Radar Transmitters

SITRANS LR250 (Foundation Fieldbus)

Operating Instructions · 01/2014

SITRANS

SIEMENS

Safety Guidelines

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

Qualified Personnel

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

Unit Repair and Excluded Liability:

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

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

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

Note: Always use product in accordance with specifications.

Contact SMPI Technical Publications at the following address:
Technical Publications
Siemens AG
Siemens Milltronics Process Instruments
1954 Technology Drive, P.O. Box 4225
Peterborough, Ontario, Canada, K9J 7B1
Email: techpubs.smpi@siemens.com

European Authorized Representative

Siemens AG
Industry Sector
76181 Karlsruhe
Deutschland

- For a selection of Siemens Milltronics level measurement manuals, go to: **www. siemens.com/processautomation**. Under Process Instrumentation, select *Level Measurement* and then go to the manual archive listed under the product family.
- For a selection of Siemens Milltronics weighing manuals, go to: **www. siemens.com/processautomation**. Under Weighing Technology, select *Continuous Weighing Systems* and then go to the manual archive listed under the product family.

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SITRANS

Radar Transmitters SITRANS LR250 (FOUNDATION FIELDBUS)

Operating Instructions

01/2014

A5E32221411-AB

Legal information

Warning notice system

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

⚠DANGER

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

⚠WARNING

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

⚠CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠WARNING

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

Trademarks

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

Disclaimer of Liability

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

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GERMANY

Order number: A5E32221411
℗ 09/2013 Technical data subject to change

Table of contents

Introduction

1

1.1 The manual

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

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

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

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

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

Note

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

Application examples

The application examples used in this manual illustrate typical installations. [See Application examples (Page 55).] Because there is often a range of ways to approach an application, other configurations may also apply.

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

Note

For industrial use only

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

1.2 Firmware revision history

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

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

Firmware rev.	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.

Safety notes

2

2.1 Safety marking symbols

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

2.2 FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

⚠ WARNING
Changes or modifications not expressly approved by Siemens Milltronics could void the user's authority to operate the equipment.

Note

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications, in which case the user will be required to correct the interference at his own expense.

2.3 CE Electromagnetic Compatibility (EMC) Conformity

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

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

2.4 Industry Canada

1. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
2. This device shall be installed and operated in a completely enclosed container to prevent RF emission which otherwise can interfere with aeronautical navigation. Installation shall be done by trained installers, in strict compliance with the manufacturer’s instructions.
3. The use of this device is on a “no-interference, no-protection” basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. On the other hand, level probing devices found to interfere with primary licensing operations will be required to be removed at the user’s expense.

Description

3

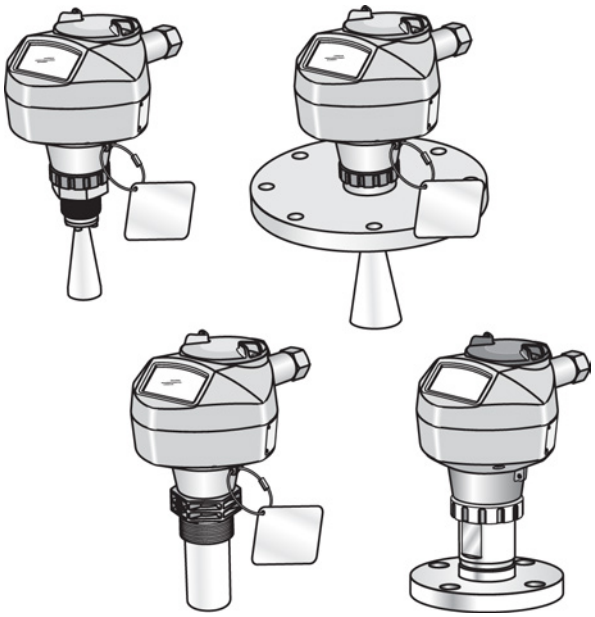
3.1 SITRANS LR250 overview

⚠ WARNING
SITRANS LR250 is to be used only in the manner outlined in this manual, otherwise protection provided by the device may be impaired.

SITRANS LR250 is a 2-wire 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage vessels including high pressure and high temperature, to a range of 20 meters (66 feet). It is ideal for small vessels and low dielectric media.

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

This device supports 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

3.4 Approvals and certificates

Note

For further details see Approvals (Page 203).

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

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

Installing/mounting

4

WARNING

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

Note

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

4.1 Pressure applications

⚠ WARNING

Pressure applications

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

Note

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

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

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

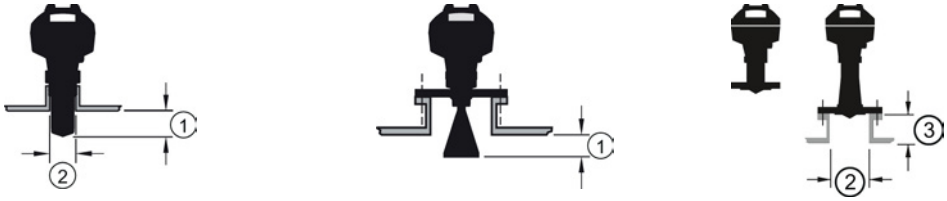
4.2 Mounting location

Note

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

4.2.1 Nozzle design

Threaded PVDF antenna **Stainless steel horn antenna** **Flanged encapsulated antenna**



① Minimum clearance: 10 mm (0.4")

② Minimum diameter: 50 mm (2")

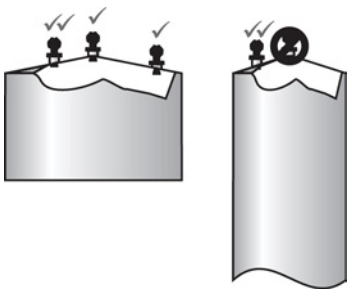
③ Maximum nozzle length: 500 mm (20")

- The end of the antenna must protrude a minimum of 10 mm (0.4") to avoid false echoes being reflected from the 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 any version except the Threaded PVDF and Flanged encapsulated antenna (FEA).
- The maximum nozzle length for the FEA is 500 mm (20").

1) Not applicable for FEA

4.2.2 Nozzle location

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

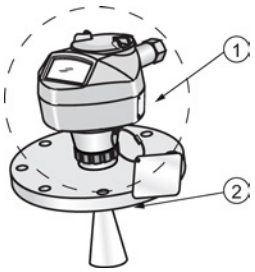


Preferred

Undesirable

Environment

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



① Ambient temperature
② Process temperature (at process connection)

Antenna	①	②
Horn	-40 to +80 °C (-40 to +176 °F)	with FKM O-ring:-40 to +200 °C (-40 to 392 °F)
		with FFKM O-ring:-20 to +200 °C (-4 to +392 °F)
PVDF	-40 to +80 °C (-40 to +176 °F)	-40 to +80 °C (-40 to +176 °F)
Flanged encapsulated	-40 to +80 °C (-40 to +176 °F)	-40 to +170 °C (-40 to +338 °F)

Access for programming

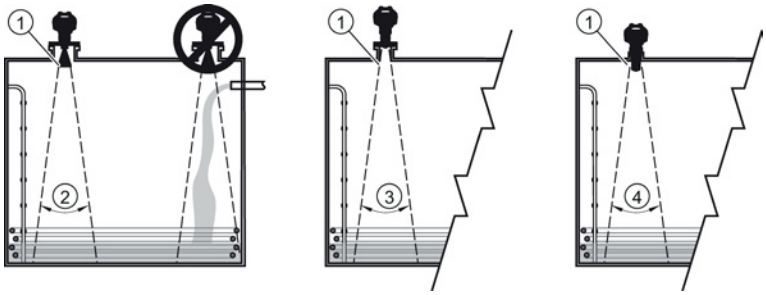
- Provide easy access for viewing the display and programming via the handheld programmer.

Beam angle

Note

- Beam width depends on antenna size: see below.
- For details on avoiding false echoes, see Auto False Echo Suppression (Page 236).

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



① Emission cone

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

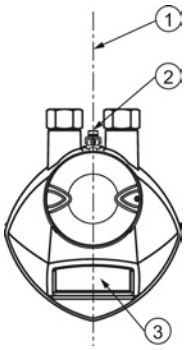
Emission cone

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

4.2.3 Orientation in a vessel with obstructions

Polarization reference point

For best results on a vessel with obstructions, or a stillpipe with openings, orient the front or back of the device toward the obstructions. For an illustration, see Device orientation (Page 21).



① Polarization axis
② Polarization reference point
③ Display

4.2.4 Mounting on a Stillpipe or Bypass Pipe

A stillpipe or bypass pipe is used for products with a low dK, or when vortex or extremely turbulent conditions exist. It can also be used to provide optimum signal conditions on foaming materials. See Dielectric constant of material measured in Performance (Page 198) for more information.

4.2.5 Stillpipe or Bypass Pipe requirements

- The pipe diameter must be matched with the antenna size. Use the largest antenna size that will fit the stillpipe/bypass pipe[1]. See Threaded Horn dimensions (Page 205) or Raised-Face Flange per EN 1092-1 (Page 222).
- One continuous length of metallic pipe is preferred, without joints. Bad joints create reflections.
- Joints (if unavoidable) must be machined to ± 0.25 mm (± 0.010") and must have welded connecting sleeve on the outside.

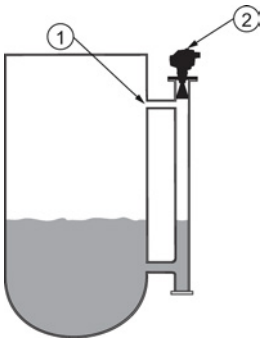
[1] Mounting in a pipe greater than 100 mm (4") can cause large errors, and therefore is not recommended.

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

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

4.2.6 Device orientation

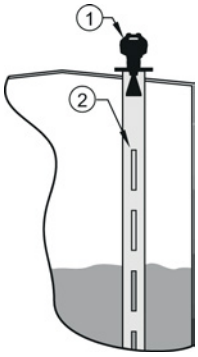
Bypass pipe installation



① Vent

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

Stillpipe installation



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

② Slots

[1] Horn antenna version shown as example

4.3 Installation instructions

⚠ WARNING

For pressure applications, it will be necessary to use PTFE tape or other appropriate thread sealing compound, and to tighten the process connection beyond hand-tight. (The maximum recommended torque for Threaded versions is 40 N-m (30 ft.lbs.) See Flange bolting, Flanged encapsulated antenna only (Page 23) for FEA recommended torque values.)

Note

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

Threaded versions

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

Flanged versions

See Flanged Horn with extension (Page 210), Raised-Face Flange per EN 1092-1 (Page 222), Flat-Face Flange (Page 225), and Flanged encapsulated antenna (3"/DN80/80A sizes and larger) (Page 216) for dimensions.

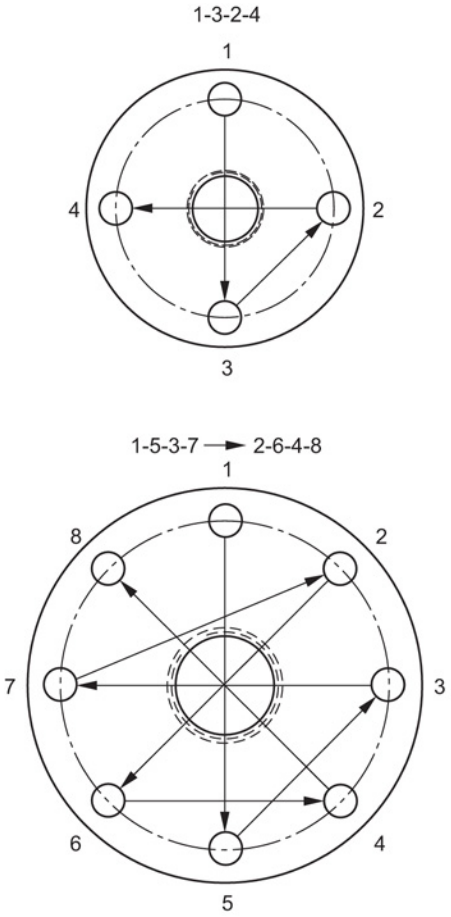
4.4 Flange bolting, Flanged encapsulated antenna only

Note

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

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



Recommendations for flange bolting:

- Use cross-pattern sequence as shown
- Check uniformity of the flange gap
- Apply adjustments by selective tightening if required
- Torque incrementally until desired value is reached
- Check/re-torque after 4 to 6 hours
- Check bolts periodically, re-torque as required
- Use new lens, O-ring and spring washers after removal from installation.

For instructions on replacing the lens, see Part replacement (Page 185).

Connecting

5

5.1 Power

WARNING

The DC input terminals shall be supplied from a source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1.

Note

All field wiring must have insulation suitable for rated voltages.

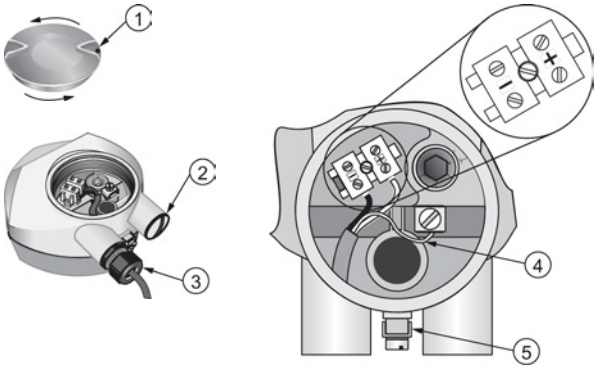
5.2 Connecting SITRANS LR250

⚠ WARNING

- Check the nameplate on your device, to verify the approval rating.
- Use appropriate conduit seals to maintain IP or NEMA rating.
- See Wiring setups with Foundation Fieldbus for hazardous areas (Page 30).

