SITRANS LR 200 Quick Start Manual

English

This manual outlines the essential features and functions of the SITRANS LR 200. We strongly advise you to acquire the detailed version of the manual so you can use your device to its fullest potential. The complete manual is available on our Web site: www.siemens-milltronics.com. The printed manual is available from your local Siemens Milltronics representative.

Questions about the contents of this manual can be directed to:

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Safety Guidelines

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

⚠ **WARNING: relates to a caution symbol on the product, and means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.**

! **WARNING: means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.**

CAUTION: means that failure to observe the necessary precautions can result in considerable material damage.

Note: means important information about the product or that part of the operating manual.

English

SITRANS LR 200

! 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 in which case the user will be required to correct the interference at his own expense

SITRANS LR 200 is to be used only in the manner outlined in this manual, otherwise protection provided by the equipment may be impaired.

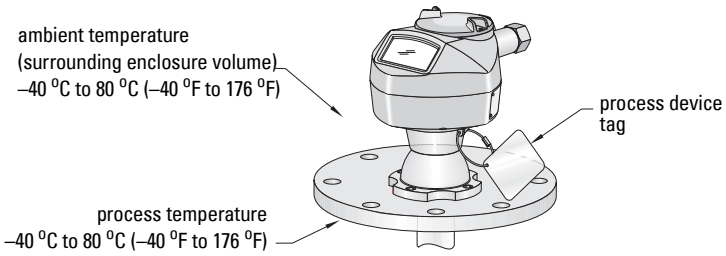
SITRANS LR 200 is a 2-wire loop-powered, continuous level-measuring instrument that utilizes advanced pulse radar technology at 5.8 GHz (6.3 GHz in the USA). The instrument consists of an electronic component coupled to the antenna and process connection.

Specifications

For a complete listing, see the SITRANS LR 200 Instruction Manual. For Approvals information, please refer to the process device tag.

Ambient/Operating Temperature

Note: Process temperature and pressure capabilities are dependent upon information on the process device tag. The reference drawing listed on the tag can be downloaded from the Siemens Milltronics Web site at www.siemens-milltronics.com



Power

Nominal 24 Vdc with 550 Ohm:	For other configurations see the full manual

- Maximum 30 Vdc
- 4 to 20 mA

Approvals

- Europe:
  1. General Purpose
  2. Zone 0, Intrinsically safe, ia connection, IIC, T-; ATEX II 1 G
- Americas:
  1. General Purpose
  2. Intrinsically Safe: Class I, Div. 1, Groups A, B, C, D (barrier required)

     AEx ia IIC T-

Note: The use of approved watertight conduit hubs/glands is required for Type 4X / NEMA 4X / IP67 (outdoor) applications.

Installation

! **WARNINGS:**

- **This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.**
- **This product is designated as a Pressure Accessory per Directive 97 / 23 / EC, and is <u>not</u> intended for use as a safety device.**
- **The user is responsible for the selection of bolting and gasket materials which will fall within the limits of the flange and its intended use, and which are suitable for the service conditions.**
- **Do <u>not</u> attempt to loosen, remove, or disassemble process connection or instrument housing while vessel contents are under pressure.**
- **Improper installation may result in loss of process pressure.**

Mounting location

Recommendations

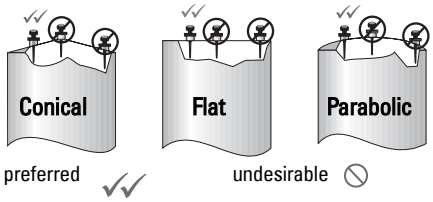
- Easy access for viewing the display and programming via the hand programmer.
- An environment suitable to the housing rating and materials of construction.

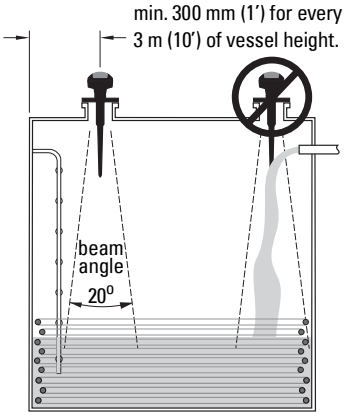
Precautions:

- Avoid proximity to high voltage or current wiring, high voltage or current contacts, and to variable frequency motor speed controllers.
- Avoid interference to the emission cone from obstructions or from the fill path.

