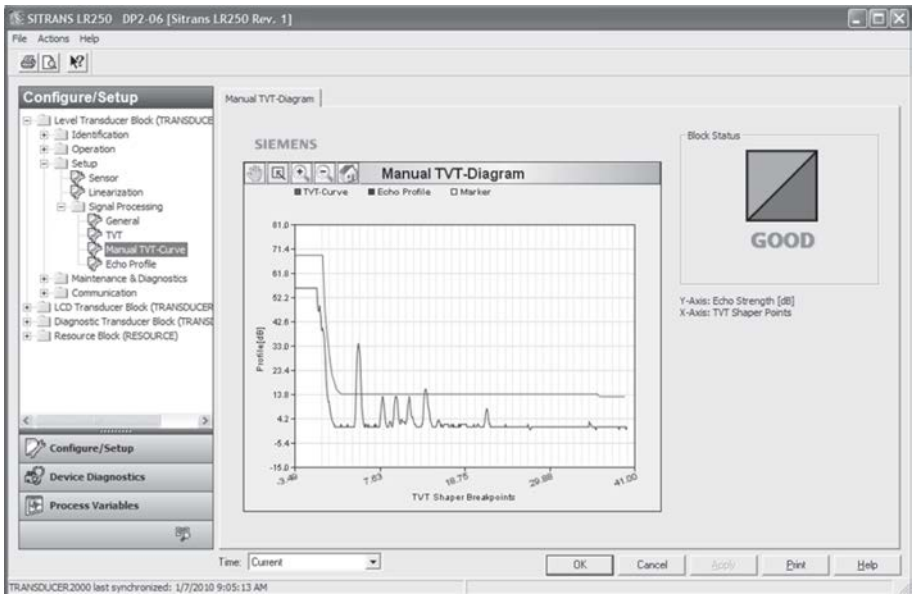
- Breakpoints 1 to 40
- Shaper Mode

1. Open the menu **Configure/Setup > LTB > Setup > Signal Processing > TVT** and click on the TVT Setup tab
2. Turn Shaper Mode to **On** to activate Breakpoints 1 to 40 on the TVT Shaper tab

Manual TVT curve

Displays the effects of the TVT shaper modifications.

Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on **Manual TVT Curve**.



Echo Profile

Displays the current echo profile.

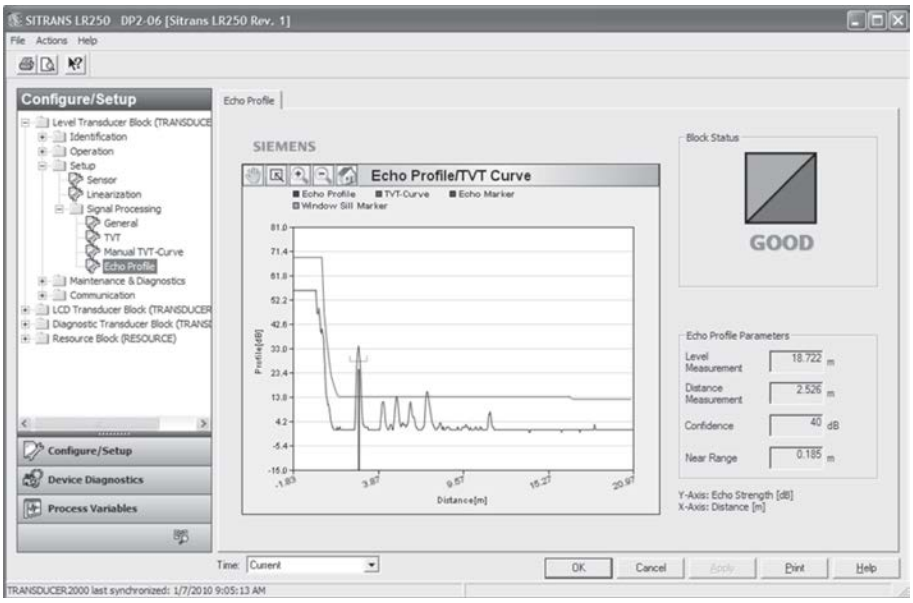
Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on **Echo Profile** to view the current echo profile and to access:

Echo Profile Parameters

[see **Echo Profile (3.1.)**]

- Level Measurement [see **Measured Values (2.8)**]
- Distance Measurement [see **Measured Values (2.8.)**]
- Confidence [see **Confidence (2.5.9.1.)**]
- Near Range (see **(Near Range 2.5.1.)**]

To view a previous profile, click the drop-down arrow on the **Time** field and select the desired profile (note: available only using AMS version 10.1or later).



7.1.9.6 Maintenance & Diagnostics (LTB)

Note

For more detailed explanations of the parameters listed below see the pages referenced.

Navigate to **Configure/Setup > LTB > Maintenance and Diagnostics** for access to:

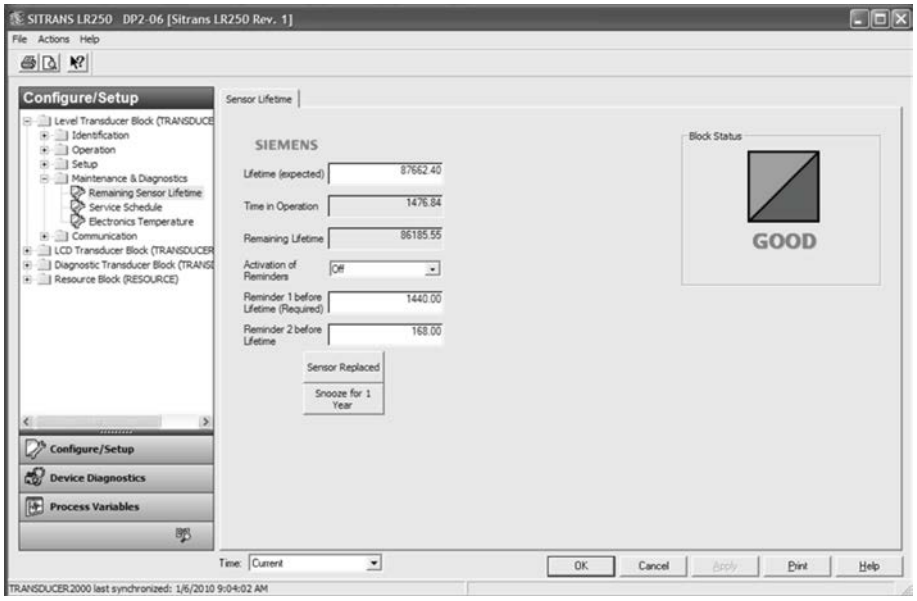
Remaining Sensor Lifetime

[see **Remaining Sensor LIfetime (4.3.)**]

- Lifetime (expected) [see **Lifetime (expected) (4.3.1.)**]
- Time in Operation [see **Time in Operation (4.3.2.)**]
- Remaining Lifetime [see **Remaining Lifetime (4.3.3.)**]
- Activation of Reminders [see **Activation of Reminders (4.3.4.)**]
- Reminder 1 before Lifetime (Required) [see **Reminder 1 before Lifetime (Required) (4.3.5.)**]
- Reminder 2 before Lifetime (Demanded) [see **Reminder 2 before Lifetime (Demanded) (4.3.6.)**]

1. Open the window **Remaining Sensor Lifetime**
2. After modifying values/units as required, click on **Apply** to accept the change.