Note

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



① Use a 2 mm Allen key to loosen the lid-lock set screw

② Plug (IP 68)

③ Optional cable gland [a) b)] (or NPT cable entry)[b)]

④ Cable shield

⑤ Ground terminal

[a)] May be shipped with the device.

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

Wiring instructions

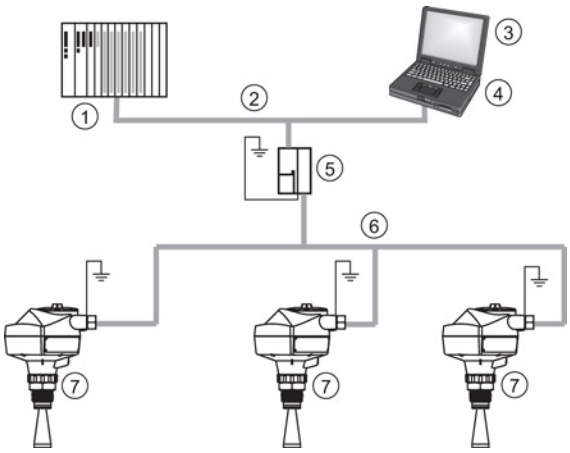
1. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland. (If cable is routed through conduit, use only approved suitable-size hubs for waterproof applications.)
2. Connect the wires to the terminals as shown: the polarity is identified on the terminal block.
3. Ground the device according to local regulations.
4. Tighten the gland to form a good seal.
5. Close the lid and secure the locking screw before programming and device configuration.

Note

- 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.

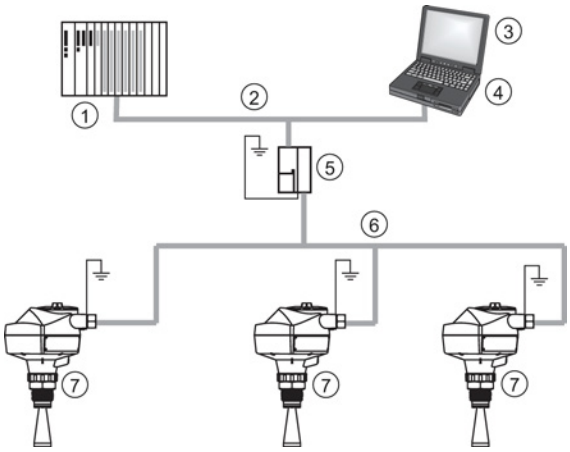
5.2.1 Basic Configuration with Foundation Fieldbus (H1)

Configuration via Gateway



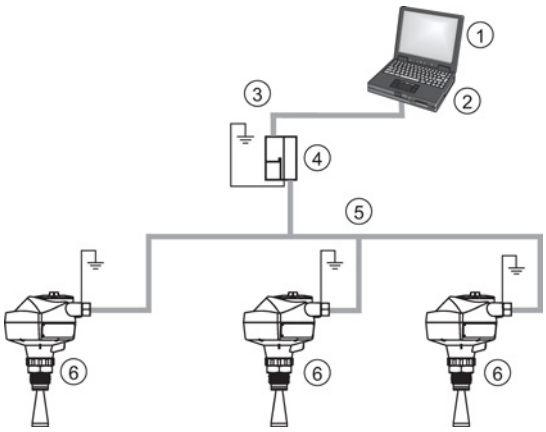
① Controller
② FF (HSE)
③ Configurator software
④ PC/laptop
⑤ Rosemount 3420 HSE/H1Gateway
⑥ FF (H1)
⑦ LR250 FF

Configuration via Linking Device



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

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 with Foundation Fieldbus for hazardous areas

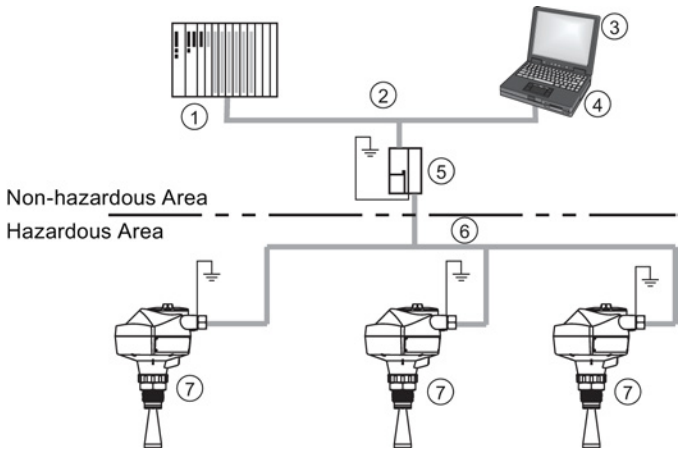
There are three wiring options for hazardous area installations:

- Intrinsically safe wiring (Page 32)
- Non-sparking wiring (Page 35)
- Non-incendive wiring (US/Canada only) (Page 35)

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

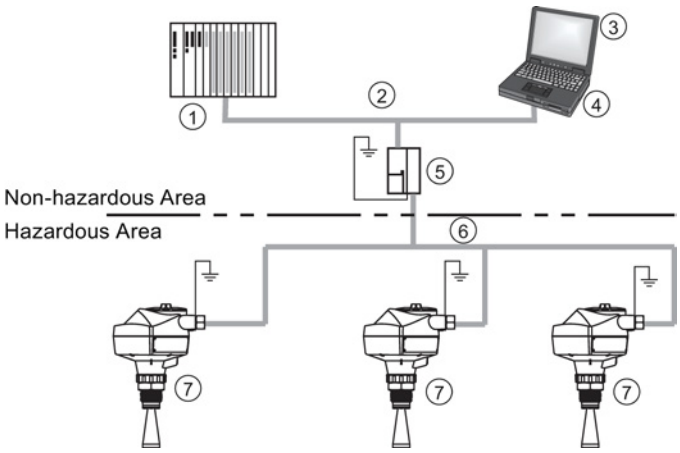
5.3.1 Configuration with Foundation Fieldbus for hazardous areas

Configuration via Gateway



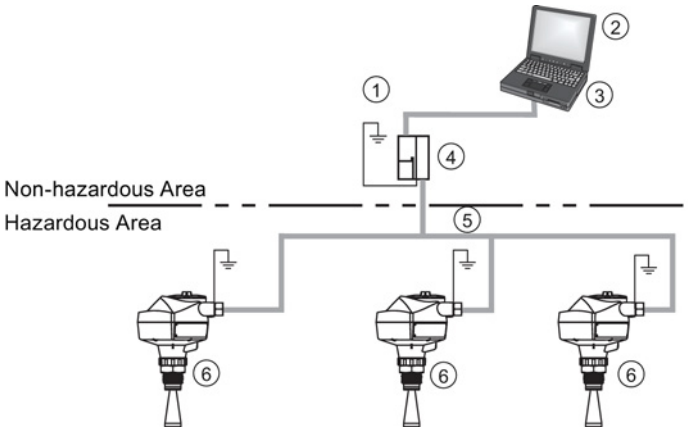
① Controller
② FF (HSE)
③ Configurator software
④ PC/laptop
⑤ EEx ia type HSE/H1
⑥ FF (H1)
⑦ LR250 FF

Configuration via Linking Device



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

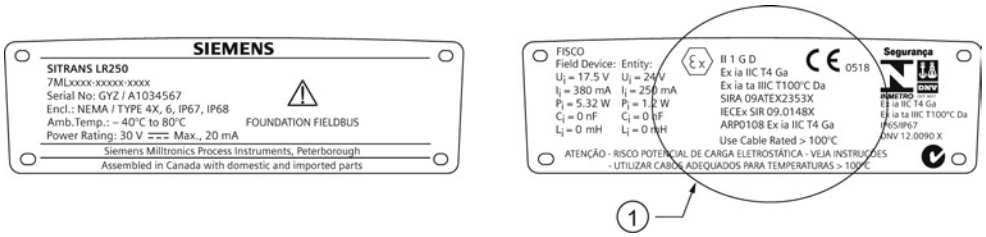
Configuration via PCI/PCMCIA Card



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

5.3.2 Intrinsically safe wiring

Device nameplate (ATEX/IECEx/C-TICK)



① ATEX certificates

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

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

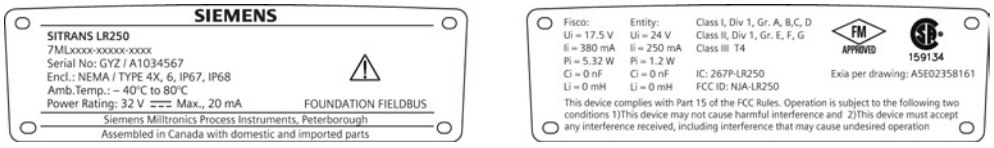
Go to **Support > Approvals / Certificates.**

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.**

Device nameplate (FM/CSA)



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 36).

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.

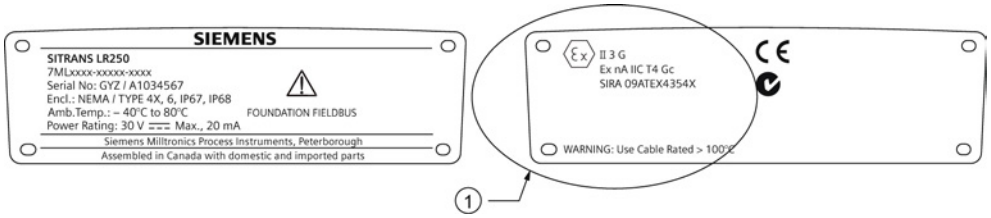
In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The allowed voltage Uo (or Voc or Vt) of the associated apparatus is limited to the range of 14V dc to 24V dc. All other equipment connected to the bus cable 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

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



① ATEX certificate

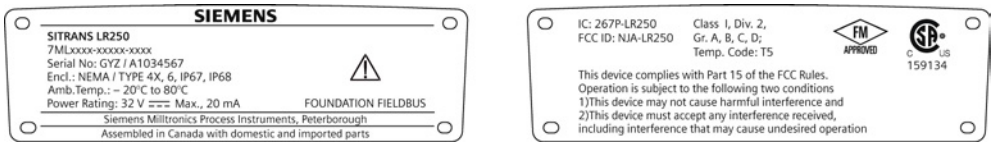
Product page (http://www.siemens.com/LR250)

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 36).

5.4 Instructions specific to hazardous area installations

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

The following instructions apply to equipment covered by certificate number SIRA 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.

Commissioning

6

6.1 Operating via the handheld programmer

6.1.1 Power up

Power up the device. A transition screen showing first the Siemens logo and then the current firmware revision is displayed while the first measurement is being processed. 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 70).]

Follow these steps to configure the device via the LUI:

- Complete the Quick Start Wizard [see Quick Start Wizard via the handheld programmer (Page 48)]. 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.

6.1.2 Handheld programmer functions

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

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

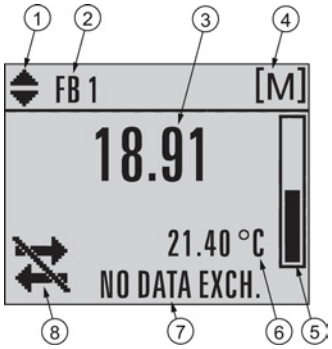
- locally [see Quick Start Wizard via the handheld programmer (Page 48)]
- or from a remote location [see Quick Start Wizard via AMS Device Manager (Page 70)]

For more complex setups see Application Examples (Page 55), and for the complete range of parameters see Parameter Reference (Page 129).

6.1.2.1 The LCD display

Measurement mode display

Normal operation

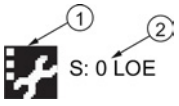


① toggle indicator [a] to switch between AIFB 1/AIFB 2 (displayed as FB1/FB2)
② identifies which block is source of displayed value
③ Measured value (level, space, distance, or volume)
④ Units
⑤ Bar graph indicates level
⑥ Secondary region indicates on request [b] electronics temperature, echo confidence,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

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

[b] In response to a key press request. For details, see Programming (Page 42) for key functions in Measurement mode.

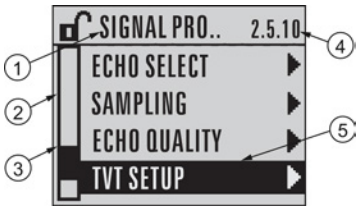
Fault present



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

PROGRAM mode display

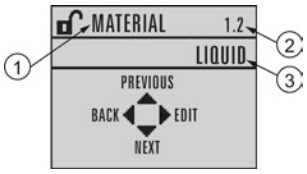
Navigation view



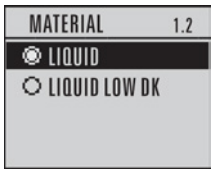
① Current menu
② Menu bar
③ Item band
④ Current item number
⑤ Current item

- 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

6.1.2.2 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.

6.1.3 Programming

Note

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

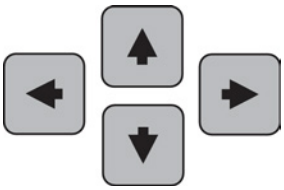
Change parameter settings and set operating conditions to suit your specific application. For remote operation see Operating via AMS Device Manager (Page 63).

Parameter menus

Note

For the complete list of parameters with instructions, see Parameter Reference (Page 129).

