

English  
Dansk  
Deutsch  
Ελληνικά  
Español  
Français  
Italiano  
Nederlands  
Português  
Suomi  
Svenska

# sitrans

## LR 200

**SIEMENS**

# SIEMENS

## SITRANS LR 200

SERIAL No: 2003/12345678

ENCL.: NEMA/TYP4X, 6, IP67

AMB. TEMP.: -40°C to 80°C

POWER RATING: 24V $\overline{=}$  Nom., 30V $\overline{=}$  Max., 4-20mA



Siemens Milltronics Process Instruments Inc. Peterborough

Made in Canada

Exia per drawing: 23651611

Temp. Code: T4

Class I, Div 1, Group A, B, C, D

Class II, Div 1, Group E, F, G

Class III

HART 5.8 GHz



II 1 G

Ex ia IIC T4

SIRA 03ATEX2142X

WARNING: POSSIBLE STATIC HAZARD, DO NOT RUB OR CLEAN ON SITE.

CANADA: 267P - LR200

Ex ia per drawing: 23651621

Class I, Div 1, Group A, B, C, D

Class II, Div 1, Group G

Class III

6.3 GHz

HART

FCC ID: NJA-LR200

Temp. Code: T4

$I_{max}$  = 120mA

$P_{max}$  = 0.8 W

$V_{max}$  = 30V

$C_i$  = 3.6 nF

$L_j$  = 0.1 mH 159134



WARNING: POSSIBLE STATIC HAZARD, DO NOT RUB OR CLEAN ON SITE.

[ ]

[ ]

CANADA: 267P- [ ]

FCC ID: NJA-LR200



Class I, Div. 2,  
Group A, B, C, D  
Temp. Code: T5

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions

- 1) This device may not cause harmful interference and
- 2) This device must accept any interference received,  
including interference that may cause undesired operation

# SITRANS LR 200 Quick Start Manual

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 instrument to its fullest potential. The complete manual is available on our website: [www.siemens.com/processautomation](http://www.siemens.com/processautomation). The printed manual is available from your local Siemens Milltronics representative.

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

Siemens Milltronics Process Instruments Inc.  
1954 Technology Drive, P.O. Box 4225  
Peterborough, Ontario, Canada, K9J 7B1  
Email: [techpubs.smpi@siemens.com](mailto:techpubs.smpi@siemens.com)

**Copyright Siemens Milltronics  
Process Instruments Inc. 2004.  
All Rights Reserved**

## Disclaimer of Liability

We encourage users to purchase authorized bound manuals, or to view electronic versions as designed and authored by Siemens Milltronics Process Instruments Inc. Siemens Milltronics Process Instruments Inc. will not be responsible for the contents of partial or whole reproductions of either bound or electronic versions.

While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

Technical data subject to change.

MILLTRONICS is a registered trademark of Siemens Milltronics Process Instruments Inc.

## 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.

# SITRANS LR 200

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

## Notes:

- 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 North America). The instrument consists of an electronic component coupled to the antenna and process connection.

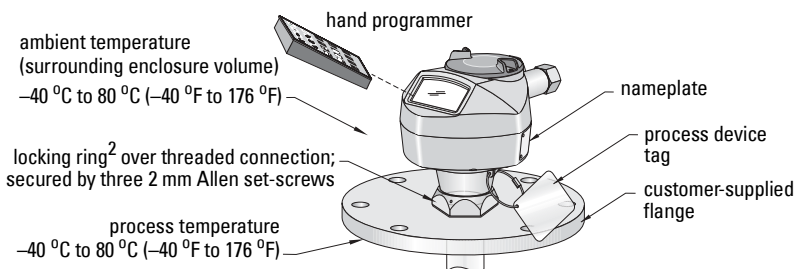
Communication is via HART<sup>1</sup>, and signals are processed using Sonic Intelligence<sup>®</sup>.

## 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 website at [www.siemens.com/processautomation](http://www.siemens.com/processautomation).



1. HART<sup>®</sup> is a registered trademark of the HART Communication Foundation.

2. When the locking ring is secured, it prevents the enclosure rotating on the threaded connection.

## Power

Nominal 24 V DC at max. 550 Ohm: for other configurations see the full manual.