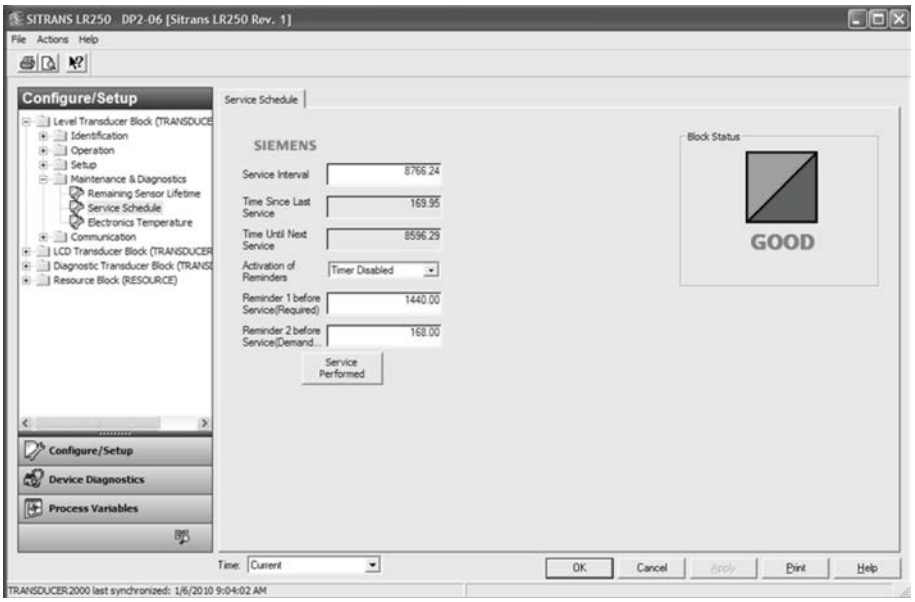
- Click on **Sensor Replaced** to reset Time in Operation to 0 hours
- Click on **Snooze for 1 Year** to add a year to the Total Expected Sensor Life



Service Schedule

[see **Service Schedule (4.4.)**]

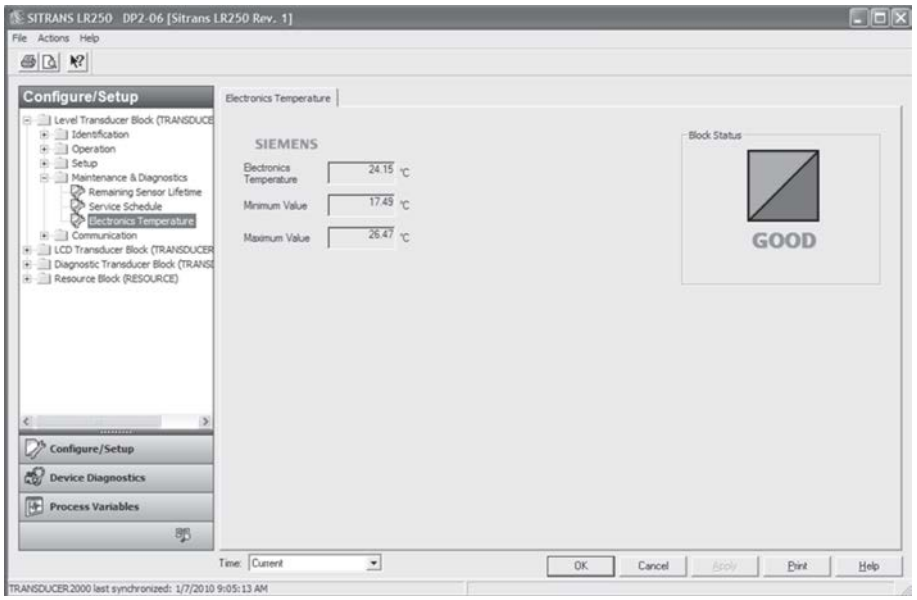
- Service Interval [see **Service Interval (4.4.1.)**]
- Time Since Last Service [see **Time Since Last Service (4.4.2.)**]
- Time Until Next Service [see **Time Until Next Service (4.4.3.)**]
- Activation of Reminders [see **Activation of Reminders (4.4.4.)**]
- Reminder 1 before Lifetime (Required) [see **Reminder 1 before Service (Required) (4.4.5.)**]
- Reminder 2 before Lifetime (Demanded) [see **Reminder 2 before Service (Demanded) (4.4.6.)**]
- Click on **Service Performed** to reset Time Since Last Service to 0 hours



Electronics Temperature

[see **Electronics Temperature (3.3.)**]

- Electronics Temperature: Displays the current internal temperature of the device
- Minimum Value [see **Minimum Value (3.3.1.)**]
- Maximum Value [see **Maximum Value (3.3.2.)**]

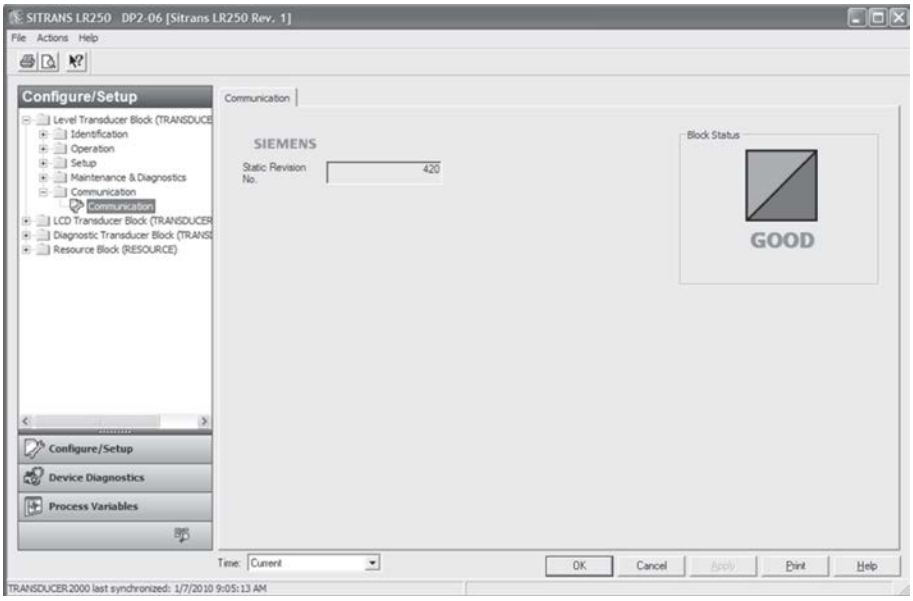


7.1.9.7 Communication (LTB)

Navigate to **Configure/Setup > LTB > Communication** for access to:

Communication:

- Static Revision No. [see **Static Revision Number (2.6.1.)**]



7.1.10 Configure/Setup (Liquid Crystal Display Block-LCD)

7.1.10.1 Identification (LCD)

Navigate to **Configure/Setup > LCD > Identification**.

Identification:

- TAG
- Descriptor
- Transducer Block Type
- Strategy
- Plant Unit

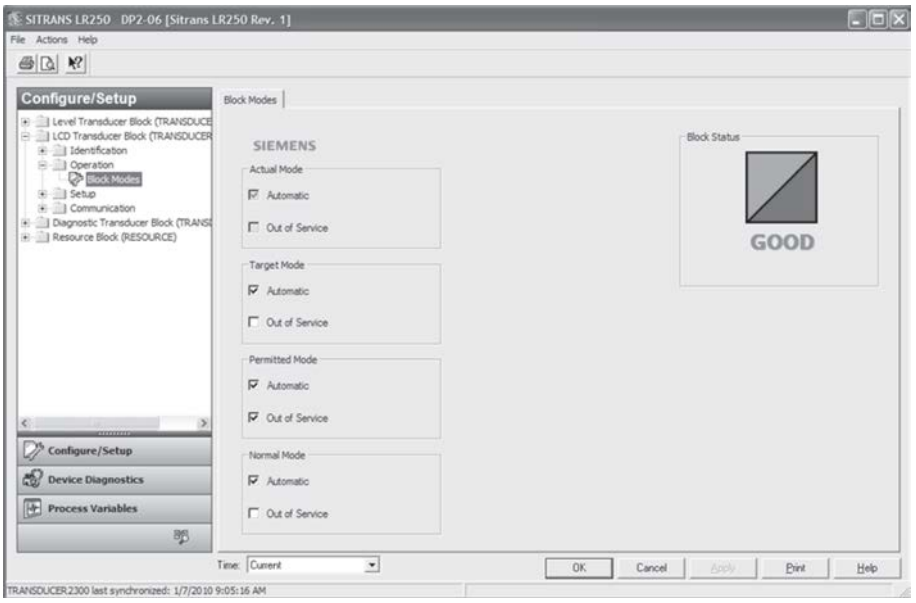
Note

For descriptions of Identification parameters see Identification (LTB) (Page 92).

7.1.10.2 Operation (LCD)

Note

For more detailed explanations of the parameters listed below see the pages referenced.



Navigate to **Configure/Setup > LCD > Operation**.

Click on **Block Modes** to open the dialog window for access to:

Block Modes:

- Actual Mode
- Target Mode
- Permitted Mode
- Normal Mode

Note

For descriptions of Block Modes see Operation (LTB) (Page 93).

To disable updating of the LCD remotely, Actual Mode of this block should read **Out of Service**. This is done by setting Target Mode to **Out of Service**.