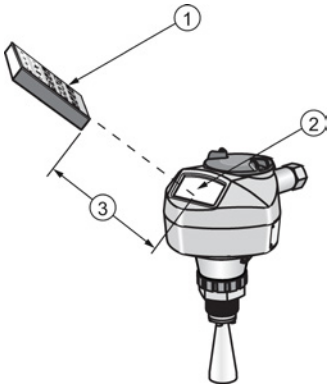
Parameters are identified by name and organized into function groups. See LCD menu structure (Page 255).



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

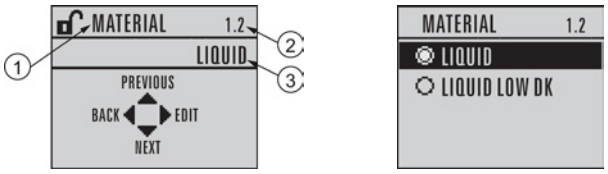
Note

- 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

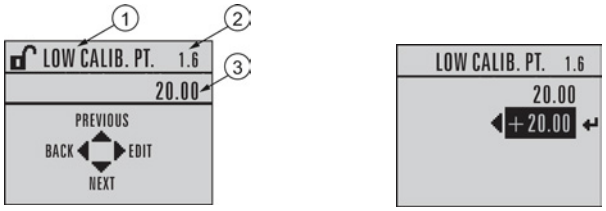
1. Navigate to the desired parameter.
2. Press **RIGHT arrow** to open parameter view.
3. Press **RIGHT arrow** again to open **Edit** mode. The current selection is highlighted. Scroll to a new selection.
4. Press **RIGHT arrow** to accept it. The LCD returns to parameter view and displays the new selection.



① Parameter name
② Parameter number
③ Current selection

Changing a numeric value

1. Navigate to the desired parameter.
2. Press **RIGHT arrow** to open parameter view. The current value is displayed.
3. Press **RIGHT arrow** again to open **Edit** mode. The current value is highlighted.
4. Key in a new value.
5. Press **RIGHT arrow** to accept it. 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.
	**Clear**	Numeric editing	Erases the display.
	**Decimal point**	Numeric editing	• Enters a decimal point • Captures the current path [see **Secondary Value (4.1.1.)**]
	**Plus or minus sign**	Numeric editing	Changes the sign of the entered value.
 to 	**Numeral**	Numeric editing	Enters the corresponding character.

6.1.3.1 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 129). (Perform customization for your application only after the Quick Start has been completed).
- Default settings in the parameter tables are indicated with an asterisk (*).

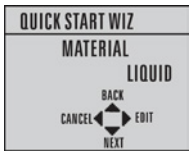
1. Quick Start

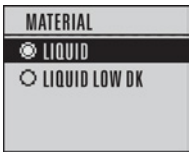
1.1. Quick Start Wiz

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

Material

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



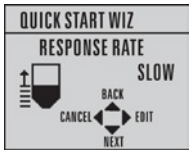


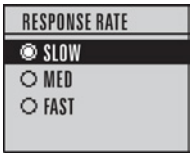
Options	*	LIQUID
		LIQUID LOW DK [a] (low dielectric liquid – CLEF algorithm enabled)

[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).

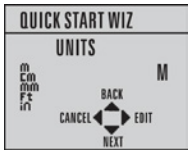


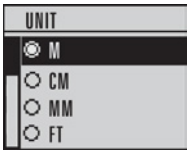


Options		**Response rate (2.3.8.1.)**	**Fill rate per Minute (2.3.8.2.)/ Empty rate per Minute (2.3.8.3.)**
	*	SLOW	0.1 m/min (0.32 ft/min)
		MED	1.0 m/min (3.28 ft/min)
		FAST	10.0 m/min (32.8 ft/min)

Units

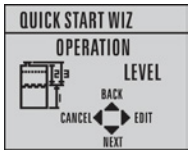
Sensor measurement units.





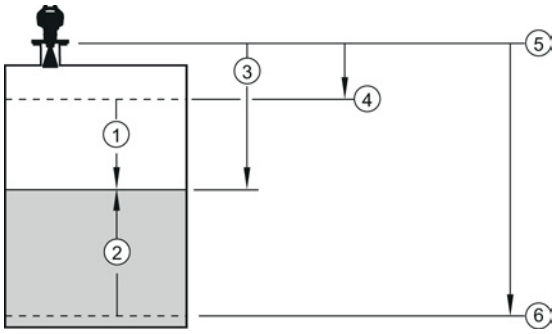
Options	m, cm, mm, ft, in Default: m

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.

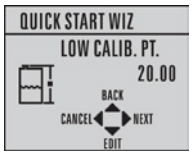


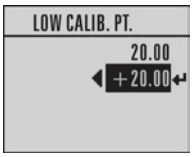
①	Space	④	High calibration point (process full level)
②	Level	⑤	Sensor reference point [a]
③	Distance	⑥	Low calibration point (process empty level)

[a] The point from which High and Low Calibration points are referenced: see Dimension drawings (Page 205).

Low calibration point

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

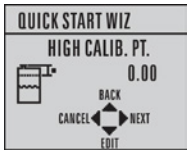


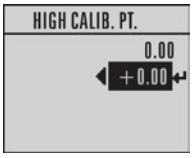


Values	Range: 0.00 to 20.00 m

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.

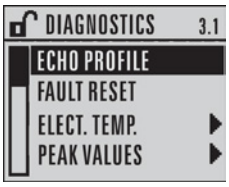
6.1.3.2 Auto False Echo Suppression

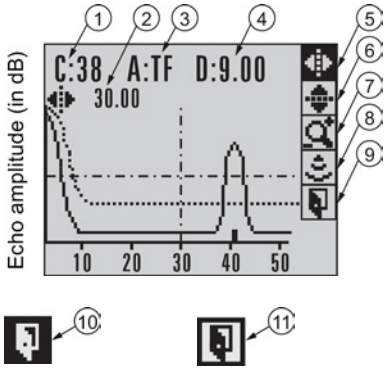
If you have a vessel with known obstructions, we recommend using Auto False Echo Suppression to prevent false echo detection. See **TVT (Auto False Echo Suppression) Setup (2.5.10.)** for instructions.

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.

6.1.3.3 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.**

6.1.3.4 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.

6.2 Application examples

Note

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

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

Configure the basic settings using the Quick Start wizard parameters. (These parameters are inter-related, and changes take effect only after you select **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.

6.2.1 Liquid resin in storage vessel, level measurement

Note

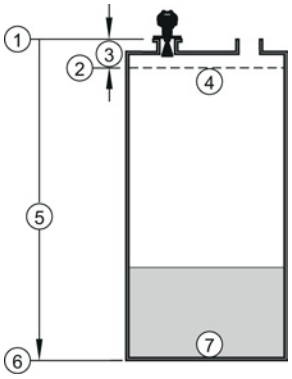
Minimum distance from flange face to target is limited by **Near Range (2.5.1.)**.

To obtain level measurement/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**	

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

6.2.2 Horizontal vessel with volume measurement

Note

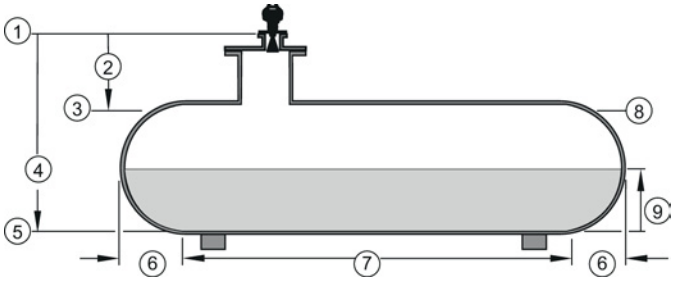
The minimum distance from the flange face to the target is limited by **Near Range (2.5.1.)**.

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

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

In the event of a loss of echo:

- SITRANS LR250 is to report a 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.

Parameter type	Parameter Name	Options/ Values	Function
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.

6.2.3 Application with stillpipe

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

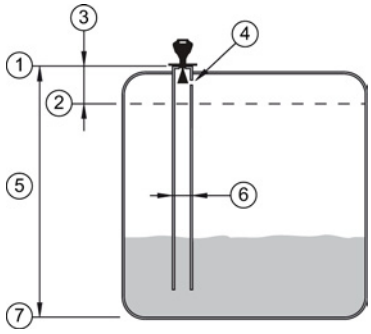
A stillpipe is recommended for products with a dK of less than 3, or if extremely turbulent or vortex conditions exist. This mounting arrangement can also be used to provide optimum signal conditions on foaming materials.

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 205).
- See Mounting on a Stillpipe or Bypass Pipe (Page 20) for installation guidelines.

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

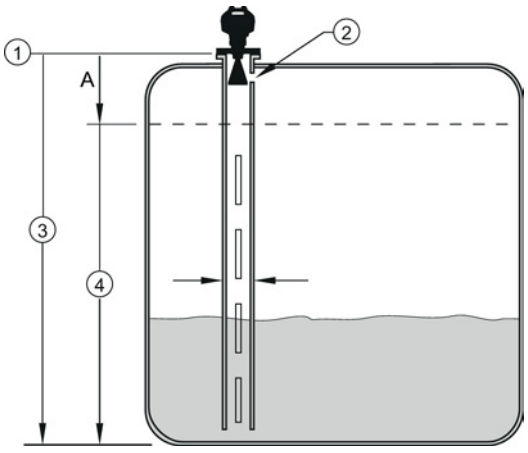
- Low Calibration Pt. is 5 m (16.4 ft) from the sensor reference point.
- High Calibration Pt. is 0.5 m (1.64 ft) from the sensor reference point.
- The stillpipe inside diameter is 50 mm (1.96").
- The maximum rate of filling or emptying is about 0.1 m (4")/min.



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

Parameter type	Parameter No./Name	Options/Values	Function
Quick Start Wizard parameters	Introduction	**NEXT**	Continue with Wizard.
	Language	**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

Note

Flanged encapsulated antenna

For Flanged encapsulated antenna (7ML5432) 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.).**

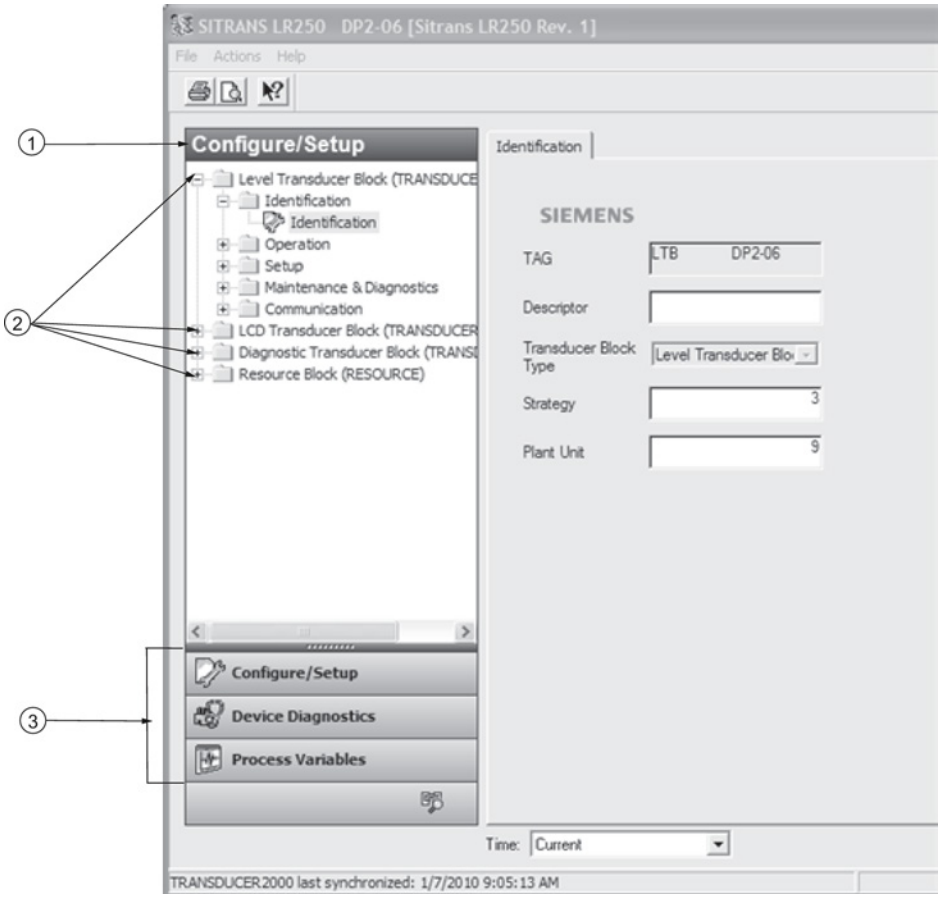
AMS Device Manager can be used to monitor the process values, alarms and status signals of the device. It allows you to display, compare, adjust, verify, and simulate process device data.