- Maximum 30 V DC • 4 to 20 mA

## Approvals

- General CSA<sub>US/C</sub>, FM, CE
- Radio Europe: (R&TTE<sup>1</sup>)  
US: FCC  
Canada: Industry Canada
- Hazardous Europe ATEX II 1 G EEx ia IIC T4  
US FM: Intrinsically Safe (barrier required)<sup>2</sup>  
Class I, Div. 1, Groups A, B, C, D  
Class II, Div. 1, Groups E, F, G  
Class III  
FM: Non-incendive (no barrier required)<sup>2</sup>  
Class I, Div. 2, Groups A, B, C, D, T5  
Canada CSA: Intrinsically Safe (barrier required)<sup>2</sup>  
Class I, Div. 1, Groups A, B, C, D (barrier required)  
Class II, Div. 1, Group G  
Class III  
Lloyd's Register of Shipping categories ENV1, ENV2, ENV3, and ENV5

**Note:** The use of approved watertight conduit hubs/glands is required for Type 4X / NEMA 4X, Type 6 / NEMA 6, IP67 (outdoor applications).

## Pressure Application

- ! WARNINGS:**
- This product is designated as a Pressure Accessory per Directive 97 / 23 / EC, and is not intended for use as a safety device.
  - For pressure applications, it will be necessary to use PTFE paste or other appropriate sealing compound, and to tighten the process connection beyond hand-tight.
  - Do not 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.

<sup>1</sup> Please check check the Radio TRLEMC certificate (under Approvals Certificates) on the SITRANS LR 200 product page of our website: [www.siemens.com/processautomation](http://www.siemens.com/processautomation).

<sup>2</sup> For more details, see the full manual, available on our website: [www.siemens.com/processautomation](http://www.siemens.com/processautomation).

# Installation



## ! WARNINGS:

- This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.
- 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.
- 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.
- Please handle the device using the enclosure, not the antenna, to avoid damage.

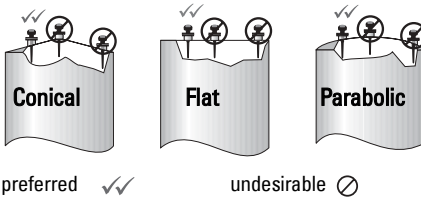
## Mounting location

### Recommendations

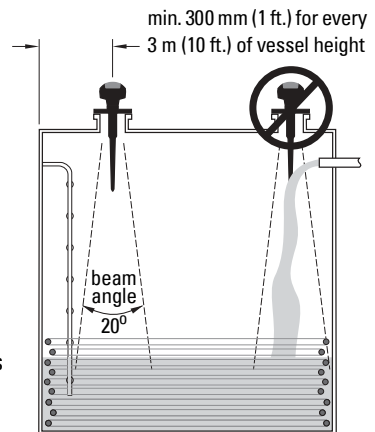
- Easy access for viewing the display and programming via the hand programmer.
- An environment suitable to the housing rating and materials of construction.

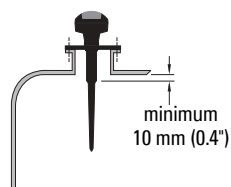
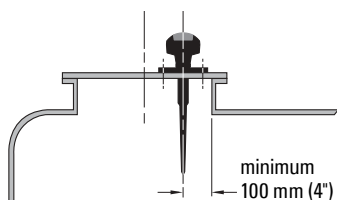
### Precautions

- 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.
- 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.
- Avoid interference from the fill path.





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.

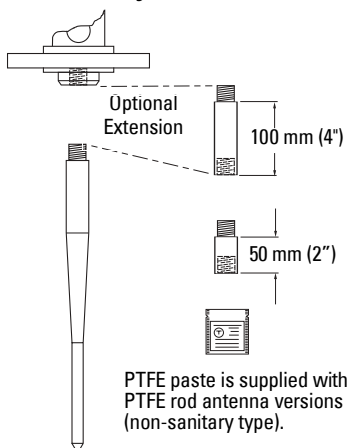
- Use the 100 mm (4") shield on nozzles that are 100 mm (4") in length, or shorter.
- Use the 250 mm (10") shield on nozzles that are 250 mm (10") in length, or shorter.

