

**SIEMENS**

Operating Instructions

# SITRANS L

Radar Transmitters

SITRANS LR150

Edition

08/2020

<https://www.siemens.com>

# SIEMENS

## SITRANS L

### Radar Transmitters SITRANS LR150

#### Operating Instructions

|                                     |    |
|-------------------------------------|----|
| Preface                             |    |
| Introduction                        | 1  |
| Safety notes                        | 2  |
| Description                         | 3  |
| Installing/mounting                 | 4  |
| Connecting                          | 5  |
| Access protection                   | 6  |
| Setup with the integrated HMI       | 7  |
| Setup with smart device (Bluetooth) | 8  |
| Setup with PC/notebook (HART modem) | 9  |
| Operating                           | 10 |
| Setup with SIMATIC PDM EDD          | 11 |
| Diagnostics and troubleshooting     | 12 |
| Service and maintenance             | 13 |
| Certificates and approvals          | 14 |
| Technical data and dimensions       | 15 |

## 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.

|   |
|---|
|  <b>DANGER</b> |
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| indicates that death or severe personal injury will result if proper precautions are not taken. |
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|  |
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|  <b>WARNING</b> |
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|  |
|--|
| indicates that death or severe personal injury may result if proper precautions are not taken. |
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|  |
|--|
|  <b>CAUTION</b> |
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|  |
|--|
| indicates that minor personal injury can result if proper precautions are not taken. |
|--|

|   |
|---|
|  <b>NOTICE</b> |
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|  |
|--|
| 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:

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

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### Disclaimer of Liability

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

# Table of Contents

|  |            |
|--|------------|
| <b>Preface</b> .....                                       | <b>vii</b> |
| <b>1 Introduction</b> .....                                | <b>1</b>   |
| 1.1 Function .....   | 1          |
| 1.2 Target group .....                                     | 1          |
| 1.3 Symbols used .....                                     | 1          |
| <b>2 Safety notes</b> .....                                | <b>3</b>   |
| 2.1 Authorised personnel .....                             | 3          |
| 2.2 Appropriate use .....                                  | 3          |
| 2.3 Warning about incorrect use .....                      | 3          |
| 2.4 General safety instructions .....                      | 3          |
| 2.5 Radar frequencies for worldwide use .....              | 4          |
| 2.6 Installation and operation in the USA and Canada ..... | 4          |
| 2.7 Security information .....                             | 4          |
| <b>3 Description</b> .....                                 | <b>7</b>   |
| 3.1 Configuration .....                                    | 7          |
| 3.2 Principle of operation .....                           | 8          |
| 3.3 Adjustment .....                                       | 9          |
| 3.4 Packaging, transport and storage .....                 | 10         |
| <b>4 Installing/mounting</b> .....                         | <b>13</b>  |
| 4.1 General instructions .....                             | 13         |
| 4.2 Mounting instructions .....                            | 13         |
| 4.3 Measurement setup - Flow .....                         | 17         |
| <b>5 Connecting</b> .....                                  | <b>19</b>  |
| 5.1 Preparing the connection .....                         | 19         |
| 5.2 Connecting .....                                       | 20         |
| 5.3 Wiring plan .....                                      | 21         |
| 5.4 Connecting HMI to electronic module .....              | 22         |
| 5.5 Switch-on phase .....                                  | 22         |
| <b>6 Access protection</b> .....                           | <b>23</b>  |
| 6.1 Bluetooth radio interface .....                        | 23         |
| 6.2 Protection of the parameterization .....               | 23         |

|           |  |           |
|-----------|--|-----------|
| <b>7</b>  | <b>Setup with the integrated HMI .....</b>       | <b>25</b> |
| 7.1       | Adjustment system .....                          | 25        |
| 7.2       | Structure and views of the display .....         | 26        |
| 7.3       | Menu overview .....                              | 29        |
| 7.4       | Parameterization .....                           | 34        |
| 7.5       | Quick setup .....                                | 34        |
| 7.5.1     | Wizards for quick setup .....                    | 34        |
| 7.5.2     | Quick setup level, space, distance .....         | 36        |
| 7.5.3     | Quick setup volume .....                         | 38        |
| 7.5.4     | Quick setup volume flow .....                    | 41        |
| 7.5.5     | Quick setup auto false echo suppression .....    | 44        |
| 7.6       | Application examples .....                       | 45        |
| 7.6.1     | Application example level .....                  | 45        |
| 7.6.2     | Application example volume flow .....            | 46        |
| 7.7       | Settings .....                                   | 47        |
| 7.7.1     | Selection HART variable .....                    | 47        |
| 7.7.2     | Transmitter .....                                | 48        |
| 7.7.3     | Adjustment .....                                 | 48        |
| 7.7.4     | Current output .....                             | 49        |
| 7.7.5     | Volume .....                                     | 50        |
| 7.7.6     | Volume flow .....                                | 52        |
| 7.7.7     | Custom .....                                     | 53        |
| 7.7.8     | Display .....                                    | 54        |
| 7.8       | Maintenance and diagnostics .....                | 55        |
| 7.8.1     | Signal .....                                     | 55        |
| 7.8.2     | Peak values .....                                | 57        |
| 7.8.3     | Circuit test .....                               | 58        |
| 7.8.4     | Resets .....                                     | 59        |
| 7.8.5     | Frequency .....                                  | 60        |
| 7.9       | Communication .....                              | 61        |
| 7.9.1     | HART address .....                               | 61        |
| 7.10      | Safety .....                                     | 61        |
| 7.10.1    | user PIN .....                                   | 61        |
| 7.10.2    | Bluetooth PIN .....                              | 61        |
| <b>8</b>  | <b>Setup with smart device (Bluetooth) .....</b> | <b>63</b> |
| 8.1       | Connecting .....                                 | 63        |
| <b>9</b>  | <b>Setup with PC/notebook (HART modem) .....</b> | <b>65</b> |
| 9.1       | Saving the parameterisation data .....           | 65        |
| <b>10</b> | <b>Operating .....</b>                           | <b>67</b> |
| <b>11</b> | <b>Setup with SIMATIC PDM EDD .....</b>          | <b>71</b> |
| 11.1      | Setup with SIMATIC PDM EDD .....                 | 71        |

---

|           |  |           |
|-----------|--|-----------|
| <b>12</b> | <b>Diagnostics and troubleshooting</b>         | <b>75</b> |
| 12.1      | Maintenance                                    | 75        |
| 12.2      | Rectify faults                                 | 75        |
| 12.3      | Diagnosis, fault messages                      | 76        |
| 12.4      | Status messages according to NE 107            | 76        |
| 12.5      | Treatment of measurement errors                | 80        |
| 12.6      | Return procedure                               | 84        |
| 12.7      | Technical support                              | 85        |
| 12.8      | How to proceed if a repair is necessary        | 86        |
| <b>13</b> | <b>Service and maintenance</b>                 | <b>87</b> |
| 13.1      | Dismounting steps                              | 87        |
| 13.2      | Disposal                                       | 87        |
| <b>14</b> | <b>Certificates and approvals</b>              | <b>89</b> |
| 14.1      | Radio licenses                                 | 89        |
| 14.2      | EU conformity                                  | 89        |
| <b>15</b> | <b>Technical data and dimensions</b>           | <b>91</b> |
| 15.1      | Technical data                                 | 91        |
| 15.2      | Dimensions                                     | 95        |
| 15.3      | Licensing information for open source software | 96        |
| 15.4      | Trademark                                      | 96        |



# Preface

## Safety instructions for Ex areas



### **WARNING**

Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each transmitter with Ex approval and are part of the operating instructions.

Editing status: 2020-08-03



# Introduction

## 1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, the exchange of parts and the safety of the user. Please read this information before putting the transmitter into operation and keep this manual accessible in the immediate vicinity of the device.

## 1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

## 1.3 Symbols used



**Information, note, tip:** This symbol indicates helpful additional information and tips for successful work.



**Note:** This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



**Caution:** Non-observance of the information marked with this symbol may result in personal injury.



**Warning:** Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



**Danger:** Non-observance of the information marked with this symbol results in serious or fatal personal injury.



### Ex applications

This symbol indicates special instructions for Ex applications.



### List

The dot set in front indicates a list with no implied sequence.

1

**Sequence of actions**

Numbers set in front indicate successive steps in a procedure.



**Battery disposal**

This symbol indicates special information about the disposal of batteries and accumulators.

## Safety notes

### 2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

### 2.2 Appropriate use

SITRANS LR150 is a transmitter for continuous level measurement.

You can find detailed information about the area of application in chapter " *Product description*".

Operational reliability is ensured only if the transmitter is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

### 2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the transmitter can be impaired.

### 2.4 General safety instructions

This is a state-of-the-art transmitter complying with all prevailing regulations and directives. The transmitter must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the transmitter. When measuring aggressive or corrosive media that can cause a dangerous situation if the transmitter malfunctions, the operator has to implement suitable measures to make sure the transmitter is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel

authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

The low transmitting power of the radar transmitter is far below the internationally approved limits. No health impairments are to be expected with intended use. The band range of the transmission frequency can be found in chapter " *Technical data*".

## 2.5 Radar frequencies for worldwide use

Country specific settings for the radar signals are determined via the frequency. The operating mode must be set in the operating menu via the respective adjustment tool at the beginning of the setup (see chapter " *Setup*" resp. " *Menu overview*").

### **WARNING**

Operating the device without selecting the frequency for the appropriate country group constitutes a violation of the regulations of the radio approvals of the respective country.

Further information can be found in the document " *Regulations for radar level measuring transmitters with radio licenses*" on our homepage.

## 2.6 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code

A Class 2 power supply unit has to be used for the installation in the USA and Canada.