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 117) for a chart, and Changing parameter settings using AMS Device Manager (Page 76) 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 88)	Echo profile viewing
LTB	TVT (time varying threshold) (Page 85)	Screen out false echoes
LTB	Linearization (LTB) (Page 82)	Volume measurement in an irregular vessel
LTB	Maintenance & Diagnostics (LTB) (Page 89)	Set schedules and reminders for sensor maintenance and service
RESOURCE	Quick Start Wizard via AMS Device Manager (Page 70)	Device configuration for simple applications
RESOURCE	Maintenance & Diagnostics (RESOURCE) (Page 102)	Set schedules and reminders for device maintenance and calibration
RESOURCE	Security (RESOURCE) (Page 105)	Protect security and communication parameters from modification by the maintenance user

DEVICE DIAGNOSTICS function group		
Block	**Feature**	**Function**
LTB	Alarms & Errors (LTB) (Page 106)	Monitor process errors and alarms
RESOURCE	Alarms & Errors (RESOURCE) (Page 110)	Monitor device errors and alarms

PROCESS VARIABLES function group		
Block	**Feature**	**Function**
LTB	Process Variables (Level Transducer Block-LTB) (Page 114)	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:

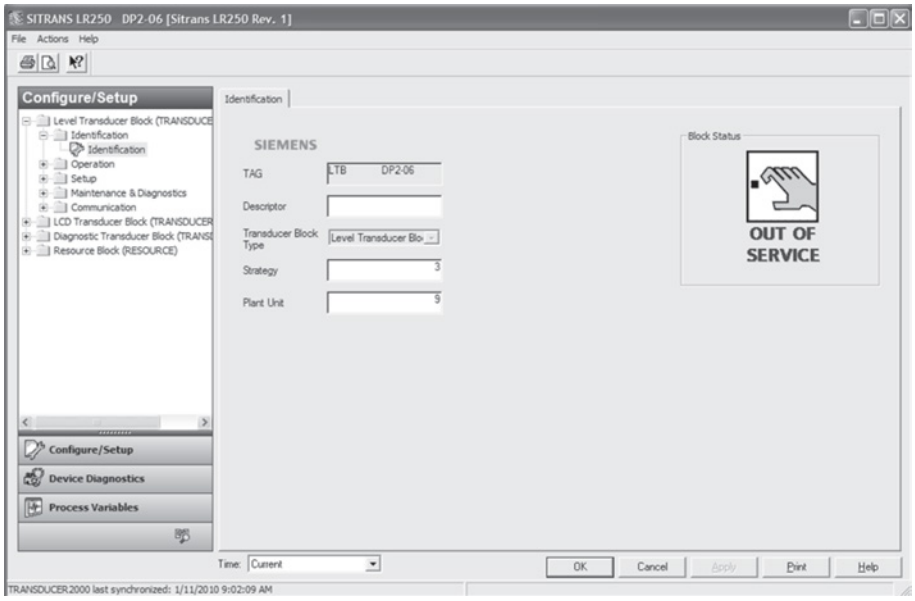
1. Launch **AMS Device Manager – AMS Device Manager**.
2. From the Device Connection View, right click on the FF Network icon and select **Rebuild Hierarchy**.
3. Right click on the device icon, and choose **Rename** from the menu.
4. Enter a device tag and press **Enter**.

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.)

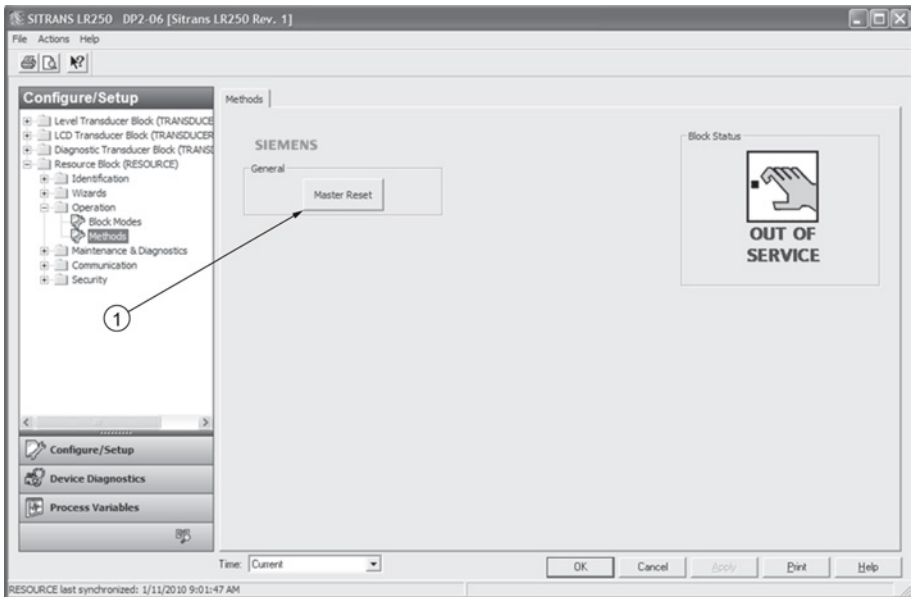


4. Next, complete a master reset.

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 48).]

Quick Start Wizard steps

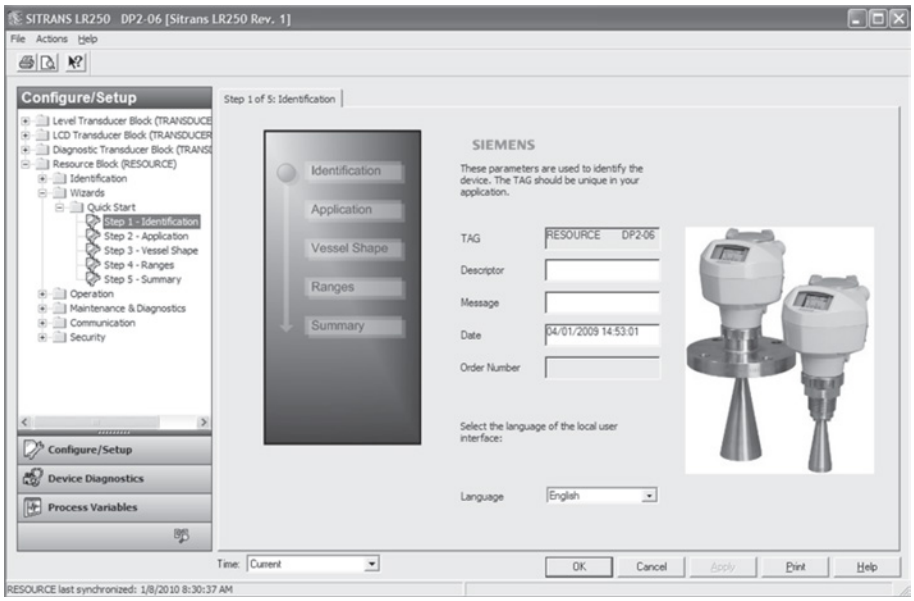
Note

- 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 76). (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**.

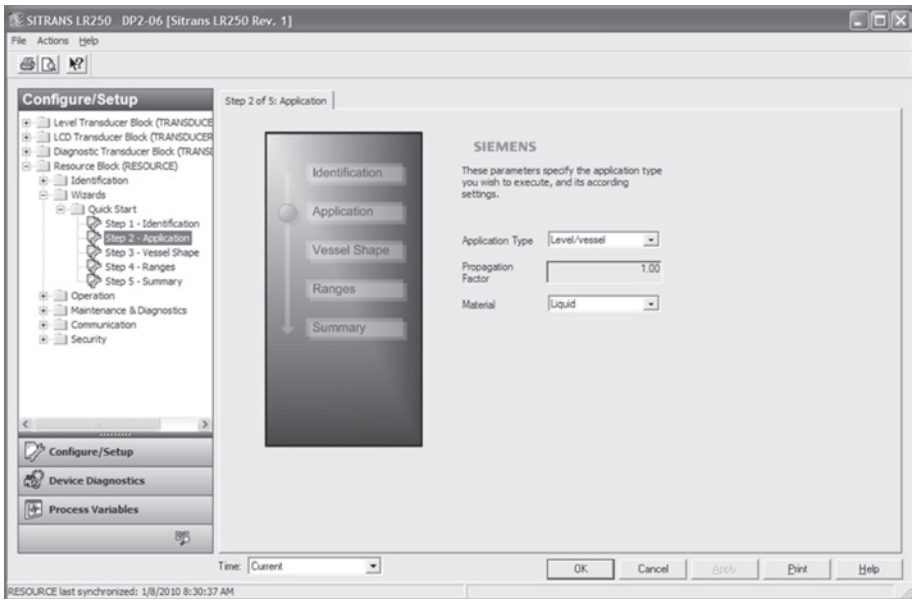
Step 1 - Identification

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.



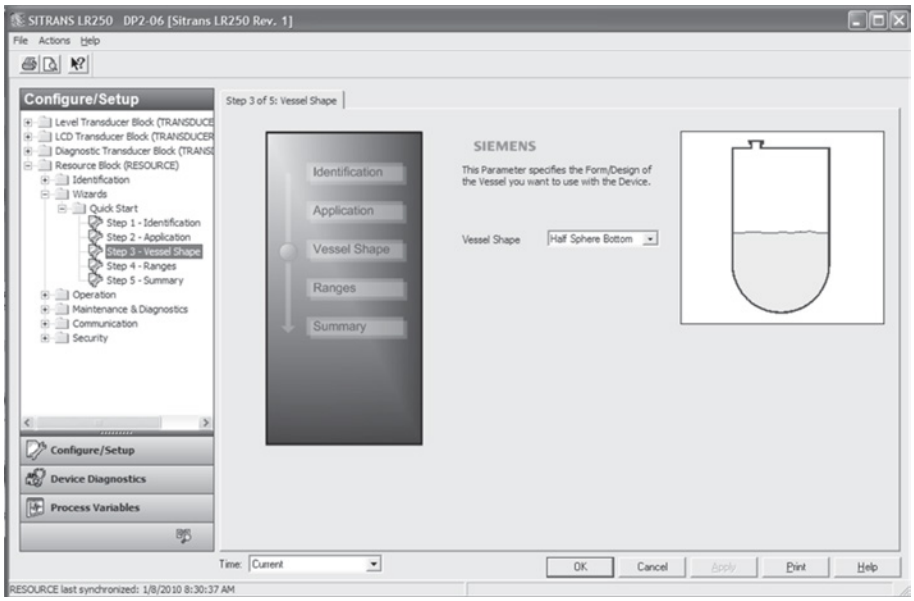
Step 2 - Application Type

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 (Page 60). Click on **Apply** to save settings then go to Step 3.



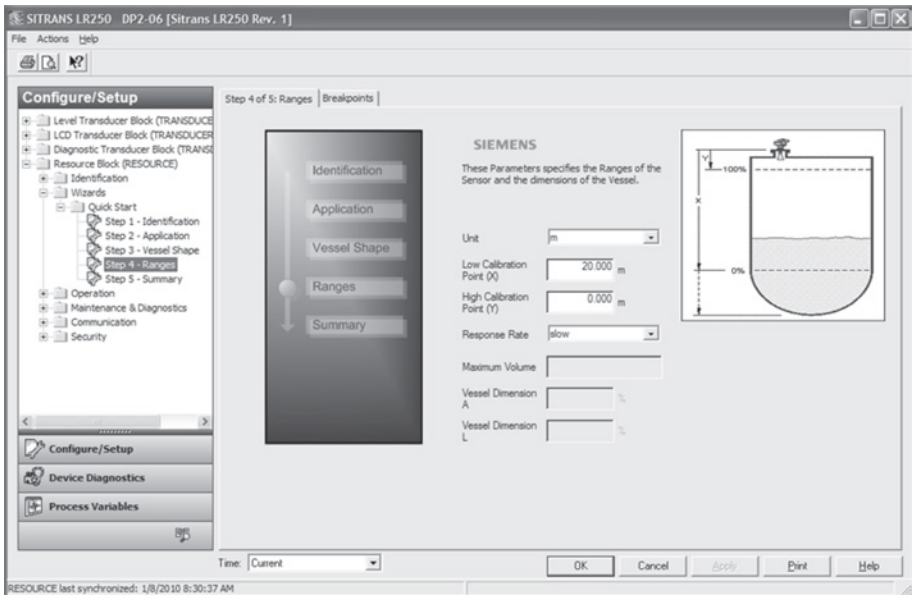
Step 3 - Vessel Shape

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 82) for more details. Click on **Apply** to save settings then go to Step 4.



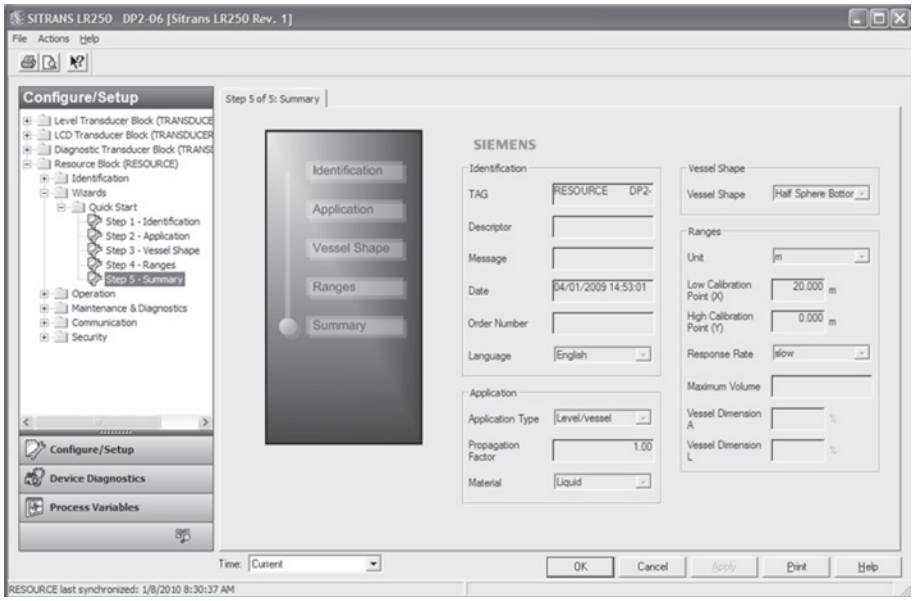
Step 4 - Ranges

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 129).
- 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.