## Mounting instructions

- Simply screw SITRANS LR 200 into the process connection, and hand tighten.
- For pressure applications, it will be necessary to use PTFE paste (or other appropriate thread-sealing compound) and tighten the process connection beyond hand tight.

The maximum torque is 40 N-m. (30 ft-lbs.)

## Rod Assembly (PTFE rod antenna version only)



### Notes:

- Water or process fluids must not enter the connecting threads: this could cause reflections at the connection, which will appear as false echoes.
- Apply a small amount of PTFE paste to the antenna threads before threading the antenna together, and tighten slowly. Ensure that the rod sections mate securely with no gaps. Do not apply too much PTFE paste or the parts will not mate securely.
- Do not use wrenches or pliers. Hand tighten only (except in pressure applications: see warning above).

# Wiring

## Power

### WARNINGS:



DC terminals shall be supplied from an SELV<sup>1</sup> source in accordance with IEC-1010-1 Annex H.

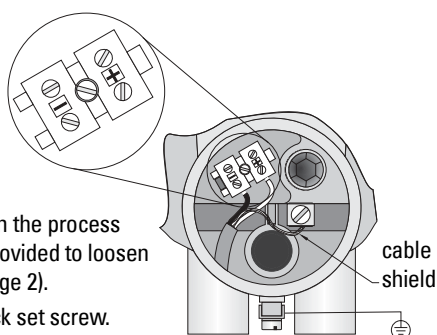
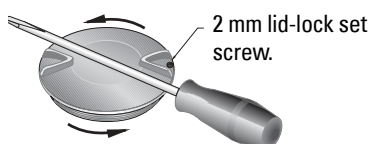


All field wiring must have insulation suitable for rated voltages.

## Connecting SITRANS LR 200

### Notes:

- For detailed wiring instructions, please refer to the full Instruction Manual.
- Use shielded, twisted pair cable (wire gauge 14-22).
- Separate cables and conduits<sup>2</sup> may be required to conform to standard instrumentation wiring practices, or electrical codes.



1. If you want to rotate the instrument on the process connection, use the 2 mm Allen key provided to loosen the locking ring (see illustration on page 2).
2. Use the Allen key to loosen the lid-lock set screw.
3. Using a screwdriver for leverage if necessary, unscrew the cover.
4. Connect the wires to the terminal as shown, and ground the instrument according to local regulations.
5. Close the lid and secure the locking ring before programming and calibration. Do not rotate the instrument after calibration, as this may cause an error.

## 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 material level. It returns the distance (in meters) to the material level referenced from Empty (process empty level). This is the default start-up display mode.

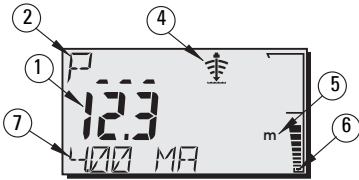
<sup>1</sup>. Safety Extra Low Voltage

<sup>2</sup>. If cable is routed through conduit, use only approved suitable-size hubs for waterproof application.

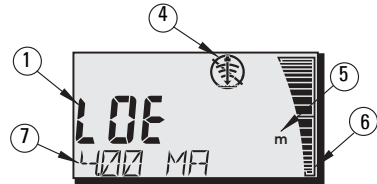
# RUN Mode Display



Use the hand programmer to control the display.

## Normal operation



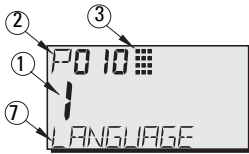
## Failsafe operation



- 1 – Primary Reading (displays level, distance, or volume, in either units or percent).
- 2 – Parameter for Auxiliary Reading. (Depending on the parameter selected, milliAmp value, distance, or echo confidence can be displayed, with units where applicable.)
- 4 – Echo status indicator: Reliable Echo  or Unreliable Echo 
- 5 – Units or Percent
- 6 – Active bar graph represents material level
- 7 – Auxiliary Reading

If the echo confidence drops below the echo confidence threshold, the failsafe timer starts running. When the timer expires, the letters **LOE** (Loss of Echo) alternate with the reading every two seconds, and the Reliable Echo indicator is replaced by the Unreliable indicator. When a valid reading is received, the level reading display returns to normal operation.