7.1.10.3 Setup (LCD)

Navigate to **Configure/Setup > LCD > Setup > Local display** for access to:

Local Display

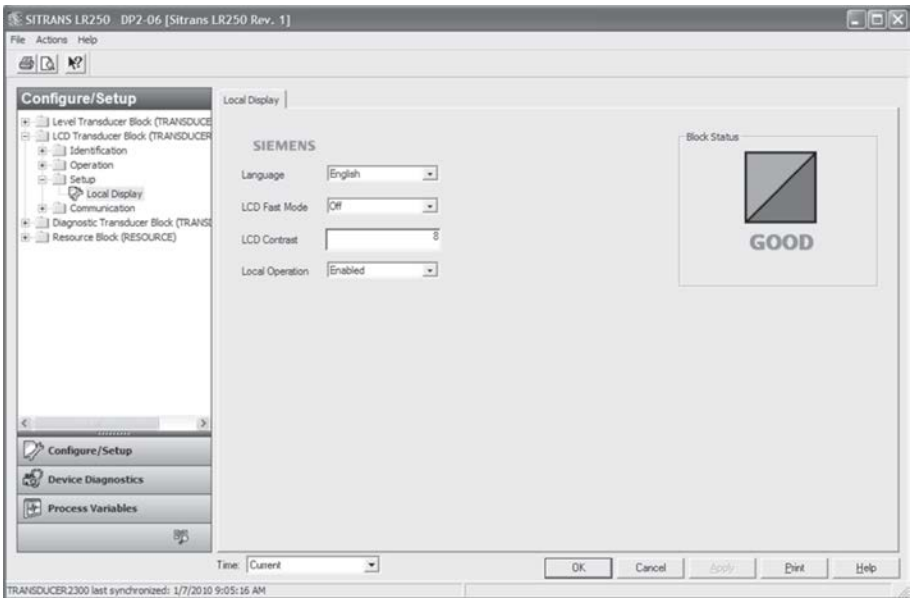
Language [see **Language (7.)**]

LCD Fast Mode [see **LCD Fast Mode (4.9.)**]

LCD Contrast [see **LCD Contrast (4.10.)**]

Local Operation [see **Local Operation (6.2.3.)**]

If local operation is disabled remotely and no communication activity exists for 30 seconds, the parameter is made visible again locally.



7.1.10.4 Communication (LCD)

Navigate to **Configure/Setup > LCD > Communication** for access to:

Communication:

- Static Revision No. [See **Static Revision Number (2.6.1.)**]

7.1.11 Configure/Setup (Diagnostic Transducer Block-DIAG)

Note

Parameters in the Diagnostic Transducer Block used solely by factory personnel.

7.1.11.1 Identification (DIAG)

Navigate to **Configure/Setup > DIAG > Identification**.

Identification:

- TAG
- Descriptor
- Transducer Block Type
- Strategy
- Plant Unit

Note

For descriptions of Identification parameters see Identification (LTB) (Page 92).

7.1.11.2 Operation (DIAG)

Navigate to **Configure/Setup > DIAG > Operation**.

Block Modes:

- Actual Mode
- Target Mode
- Permitted Mode
- Normal Mode

Note

For descriptions of Block Modes see Operation (LTB) (Page 93).

7.1.11.3 Communication (DIAG)

Navigate to **Configure/Setup > DIAG > Communication**.

Communication:

- Static Revision No. [see **Static Revision Number (2.6.1.)**]

7.1.12 Configure/Setup (Resource Block - RESOURCE)

Note

For more detailed explanations of the parameters listed below see the pages referenced.

7.1.12.1 Identification (RESOURCE)

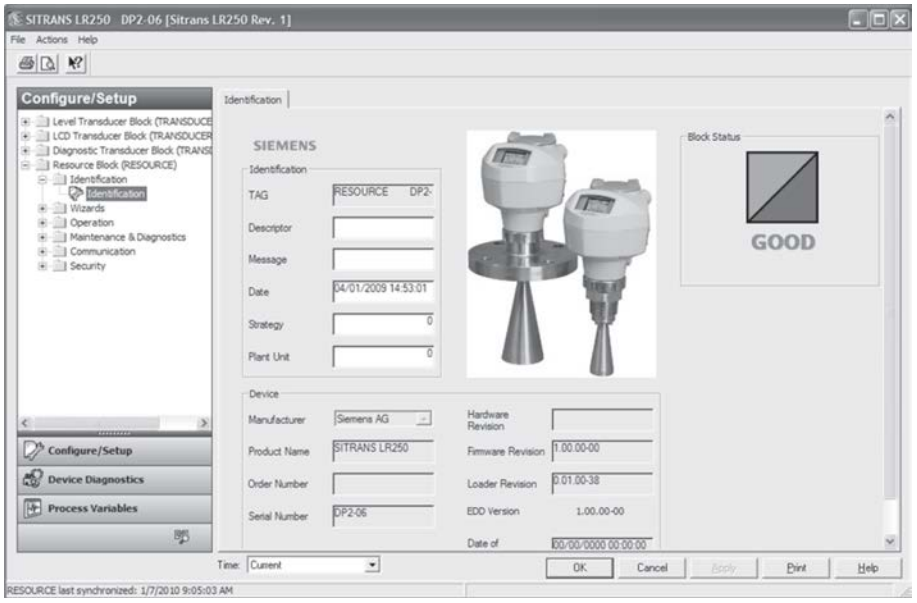
Navigate to **Configure/Setup > RESOURCE > Identification** for access to:

Identification

- TAG: Read only. Description for the associated block: device tag prefixed by block type.
- Descriptor [see **Descriptor (2.1.2.)**]
- Message [see Message **(2.1.3.)**]
- Date (Installation Date): The user entered date on which the device was installed in the system.
- Strategy: Used to identify grouping of blocks.
- Plant Unit: The identification number of the plant unit. For example, can be used in the host for sorting alarms.

Device (read only)

- Manufacturer (see **Manufacturer (5.3.)**]
- Product Name: The manufacturer's product name for this device.
- Order Number: The manufacturer's order number (MLFB) for this device.
- Serial Number: The manufacturer's unique serial number for this device.
- Hardware Revision [see **Hardware Revision (2.2.1.)**]
- Firmware Revision [see **Firmware Revision (2.2.2.)**]
- Loader Revision [see **Loader Revision (2.2.3.)**]
- EDD Version: The version of the EDD currently installed.
- Date of Manufacturing [see **Manufacture Date (4.6.)**]



7.1.12.2 Wizards (RESOURCE)

Navigate to **Configure/Setup > RESOURCE > Wizards > Quick Start** for access to Quick Start steps [see Quick Start Wizard via AMS Device Manager (Page 85)].

7.1.12.3 Operation (RESOURCE)

Navigate to **Configure/Setup > RESOURCE > Operation**.

Click on **Block Modes** to open the dialog window for access to:

Block Modes:

- Actual Mode
- Target Mode
- Permitted Mode
- Normal Mode

Note

- For descriptions of Block Modes see Operations (LTB) (Page 93).
- If the RESOURCE block is set to Out of Service, the LTB, and AIFB blocks are forced to Out of Service also, but the LCD and DIAG blocks remain in Automatic mode