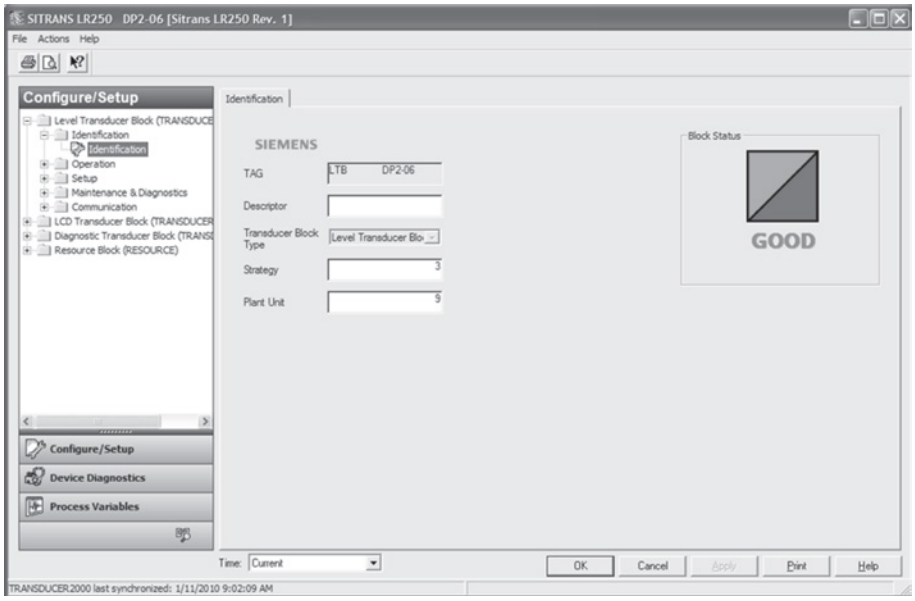
7.1.9 Configure/Setup (Level Transducer Block-LTB)

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.



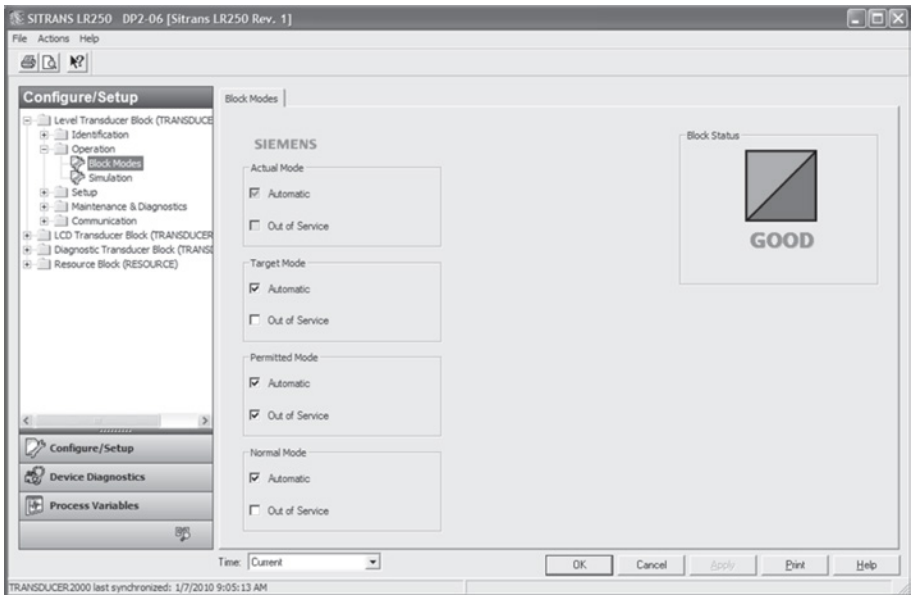
7.1.9.2 Operation (LTB)

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:

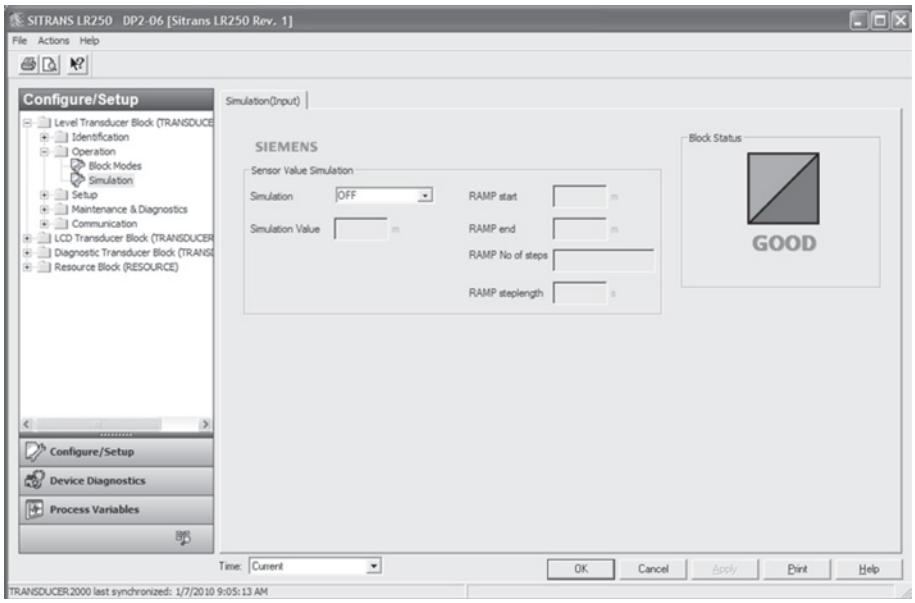
Simulation (Input)

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.)**.

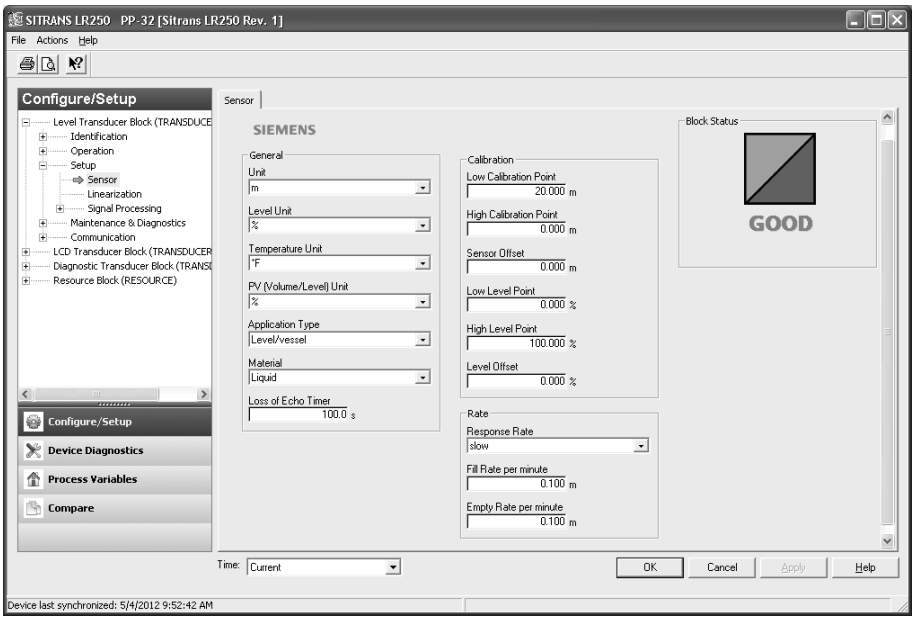
- Simulation
- Simulation Value
- RAMP start
- RAMP end
- RAMP No of steps
- RAMP steplength



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.)**]

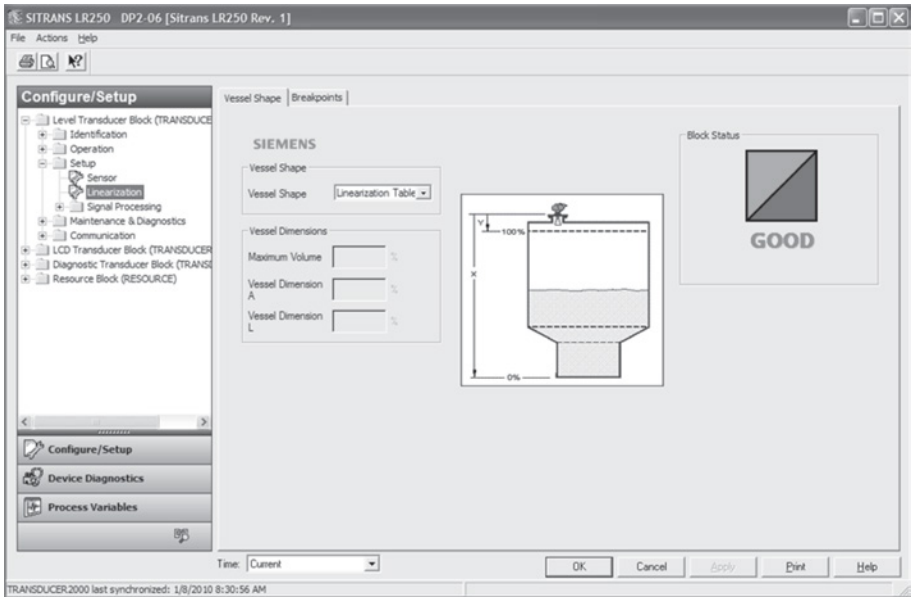
Rate

[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

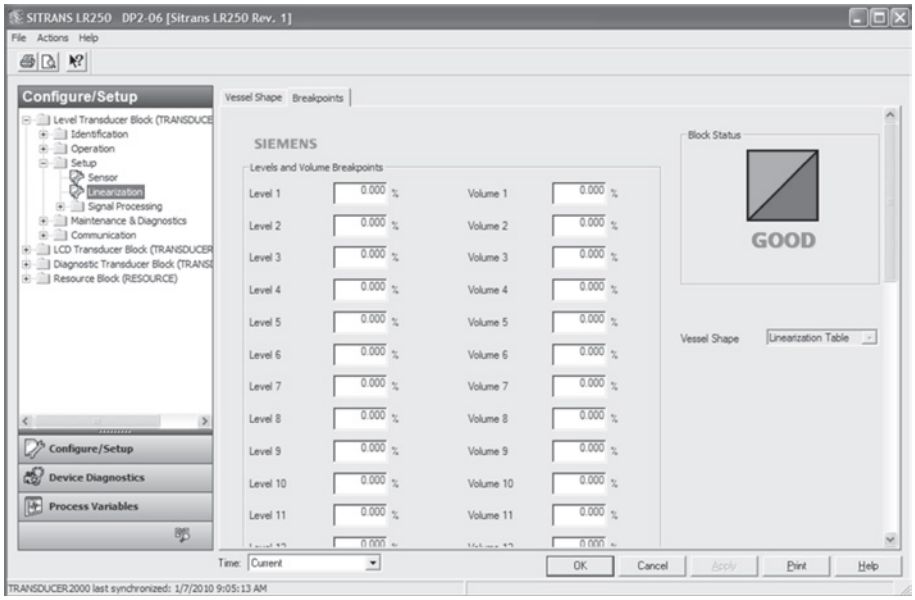
Click on **Breakpoints** tab for access to level and volume breakpoints.

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.

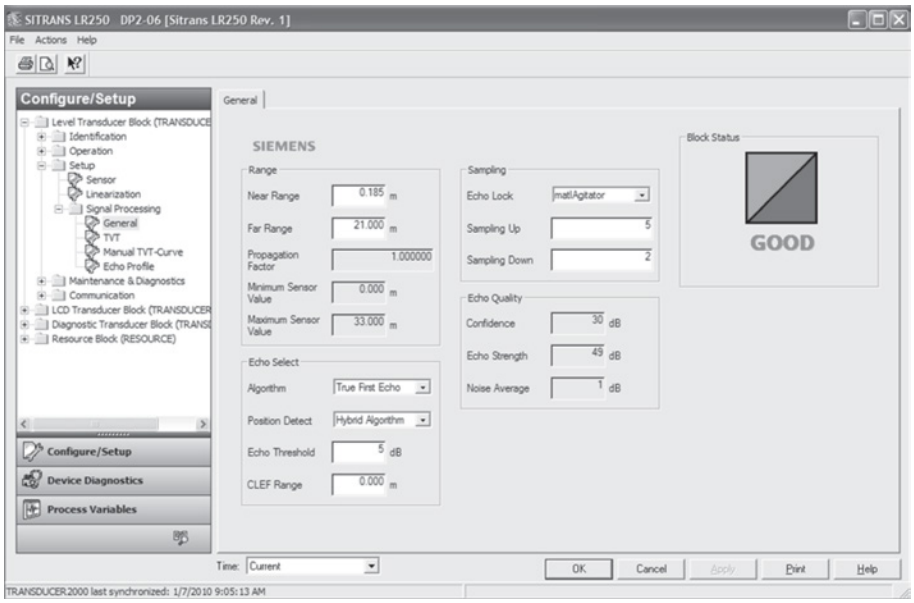
After completing the above steps you will need to configure AIFB 1 and/or AIFB 2. [See **AIFB 1 (2.6.)** and **AIFB 2 (2.7.)**]

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 231), and **Auto False Echo Suppression (2.5.10.1.)**].