## 2.7 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

To protect plants, systems, machines and networks against cyber threats, it is necessary to implement (and continuously maintain) a holistic, state-of-the-art industrial security concept. Siemens products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>

Siemens products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under: <https://www.siemens.com/industrialsecurity>



## Description

### 3.1 Configuration

#### Scope of delivery

The scope of delivery encompasses:

- SITRANS LR150 radar transmitter
- Information sheet "*Documents and software*" with:
  - Transmitter serial number
  - QR code with link for direct scanning
- Information sheet "*Device Bluetooth and Parameter Access Codes*" with:
  - Bluetooth PIN
  - Bluetooth PUK
  - Device Access PUK

The further scope of delivery encompasses:

- Documentation
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - If necessary, further certificates

---

#### Note

Optional transmitter features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

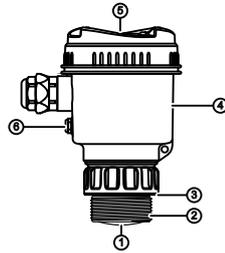
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#### Scope of this operating instructions

This operating instructions manual applies to the following transmitter versions:

- Hardware version from 1.0.0
- Software version from 1.2.0

### Constituent parts

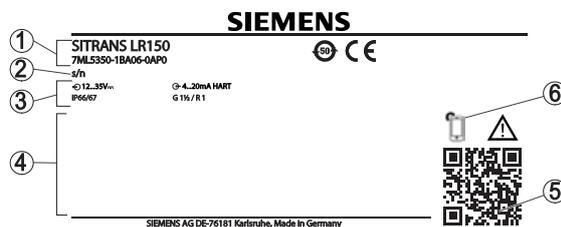


- ① Ventilation/pressure compensation
- ② Display and adjustment unit
- ③ Electronics housing
- ④ Radar antenna
- ⑤ Process fitting
- ⑥ Process seal

Figure 3.1 Components of SITRANS LR150 (Example process fitting G1½)

### Nameplate

The nameplate contains the most important data for identification and use of the transmitter.



- ① Transmitter type
- ② Serial number
- ③ Technical data
- ④ Field for approvals
- ⑤ QR code for device documentation
- ⑥ Wireless access via smart device

Figure 3.2 Layout of the nameplate (example)

## 3.2 Principle of operation

### Application area

SITRANS LR150 is a radar transmitter for non-contact, continuous level measurement. It is suitable for liquids and solids in practically all industries.

### Functional principle

The transmitter emits a continuous, frequency-modulated radar signal through its antenna. The emitted signal is reflected by the medium and received by the antenna as an echo with modified frequency. The frequency change is proportional to the distance and is converted into the level.

## 3.3 Adjustment

### Local adjustment

On-site adjustment of the device is carried out via the optionally integrated HMI.

### Wireless adjustment

Devices with integrated Bluetooth module can be adjusted wirelessly via Siemens mobile IQ app.

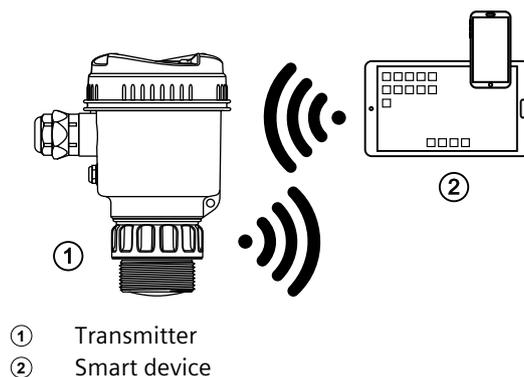
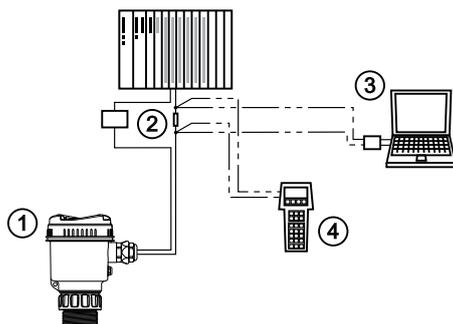


Figure 3.3      Wireless connection to standard operating devices with integrated Bluetooth LE

### Adjustment via the signal cable

Devices with signal output 4 ... 20 mA/HART can also be operated via a signal cable. This is done via an interface adapter and a PC/notebook using SIMATIC PDM.



- ① Transmitter
- ② HART resistance 250  $\Omega$  (optional depending on evaluation)
- ③ Control system
- ④ Handheld

Figure 3.4 Connecting the PC to the signal cable

## 3.4 Packaging, transport and storage

### Packaging

Your transmitter was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

### Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

### Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

### Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

#### **Storage and transport temperature**

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 ... 85 %

*Description*

---

*3.4 Packaging, transport and storage*

## Installing/mounting

### 4.1 General instructions

#### Ambient conditions

The transmitter is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

#### Process conditions

---

**Note**

For safety reasons, the transmitter must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data*" of the operating instructions or on the nameplate.

---

Hence make sure before mounting that all parts of the transmitter exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

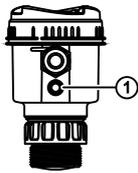
- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

### 4.2 Mounting instructions

#### Polarisation

Radar transmitters for level measurement emit electromagnetic waves. The polarization is the direction of the electrical component of these waves.

The polarization direction is marked on the housing, see following drawing:



① Marking of the polarisation

Figure 4.1 Position of the polarisation

---

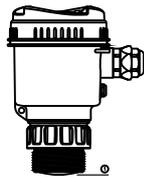
**Note**

When the housing is rotated, the direction of polarization changes and hence the influence of the false echo on the measured value. Please keep this in mind when mounting or making changes later.

---

**Reference point**

The centre of the antenna lens is the beginning of the measuring range and at the same time the reference point for the min./max. adjustment, see following diagram:



① Reference point

Figure 4.2 Reference point

---

**Installation position**

When mounting the device, keep a distance of at least 200 mm (7.874 in) from the vessel wall. If the device is installed in the center of dished or round vessel tops, multiple echoes can arise. However, these can be suppressed by an appropriate adjustment (see chapter "Set up").

If you cannot maintain this distance, you should carry out a auto false echo suppression during setup. This applies particularly if buildup on the vessel wall is expected. In such cases, we recommend repeating the auto false echo suppression at a later date with existing buildup.

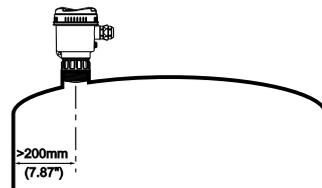


Figure 4.3 Mounting of the radar transmitter on round vessel tops

In vessels with conical bottom it can be advantageous to mount the device in the centre of the vessel, as measurement is then possible down to the bottom.

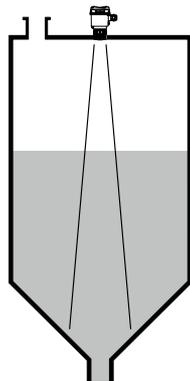


Figure 4.4 Mounting of the radar transmitter on vessels with conical bottom

### Inflowing medium

Do not mount the transmitters in or above the filling stream. Make sure that you detect the medium surface, not the inflowing product.

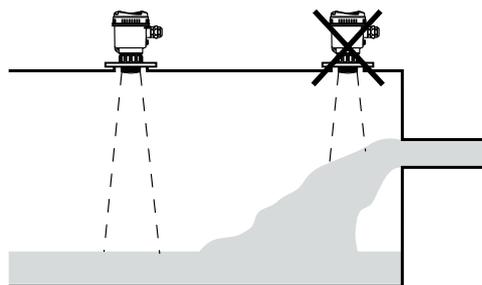


Figure 4.5 Mounting of the radar transmitter with inflowing medium

### Threaded nozzle und nozzle piece

With threaded connection, the antenna end should protrude at least 5 mm (0.2 in) out of the nozzle.

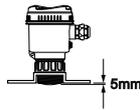


Figure 4.6 Thread mounting

If the reflective properties of the medium are good, you can mount SITRANS LR150 on nozzles longer than the antenna. The nozzle end should be smooth and burr-free, if possible also rounded.

You will find recommended values for nozzle heights in the following illustration or the table. The values come from typical applications. Deviating from the proposed dimensions, also longer nozzles are possible, however the local conditions must be taken into account.

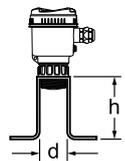


Figure 4.7 Nozzle mounting

| Nozzle diameter d |        | Nozzle length h |           |
|-------------------|--------|-----------------|-----------|
| 40 mm             | 1 1/2" | ≤ 150 mm        | ≤ 5.9 in  |
| 50 mm             | 2"     | ≤ 200 mm        | ≤ 7.9 in  |
| 80 mm             | 3"     | ≤ 300 mm        | ≤ 11.8 in |
| 100 mm            | 4"     | ≤ 400 mm        | ≤ 15.8 in |
| 150 mm            | 6"     | ≤ 600 mm        | ≤ 23.6 in |

**Note**

When mounting on longer nozzles, we recommend carrying out an auto false echo suppression (see chapter "Parameter adjustment").

**Orientation**

In liquids, direct the device as perpendicular as possible to the medium surface to achieve optimum measurement results.

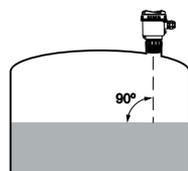


Figure 4.8 Alignment in liquids

## Agitators

If there are agitators in the vessel, a auto false echo suppression should be carried out with the agitators in motion. This ensures that the interfering reflections from the agitators are saved with the blades in different positions.

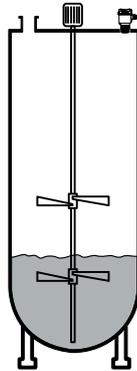


Figure 4.9 Agitators

## Foam generation

Through the action of filling, stirring and other processes in the vessel, compact foams which considerably damp the emitted signals may form on the medium surface.

If foams lead to measurement errors, you should use transmitters with guided radar.

## 4.3 Measurement setup - Flow

In general, the following must be observed while mounting the device:

- Mounting the transmitter on the upstream or inlet side
- Installation in the centre of the flume and vertical to the liquid surface
- Distance to the overfall orifice or Venturi flume
- Min. distance to the max. height of damming for optimum accuracy: 250 mm (9.843 in)<sup>1</sup>

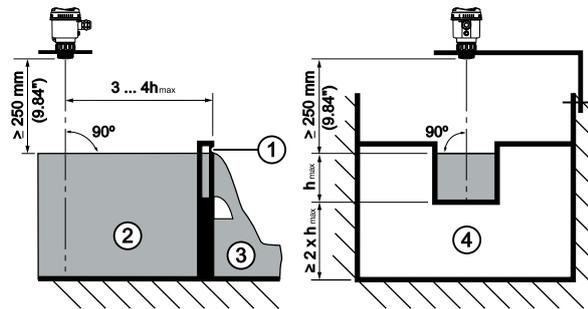
Detailed project planning data can be found at the channel manufacturers and in the technical literature.

The following examples serve as an overview for flow measurement.

---

<sup>1</sup> At smaller distances the measuring accuracy is reduced, see "Technical data".