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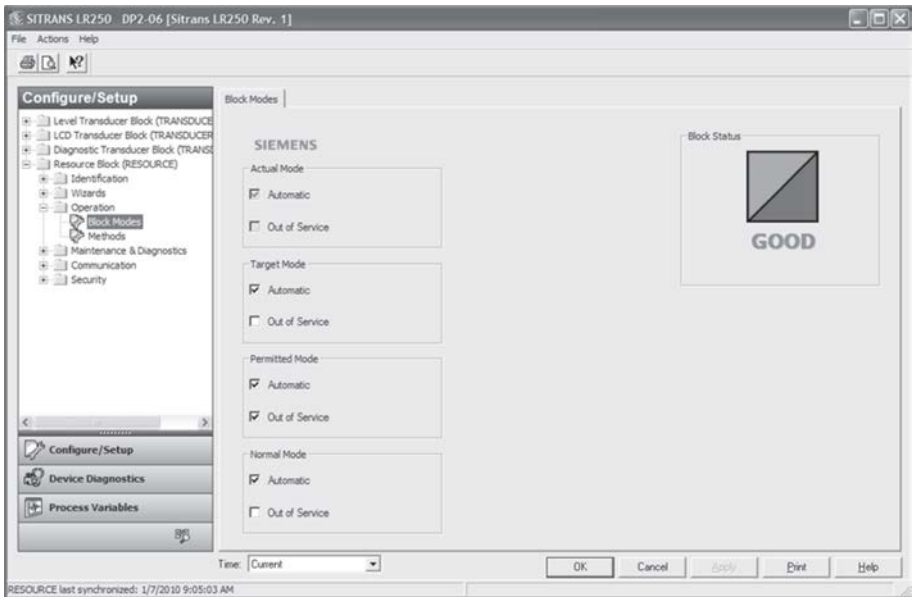
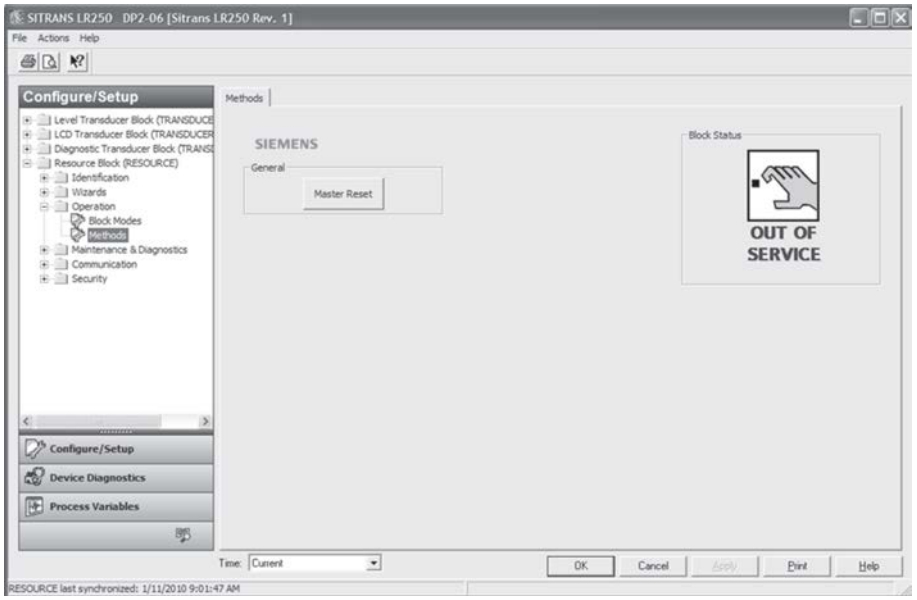


Click on **Methods** to open the dialog window for access to:

General:

- Master Reset: see **Master Reset (4.1.)**



1. Ensure the Block Status is Out of Service.
2. Click the Master Reset button, then click Next to perform a reset.
3. Select the Reset Type

Note

The following parameters are not reset by any reset type: Write Protection, PIN to Unlock, Auto False Echo Suppression Range, Learned TVT.

Reset Type	Result
Factory Defaults [a)]	Default. Resets all user parameters to the manufacturer's default settings. Following this type of reset, complete reprogramming is required.
Standard Defaults	Resets all parameters to standard default settings.
Informational	Resets parameters such as Block Descriptor, Strategy, Device Install Date, Device Message.
Functional [a)]	Resets parameters that control device behavior and functionality (such as Low Calibration Point).
Warm Start	Has the same effect as recycling power to the device.
FF Object Dictionary	Resets the FF standard block profile parameters (such as block tags) to their specified defaults. This option also clears any function block parameters and device schedule [b)] set by the user.

a) The only difference between Factory Defaults and Functional reset is that Factory Defaults resets maintenance parameters, such as device and sensor wear, calibration and maintenance timers. Functional reset does not reset these parameters.

b) See Data transmission in manual *Foundation Fieldbus for Level Instruments* (7ML19985MP01) for further details.

4. Click Next, then FINISH to complete the Master Reset.

7.1.12.4 Maintenance & Diagnostics (RESOURCE)

Navigate to **Configure/Setup > RESOURCE > Maintenance & Diagnostics** for access to:

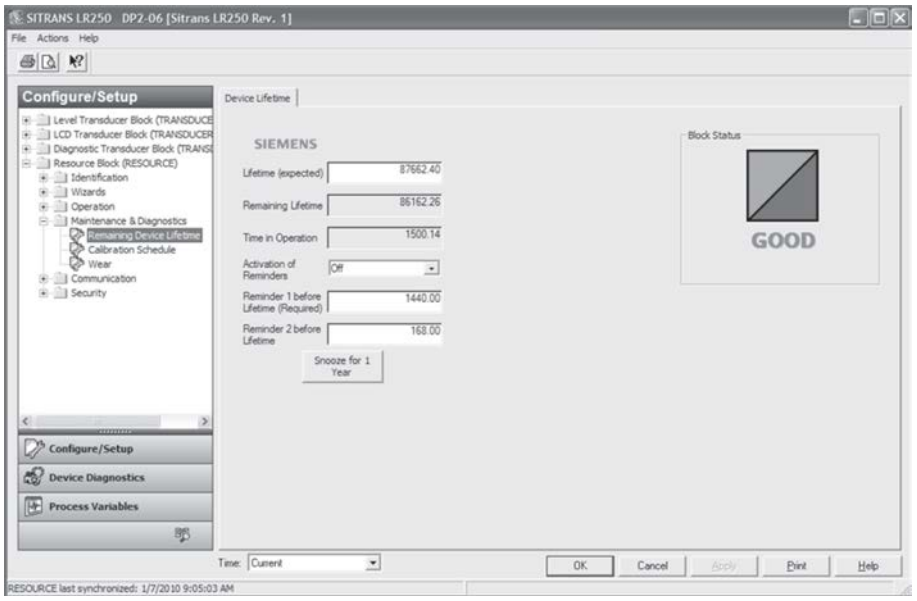
Remaining Device Lifetime

[see **Remaining Device Lifetime (4.2.)**]

- Lifetime (expected) [see **Lifetime (expected (4.2.1.)**]
- Remaining Lifetime (read only) [see **Remaining Lifetime (4.2.3.)**]
- Time in Operation (read only) [see **Time in Operation (4.2.2.)**]
- Activation of Reminders [see **Activation of Reminders (4.2.4.)**]
- Reminder 1 before Lifetime (Required) [see **Reminder 1 before Lifetime (Required) (4.2.5.)**]
- Reminder 2 before Lifetime (Demanded) [see **Reminder 2 before Lifetime (Demanded) (4.2.6.)**]

1. Open the window **Remaining Device Lifetime**
2. After modifying values/units as required, click on **Apply** to accept the change.

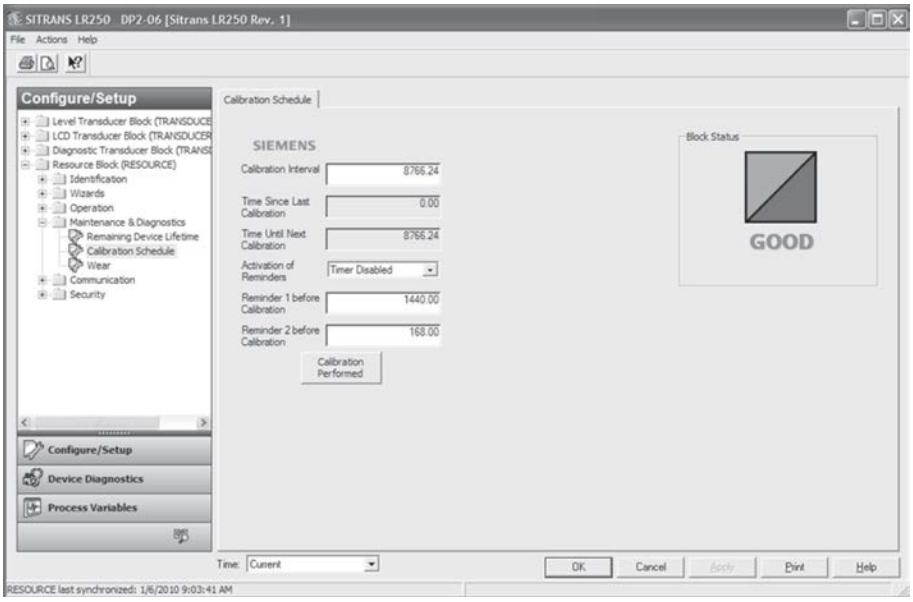
- Click on **Snooze for 1 Year** to add a year to the Total Expected Device Life.