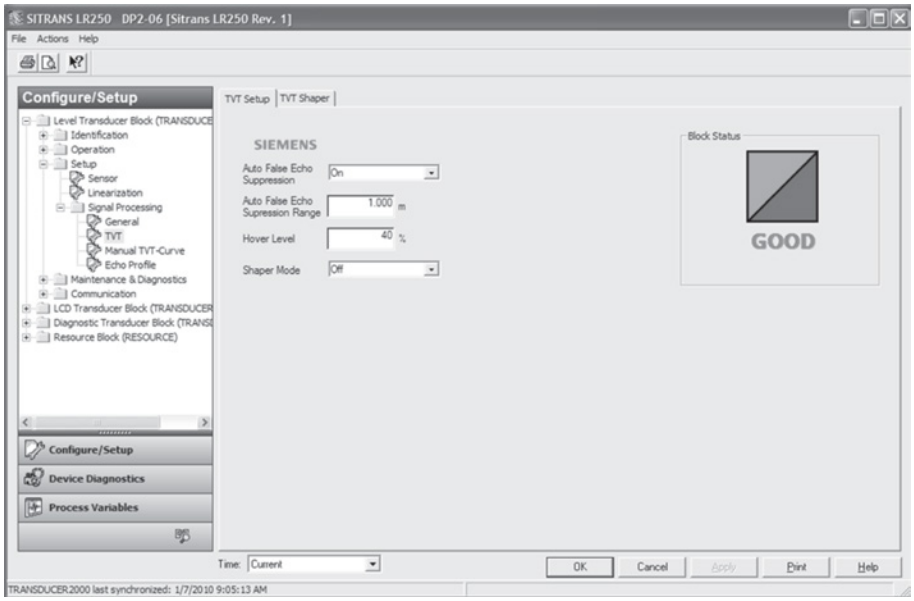
Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on **TVT**. Click on one of the two tabs to access the parameters listed:

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.)**]

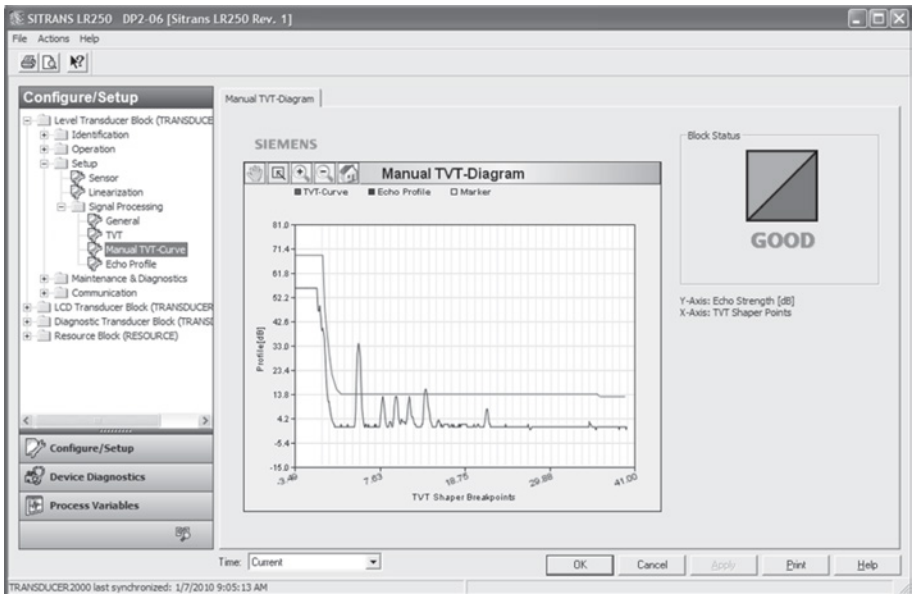
- Breakpoints 1 to 40
- Shaper Mode

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.

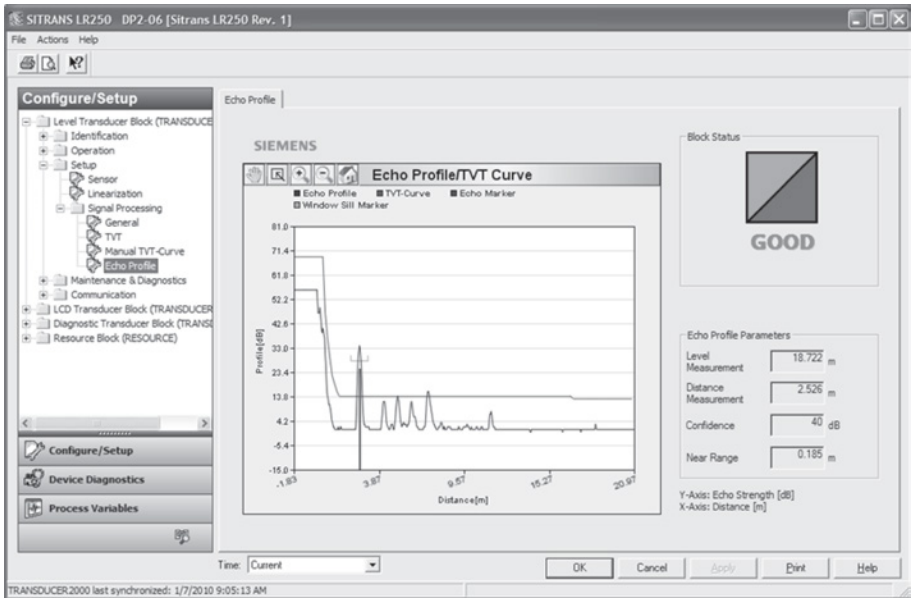
Navigate to **Configure/Setup > LTB > Setup > Signal Processing** and click on **Echo Profile** to view the current echo profile and to access:

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:

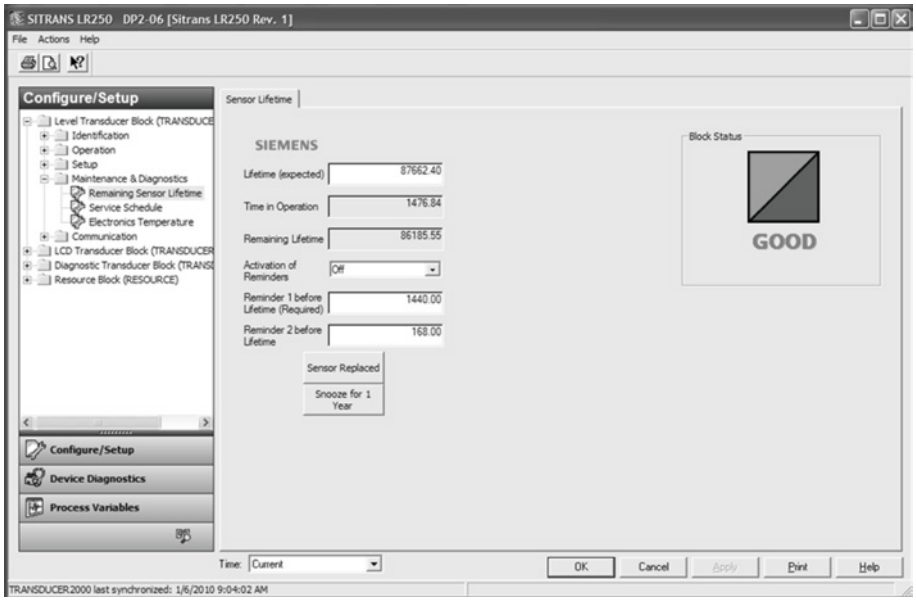
Remaining Sensor Lifetime

[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.

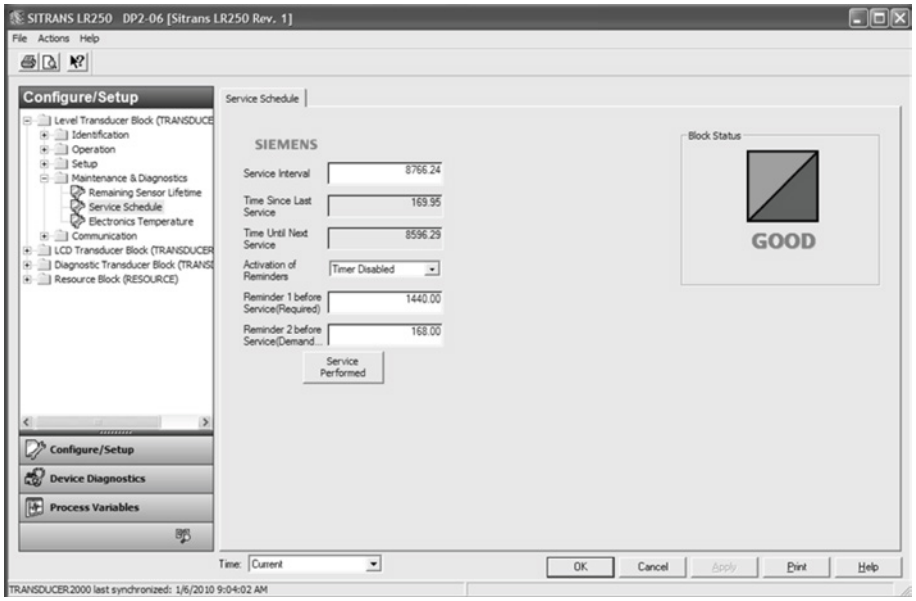
- Click on **Sensor Replaced** to reset Time in Operation to 0 hours
- Click on **Snooze for 1 Year** to add a year to the Total Expected Sensor Life



Service Schedule

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

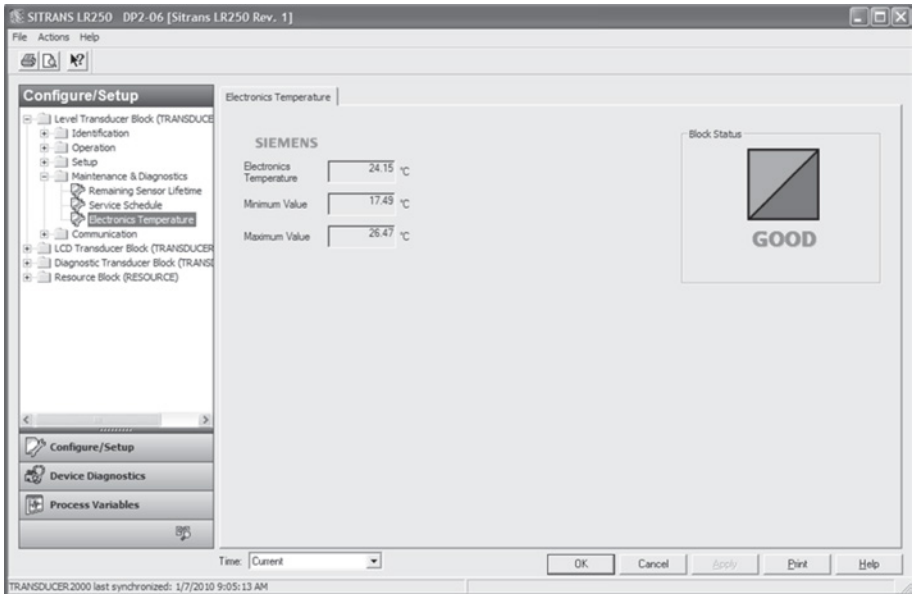
- Service Interval [see **Service Interval (4.4.1.)**]
- Time Since Last Service [see **Time Since Last Service (4.4.2.)**]
- Time Until Next Service [see **Time Until Next Service (4.4.3.)**]
- Activation of Reminders [see **Activation of Reminders (4.4.4.)**]
- Reminder 1 before Lifetime (Required) [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.)**]

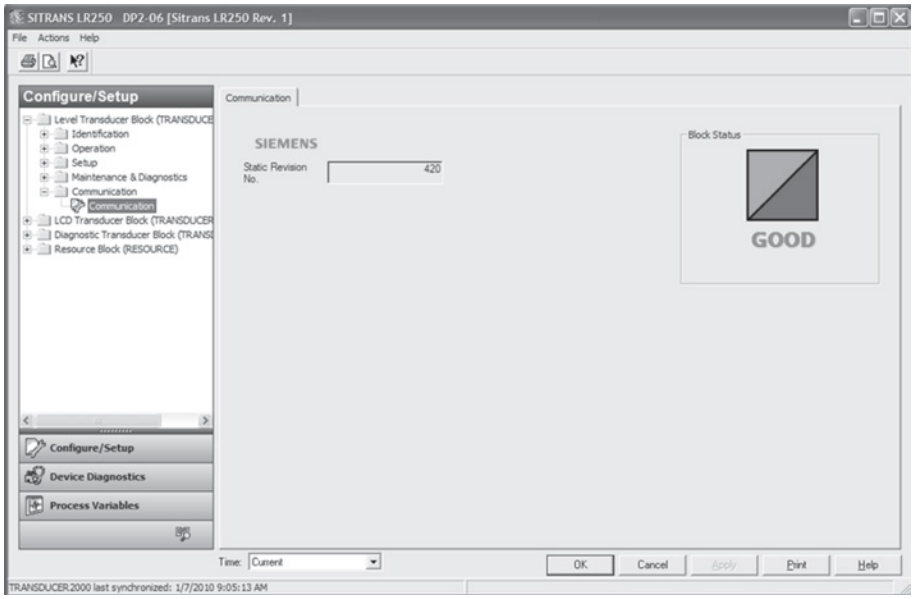


7.1.9.7 Communication (LTB)

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

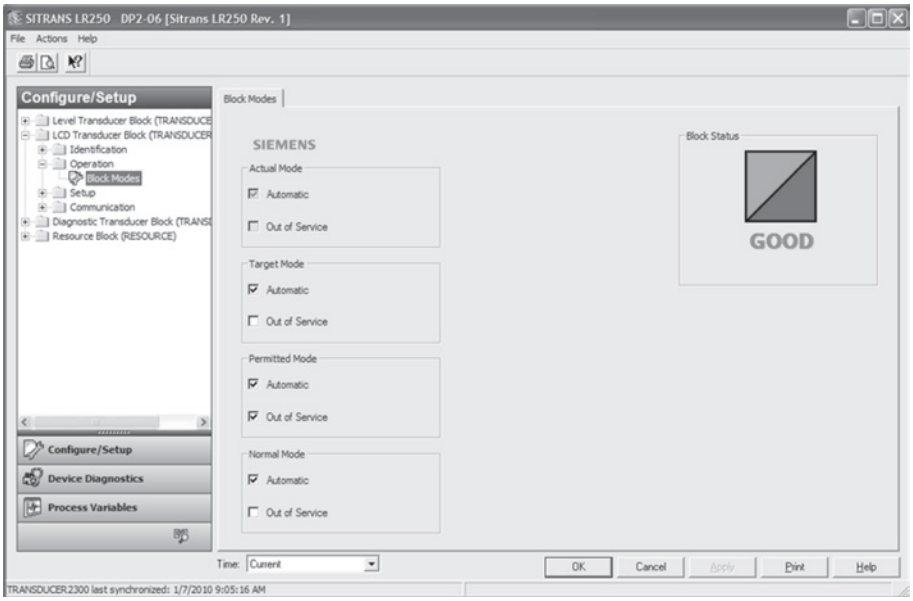
Note

For descriptions of Identification parameters see Identification (LTB) (Page 77).