English

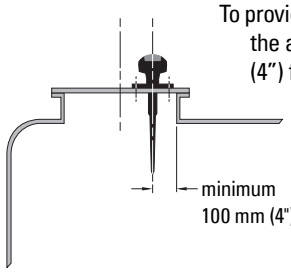
- Avoid central locations on vessels

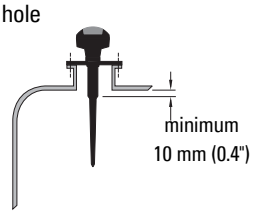




- locate the antenna away from the side wall, to avoid interference from indirect echoes
- avoid interference from objects such as ladders or pipes, which can cause false reflections

To provide optimum signal conditions on a manhole cover, locate the antenna off-center relative to the cover, typically 100 mm (4") from the side of the manhole





- Use the 100 mm (4") shield on nozzles that are 100 mm (4") in length, or shorter.
- Use the 250 mm (10") shield on nozzles that are 250 mm (10") in length, or shorter.

Wiring

Power

WARNINGS:

⚠ **dc terminals shall be supplied from an SELV source in accordance with IEC-1010-1 Annex H.**

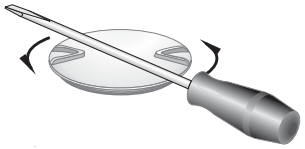
! **All field wiring must have insulation suitable for rated input voltages.**

Connecting SITRANS LR 200

Notes:

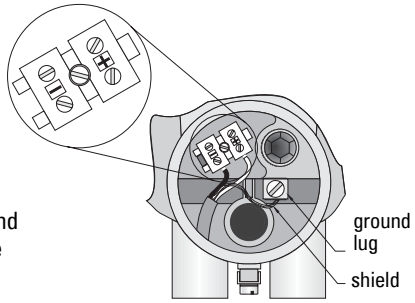
- For complete wiring instructions, please refer to the Instruction Manual.
- Use shielded, twisted pair cable (wire gauge 14-22).
- Separate cables and conduits[1] may be required to conform to standard instrumentation wiring practices, or electrical codes.

1. If cable is routed through conduit, use only approved suitable-size hubs for waterproof application.



Using a screwdriver for leverage if necessary, unscrew the cover.

Connect the wires to the terminal as shown and connect the shield to the ground lug inside the enclosure



RUN Mode and PROGRAM Mode

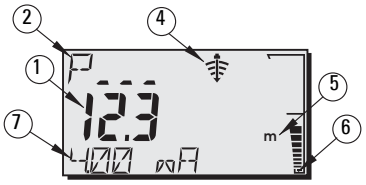
SITRANS LR 200 has 2 modes of operation: RUN and PROGRAM.

After you complete the installation procedures and power up SITRANS LR 200, it starts in **RUN** mode and detects the distance to the material level in meters. This is the default start-up display mode.

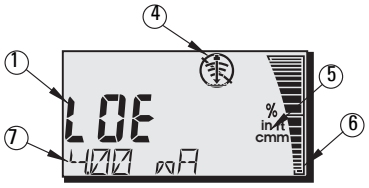
RUN Mode Display

Use the hand programmer to control the display.

Normal operation



Failsafe operation



1 – Primary Reading (displays level, distance, or volume, in either units or percent).

2 – Parameter for Auxiliary Reading (can be set to display milliAmp value (HART only), distance, or confidence. It displays units, if applicable.)

4 – Echo status indicator: Reliable Echo or Unreliable Echo

5 – Units or Percent

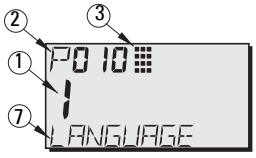
6 – Active bar graph represents material level

7 – Auxiliary Reading

Whenever a loss of echo occurs, **LOE** flashes and the Reliable Echo indicator is replaced by the Unreliable indicator. Before the Failsafe Timer expires, the letters **LOE** (Loss of Echo) alternate with the reading every two seconds. Once the Failsafe condition is established, LOE is displayed permanently. When a valid reading is received, the level reading display returns to normal operation.

English

PROGRAM Mode Display



1– Primary Reading (displays parameter value)

2– Secondary Reading (displays parameter number)

3– Programming indicator

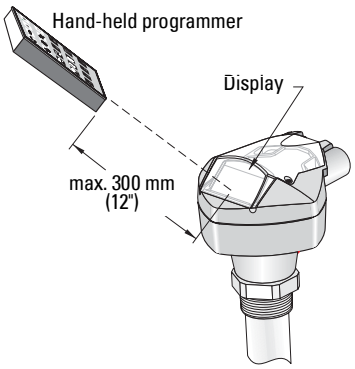
7– Auxiliary Reading (displays parameter names for P001 to P010, if a language is selected. It displays the index value for indexed parameters, such as P054).

Programming

- Set parameters to suit your specific application.
- Activate **PROGRAM** mode at any time, to change parameter values and set operating conditions.
- For local programming, use the Siemens-Milltronics hand programmer.
- If you are programming from a distance, you can use either a HART handheld communicator or a PC running Simatic PDM.

Hand programmer

For direct access to SITRANS LR 200, point the programmer at the SITRANS LR 200 display and press the keys.