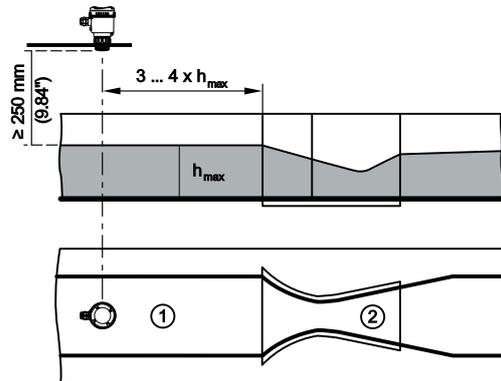
Rectangular overflow



- ① Overfall orifice (side view)
- ② Upstream water
- ③ Tailwater
- ④ Overfall orifice (view from tailwater)

Figure 4.10 Flow measurement with rectangular flume:  $h_{max}$  = max. filling of the rectangular flume

Khafagi-Venturi flume



- ① Position transmitter
- ② Venturi flume

Figure 4.11 Flow measurement with Khafagi-Venturi flume:  $h_{max}$  = max. filling of the flume; B = tightest constriction in the flume

## Connecting

### 5.1 Preparing the connection

#### Safety instructions

Always keep in mind the following safety instructions:

- Carry out electrical connection by trained, qualified personnel authorised by the plant operator

|  |
|--|
|  <b>WARNING</b> |
|--|

|   |
|---|
| Only connect or disconnect in de-energized state. |
|---|

#### Voltage supply

The data for power supply are specified in chapter " *Technical data*".

---

**Note**

Power the transmitter via an energy-limited circuit (power max. 100 W) acc. to IEC 61010-1, e.g.

- Class 2 power supply unit (acc. to UL1310)
- SELV power supply unit (safety extra-low voltage) with suitable internal or external limitation of the output current

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load (e.g. with a transmitter current of 20.5 mA or 22 mA in case of fault)
- Influence of additional transmitters in the circuit (see load values in chapter " *Technical data*")

#### Connection cable

Use cable with round cross section for transmitters with housing and cable gland. To ensure the seal effect of the cable gland (IP protection rating), find out which cable outer diameter the cable gland is suitable for.

Shielded, two-wire cable is recommended for connecting the device.

---

**Note**

Shielded cable generally necessary in HART multidrop mode.

---

**Note**

If the temperatures are too high, the cable insulation can be damaged. Hence keep apart from the ambient temperature also the self-heating of the transmitter for the temperature resistance of the cable in the connection compartment in mind (With an ambient temperature  $\geq 50\text{ °C}$  (122 °F) the connection cable should be suitable for a temperature which is at least 20 °C (36 °F) higher.).

---

**Cable screening and grounding**

It is recommended to connect the cable screening to ground potential on the supply side.

**Cable gland**

**Metric threads**

In the case of transmitter housings with metric thread, the cable gland is screwed in at the factory. It is sealed with plastic plugs as transport protection.

You have to remove this plug before electrical connection.

**NPT thread**

In the case of transmitter housings with self-sealing NPT threads, it is not possible to have the cable entry screwed in at the factory. The cable gland is therefore covered with a red dust protection cap as transport protection.

---

**Note**

To ensure the housing protection class, you must replace this protective cap with an approved NPT cable gland before setup.

---

**Note**

Do not use grease when screwing in the NPT cable gland or a conduit steel pipe.

---

Maximum torque - see chapter "*Technical data*".

## 5.2 Connecting

**Connection technology**

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

---

**Note**

Fixed conductors and flexible conductors with ferrules can be inserted directly into the terminal openings. In the case of flexible conductors for opening the terminals, use a screwdriver (3 mm blade width) to push the actuator lever away from the terminal opening. When released, the terminals are closed again.



Figure 5.1 Connection

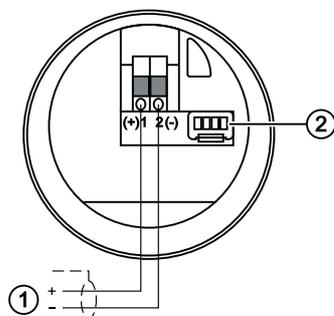
You can find further information on the max. wire cross-section under "*Technical data - Electromechanical data*".

## Connecting

Connect the transmitter according to the following wiring plan.

## 5.3 Wiring plan

### Electronics and connection compartment

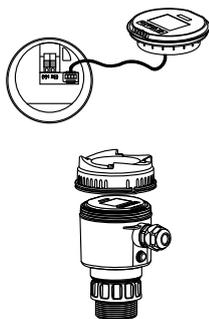


① Voltage supply, signal output

- ② Plug connector for HMI

Figure 5.2 Connection compartment SITRANS LR150

## 5.4 Connecting HMI to electronic module



## 5.5 Switch-on phase

After connection to the power supply, the device carries out a self-test:

- Internal check of the electronics
- Output signal is set to failure

The current measured value is then output on the signal cable.

## Access protection

### 6.1 Bluetooth radio interface

Devices with a Bluetooth radio interface are protected against unwanted access from outside. This means that only authorized persons can receive measured and status values and change device settings via this interface.

#### Bluetooth PIN

A Bluetooth PIN is required to establish Bluetooth communication via the adjustment tool (smartphone/tablet/notebook). This code must be entered once when Bluetooth communication is established for the first time in the adjustment tool. It is then stored in the adjustment tool and does not have to be entered again.

The Bluetooth PIN is individual for each device. It is supplied with the device in the information sheet "*Device Bluetooth and Parameter Access Codes*". It can be changed by the user after the first connection has been established. If the Bluetooth PIN has not been entered correctly, a new entry can only be made after a waiting period has elapsed. The waiting time increases with each additional incorrect entry.

#### Bluetooth PUK

The Bluetooth PUK enables Bluetooth communication to be established in the event that the Bluetooth PIN is no longer known. It can't be changed. The Bluetooth PUK can be found in information sheet "*Device Bluetooth and Parameter Access Codes*". If this document is lost, the Bluetooth PUK can be retrieved from your personal contact person after legitimation. The storage and transmission of Bluetooth access codes is always encrypted (SHA 256 algorithm).

### 6.2 Protection of the parameterization

The settings (parameters) of the device can be protected against unwanted changes. The parameter protection is deactivated on delivery, all settings can be made.

#### user PIN

To protect the parameterization, the device can be locked by the user with the aid of a freely selectable user PIN. The settings (parameters) can then only be read out, but not changed. The user PIN is also stored in the adjustment tool. However, unlike the Bluetooth PIN, it must be re-entered for each unlock. When using the adjustment app or EDD, the stored user PIN is then suggested to the user for unlocking.

### Device Access PUK

The Device Access PUK allows unlocking the device in case the user PIN is no longer known. It can't be changed. The Device Access PUK can also be found on the supplied information sheet "*Device Bluetooth and Parameter Access Codes*". If this document is lost, the Device Access PUK can be retrieved from your personal contact person after legitimation. The storage and transmission of the user PIN is always encrypted (SHA 256 algorithm).

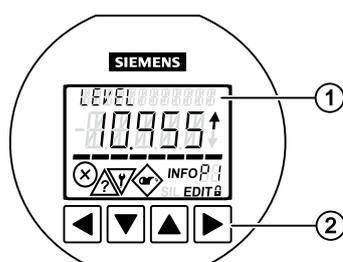
## Setup with the integrated HMI

### 7.1 Adjustment system

#### Function

The transmitter is operated via the four keys of the integrated display and adjustment unit. The respective menu items are shown on the HMI. You can find the function of the individual keys in the following overview.

#### Display and adjustment elements



- ① HMI
- ② Adjustment keys

Figure 7.1 Elements of the integrated display and adjustment unit

#### Key functions

| Key   | Function  |
|---|---|
|  | All views: return to the measured value view<br>Editing view: Selecting the parameter settings<br>Editing view: return to the parameter view without changing the parameter setting |
|  | Measured value view: Select the desired measured value<br>Parameter view: Select parameter<br>Editing view: Change parameter value upwards  |

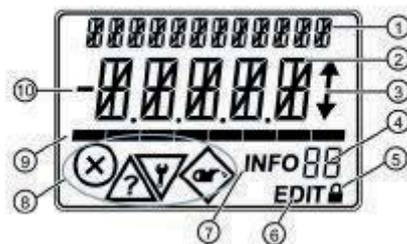
| Key   | Function  |
|---|---|
|  | Measured value view: Select the desired measured value<br>Parameter view: Select parameter<br>Editing view: Change parameter value downwards            |
|  | Measured value view: Navigate to main menu or parameter view<br>Parameter view: Navigate to edit view<br>Editing view: confirm selected parameter value |

**Time functions**

If the respective key is pushed, the scrolling speed or the parameter change rate increases. 10 minutes after the last key is pressed, an automatic return to the measured value view is triggered. Parameter changes that have not yet been confirmed are lost.

**7.2 Structure and views of the display**

**Structure of the display**



- ① Title line
- ② Main line
- ③ UP/DOWN navigation arrows
- ④ INFO field
- ⑤ Locking symbol
- ⑥ EDIT indicator
- ⑦ INFO indicator
- ⑧ NE 107 diagnostic states
- ⑨ Bar graph
- ⑩ Sign of the process value

Figure 7.2 Structure of the display

## Display symbols

| INFO field | Symbol  | Meaning  |
|------------|---|--|
| LP         |  | Device is write protected via parameter " User PIN".   |
| Co         |   | Loop test in operation   |
|            | EDIT  | When the symbol flashes, you can edit the parameter.   |
|            | INFO  | Diagnostic message. The ID next to the INFO symbol is used to identify the diagnostic message. |

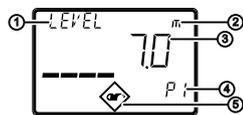
In the following, the different display views are shown and described.

### Note

The display will return to measurement view after ten minutes of inactivity.

## Measured value view

The measured value view shows the current measured values of the device as well as status and diagnostic messages. Process value name and unit are displayed alternately.