## 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).

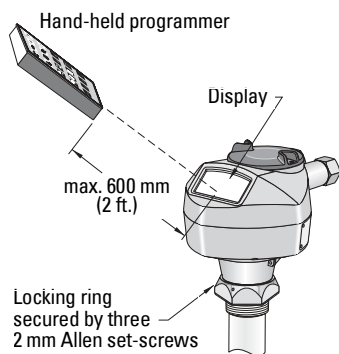
## Programming

- 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<sup>1</sup> PDM.

<sup>1</sup> SIMATIC® is a registered trademark of Siemens AG.

## Hand programmer.

For direct access to SITRANS LR 200, point the programmer at the SITRANS LR 200 display and press the keys. (For detailed instructions, see the next page.)



Key	Programming Mode
	Decimal point
	Negative value
	<b>CLEAR</b> value
	<b>TOGGLE</b> between Units and % on parameter value
	End <b>PROGRAM</b> session and enable <b>RUN</b> mode
	Update echo quality parameters
	Parameter scroll-up
	Parameter scroll-down
	<b>DISPLAY</b> opens parameter fields
	<b>ENTER</b> the displayed value

## Security: (P000: Lock)

Value		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

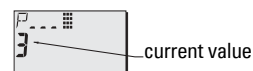
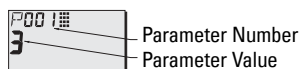
Power up the instrument. SITRANS LR 200 starts in **RUN** mode.

### Notes:

- Keep infrared devices such as laptops, cell phones, and PDA's, away from SITRANS LR 200 to prevent inadvertent operation.
- The following instructions apply when using the Hand Programmer.
- Do not use the Hand Programmer at the same time as SIMATIC PDM, or erratic operation may result.
- Press **PROGRAM** then **DISPLAY** to access **PROGRAM** mode, and press **PROGRAM** to return to **RUN** mode.
- You do not need to key in initial zeros when entering a parameter number: for example, for P005, key in **5**.


## Accessing a parameter

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** .
5. **For example:** press **5**  .
6. 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**  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**  then **ENTER** . The value returns to the default setting.

### Master Reset (P999)

Returns all parameters except P000 and P069 to default settings. (The learned TVT curve is not lost.)

1. Press **PROGRAM** , then **DISPLAY**  to activate **PROGRAM** mode.
2. Press **DISPLAY**  to open parameter fields.
3. Key in **999**.
4. Press **CLEAR**  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

**Note:** Factory settings are marked by an asterisk (\*) in the tables.

## 1. Select language (P010: Language)

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

	ENGLISH	DEUTSCH	FRANÇAIS	ESPAÑOL
P000	LOCK	VERRIEGELG	VERROUIL	BLOQUEO
P001	OPERATION	BETRIEB	FONCTIONMT	FUNCIIONAM.
P003	MEAS RESP	REAKTIONSZ	TEMPS REP	TIEMPO R.
P004	ANTENNA	ANTENNE	ANTENNE	ANTENA
P005	UNITS	EINHEIT	UNITES	UNIDADES
P006	EMPTY	MESSBER.	VIDE	VACIO
P007	SPAN	MESSSPANNE	PLAGE	RANGO
P010	LANGUAGE	SPRACHE	LANGUE	IDIOMA