Key	Programming Mode
P....	Decimal point
− Pxxx	Negative value
C	**CLEAR** value
A%	**TOGGLE** between Units and % on parameter value
≡	End **PROGRAM** session and enable **RUN** mode
↓	Update echo quality parameters
▲	Parameter scroll-up
▼	Parameter scroll-down
⇔	**DISPLAY** opens parameter fields
↵	**ENTER** the displayed value

Security: (P000: Lock)

Values		Description
Value stored in P069	*	Lock off: programming permitted
other		Lock activated: no changes permitted

Factory setting for P069 is 1954: after a new value is entered and accepted, it becomes the default setting.

Activating SITRANS LR 200

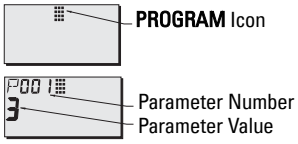
Power up the instrument. SITRANS LR 200 starts in **RUN** mode.

Accessing a parameter

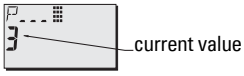
Notes:

- Press **PROGRAM** then **DISPLAY** to access **PROGRAM** mode, and press **PROGRAM** to return to **RUN** mode.
- The following instructions apply when using the Hand Programmer
- You do not need to key in initial zeros when entering a parameter number: for example, for P005, key in **5**.

1. Press **PROGRAM** then **DISPLAY**, to activate **PROGRAM** mode.



2. Either use the **ARROW** keys to scroll to a different parameter, or:
3. Press **DISPLAY** to open the Parameter Number field.
4. Key in the desired parameter number followed by **ENTER**.



For example: press 5 mA.
The LCD displays the new parameter number and value.

Changing a Parameter Value

Notes:

- Security must be disabled to enable programming: set P000 to the Unlocked Value stored in P069. (A remote master can still change configuration, if P799 is set to allow this.)
- Invalid entries will be rejected or limited.
- **CLEAR** C can be used to clear the field.

1. Key in the new value.
2. Press **ENTER** to set the value.

Parameter Reset to Factory Default

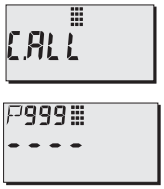
1. Scroll to the parameter or enter its address.
2. Press **CLEAR** C then **ENTER**. The value returns to the default setting.

English

Master Reset (P999)

Returns all parameters to default settings.

1. Press **PROGRAM**, then **DISPLAY** to activate **PROGRAM** mode.
2. Press **DISPLAY** to open parameter fields.
3. Key in **999**.
4. Press **CLEAR** c then **ENTER**, to Clear All and initiate reset. The LCD displays **C.ALL**.
5. Reset complete. (Reset takes several seconds to complete.



Quick Setup: steps 1 to 9

1. Select language (P010: Language)

Value	**0**	*	Numeric/None
	1		English
	2		German
	3		French
	4		Spanish

2. Set P001: Operation (measurement mode)

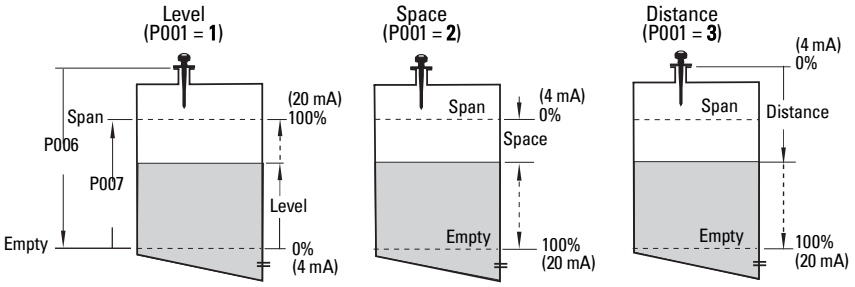
Notes:

- Setting P001 resets Span (P007), unless Span has previously been set to a different value.
- Changing P001 may reset Output Function (P201): this applies to HART only.

corrected

Value	**0**		Instrument out of service.
	1		**Level** returns distance to material level referenced from Empty (process empty level). The reading is returned in volumetric units if parameters 050 to 055 are set to enable this.
	2		**Space returns** distance to material level referenced from Span (process full level).
	3	*	**Distance** returns distance to material level from reference point.

mA Output with Level, Space, and Distance operation



3. Set P003: Measurement Response)

Value	**1**		slow	0.1m/minute
	2	*	medium	1m/minute
	3		fast	10m/minute

Set P003 to a measurement response speed just faster than the maximum filling or emptying rate (whichever is greater).