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 78).

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

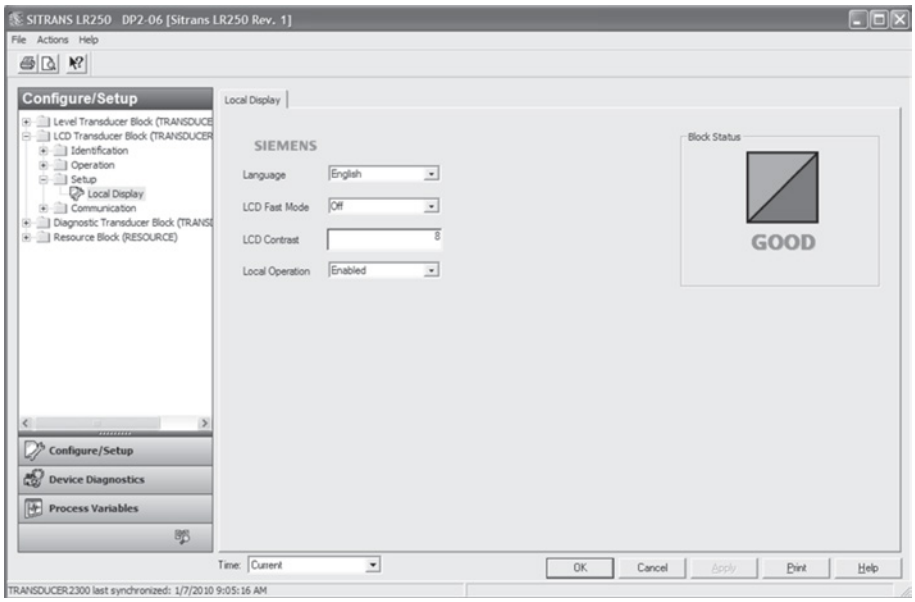
Language [see **Language (7.)**]

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 77).

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 78).

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)

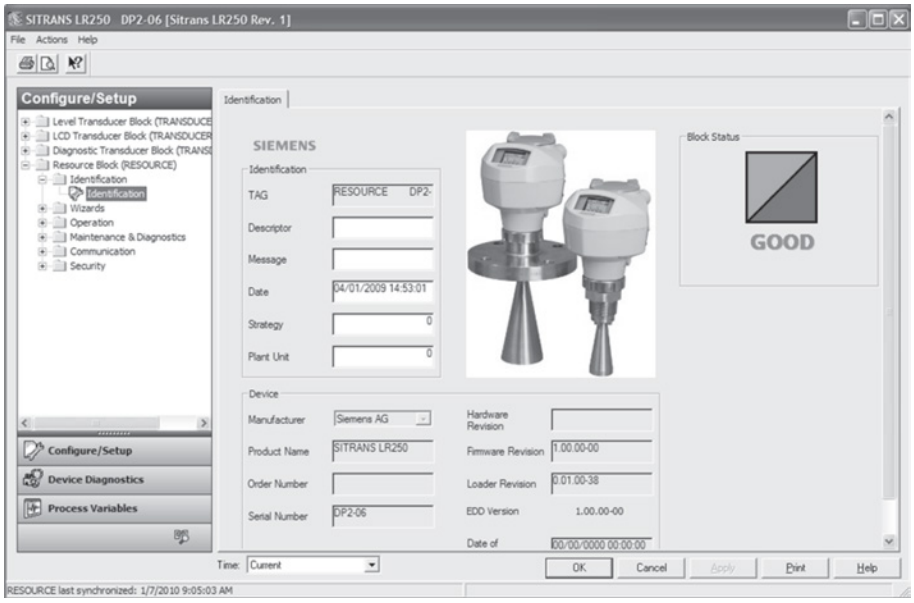
Navigate to **Configure/Setup > RESOURCE > Identification** for access to:

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 70)].

7.1.12.3 Operation (RESOURCE)

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

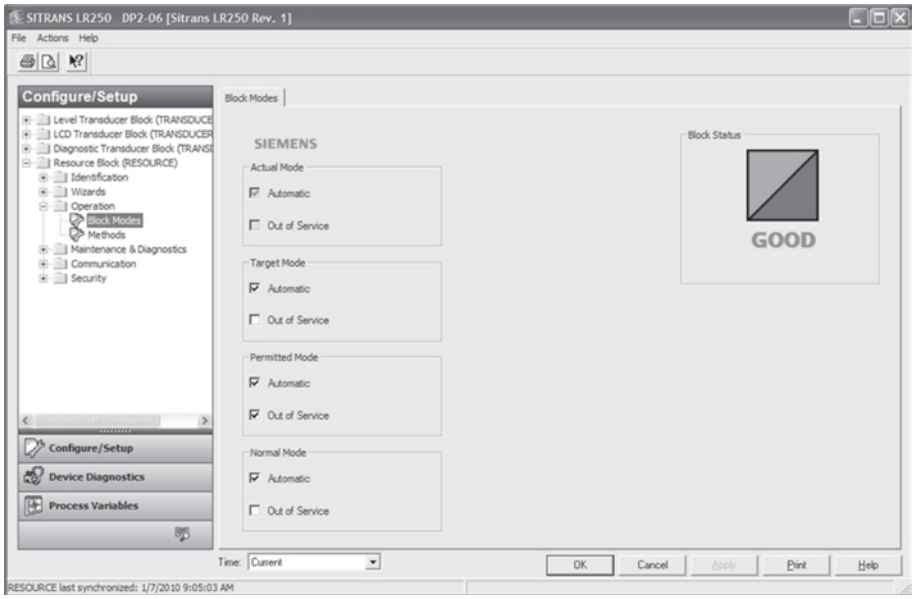
Click on **Block Modes** to open the dialog window for access to:

Block Modes:

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

Note

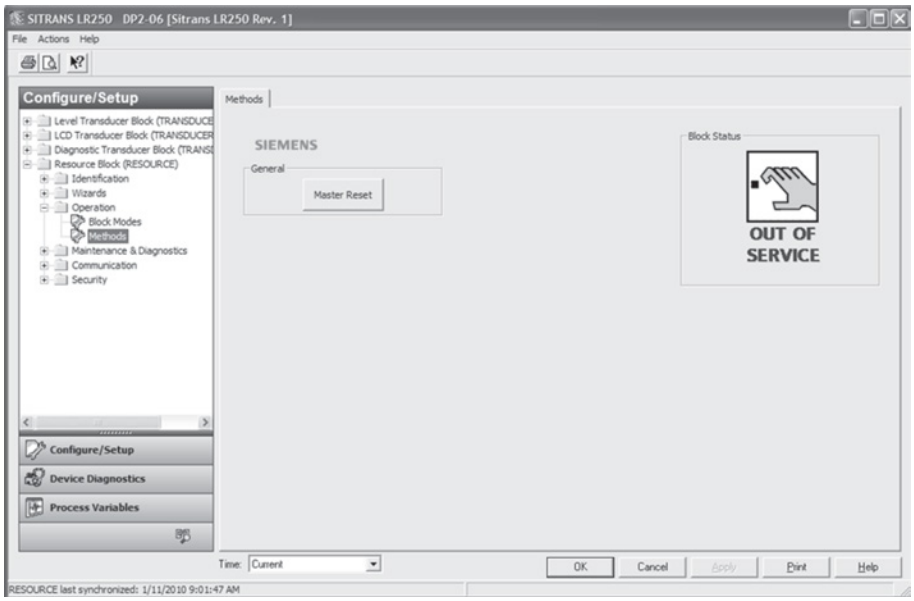
- For descriptions of Block Modes see Operations (LTB) (Page 78).
- If the RESOURCE block is set to Out of Service, the LTB, and AIFB blocks are forced to Out of Service also, but the LCD and DIAG blocks remain in Automatic mode



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:

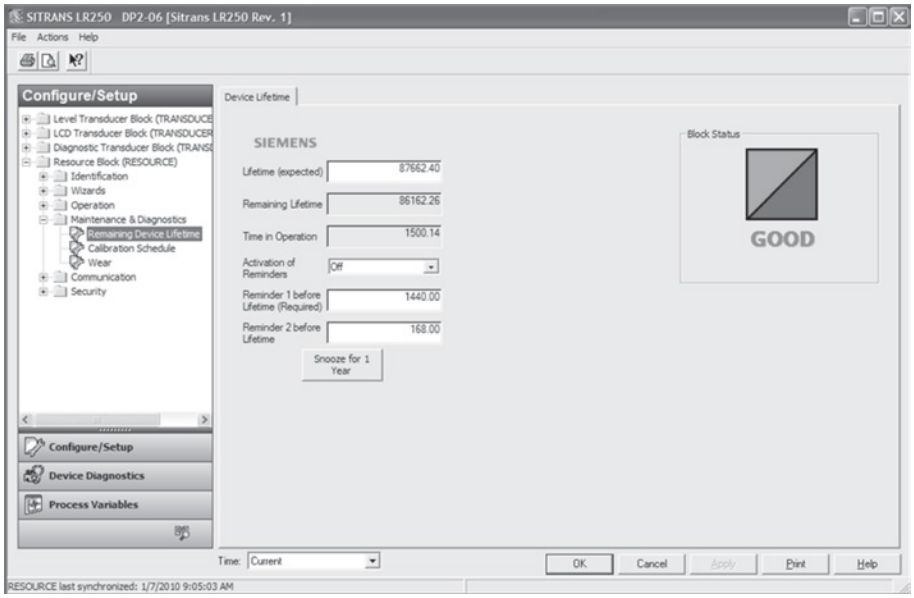
Remaining Device Lifetime

[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.

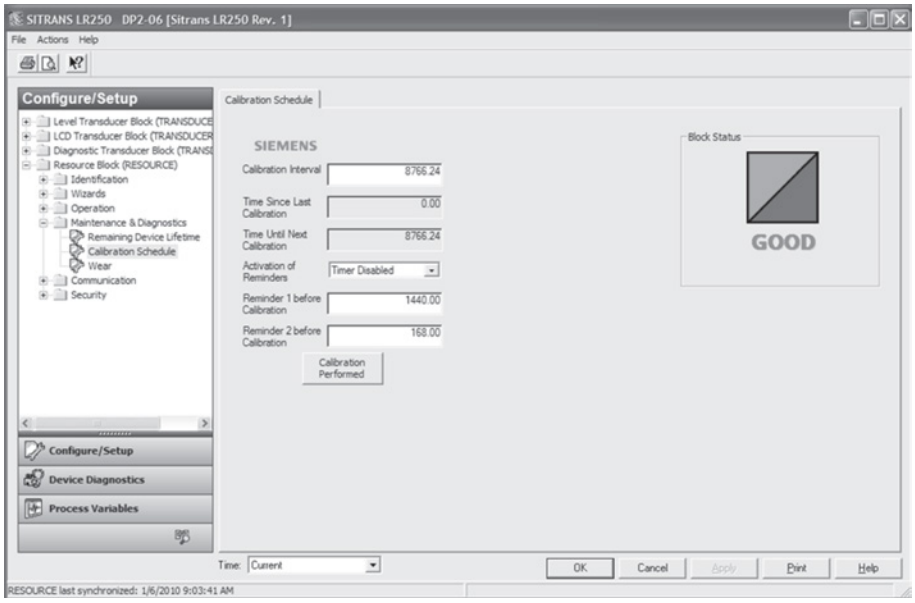
- Click on **Snooze for 1 Year** to add a year to the Total Expected Device Life.