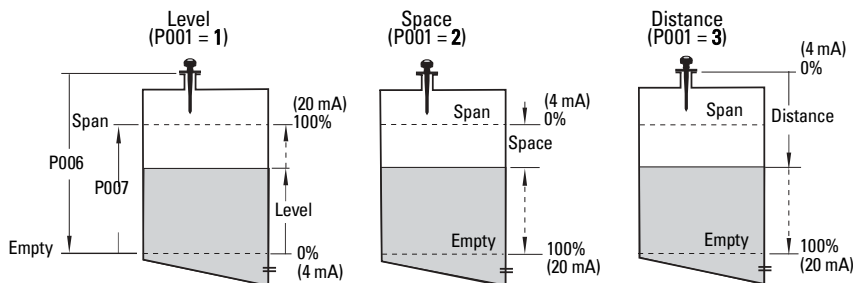
## 2. Set P001: Operation (measurement mode)

**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.

Value	1	*	<b>Level</b> 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		<b>Space</b> returns distance to material level referenced from Span (process full level).
	3		<b>Distance</b> 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).

## (P004 - view only)

Value	240	*	rod antenna
	241		rod + 50 mm PTFE extension
	242		rod + 100 mm PTFE extension

#### 4. Select measurement units (P005)

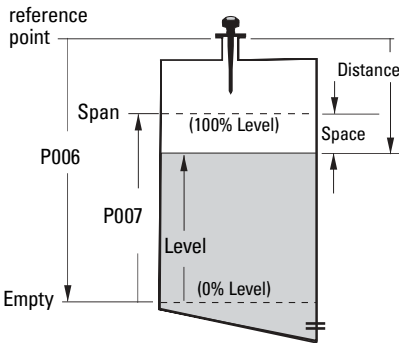
Value	1	* meters
	2	centimeters
	3	millimeters
	4	feet
	5	inches

#### 5. Set process empty level (P006: Empty)

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

Value	Range	<b>0.0000 to 20.00</b>
	Default	<b>20.00 m (max. range)</b>

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



#### 6. Set measurement range (P007: Span)

Value	Range	<b>0.0000 to 20.00</b>
	Default	<b>19.56 m (see note below)</b>

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<sup>1</sup>, 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:	<b>0.0000 to 20.00 (m)</b>
	*	<b>1.000</b>

Use P838 and P837 together: see step-by-step instructions on page 12.

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


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

<sup>1</sup> Default setting for Blanking is 0.4 m


## 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<sup>1</sup>.

### 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 – 0.5 m].
  - 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.

## SITRANS LR 200 Communications: HART

**Note:** See *mA Output with Level, Space, and Distance operation* on page 10 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](http://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.

## Unit Repair and Excluded Liability

For detailed information, please see the inside back cover.

<sup>1</sup> For more details on Auto False Echo Suppression, see the full manual.

# 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 03ATEX2142X:

1. For use and assembly, refer to the main instructions.
2. The equipment is certified for use as Category 1G equipment.
3. The equipment may be used with flammable gases and vapors with apparatus group IIC and temperature class T4.
4. The equipment is certified for use in an ambient temperature range of  $-40\text{ }^{\circ}\text{C}$  to  $80\text{ }^{\circ}\text{C}$ .
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. It is the responsibility of the user to ensure that manual override is possible in order to shut down the equipment and protective systems incorporated within automatic processes which deviate from the intended operating conditions, provided that this does not compromise safety.
10. The 'X' suffix to the certificate number relates to the following special conditions for safe use:
  - a. Parts of the enclosure may be non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charge on non-conducting surfaces.
  - b. As either Aluminum, Magnesium, Titanium or Zirconium may be used at the accessible surface of the equipment, in the event of rare incidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the SITRANS LR 200 or SITRANS Probe is being installed in locations that specifically require group II, category 1G equipment.

11. The certification of this equipment relies upon the following materials used in its construction:

Aluminum alloy ANSI ref. A380.0 (aluminum enclosure option)  
STYCAST<sup>1</sup> 2651-40FR encapsulant, catalyst II

The detailed composition of Aluminum A380.0 as used in the metal enclosure (threaded lid option only) is as follows:

Si – 8.5%, Fe – 1.3%, Cu – 3.5%, Mn – 0.5%, Mg – 0.1%, Ni – 0.1%, Zn – 3%,  
Sn – 0.35%, others – 0.5%, Al - balance

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.

12. **Equipment Marking:**

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

---

<sup>1</sup>. STYCAST® is a registered trademark of the National Starch and Chemical Company.