- ① Process value name
- ② Process value unit
- ③ Process value If the process value is too large to be shown on the display (value has more than 5 digits), hashes "#####" will be shown instead.
- ④ Process value number
- ⑤ Diagnosis symbol

Figure 7.3 Measured value view

The following measured value views are offered:

| Setting         | Description |              |
|-----------------|-------------|--------------|
| P1              | LEVEL       | Level        |
| P2              | SPACE       | Space        |
| P3              | DIST        | Distance     |
| P4 <sup>a</sup> | VOL         | Volume       |
| P5 <sup>b</sup> | VFLOW       | Volume flow  |
| P6              | LOOPC       | Loop current |
| P7              | PERCENT     | Percent      |

| Setting | Description |                         |
|---------|-------------|-------------------------|
| P8      | STEMP       | Electronics temperature |

<sup>a</sup> If the mode of operation is set accordingly

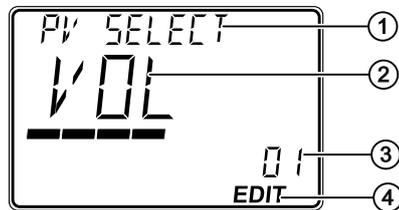
<sup>b</sup> If the mode of operation is set accordingly

**Note**

If the measured value cannot be shown in the display, "99999" appears flashing. In this case the selected unit or scaling must be adapted.

**Parameter view**

The parameter view shows the parameters, parameter values and the wizards of the device.



- ① Parameter name
- ② Parameter value
- ③ Parameter number
- ④ "EDIT" symbol (permanently activated)

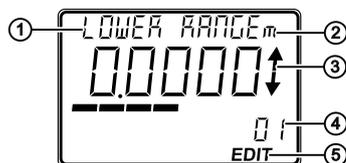
Figure 7.4 Parameter view

**Editing view**

Parameter values can be changed in this view. Wizards are available for certain parameters.

**Note**

While the device is in the editing view, the output remains active and continues to respond to changes.



- ① Parameter name
- ② Unit of the measured value (no. 1 and 2 are displayed alternately)
- ③ Arrows for scrolling (only within an option list)
- ④ Parameter number

⑤ EDIT" symbol (flashing)

Figure 7.5 Editing view

Ten minutes after the last key is pressed, an automatic return to the measured value view is triggered. Parameter changes that have not yet been confirmed are lost.

## 7.3 Menu overview

| Menu item                                   | Parameter                                     | Setting               | Default                       |       |
|---|---|-----------------------|-------------------------------|-------|
| COMMISSION                                  | OPERATION                                     |                       | LEVEL                         |       |
|   | <b>OPERATION = LEVEL</b>                      |                       |                               |       |
|   | MATERIAL TYPE LIQUID                          | STRGE                 | Vessel                        | STRGE |
|   |   | PRCSS                 | Process vessel with agitation |       |
|   |   | WTWLL                 | Wet well                      |       |
|   |   | PLSTC                 | Outside of Plastic Tank       |       |
|   |   | OPEN                  | Level of open liquid          |       |
|   |   | DEMO                  | Demonstration                 |       |
|   | MATERIAL TYPE SOLID                           | SILO                  | Silo                          | SILO  |
|   |   | BIN                   | Buffer, surge bin             |       |
|   |   | OPEN                  | Heap, pile                    |       |
| UNITS = DeviceUnits,<br>Physical Value Unit | mm, m, in, ft                                 |                       | m                             |       |
| LOWER CAL PT                                | Level Adjustment Data                         |                       | 15 m                          |       |
| UPPER CAL PT                                | Level Adjustment Data                         |                       | 0 m                           |       |
| CONFIRM                                     |   |                       |                               |       |
| COMMISSION                                  | <b>OPERATION = SPACE</b>                      |                       |                               |       |
|   | MATERIAL TYPE LIQUID                          | STRGE                 | Vessel                        | STRGE |
|   |   | PRCSS                 | Process vessel with agitation |       |
|   |   | WTWLL                 | Wet well                      |       |
|   |   | PLSTC                 | Outside of Plastic Tank       |       |
|   |   | OPEN                  | Level of open liquid          |       |
|   |   | DEMO                  | Demonstration                 |       |
|   | MATERIAL TYPE SOLID                           | SILO                  | Silo                          | SILO  |
|   |   | BIN                   | Buffer, surge bin             |       |
|   |   | OPEN                  | Heap, pile                    |       |
|   | UNITS, LOWER CAL PT,<br>UPPER CAL PT, CONFIRM | See OPERATION = LEVEL |                               |       |
| COMMISSION                                  | <b>OPERATION = DISTANCE</b>                   |                       |                               |       |
|   | MATERIAL TYPE LIQUID                          | STRGE                 | Vessel                        | STRGE |
|   |   | PRCSS                 | Process vessel with agitation |       |
|   |   | WTWLL                 | Wet well                      |       |
|   |   | PLSTC                 | Outside of Plastic Tank       |       |

| Menu item                                  | Parameter                                      | Setting                                  |  | Default |
|--|--|--|--|---------|
|  |  | OPEN                                     | Level of open liquid                       |         |
|  |  | DEMO                                     | Demonstration                              |         |
|  | MATERIAL TYPE SOLID                            | SILO                                     | Silo                                       | SILO    |
|  |  | BIN                                      | Buffer, surge bin                          |         |
|  |  | OPEN                                     | Heap, pile                                 |         |
| UNITS, LOWER CAL PT, UPPER CAL PT, CONFIRM | See OPERATION = LEVEL                          |  |  |         |
| COMMISSION                                 | <b>OPERATION = VOLUME</b>                      |  |  |         |
|  | MATERIAL TYPE LIQUID                           | STRGE                                    | Vessel                                     | STRGE   |
|  |  | PRCSS                                    | Process vessel with agitation              |         |
|  |  | WTWLL                                    | Wet well                                   |         |
|  |  | PLSTC                                    | Outside of Plastic Tank                    |         |
|  |  | OPEN                                     | Level of open liquid                       |         |
|  | MATERIAL TYPE Solid                            | SILO                                     | Silo                                       | SILO    |
|  |  | BIN                                      | Buffer, surge bin                          |         |
|  |  | OPEN                                     | Heap, pile                                 |         |
|  | UNITS = DeviceUnits, Physical Value Unit       | mm, m, in, ft                            |  | m       |
|  | VESSEL SHAPE                                   | LINR                                     | Linear                                     | LINR    |
|  |  | CONIC                                    | Conical Bottom                             |         |
|  |  | FLAT                                     | Inclined bottom                            |         |
|  |  | CYLIN                                    | Horizontal cylindrical vessel              |         |
|  |  | CUSTM                                    | User programmable                          |         |
|  | VESSEL DIM A                                   | Linearization Curve, Intermediate Height |  | 0 mm    |
| LOWER CAL PT                               | Level Adjustment Data                          |  | 15 m                                       |         |
| UPPER CAL PT                               | Level Adjustment Data                          |  | 0 m  |         |
| VOL UNITS                                  | Level Scaling: Scaling Unit                    |  | Liter                                      |         |
| SCALE FORMAT                               | Level Scaling: Decimal Places Display          |  | 0  |         |
| UPPER RANGE                                | Level Scaling: Max Scaled Value                |  | 100  |         |
| COMMISSION                                 | <b>OPERATION = VFLOW</b>                       |  |  |         |
|  | MATERIAL TYPE LIQUID = Application: MediumType | Level of open water, DEMO                |  | OPEN    |
|  | UNITS = DeviceUnits: Physical Value Unit       | mm, m, in, ft                            |  | m       |
|  | PRIM MEASDEV = Linearization Curve: Curve Type | PBFLM                                    | Palmer-Bowlus flume                        | PBFLM   |
|  |  | RWRC                                     | Venturi-, trapezoidal weir, rectangle weir |         |
|  |  | TPVWR                                    | VNotch-, triangle weir                     |         |
|  |  | CUSTM                                    | User programmable                          |         |
| LOWER CAL PT                               | Level Adjustment Data                          |  | 15 m                                       |         |
| UPPER CAL PT                               | Level Adjustment Data                          |  | 0 m  |         |

| Menu item        | Parameter   | Setting   | Default                                       |        |
|------------------|---|---|---|--------|
|                  | VFLOW UNITS = Level<br>Scaling: ScalingUnit                                     | l/s, l/min, l/h, Ml/d, m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, m <sup>3</sup> /d, lb/s, lb/min, lb/h, gal/s, gal/min, gal/h, gal/d, Mgal/d, ft <sup>3</sup> /s, ft <sup>3</sup> /min, ft <sup>3</sup> /h, ft <sup>3</sup> /d, bbl/s, bbl/min, bbl/h, bbl/d, ImpGal/s, ImpGal/min, ImpGal/h, ImpGal/d | l/s   |        |
|                  | SCALE FORMAT  | Level Scaling: Decimal Places Display   | 0   |        |
|                  | UPPER SCALNG  | Level Scaling: Max Scaled Value   | 100 l/s                                       |        |
| AFES             | AFES RANGE  | Distance  | 00000   |        |
|                  | CONFIRM   |   |   |        |
| Menu item        | Parameter   | Setting   | Default                                       |        |
| SELECT<br>OUTPUT | SELECTION = Hart<br>Dynamic Variable<br>Channel: Device Variable<br>Code For SV | LEVEL   | Level   | DIST   |
|                  |   | SPACE   | Space   |        |
|                  |   | DIST  | Distance                                      |        |
|                  |   | VOL   | Scaled value                                  |        |
|                  |   | VFLOW   | Scaled value                                  |        |
|                  |   | CONF  | Measurement reliability                       |        |
|                  |   | STEMP   | Transmitter temperature                       |        |
|                  | LINEARIZTYPE =<br>Linearization Curve Type                                      | LINR  | Linear  | Linear |
|                  |   | CYLIN   | Horizontal cylindrical vessel                 |        |
|                  |   | VENTU   | Venturi-, trapezoidal weir,<br>rectangle weir |        |
|                  |   | PALM  | Flow Palmer-Bowlus flume                      |        |
|                  |   | V-NOT   | Flow VNotch-, triangle weir                   |        |
|                  |   | CONIC   | Conical Bottom                                |        |
|                  |   | FLAT  | Inclined Bottom                               |        |
| SENSOR           | UNITS = Device Units:<br>Physical Value Unit                                    | mm, m, in, ft   | m   |        |
| CALIBRATION      | LOWER CAL PT  | Level Adjustment Data   | 15 m  |        |
|                  | UPPER CAL PT  | Level Adjustment Data   | 0 m   |        |
|                  | SENSR OFFSET  | Offset Application Value  | 0 m   |        |
| CURRENT OUT      | LOOP CUR MDE =<br>Display_Read Write Hart<br>Parameter. Loop Current<br>Mode    | ON = Enabled (4 ... 20 mA)<br>OFF = Disabled (4 mA fixed)   | ON  |        |
|                  | DAMPING =<br>Level_Integration Time.<br>Responsetime                            | 0 ... 999 s   | 0 s   |        |
|                  | OUT CHARACTER = Main<br>Current Output_<br>Configuration: Gradient<br>Type      | 4 ... 20 mA = rising gradient, 20 ... 4 mA =<br>falling gradient  | 4 ... 20 mA                                   |        |
|                  | SATURATE CUR<br>= Main Current<br>Output_Configuration:<br>Current Limits       | 3.8 ... 20.5 mA, 4 ... 20 mA  | 3.8 ... 20.5 mA                               |        |