Calibration Schedule

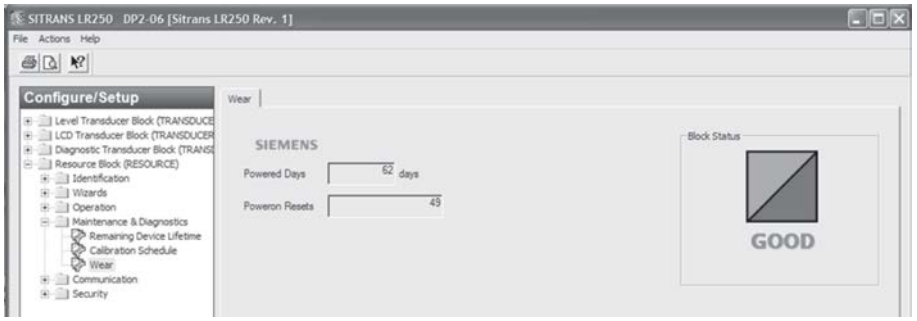
[see **Calibration Schedule (4.5)**]

- Calibration Interval [see **Calibration Interval (4.5.1.)**]
- Time Since Last Calibration [see **Time Since Last Calibration (4.5.2.)**]
- Time Until Next Calibration (read only) [see **Time Until Next Calibration (4.5.3.)**]
- Activation of Reminders [see **Activation of Reminders (4.5.4.)**]
- Reminder 1 before Calibration (Required) [see **Reminder 1 before Calibration (Required) (4.5.5.)**]
- Reminder 2 before Calibration (Demanded) [see **Reminder 2 before Calibration (Demanded) (4.5.6.)**]
- Click on **Calibration Performed** to reset Time Since Last Calibration to 0 hours.



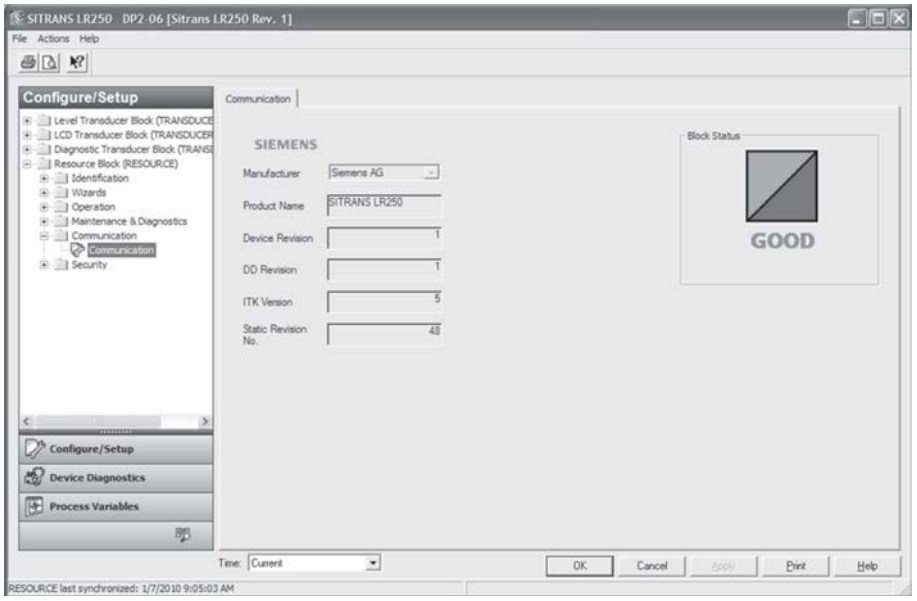
Wear

- Powered Days (read only) [see **Powered Hours (4.7.)**]
- Poweron Resets (read only) [see **Power-on Resets (4.8.)**]



7.1.12.5 Communication (RESOURCE)

- Navigate to **Configure/Setup > RESOURCE > Communication** to read the following:
- Manufacturer [see **Manufacturer (5.3.)**]
- Product Name: the manufacturer's product name for this device.
- Device Revision [see **Device Revision (5.5.)**]
- DD Revision: revision of the DD (also called EDD) associated with this device.
- ITK Version [see **ITK Version (5.6.)**]
- Static Revision No. [see **Static Revision Number (2.6.1.)**]



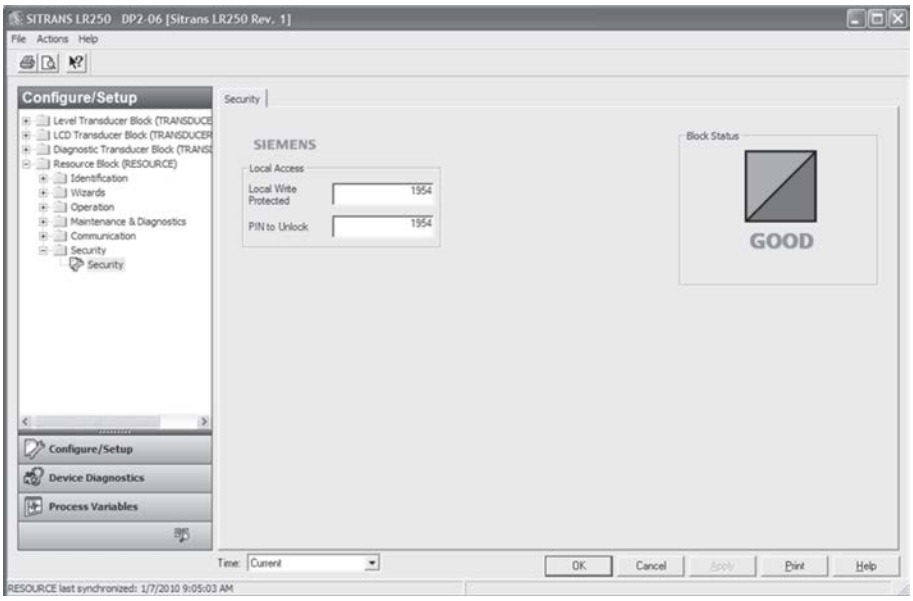
7.1.12.6 Security (RESOURCE)

Navigate to **Configure/Setup > RESOURCE > Security** to access:

Local Access

- Local Write Protected [see **Write Protection (6.2.1.)**]
- PIN to Unlock [see **PIN to Unlock (6.2.2.)**]

See also Password Protection (Page 129).



7.1.13 Device Diagnostics (Level Transducer Block - LTB)

Note

For explanations of the alarms and errors listed below, see Parameter Description charts for the respective block in manual *Foundation Fieldbus for Level Instruments* (7ML19985MP01).

7.1.13.1 Alarms & Errors (LTB)

Navigate to **Device Diagnostics > LTB > Alarms & Errors**.

Click on **Block Error** to open the dialog window to read the following:

Failures

- Input Failure
- Output Failure
- Memory Failure
- Lost Static Data
- Lost Non-Volatile Data
- Readback Check
- Device Fault State
- Block Configuration
- Link Configuration
- Other

Maintenance

- Maintenance Required
- Maintenance Demanded

Information

- Simulation Active
- Local Override
- Power Up
- Out of Service

XD Error

- Transducer Error

Click on **Block Alarm** to open the dialog window to read the following:

Unacknowledged

- Unacknowledged

Alarm State

- Alarm State

Time Stamp

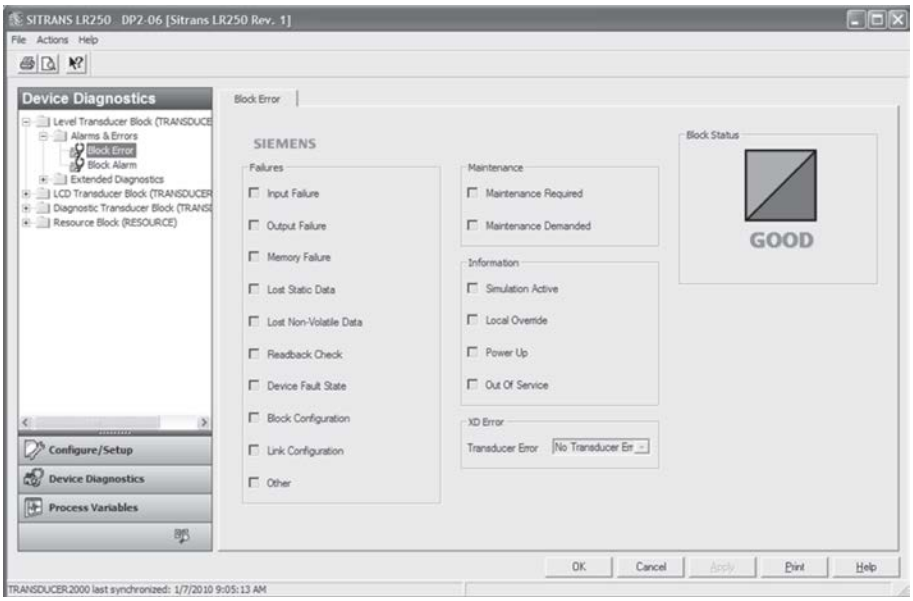
- Time Stamp

Subcode

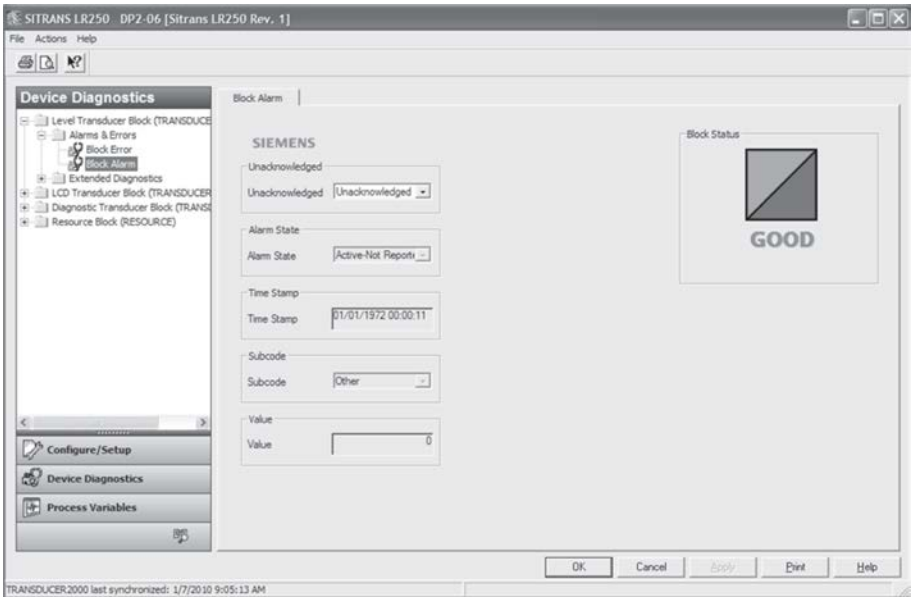
- Subcode

Value

- Value



1. From the **Block Error** tab, check the **Maintenance** window to display the level of maintenance alarm that is active.
2. From the **Block Alarm** tab, check the **Alarm State** window to display the level of maintenance alarm that has been acknowledged.
3. From the **Block Alarm** tab, in the **Unacknowledged** window, select **Acknowledged** to acknowledge an alert.



Note

Acknowledging a maintenance reminder from the device (see **Acknowledge (4.2.9.)**, **(4.3.9.)**, **(4.4.9.)**, **(4.5.9.)** will not set the Block Alarm to Acknowledged in AMS. The maintenance alarm will cause an FF block alert, and the block alert can only be acknowledged via a remote host such as NI-FBUS Configurator or AMS Device Manager (as in step 3 above).

7.1.13.2 Extended Diagnostics (LTB)

Navigate to **Device Diagnostics > LTB > Extended Diagnostics** to read the following:

Detailed Error Info

- Loss of Echo
- No Tech Power
- Sensor Lifetime Limit1
- Sensor Lifetime Limit2
- Device Service Limit1
- Device Service Limit2
- LTB Scale
- Internal Temp Sensor
- Internal Temp High
- Internal Temperature Calibration
- Velocity Calibration
- Receiver Init Calibration
- Receiver Calibration
- Tech Module Hardware
- Tech Module Ramp
- Receiver Frequency Calibration
- Safe Process Data Corrupt
- Profile Clipped
- Too Few Shots Taken
- Measurement Error
- No Shots Taken
- Measurement Was Corrupted
- DMA Error
- Sensor Value too High
- Sensor Value too Low

7.1.14 Device Diagnostics (Liquid Crystal Display Block - LCD)

7.1.14.1 Alarms & Errors (LCD)

Navigate to **Device Diagnostics > LCD > Alarms & Errors** to read Block and Alarm errors. [Errors displayed are the same for each block (LTB, LCD, DIAG, RESOURCE). See Alarms & Errors (LTB) (Page 120) for full listing.]

7.1.15 Device Diagnostics (Diagnostic Transducer Block - DIAG)

7.1.15.1 Alarms & Errors (DIAG)

Navigate to **Device Diagnostics > DIAG > Alarms & Errors** to read Block and Alarm errors. [Errors displayed are the same for each block (LTB, LCD, DIAG, RESOURCE). See Alarms & Errors (LTB) (Page 120) for full listing. See AMS Device Manager instruction manual to work with alarms and errors.]

7.1.16 Device Diagnostics (Resource Block - RESOURCE)

7.1.16.1 Alarms & Errors (RESOURCE)

Navigate to **Device Diagnostics > RESOURCE > Alarms & Errors**.

Click on **Block Error** tab to open the dialog window to read the following:

Failures

- Input Failure
- Output Failure
- Memory Failure
- Lost Static Data
- Lost Non-Volatile Data
- Readback Check
- Device Fault State
- Block Configuration
- Link Configuration
- Other

Maintenance

- Maintenance Required
- Maintenance Demanded

Information

- Simulation Active
- Local Override
- Power Up
- Out of Service

Click on **Block Alarm** tab to open the dialog window to read the following:

Unacknowledged

- Unacknowledged

Alarm State

- Alarm State

Time Stamp

- Time Stamp

Subcode

- Subcode

Value

- Value

Values available on **Block Alarm** tab are also available for **Write Alarm** with one exception: the Value parameter on the Write Alarm tab is a **Discrete Value**. Click on **Alarm Summary** tab to open the dialog window to read the following:

Current

- Discrete Alarm
- Block Alarm

Unacknowledged

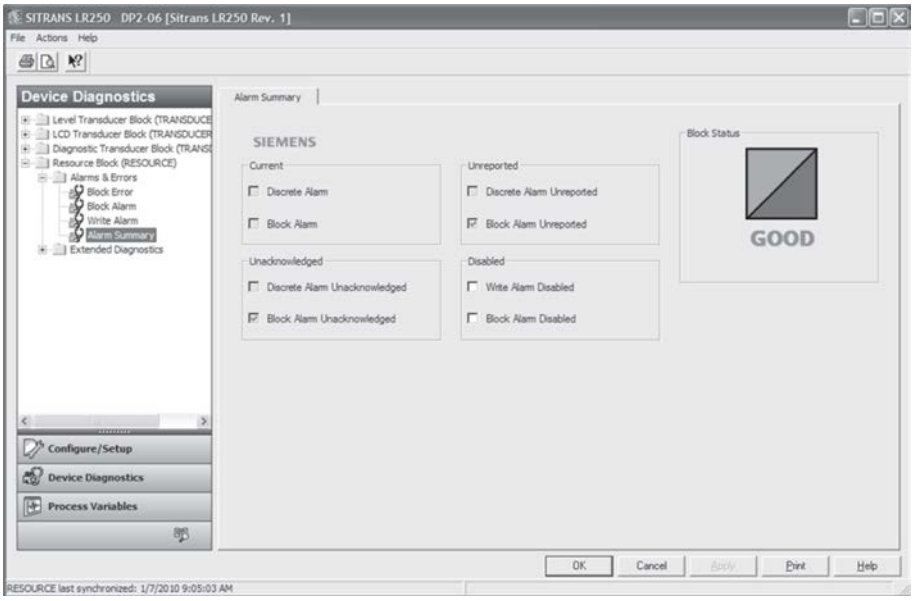
- Discrete Alarm Unacknowledged
- Block Alarm Unacknowledged

Unreported

- Discrete Alarm Unreported
- Block Alarm Unreported

Disabled

- Write Alarm Disabled
- Block Alarm Disabled



7.1.16.2 Extended Diagnostics (RESOURCE)

Navigate to **Device Diagnostics > RESOURCE > Extended Diagnostics** to read the following:

Detailed Error Info

- Device Lifetime Limit1
- Device Lifetime Limit2
- Calibration Schedule Limit1
- Calibration Schedule Limit2
- Memory RAM
- Memory EEPROM
- Memory EEPROM Flags
- Memory Flash
- Corrupt Stack
- High Stack
- Data Safe Read
- Data Safe Write
- Board Voltage
- ADC Failed
- Seq. Corrupt
- Seq. CP
- Seq. Duration
- BC Corrupt
- BC Start
- BC Stop
- BC Duration
- CPU Fault
- Data Bus
- Addr Bus
- Spurious SW Interrupt
- Spurious HW Interrupt
- Time Base Failure

7.1.17 Process Variables (Level Transducer Block - LTB)

To compare outputs in real time navigate to **Process Variables > LTB**.