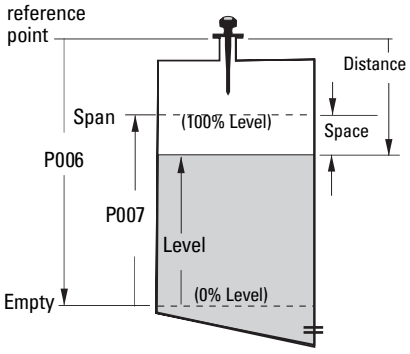
4. Select measurement units (P005)

Value	**1**	*	meters
	2		centimeters
	3		millimeters
	4		feet
	5		inches

5. Set process empty level (P006: Empty)

Value	Range	**0.0000 to 20.00**
	Default	**20.00 m (maximum instrument range)**

Empty can be set to any distance: not necessarily the bottom of the tank.



Note:
- P006 and P007 are interlinked: see notes attached to P007.

6. Set measurement range (P007: Span)

Values	Range	**0.0000 to 20.00**
	Default	**20.00 m (but see note below)**

Span can be set at any distance above Empty level.

Notes:
- Setting P006 resets Span, if it has not previously been set to a different value.
- The default setting for Span is based on Operation (P001) and Empty (P006). Span is set to Empty minus 110% of Blanking distance[1], unless Operation is set to **distance** (P001=3). In this case, Span is set to Empty distance.
- Always prevent the monitored surface from approaching within 0.3 m (1 ft) of the reference point, as this is the minimum distance detectable.

7. Minimize false reflections: Set P838 (Auto False Echo Suppression Distance)

Value	Range:	**0.0000 to 20.00 (m)**
	*	**1.000**

Use P838 and P837 together: see step-by-step instructions on page 10.

8. Enable False Echo Suppression: set P837 (Auto False Echo Suppression.

Value	**0**		Off
	1	*	Use "learned" TVT
	2		"Learn"

1. Default setting for Blanking is 0.4 m

English

Using P837 and P838 (perform this function at low tank levels)

If SITRANS LR 200 displays an incorrect full level, or if the reading fluctuates between a false high level and a correct level, use P838 and P837 together to elevate the TVT (Time Varying Threshold) in this region and de-sensitize the receiver from any 'base noise' caused by internal antenna reflections, nozzle echoes, or other vessel false echoes.

Notes:
- Use this function only if there is a minimum distance of 2 meters from SITRANS LR 200 to the material.
- Set P837 and P838 during start up, if possible.
- If the vessel contains an agitator, the agitator should be running.

a. First rotate the instrument for best signal (lowest false echo amplitude)
b. Determine the distance from the reference point to the material level.
c. Select P838 and key in [distance to liquid level – 0.5m].
d. Select P837, then press **2** (Learn) and **ENTER**. P837 will automatically revert to **1** (use Learned TVT) after a few seconds.

9. Return to RUN

Press **PROGRAM** to return to **RUN** mode: setup is complete.

cross-referenced

SITRANS LR 200 Communications: HART

Note: See *mA Output with Level, Space, and Distance operation* on page 8 for an illustration of the mA output with different modes of operation.

- You will need the full manual to acquire the list of applicable parameters.
- The HART Device Descriptor (DD) may be obtained from the HART Communication Foundation at www.hartcomm.org
- We recommend that you use Simatic Process Device Manager (PDM) to program your instrument.

Maintenance

SITRANS LR 200 requires no maintenance or cleaning under normal operating conditions. If cleaning becomes necessary under severe operating conditions:

1. Note the antenna material and the process medium, and select a cleaning solution that will not react adversely with either.
2. Remove the instrument from service and wipe the antenna clean using a cloth and suitable cleaning solution.

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 numberxxxx:

1. For use and assembly, refer to the main instructions.
2. The equipment is certified for use as Category 1G/2G equipment.
   The 1G certification covers the use of the equipment antenna or wave-guide in a zone 0 environment at ambient temperatures of –40°C to +60°C and atmospheric pressure up to the process flange. The 2G certification covers the remainder of the equipment for use in a zone 1 environment.
3. The equipment may be used with flammable gases and vapors with apparatus group IIC and temperature class T6.
4. The equipment is certified for use in an ambient temperature range of–40°C to 60°C.
5. The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
6. 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).
7. Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-19 within Europe).
8. Components to be incorporated into or used as replacements in the equipment shall be fitted by suitably trained personnel in accordance with the manufacturer's documentation.
9. The equipment has been tested in accordance with MIL Standard D0160B for the following vibration levels:

   Frequency range 15–54Hz, 0.010 inch displacement

   Frequency range 54–2000 Hz, 1.5 g of acceleration.

   These were randomly cycled for a period of 2 hours.
10. The certification of this equipment relies upon the following materials used in its construction:

    Aluminum alloy A-356 T6 (aluminum enclosure option)
    Stainless steel CF8M (stainless steel enclosure option)
    Stycast 2651-40FR encapsulant, catalyst II
    Stycast LA-9823-76 epoxy cement
    Tempered glass (window)

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. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

11. Equipment Marking

The equipment marking contains at least the information on the product label, shown on the inside front cover of this manual.