7.3 Menu overview

| Menu item    | Parameter  | Setting  | Default   |       |
|--------------|--|--|---|-------|
|              | FAULT CUR = Main Current Output_Configuration1: Current Limits | ≤ 3.6 mA, ≥ 21 mA  | ≤ 3.6 mA  |       |
|              | FAIL SAFE LOE = Echo Loss Detection: Mode                      | HOLD = off<br>FAULT = Failure  | HOLD  |       |
|              | LOE TIMER  | Echo Loss Detection: Echo Loss Time                                    | 15 s  |       |
| VOLUME       | VESSEL SHAPE   | LINR   | Linear  | LINR  |
|              |  | CONIC  | Conical Bottom  |       |
|              |  | FLAT   | Inclined bottom   |       |
|              |  | CYLIN  | Horizontal cylindrical vessel   |       |
|              | USER   | User programmable  |   |       |
|              | VESSEL DIM A   | Intermediate Height  | 0 mm  |       |
|              | VOL UNITS  | Level Scaling: Scaling Unit  | l   |       |
|              | UPPER SCALNG   | Level Scaling: Max Scaled Value  | 100 l   |       |
| VOLUME FLOW  | PRIM MEASDEV   | PBFLM  | Flow Palmer-Bowlus flume  | PBFLM |
|              |  | RWRC   | Venturi-, trapezoidal weir, rectangle weir  |       |
|              |  | TPVWR  | Flow VNotch-, triangle weir   |       |
|              |  | CUSTM  | User programmable   |       |
|              |  | VFLOW UNITS = Level Scaling: ScalingUnit                               | l/s, l/min, l/h, Ml/d, m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, m <sup>3</sup> /d, lb/s, lb/min, lb/h, gal/s, gal/min, gal/h, gal/d, Mgal/d, ft <sup>3</sup> /s, ft <sup>3</sup> /min, ft <sup>3</sup> /h, ft <sup>3</sup> /d, bbl/s, bbl/min, bbl/h, bbl/d, ImpGal/s, ImpGal/min, ImpGal/h, ImpGal/d | l/s   |
|              |  | SCALE FORMAT   | Level Scaling: Decimal Places Display   | 0     |
|              | UPPER SCALNG   | Level Scaling: Max Scaled Value  | 100 l/s   |       |
| CUSTOM       | UPPER SCALNG   | Level Scaling: Max Scaled Value  | 100 l   |       |
|              | CUSTOM CURVE = Linearization Points: Level Value, Volume Value | X VALUE 1, Y VALUE 1, X VALUE 2, Y VALUE 2, ... X VALUE 32, Y VALUE 32 | 0 %, 0 ... 100 %, 100 %   |       |
| LOCL DISPLAY | START VIEW   | Display Config: Picture Selection                                      | LEVEL   |       |

| Menu item  | Parameter   | Setting                                       | Default                               |            |
|------------|-------------|---|---------------------------------------|------------|
| SIGNAL     | SIG QUALITY | CONFIDENCE                                    | Level Reliability Value: Unit         | CONFIDENCE |
|            |             | ECHO SIG STR                                  | Level Echo Info: Amplitude            |            |
|            |             | NOISE AVG                                     | Noise Detection Info: Noise Level Abs |            |
|            | ECHO CONFIG | NEAR RANGE                                    | Measuring Range                       | OFF        |
|            |             | ON  | Active                                |            |
|            |             | OFF   | Inactive                              |            |
| TVT CONFIG | AFES ON     | False Signal Calculation: Manual Curve active | ON                                    |            |

| Menu item   | Parameter                | Setting  | Default   |       |
|-------------|--------------------------|--|---|-------|
|             |                          | AFES OFF   | False Signal Calculation: Manual Curve not active                     |       |
|             |                          | AFES RANGE   | False Signal Manual Action: Distance                                  |       |
| PEAK VALUES | MIN DISTANCE             | Min Level Distance   | -   |       |
|             | MAX DISTANCE             | Max Level Distance   | -   |       |
|             | TR TEMP MIN              | Min Electronic Temperature   | -   |       |
|             | TR TEMP MAX              | Max Electronic Temperature   | -   |       |
| LOOP TEST   | LOOP TEST                | Current Output Simulation  | OFF   |       |
| RESETS      | DEVICE RSTRT = Warmstart | CANCL  | No restart  | CANCL |
|             |                          | OK   | Make restart  |       |
|             | RESET                    | NO   | No Reset  | NO    |
|             |                          | FACT   | Basic settings  |       |
|             |                          | RSTR CUST CFG  | Factory settings  |       |
|             | RESET PEAK               | NO   | No Reset  | NO    |
|             |                          | DIST   | Reset User Min Max Level Distance. Reset Action = Both values         |       |
|             |                          | STEMP  | Reset User Min Max Electronic Temperature. Reset Action = Both values |       |
|             | FREQUENCY                | 1: EU, Albania, Andorra, Azerbaijan, Australia, Belarus, Bosnia and Herzegovina, Canada, Iceland, United Kingdom, Liechtenstein, Moldova, Monaco, Montenegro, New Zealand, Northern Macedonia, Norway, San Marino, Saudi Arabia, Switzerland, Serbia, Turkey, Ukraine, USA<br>2: South Korea, Taiwan, Thailand<br>3: South Africa<br>4: Russia | Radar Mode country selection  | 1     |

| Menu item    | Parameter | Setting  | Default |
|--------------|-----------|--|---------|
| POLLING ADDR |           | Display Read Write Hart Parameter, Polling Address | 0       |

| Menu item     | Parameter | Setting               | Default    |
|---------------|-----------|-----------------------|------------|
| USER PIN      |           | ACTIVATE, CANCEL      | ENABLE     |
| BLUETOOTH PIN |           | Bluetooth Access Code | Individual |

## 7.4 Parameterization

### Starting

From the measured value view, you can access the parameter view with the " → " key, and by pressing " → " again you can access the first menu level.

### Select

1. Navigate to the desired parameter.
2. Press " → " to open the edit view. The current selection is highlighted.
3. Scroll to a new selection with " ↓ " and " ↑ ".
4. Press " → " to confirm. The display returns to the parameter view and shows the new selection.

### Change numeric value

1. Navigate to the desired parameter.
2. When selected, the current value is displayed.
3. Press " → " for configuration. The symbol " *EDIT* " flashes.
4. Use " ↑ " and " ↓ " to increase or decrease the value. Press and hold the button to increase the scroll speed.
5. To cancel without saving your changes, press " ← " to return to the parameter view.
6. Press " → " to confirm the new value. The display returns to the parameter view (the " *EDIT* " symbol is permanently displayed) and shows the new selection. Check that the value is correct.

## 7.5 Quick setup

### 7.5.1 Wizards for quick setup

#### Overview

A wizard provides a simple step-by-step procedure to configure your device for a basic application.

To configure the SITRANS LR150 for level, space, distance, volume or volume flow applications, use the " *Quick Commissioning Wizard* " via the display.

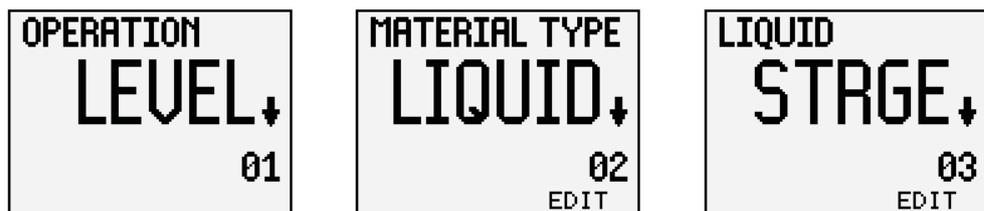
## Procedure

The first steps of the wizard are the same for all application types. The subsequent parameters of the wizard differ depending on the selected application. Three separate lists follow for documentation purposes. These lists contain the parameters of the wizard that are available for setting up each type of application.

1. In the measured value view, press key " → " to reach the parameter view. The first menu level (QUICK START) appears. Push key " → " to call up this menu.



2. Press the " → " button again to start the " Quick Commissioning Wizard" (COMMISSION). In the wizard, it is not necessary to press the " ↓ " button to navigate to the next step. In each step you will be taken directly to the edit view.
3. Set " Operation" followed by " Material type". The following parameters of the wizard vary depending on the selected application.



4. Select " Yes" to confirm all parameter changes as the final step in the Quick Commissioning Wizard and return to the parameter view. The main line of the display shows " DONE".
5. Press the " ← " key three times to return to the measured value view.

## Note

A reset to factory settings should be carried out before starting the " Quick Commissioning Wizard" if the device was previously used in another application.

The settings for the wizard are interrelated and changes only take effect if you set " Confirm" to " Yes " in the last step.

Do not use the " Quick Commissioning Wizard" to change individual parameters. Only carry out the adaptation to your specific application after completing the wizard.

While the device is being configured using the assistant, the output remains active and continues to respond to changes in the device.

In the following steps of the assistant, a complete list of options appears for each parameter. Depending on the selected application, certain options may not appear on the device.