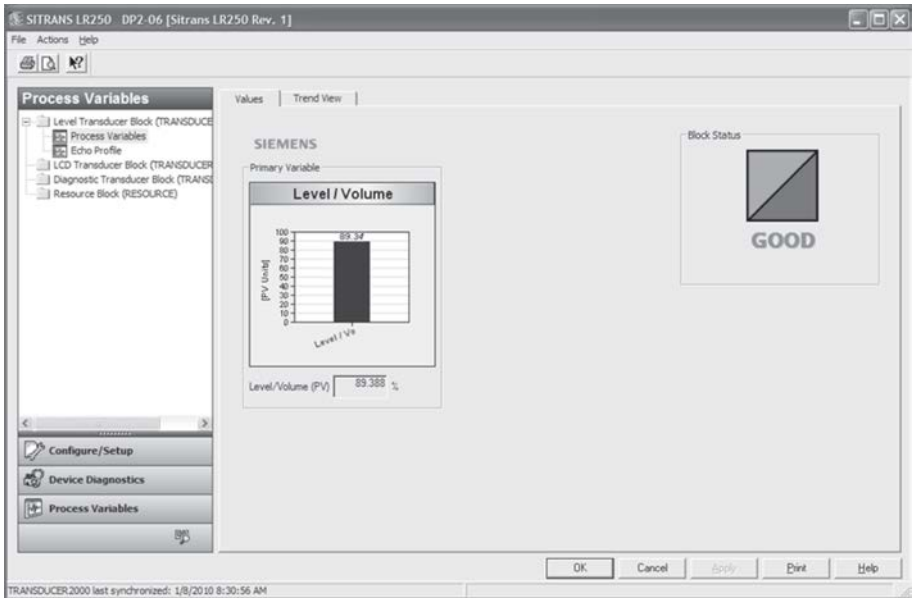
Click on **Process Variables** then the **Values** tab to read the following:

Primary Variable

[see **Main Output (PV - Primary Value) (2.8.1.)**]

- Level/Volume (PV)

  The primary variable and the channel 1 output from the transducer block. For level applications, chart range is affected by High and Low Level Point values set in **Configure/Setup > LTB > Setup > Sensor**. For volume applications, chart range is 0 to Max. Volume, set in **Configure/Setup > LTB > Setup > Linearization**.



Click on **Trend View** tab to read the following:

Trend Values

- Level/Volume (PV)

  The primary variable and the channel 1 output from the transducer block.

Click on **Echo Profile** to open the dialog window to read the following:

Echo Profile

• Level Measurement [see **Measured Values (2.8.)**]

• Distance Measurement [see **Measured Values (2.8.)**]

• Confidence [see **Confidence (2.5.9.1.)**]

• Near Range [see **Near Range (2.5.1.)**]

7.1.18 Password Protection

7.1.18.1 User Manager utility

Usernames, passwords, and permissions, are assigned to users by an AMS Device Manager administrator, using the User Manager utility on the Server Plus Station. Only a user with AMS Device Manager System Administration rights can log in to User Manager.

To configure a new user/edit existing user:

1. From the Windows taskbar select: **Start > AMS Device Manager > User Manager**.
2. In the User Manager window click on **Add User**.

The Add User Wizard dialog allows you to:

- select a user type, standard (AMS Device Manager) or Window user.
- enter the username and password, and set permissions
- edit existing users

An AMS Device Manager administrator can configure the user to require a password. The use of passwords is recommended. A password should be assigned to the 'admin' username immediately after installing AMS Device Manager.

Each user is given an AMS Device Manager username and password and required to enter them when they start AMS Device Manager. Access to functions depends on the level of permissions granted.

Login types

- standard, local, or domain

A standard user can change their password in AMS Device Manager. A Local or Domain Windows user cannot change their password using AMS Device Manager and must request their network administrator to do so.

7.1.19 AMS menu structure

CONFIGURE/SETUP

LEVEL TRANSDUCER BLOCK

- **IDENTIFICATION**
  - **Identification**
    - Identification (tab)
      - TAG
      - Descriptor
      - Transducer Block Type
      - Strategy
      - Plant Unit
- **IDENTIFICATION**
  - **Block Modes**
    - Block Modes (tab)
      - Actual Mode
        - Automatic
        - Out of Service
      - Target Mode
        - Automatic
        - Out of Service
      - Permitted Mode
        - Automatic
        - Out of Service
      - Normal Mode
        - Automatic
        - Out of Service
  - **Simulation**
    - Simulation(input) (tab)
      - Sensor Value Simulation
        - Simulation
        - Simulation Value
        - RAMP start
        - RAMP end
        - RAMP No of steps
        - RAMP steplength
- **SETUP**
  - **Sensor**
    - Sensor (tab)
      - General
        - Unit
        - Level Unit
        - Temperature Unit
        - PV (Volume/Level) Unit
        - Application Type
        - Material
        - Loss of Echo Timer

- Calibration
  - Low Calibration Point
  - High Calibration Point
  - Sensor Offset
  - Low Level Point
  - High Level Point
  - Level Offset
- Rate
  - Response Rate
  - Fill Rate per minute
  - Empty Rate per minute

Linearization

- Vessel Shape (tab)
  - Vessel Shape
    - Vessel Shape
  - Vessel Dimensions
    - Maximum Volume
    - Vessel Dimension A
    - Vessel Dimension L
- Breakpoints (tab)
  - Levels and Volume Breakpoints
    - Level 1
    - Level 2
    - ...
    - Level 32
    - Volume 1
    - Volume 2
    - ...
    - Volume 32
    - Vessel Shape

SIGNAL PROCESSING

General

- General (tab)
  - Range
    - Near Range
    - Far Range
    - Propogation Factor
    - Minimum Sensor Value
    - Maximum Sensor Value
  - Echo Select
    - Algorithm
    - Position Detect
    - Echo Threshold
    - CLEF Range
  - Sampling
    - Echo Lock
    - Sampling Up
    - Sampling Down
  - Echo Quality
    - Confidence
    - Echo Strength
    - Noise Average

- **TVT**
  - TVT Setup (tab)
    - Auto False Echo Suppression
    - Auto False Echo Suppression Range
    - Hover Level
    - Shaper Mode
  - TVT Shaper (tab)
    - Breakpoints
      - Breakpoint 1
      - Breakpoint 2
      - ...
      - Breakpoint 40
      - Shaper Mode
- **Manual TVT-Curve**
  - Manual TVT-Diagram (tab)
- **Echo Profile**
  - Echo Profile (tab)
    - Echo Profile Parameters
      - Level Measurement
      - Distance Measurement
      - Confidence
      - Near Range

MAINTENANCE & DIAGNOSTICS

- **Remaining Sensor Lifetime**
  - Sensor Lifetime (tab)
    - Lifetime (expected)
    - Time in Operation
    - Remaining Lifetime
    - Activation of Reminders
    - Reminder 1 before Lifetime (Required)
    - Reminder 2 before Lifetime (Demanded)
- **Service Schedule**
  - Service Schedule (tab)
    - Service Interval
    - Time Since Last Service
    - Time Until Next Service
    - Activation of Reminders
    - Reminder 1 before Service (Required)
    - Reminder 2 before Service (Demanded)
- **Electronics Temperature**
  - Electronics Temperature (tab)
    - Electronics Temperature
    - Minimum Value
    - Maximum Value

COMMUNICATION

- **Communication**
  - Communication (tab)
    - Static Revision No.