Calibration Schedule

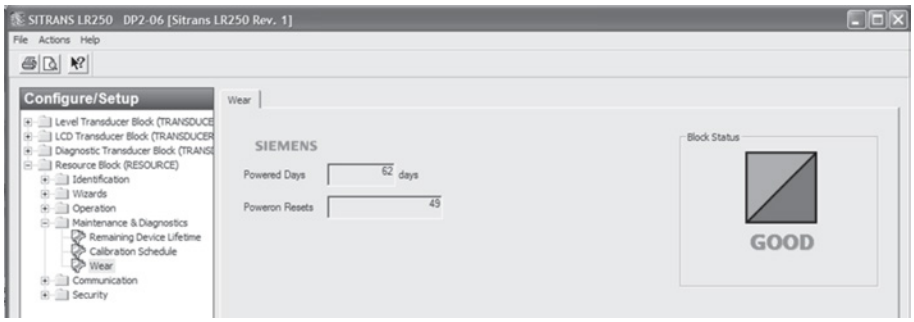
[see **Calibration Schedule (4.5)**]

- 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.



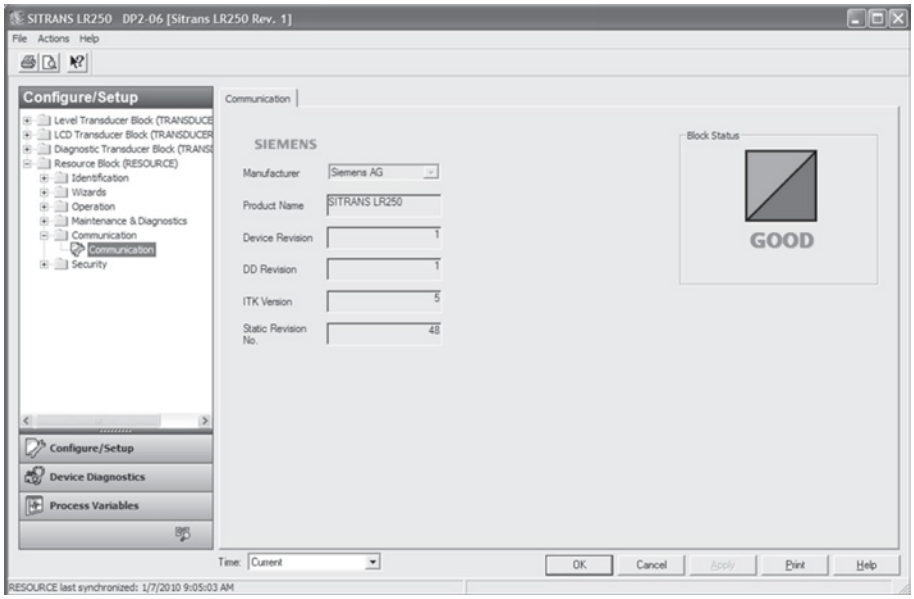
Wear

- 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.)**]



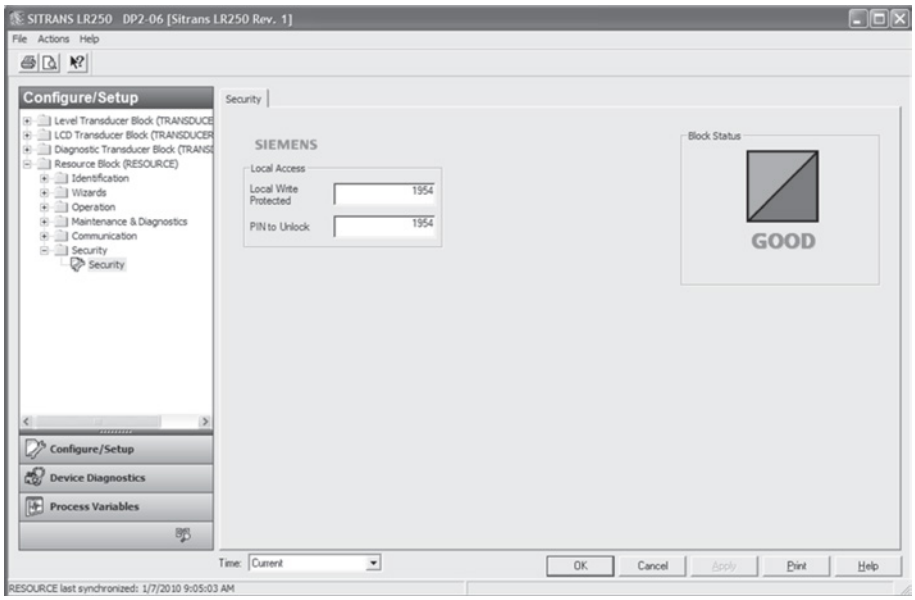
7.1.12.6 Security (RESOURCE)

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 115).



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

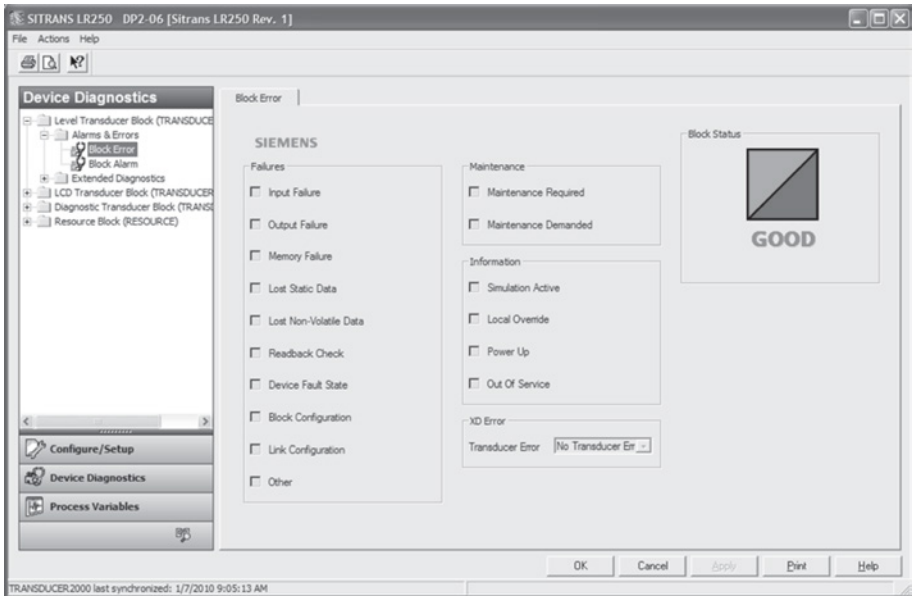
- Time Stamp

Subcode

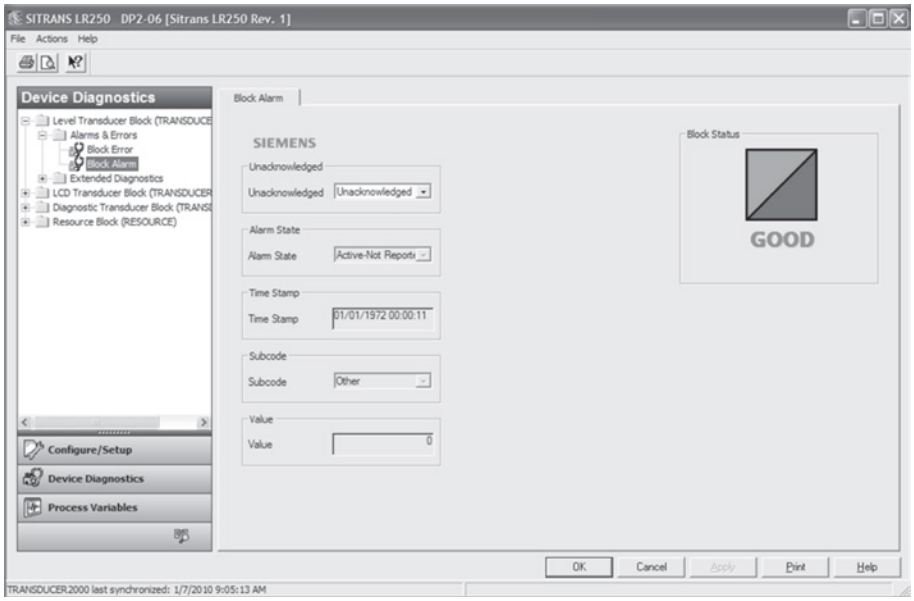
- Subcode

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 106) 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 106) 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

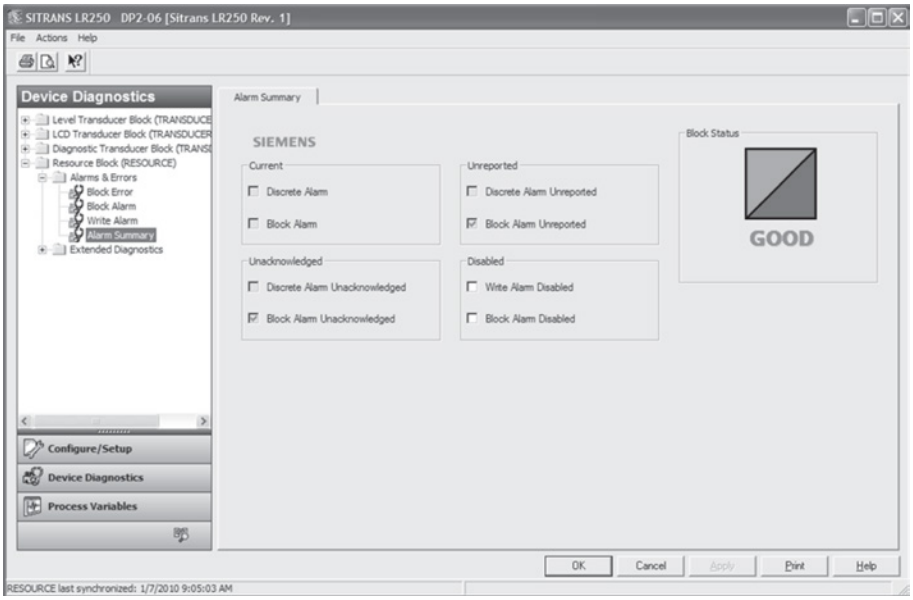
- Discrete Alarm Unacknowledged
- Block Alarm Unacknowledged

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**.

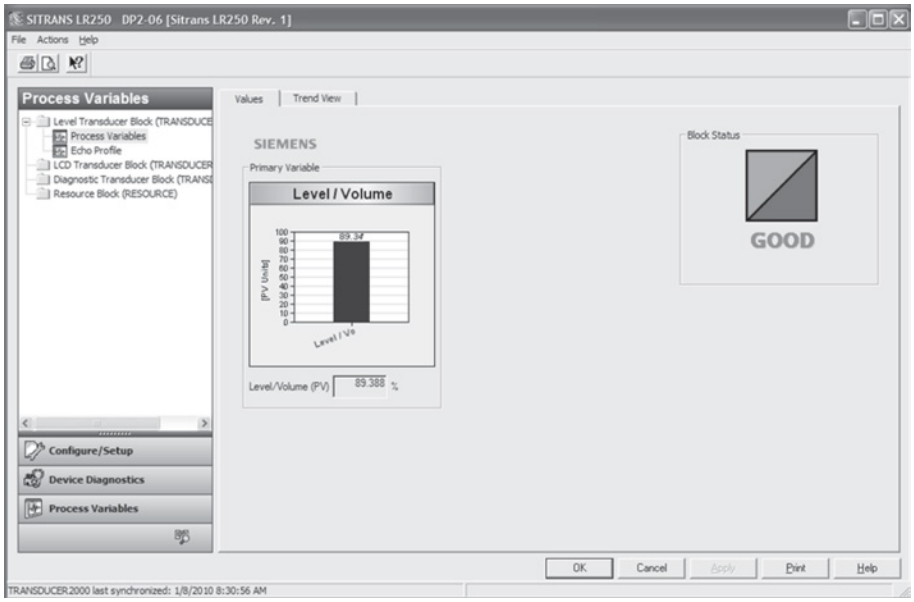
Click on **Process Variables** then the **Values** tab to read the following:

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

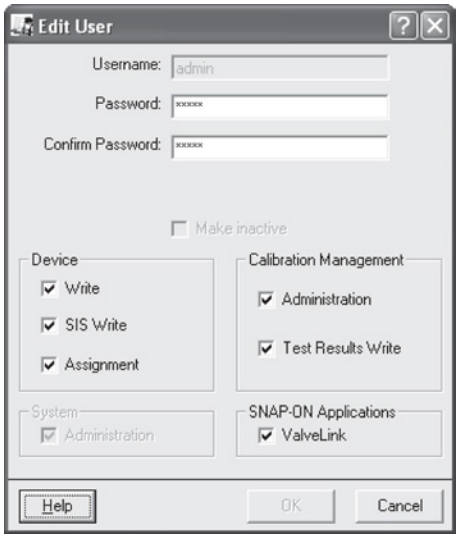
Usernames, passwords, and permissions, are assigned to users by an AMS Device Manager administrator, using the User Manager utility on the Server Plus Station. Only a user with AMS Device Manager System Administration rights can log in to User Manager.

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

EXTENDED DIAGNOSTICS

Extended Diagnostics

Extended Diagnostics (tab)

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

PROCESS VARIABLES

LEVEL TRANSDUCER BLOCK

PROCESS VARIABLES

Process Variables

Values (tab)

Primary Variable

Level/Volume (PV)

Trend View (tab)

Trend Values

Level/Volume (PV)

Echo Profile

Echo Profile (tab)

Echo Profile Parameters

Level Measurement
Distance Measurement
Confidence
Near Range