## 7.5.2 Quick setup level, space, distance

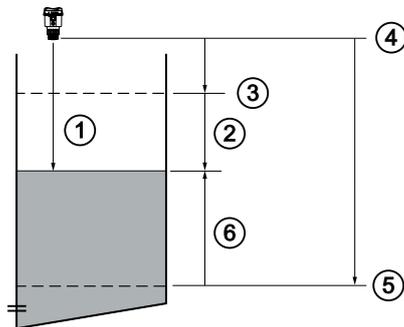
### Mode

#### OPERATION: LEVEL, SPACE, DIST

Sets the mode of operation that determines the output and display:



| Setting | Description |
|---------|-------------|
| LEVEL   | Level       |
| SPACE   | Space       |
| DIST    | Distance    |
| VOL     | Volume      |
| VFLOW   | Volume flow |



- ① Distance
- ② Space
- ③ Upper calibration point
- ④ Transmitter reference point
- ⑤ Lower calibration point
- ⑥ Level

Figure 7.6 Overview quick setup level, ullage, distance, user-specific

| Setting | Description   | Reference point                                     |
|---------|---|---|
| LEVEL   | Material height   | Lower calibration point (zero point of the process) |
| SPACE   | Distance from the Upper calibration point to the material surface | Upper calibration point (full point of the process) |
| DIST    | Distance to the material surface                                  | Lower calibration point                             |

## Material type

Used to optimize the device function depending on the type of material and vessel or application:

| Setting       | Selection | Selection | Vessel                        |
|---------------|-----------|-----------|-------------------------------|
| MATERIAL TYPE | LIQUID    | STRGE     | Process vessel with agitation |
|               |           | PRCSS     | Wet well                      |
|               |           | WTWLL     | Outside of Plastic Tank       |
|               |           | PLSTC     | Level of open liquid          |
|               |           | OPEN      | Demonstration                 |
|               |           | DEMO MODE | Silo                          |
|               | SOLID     | SILO      | Buffer, surge bin             |
|               |           | BIN       | Heap, pile                    |
|               |           | OPEN      | Heap profile                  |

## Unit

### UNITS:

Sets the measuring unit used (default setting in brackets):

- Meter " *m* " (3 decimal places)
- Centimeter " *cm* " (1 decimal place)
- Feet " *ft* " (3 decimal places)
- Inches " *in* " (2 decimal places)

## Lower calibration point

### LOWER CAL PT:

Sets the distance from the transmitter reference point to the lower calibration point: usually corresponds to the zero point of the process.

## Upper calibration point

### UPPER CAL PT:

Sets the distance from the transmitter reference point to the upper calibration point: usually corresponds to the full level.

## Confirm

### CONFIRM:

Accepts the settings as the last step in the wizard.

**Setting Yes:**

The wizard is closed and settings are applied.

**Setting No:**

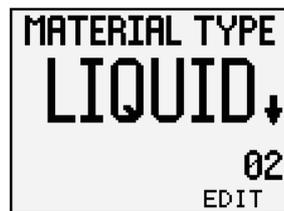
The wizard is closed and settings are not applied. They must be entered again when the wizard is run again.

**7.5.3 Quick setup volume**

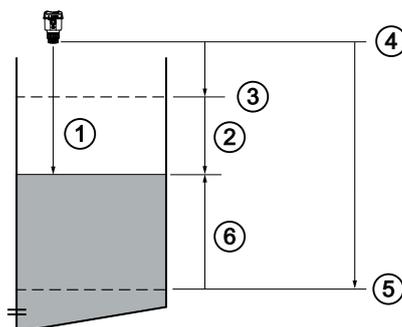
**Mode**

**OPERATION:**

Sets the mode of operation that determines the output and display:



| Setting | Description |
|---------|-------------|
| LEVEL   | Level       |
| SPACE   | Space       |
| DIST    | Distance    |
| VOL     | Volume      |
| VFLOW   | Volume flow |



- ① Distance
- ② Space
- ③ Upper calibration point
- ④ Transmitter reference point
- ⑤ Lower calibration point

## ⑥ Level

Figure 7.7 Overview quick setup volume

| Setting |     | Description  | Reference point         |
|---------|-----|--|-------------------------|
| Volume  | VOL | Volume of the material in volume unit (related to the level) | Lower calibration point |

## Material type

Used to optimize the device function depending on the type of material and vessel or application:

| Setting       | Selection | Selection | Selection                     |
|---------------|-----------|-----------|-------------------------------|
| MATERIAL TYPE | LIQUID    | STRGE     | Vessel                        |
|               |           | PRCSS     | Process vessel with agitation |
|               |           | WTWLL     | Wet well                      |
|               |           | PLSTC     | Outside of Plastic Tank       |
|               |           | OPEN      | Level of open liquid          |
|               |           | DEMO MODE | Demonstration                 |
|               | SOLID     | SILO      | Silo                          |
|               |           | BIN       | Buffer, surge bin             |
|               |           | OPEN      | Heap, pile                    |

## Unit

### UNITS:

Sets the measuring unit used (default setting in brackets):

- Meter " *m* " (3 decimal places)
- Centimeter " *cm* " (1 decimal place)
- Feet " *ft* " (3 decimal places)
- Inches " *in* " (2 decimal places)

## Vessel shape

### VESSEL SHAPE:

Sets the vessel shape and allows the device to calculate the volume instead of the level:

- Linear vessel (LINR)
- Conical vessel bottom (CONIC)
- Container with flat sloping bottom (FLAT)
- Cylindrical vessel (CYLIN)

- User-specific (USER)

### Vessel dimension A

#### **VESSEL DIM A:**

Adjusts the height of the vessel bottom in case of a conical or flat sloping bottom.  
Sets the height of the end piece for a horizontal tank with parabolic ends.

### Lower calibration point

#### **LOWER CAL PT:**

Sets the distance from the transmitter reference point to the lower calibration point: usually corresponds to the zero point of the process.

### Upper calibration point

#### **UPPER CAL PT:**

Sets the distance from the transmitter reference point to the upper calibration point: usually corresponds to the full level.

### Volume unit

#### **VOL UNITS:**

Sets the measuring units for the volume.

- Litre (l)
- Hectolitre (hl)
- Cubic meters (m<sup>3</sup>)
- Cubic inches (in<sup>3</sup>)
- Gallons (gal)
- Cubic foot (ft<sup>3</sup>)
- Barrel (bbl)

### Confirm

#### **CONFIRM:**

Accepts the settings as the last step in the wizard.

#### **Setting Yes:**

The wizard is closed and settings are applied.

**Setting No:**

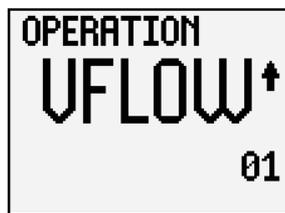
The wizard is closed and settings are not applied. They must be entered again when the wizard is run again.

**7.5.4 Quick setup volume flow**

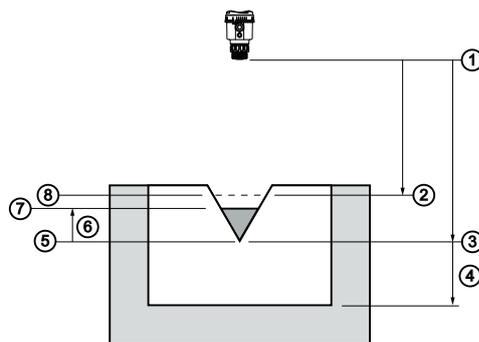
**Mode**

**OPERATION:**

Sets the mode of operation that determines the output and display:



| Setting | Description |       |
|---------|-------------|-------|
|         | Level       | LEVEL |
|         | Space       | SPACE |
|         | Distance    | DIST  |
|         | Volume      | VOL   |
|         | Volume flow | VFLOW |



- ① Transmitter reference point
- ② Upper calibration point
- ③ Lower calibration point
- ④ Far range
- ⑤ Zero level (head)
- ⑥ Level (head)
- ⑦ Material surface
- ⑧ Upper scaling point (max. volume/flow)

Figure 7.8 Overview quick setup volume flow

| Setting     |       | Description  | Reference point                   |
|-------------|-------|--|-----------------------------------|
| Volume flow | VFLOW | Flow measurement in open channel in volume flow unit | Zero point level, zero point flow |

### Material type

Used to optimize the device function depending on the type of material or application:

| Setting       | Selection | Selection | Selection     |
|---------------|-----------|-----------|---------------|
| MATERIAL TYPE | LIQUID    | OPEN      | Open basin    |
|               |           | FLOW      | Open flume    |
|               |           | DEMO      | Demonstration |

### Unit

#### UNITS:

Sets the measuring unit used (default setting in brackets):

- Meter " *m* " (3 decimal places)
- Centimeter " *cm* " (1 decimal place)
- Feet " *ft* " (3 decimal places)
- Inches " *in* " (2 decimal places)

### Measuring structure

#### PRIM MEASDEV:

Sets the version of the measuring structure used.

- Palmer Bowlus flume (PBFLM)
- Flow Venturi-, trapezoidal weir, rectangle weir (RWRC)
- Flow VNotch-, triangle weir (TPVWR)
- User programmable (USER)

### Lower calibration point

#### LOWER CAL PT:

Sets the distance from the transmitter reference point to the lower calibration point: usually corresponds to the zero point of the process.

## Upper calibration point

### UPPER CAL PT:

Sets the distance from the transmitter reference point to the upper calibration point: usually corresponds to the full level.

## Volume flow unit

### FLOW UNITS:

Sets the measuring units for the volume.

- Litres per second (l/s)
- Litres per minute (l/m)
- Litres per hour (l/h)
- Mega litres per day (Ml/d)
- Cubic metres per second (m<sup>3</sup>/s)
- Cubic metres per minute (m<sup>3</sup>/min)
- Cubic metres per hour (m<sup>3</sup>/h)
- Cubic metres per day (m<sup>3</sup>/d)
- lbs per second (lb/s)
- lbs per minute (lb/min)
- lbs per hour (lb/h)
- US gallons per minute (gal/min)
- US gallons per hour (gal/h)
- US gallons per day (gal/d)
- US mega gallons per day (Mgal/d)
- Cubic feet per second (Ft<sup>3</sup>/s)
- Cubic feet per minute (Ft<sup>3</sup>/min)
- Cubic feet per hour (Ft<sup>3</sup>/h)
- Cubic feet per day (Ft<sup>3</sup>/d)
- Barrel per second (bbl/s)
- Barrel per minute (bbl/min)
- Barrel per hour (bbl/h)
- Barrel per day (bbl/d)
- British gallons per second (ImpGal/s)
- British gallons per minute (ImpGal/m)
- British gallons per day (ImpGal/d)

### Scaling format

**SCALE FORMAT:**

Sets the decimal places with which the process value is displayed.

### Final scaling value

**UPPER SCALNG:**

Sets the process value that corresponds to a loop current of 20 mA.

### Confirm

**CONFIRM:**

Accepts the settings as the last step in the wizard.

**Setting Yes:**

The wizard is closed and settings are applied.

**Setting No:**

The wizard is closed and settings are not applied. They must be entered again when the wizard is run again.

## 7.5.5 Quick setup auto false echo suppression

### Use

Used to prevent the detection of false echoes in a specified range.