LCD TRANSDUCER BLOCK

- **IDENTIFICATION**
  - **Identification**
    - Identification (tab)
      - TAG
      - Descriptor
      - Transducer Block Type
      - Strategy
      - Plant Unit
- **OPERATION**
  - **Block Modes**
    - Block Modes (tab)
      - Actual Mode
        - Automatic
        - Out of Service
      - Target Mode
        - Automatic
        - Out of Service
      - Permitted Mode
        - Automatic
        - Out of Service
      - Normal Mode
        - Automatic
        - Out of Service
- **SETUP**
  - **Local Display**
    - Local Display (tab)
      - Language
      - LCD Fast Mode
      - LCD Contrast
      - Local Operation
- **COMMUNICATION**
  - **Communication**
    - Communication (tab)
      - Static Revision No.

DIAGNOSTIC TRANSDUCER BLOCK

- **IDENTIFICATION**
  - **Identification**
    - Identification (tab)
      - TAG
      - Descriptor
      - Transducer Block Type
      - Strategy
      - Plant Unit
- **OPERATION**
  - **Block Modes**
    - Block Modes (tab)
      - Actual Mode
        - Automatic
        - Out of Service

Target Mode
Automatic
Out of Service
Permitted Mode
Automatic
Out of Service
Normal Mode
Automatic
Out of Service

COMMUNICATION

Communication
Communication (tab)
Static Revision No.

RESOURCE BLOCK

IDENTIFICATION

Identification
Identification (tab)
Identification
TAG
Descriptor
Message
Date
Strategy
Plant Unit
Device
Manufacturer
Product Name
Order Number
Serial Number
Hardware Revision
Firmware Revision
Loader Revision
EDD Version
Date of Manufacturing

WIZARDS

Quick Start

Step 1 - Identification
Step 1 of 5: Identification (tab)
TAG
Descriptor
Message
Date
Order Number
Language

Step 2 - Application
Step 2 of 5: Application (tab)
Application Type
Propogation Factor
Material

Step 3 - Vessel Shape
- Step 3 of 5: Vessel Shape (tab)
  - Vessel Shape

Step 4 - Ranges
- Step 4 of 5: Ranges (tab)
  - Unit
  - Low Calibration Point (X)
  - High Calibration Point (Y)
  - Response Rate
  - Maximum Volume
  - Vessel Dimension A
  - Vessel Dimension L
- Breakpoints (tab)
  - Levels and Volume Units
    - Level Unit
    - Level PV (Volume/Level) Unit
  - Levels and Volume Breakpoints
    - Level 1
    - Level 2
    - ...
    - Level 32
    - Volume 1
    - Volume 2
    - ...
    - Volume 32

Step 4 - Summary
- Step 5 of 5: Summary (tab)
  - Identification
    - TAG
    - Descriptor
    - Message
    - Date
    - Order Number
    - Language
  - Application
    - Application Type
    - Propogation Factor
    - Material
  - Vessel Shape
    - Vessel Shape
  - Ranges
    - Unit
    - Low Calibration Point (X)
    - High Calibration Point (Y)
    - Response Rate
    - Maximum Volume
    - Vessel Dimension A
    - Vessel Dimension L

- **OPERATION**
  - **Block Modes**
    - Block Modes (tab)
      - Actual Mode
        - Automatic
        - Out of Service
      - Target Mode
        - Automatic
        - Out of Service
      - Permitted Mode
        - Automatic
        - Out of Service
      - Normal Mode
        - Automatic
        - Out of Service
  - **Methods**
    - Methods (tab)
      - General
        - Master Reset
- **MAINTENANCE & DIAGNOSTICS**
  - **Remaining Device Lifetime**
    - Device Lifetime (tab)
      - Lifetime (expected)
      - Remaining Lifetime
      - Time in Operation
      - Activation of Reminders
      - Reminder 1 before Lifetme (Required)
      - Reminder 2 before Lifetime (Demanded)
  - **Calibration Schedule**
    - Calibration Schedule (tab)
      - Calibration Interval
      - Time Since Last Calibration
      - Time Until Next Calibration
      - Activation of Reminders
      - Reminder 1 before Calibration (Required)
      - Reminder 2 before Calibration (Demanded)
  - **Wear**
    - Wear (tab)
      - Powered Days
      - Poweron Resets
- **COMMUNICATION**
  - **Communication**
    - Communication (tab)
      - Manufacturer
      - Product Name
      - Device Revision
      - DD Revision
      - ITK Version
      - Static Revision No.

SECURITY

Security

Security (tab)

Local Access

Local Write Protected

PIN to Unlock

DEVICE DIAGNOSTIC

LEVEL TRANSDUCER BLOCK

ALARMS & ERRORS

Block Error

Block Error (tab)

Failures

Input Failure

Output Failure

Memory Failure

Lost Static Data

Lost Non-Volatile Data

Readback Check

Device Fault State

Block Configuration

Link Configuration

Other

Maintenance

Maintenance Required

Maintenance Demanded

Information

Simulation Active

Local Override

Power Up

Out of Service

XD Error

Transducer Error

Block Alarm

Block Alarm (tab)

Unacknowledged

Unacknowledged

Alarm State

Alarm State

Time Stamp

Time Stamp

Subcode

Subcode

Value

Value

EXTENDED DIAGNOSTICS

Extended Diagnostics

Extended Diagnostics (tab)

Detailed Error Info

Loss of Echo

No Tech Power

Sensor Lifetime Limit1
Sensor Lifetime Limit2
Device Service Limit1
Device Service Limit2
LTB Scale
Internal Temp Sensor
Internal Temp High
Internal Temperature Calibration
Velocity Calibration
Receiver Init Calibration
Receiver Calibration
Tech Module Hardware
Tech Module Ramp
Receiver Frequency Calibration
Safe Process Data Corrupt
Profile Clipped
Too Few Shots Taken
Measurement Error
No Shots Taken
Measurement Was Corrupted
DMA Error
Sensor Value Too High
Sensor Value Too Low

LCD TRANSDUCER BLOCK

ALARMS & ERRORS

Block Error

Block Error (tab)

Failures

Input Failure
Output Failure
Memory Failure
Lost Static Data
Lost Non-Volatile Data
Readback Check
Device Fault State
Block Configuration
Link Configuration
Other

Maintenance

Maintenance Required
Maintenance Demanded

Information

Simulation Active
Local Override
Power Up
Out of Service

XD Error

Transducer Error

DIAGNOSTIC TRANSDUCER BLOCK

ALARMS & ERRORS

- **Block Error**
  - Block Error (tab)
    - Failures
      - Input Failure
      - Output Failure
      - Memory Failure
      - Lost Static Data
      - Lost Non-Volatile Data
      - Readback Check
      - Device Fault State
      - Block Configuration
      - Link Configuration
      - Other
    - Maintenance
      - Maintenance Required
      - Maintenance Demanded
    - Information
      - Simulation Active
      - Local Override
      - Power Up
      - Out of Service
    - XD Error
      - Transducer Error
- **Block Alarm**
  - Block Alarm (tab)
    - Unacknowledged
      - Unacknowledged
    - Alarm State
      - Alarm State
    - Time Stamp
      - Time Stamp
    - Subcode
      - Subcode
    - Value
      - Value

RESOURCE BLOCK

ALARMS & ERRORS

- **Block Error**
  - Block Error (tab)
    - Failures
      - Input Failure
      - Output Failure
      - Memory Failure
      - Lost Static Data
      - Lost Non-Volatile Data
      - Readback Check
      - Device Fault State
      - Block Configuration

Link Configuration
Other
Maintenance
Maintenance Required
Maintenance Demanded
Information
Simulation Active
Local Override
Power Up
Out of Service

Block Alarm
Block Alarm (tab)
Unacknowledged
Unacknowledged
Alarm State
Alarm State
Time Stamp
Time Stamp
Subcode
Subcode
Value
Value

Write Alarm
Write Alarm (tab)
Unacknowledged
Unacknowledged
Alarm State
Alarm State
Time Stamp
Time Stamp
Subcode
Subcode
Value
Value

Alarm Summary
Alarm Summary (tab)
Current
Discrete Alarm
Block Alarm
Unacknowledged
Discrete Alarm Unacknowledged
Block Alarm Unacknowledged
Unreported
Discrete Alarm Unreported
Discrete Alarm Unreported
Disabled
Write Alarm Disabled
Block Alarm Disabled

Trend Values

Level/Volume (PV)

Echo Profile

Echo Profile (tab)

Echo Profile Parameters

Level Measurement

Distance Measurement

Confidence

Near Range