Use the AFES wizard if there are known installations in the application and if false echoes are to be expected.

### Notes

If possible, set the automatic false echo suppression (AFES) during commissioning by executing the "Auto false echo suppression wizard".

Make sure that the material level is below all known installations when using the "Auto false echo suppression wizard" to determine the TVT. Ideally the vessel should be empty or almost empty.

Note the distance to the material level when determining the echo profile and set the value in parameter "auto false echo suppression" to a smaller distance to avoid suppression of the material echo.

If an agitator (whisk) is available, it should be in operation.

As soon as the wizard is successfully completed, parameter "Auto false echo suppression" is set to "Activated" and the determined TVT curve is used.

## Confirm

### CONFIRM:

Accepts the settings as the last step in the wizard.

### Setting Yes:

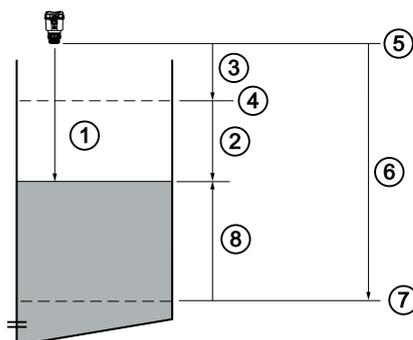
The wizard is closed and settings are applied.

### Setting No:

The wizard is closed and settings are not applied. They must be entered again when the wizard is run again.

## 7.6 Application examples

### 7.6.1 Application example level



- ① Distance (5.5 m)
- ② Space (4.5 m)
- ③ 1.0 m
- ④ Upper calibration point
- ⑤ Transmitter reference point
- ⑥ 9.0 m far range

7.6.2 Application example volume flow

- ⑦ Lower calibration point
- ⑧ Level

Figure 7.9 Application example level

| Quick commissioning parameter | Setting/value | Description  |
|-------------------------------|---------------|--|
| Operation                     | Level         | Material level with reference to the " Lower calibration point |
| Material type                 | Liquid        |  |
| Unit                          | m             | Measuring unit of the transmitter                              |
| Lower calibration point       | 9.0 m         | Zero point of the process                                      |
| Upper calibration point       | 1.0 m         | Full point of the process                                      |

7.6.2 Application example volume flow

In this example, a 12 inch (0.305 m) venturi flume is installed in an open channel. According to the manufacturer's data sheet, the maximum nominal flow rate of the device is 1143 m<sup>3</sup> per hour at a maximum level of 0.6 m. The SITRANS LR150 was installed at a height of 1.6 m above the channel.

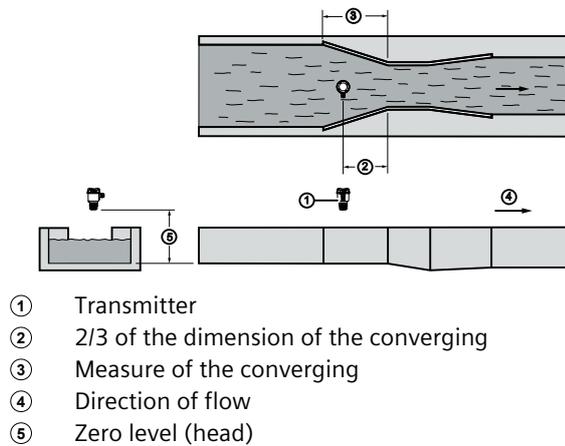
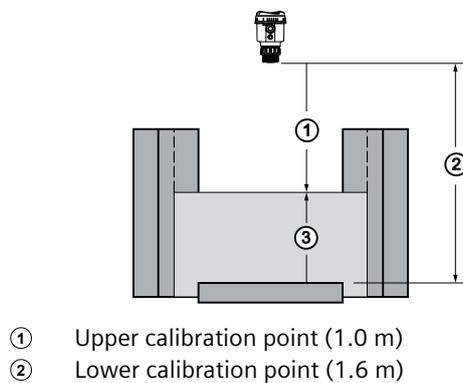


Figure 7.10 Application example volume flow



- ① Upper calibration point (1.0 m)
- ② Lower calibration point (1.6 m)

## ③ Upper scaling point (0.6 m)

Figure 7.11 Application example volume flow

| Quick commissioning parameter | Setting/value |              | Description   |
|-------------------------------|---------------|--------------|---|
| Operation                     | Volume flow   | VFLOW        |   |
| Material type                 | Liquid        | LQD          |   |
| Measuring structure           | Liquid        | RWRC         | Venturi flume   |
| Lower calibration point       |               | 1.6          | Distance to the empty point or bottom of the measuring channel. Adjusts the material level at 4 mA. |
| Upper calibration point       |               | 1            | Distance to maximum level. Sets the " <i>Measurement end</i> ".                                     |
| Volume flow unit              |               | VFLOW UNITS  | Setting according to the requirements of the end user.  |
| Unit                          |               | SCALE FORMAT | Unit which corresponds to the level (head).   |
| Measurement end               |               | UPPER SCALNG | To be taken from the data sheet of the manufacturer of the measuring structure.                     |

## 7.7 Settings

### 7.7.1 Selection HART variable



#### Secondary value

Sets a process value as secondary variable.

| Setting    | Selection  | Selection | Description |
|------------|------------|-----------|-------------|
| SELECT OUT | SELECT OUT | LEVEL     | Level       |
|            |            | SPACE     | Space       |
|            |            | DIST      | Distance    |
|            |            | VOL       | Volume      |

| Setting | Selection | Selection | Description             |
|---------|-----------|-----------|-------------------------|
|         |           | VFLOW     | Volume flow             |
|         |           | STEMP     | Electronics temperature |

**Linearization type**

Sets the type of linearization to calculate the volume or volume flow.

**7.7.2 Transmitter**

**Units**

Sets the measuring unit used.

| Setting     | Selection | Selection | Description |
|-------------|-----------|-----------|-------------|
| Transmitter | UNITS     | mm        | Millimetre  |
|             |           | m         | Meter       |
|             |           | in        | Inch        |
|             |           | ft        | Feet        |

**7.7.3 Adjustment**



**Lower calibration point**

**LOWER CAL POINT:**

Sets the distance from the transmitter reference point to the lower calibration point.

**Upper calibration point**

**UPPER CAL POINT:**

Sets the distance from the transmitter reference point to the upper calibration point.

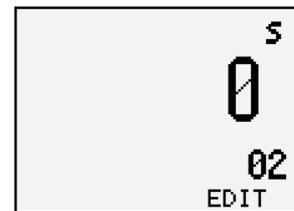
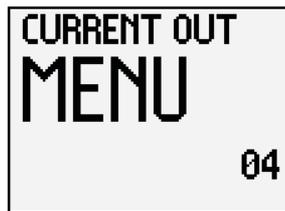
## Transmitter offset

### SENSOR OFFSET:

Sets an offset to compensate for changes in the transmitter reference point.

Changes in the transmitter reference point can be caused, for example, by using a thicker seal or reducing the height of the mounting nozzle.

## 7.7.4 Current output



## Loop current mode

Sets the operation of the current output as loop current 4 ... 20 mA, or as fixed current value 4 mA for the HART multidrop mode.

| Setting     | Selection    | Selection | Description |
|-------------|--------------|-----------|-------------|
| CURRENT OUT | LOOP CUR MDE | ON        | 4 ... 20 mA |
|             |              | OFF       | 4 mA fix    |

## Damping value

### DAMPING:

Adjusts the damping (filtering of the PV to smooth sudden fluctuations in measured values).

An increase in damping increases the reaction time of the device and affects the digital value and loop current. For noisy output values increase parameter " *Damping value*". For faster reaction times reduce parameter " *Damping value*". Determine a value that meets the requirements for signal stability and reaction time.

The process value set as the primary variable (PV) for the application is damped using the value in parameter " *Damping value*".

## Characteristics current output

Sets the current output as rising characteristics 4 ... 20 mA or as falling characteristics 20 ... 4 mA.

| Setting     | Selection   | Selection   | Description |
|-------------|-------------|-------------|-------------|
| CURRENT OUT | OUT CHARACT | 4 ... 20 mA | Rising      |

7.7.5 Volume

| Setting | Selection | Selection   | Description |
|---------|-----------|-------------|-------------|
|         |           | 20 ... 4 mA | Falling     |

**Saturation limits**

Sets the lower and upper saturation limits. The lower saturation limit is the value below which the loop current cannot fall. The upper saturation limit is the value above which the loop current cannot rise.

| Setting     | Selection    | Selection       | Description |
|-------------|--------------|-----------------|-------------|
| CURRENT OUT | SATURATE CUR | 3.8 ... 20.5 mA | -           |
|             |              | 4 ... 20 mA     | -           |

**Fault current**

Sets the current value that is output in case of an error.

| Setting     | Selection | Selection | Description |
|-------------|-----------|-----------|-------------|
| CURRENT OUT | FAULT CUR | ≤ 3.6 mA  | -           |
|             |           | ≥ 21 mA   | -           |

**Safety function with echo loss**

Defines the behavior of the safety function in case of echo loss and expiration of the LOE timer. This defines which current value is output in case of echo loss.

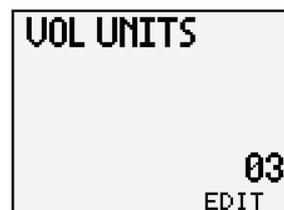
| Setting     | Selection    | Selection | Description                                     |
|-------------|--------------|-----------|---|
| CURRENT OUT | FAILSAFE LOE | HOLD      | Last valid measured value                       |
|             |              | FAULT     | Value adjusted in the parameter "Fault current" |

**Safety function LOE timer**

**LOE TIMER:**

Sets the duration of how long an echo loss must be present before the device triggers the set safety function.

7.7.5 Volume



**Note**

This menu is only visible on the device if it is configured.

**Vessel shape**

Sets the vessel shape and allows the device to calculate the volume instead of the level.

| Setting | Selection    | Selection  | Description<br>Other required parameters                                      |
|---------|--------------|------------|---|
| VOLUME  | VESSEL SHAPE | LINR       | Linear vessel<br>Upper scaling point  |
|         |              | CONIC      | Conical vessel bottom<br>Upper scaling point, vessel dimension A              |
|         |              | FLAT SLOPE | Container with flat sloping bottom<br>Upper scaling point, vessel dimension A |
|         |              | CYLIN      | Cylindrical vessel<br>Upper scaling point                                     |
|         |              | CUSTM      | Custom  |

**Vessel dimension A****VESSEL DIM A:**

Adjusts the height of the vessel bottom in case of a conical, parabolic, spherical or flat sloping bottom. Sets the height of the end piece for a horizontal tank with parabolic ends.

**Volume unit**

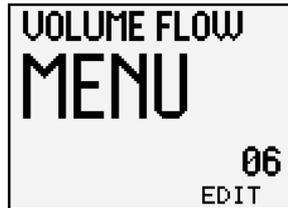
Sets the measuring units for the volume.

| Setting | Selection    | Selection      | Description     |
|---------|--------------|----------------|-----------------|
| VOLUME  | VOLUME UNITS | m <sup>3</sup> | Cubic metre     |
|         |              | L              | Litres          |
|         |              | Ga             | US gallons      |
|         |              | IGa            | British Gallons |

**Upper scaling point**

Sets the maximum scaled measured value.

**7.7.6 Volume flow**



**Note**

This menu is only visible on the device if it is configured.

**Lower calibration point**

**LOWER CAL POINT:**

Sets the distance from the transmitter reference point to the lower calibration point.

**Upper calibration point**

**UPPER CAL POINT:**

Sets the distance from the transmitter reference point to the upper calibration point.

**Measuring structure**

Sets the version of the measuring structure used.

| Setting     | Selection  | Selection | Description   |
|-------------|------------|-----------|---|
| VOLUME FLOW | FLUME TYPE | PBFLM     | Palmer-Bowlus flume                                   |
|             |            | RWRC      | Venturi flume, trapezoidal weir, rectangular overfall |
|             |            | TPVWR     | V-Notch, triangular weir                              |
|             |            | CUSTM     | Custom  |

**Flow unit**

Sets the measurement units for the volume flow.

| Setting     | Selection   | Selection         | Description     |
|-------------|-------------|-------------------|-----------------|
| VOLUME FLOW | VFLOW UNITS | m <sup>3</sup> /h | Cubic metre     |
|             |             | L/min             | Litres          |
|             |             | Ga/min            | US gallons      |
|             |             | lGa/min           | British Gallons |

## Upper scaling point

### UPPER SCALING:

Sets the maximum scaled measured value.

---

#### Note

If the parameter " *Measurement*" end is set in the " *Quick commissioning wizard*", parameter " *Upper scaling point* " is automatically set to the same value.

If the value for one of these parameters is set outside the wizard, the other value is not automatically adjusted.

---

## 7.7.7 Custom

This menu is only visible on the device if the vessel shape " *Custom specific*" is configured for the volume flow mode or if the measuring structure " *Custom specific*" is configured for the volume flow mode.

## Upper scaling point

### UPPER SCLNG:

Sets the maximum scaled measured value.

---

#### Note

If the parameter " *Measurement end*" is set in the " *Quick commissioning wizard*", parameter " *Upper scaling point*" is automatically set to the same value.

If the value for one of these parameters is set outside the wizard, the other value is not automatically adjusted.

---

## Custom specific characteristics

### CUSTOM CURVE:

Is used to enter the index markers level and output for universal measuring structures.

If the vessel shape (volume) or the measuring structure (volume flow) is more complex than the standard shapes, the shape can be determined section by section. Each input index marker (level) is assigned a value and each output index marker (volume or volume flow) a corresponding value.

- Level values are determined in units
- Volume values are determined in volume units
- Volume flow values are determined in volume flow units

**X-value 1 ... X-value 32**

Sets level index markers for which the output is known.

**Y-value 1 ... Y-value 32**

Sets the output that corresponds to each input index marker entered.

**7.7.8 Display****Start view**

Sets the process value that appears first on the display after switching on.

| Setting      | Description              |       |
|--------------|--------------------------|-------|
| LOCL DISPLAY | Level                    | LEVEL |
|              | Space                    | SPACE |
|              | Distance                 | DIST  |
|              | Volume <sup>a</sup>      | VOL   |
|              | Volume flow <sup>b</sup> | VFLOW |
|              | Loop current             | LOOPC |
|              | Percentage value         | %     |
|              | Electronics temperature  | STEMP |

<sup>a</sup> If the mode of operation is set accordingly

<sup>b</sup> If the mode of operation is set accordingly

**Note**

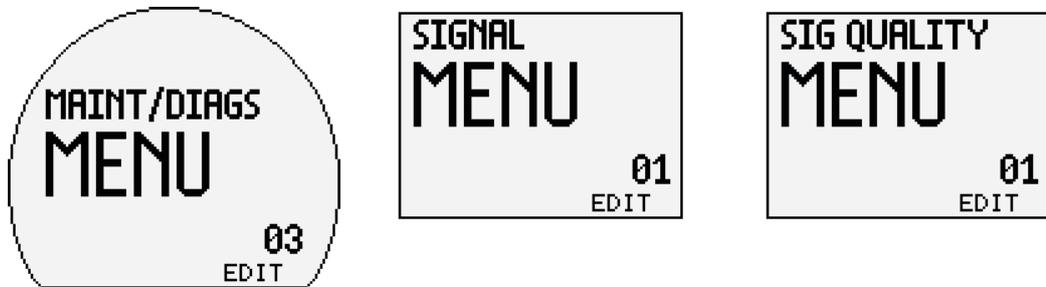
If the parameter "*Operation*" is set in the wizard, the value is automatically written to the parameter "*Start view*".

If the parameter "*Start view*" or "*PV selector*" is changed after the wizard has been executed, the last change is valid.

The options "*Volume*", "*Volume flow*" and "*Custom*" are only visible in the "*Measured value view*" if configured. If you select an option which is not configured in the parameter "*Start view*" then the next visible process value appears in the measured value view.

## 7.8 Maintenance and diagnostics

### 7.8.1 Signal



#### Signal quality

##### Echo quality:

Displays the echo quality. The higher the value, the higher the echo quality.

##### Echo signal strength:

Displays the strength of the valid echo in dB.

##### Noise average value:

Displays the average value of the noise in dB.

| Setting | Selection   | Selection    | Description          |
|---------|-------------|--------------|----------------------|
| SIGNAL  | SIG QUALITY | CONFIDENCE   | Echo quality         |
|         |             | ECHO SIG STR | Echo signal strength |
|         |             | NOISE AVG    | Noise average value  |

#### Echo configuration

##### Near range:

Sets minimum distance from transmitter reference point, beyond which an echo should be considered valid. This is sometimes referred to as blanking or a blanking distance. When the begin of the measuring range is activated, the mm value is edited by pressing the " ↓ " key.

| Setting | Selection   | Selection      | Description  |
|---------|-------------|----------------|--|
| SIGNAL  | ECHO CONFIG | NEAR RANGE ON  | Measuring range begin activated<br>Measuring range begin value |
|         |             | NEAR RANGE OFF | Measuring range begin deactivated                              |

## Echo selection

Sets the algorithm (applied to the echo profile) for determining the useful echo.

If the selection " *First large echo*" is activated, pressing the button " ↓ " selects the response threshold in dB.

| Setting | Selection   | Selection     | Description   |
|---------|-------------|---------------|---|
| SIGNAL  | ECHO SELECT | ALGORITHM ON  | Selection first large echo activated<br>Value of the response threshold |
|         |             | ALGORITHM OFF | Selection first large echo deactivated                                  |

## Filtering

The reform echo is used to smooth the echo profile in bulk solids applications. Fragmented echoes are merged. Use this function when monitoring bulk solids when the level indication fluctuates slightly although the material surface remains calm. Enter the amount for the required smoothing of the echo profile.

The transmitter damping value sets the damping (filtering) of the transmitter raw value to smooth sudden process value fluctuations.

### Note

The process value adjusted as primary variable (PV) for the application, is damped by using the values in the parameters " *Damping value*" **and** " *Transmitter damping value*". All other process values (which are not preset or selected as main PV) are only damped by the value in parameter " *Transmitter damping value*".

| Setting | Selection | Selection   | Description          |
|---------|-----------|-------------|----------------------|
| SIGNAL  | FILTERING | REFORM ECHO | Echo merging enabled |

## TVT configuration

Defines the threshold curve below which all echoes are ignored.

The Hover Level sets the offset of the TVT (Time varying threshold) curve with respect to the basic noise of the echo profile. Specified in dB with respect to the basic noise and peak value of the largest echo.

Automatic false echo suppression (AFES) is used for false echo suppression in vessels with known installations. When AFES is activated, the effective range is selected as distance in mm by pushing the button " ↓ ".

A determined TVT curve replaces the preset TVT curve in the set effective range.

Procedure for optimum results with auto false echo suppression:

1. If possible, set the automatic false echo suppression during commissioning by executing the " *Auto false echo suppression wizard*".

2. Make sure that the material level is below all known installations when using the "Auto false echo suppression wizard" to determine the TVT. Ideally the vessel should be empty or almost empty.
3. Note the distance to the material level when determining the echo profile and set the value in parameter "Effective range of automatic false echo suppression" to a smaller distance to avoid suppression of the material echo.
4. If an agitator is used, it should be in operation.

---

**Note**

The effective range of the automatic false echo suppression sets the end point of the determined TVT distance.

---

Determine the effective range of the automatic false echo suppression by measuring the actual distance from the transmitter reference point to the material surface. Use a cable or measuring tape.

| Setting | Selection  | Selection   | Description   |
|---------|------------|-------------|---|
| SIGNAL  | TVT CONFIG | HOVER LEVEL | dB value of the basic noise                             |
|         |            | AFES ON     | Activates the automatic auto false echo suppression     |
|         |            | AFES OFF    | Deactivates the automatic auto false echo suppression   |
|         |            | AFES RANGE  | Effective range of the automatic false echo suppression |

## 7.8.2 Peak values



### Min. measured distance

**MIN DISTANCE:**

Displays the value of the minimum measured distance. The value may reset if the unit is changed.

### Max. measured distance

**MAX DISTANCE:**

Displays the value of the maximum measured distance. The value may reset if the unit is changed.

### Minimum electronics temperature

**TR TEMP MIN:**

Displays the value of the minimum transmitter temperature.

### Maximum electronics temperature

**TR TEMP MAX:**

Displays the value of the maximum transmitter temperature.

## 7.8.3 Circuit test



### Simulation current output

**LOOP TEST:**

A simulated value can be set to test the operation and mA connections during setup or maintenance of the unit.

---

**Note**

The simulated value of the current output influences the output to the control system.

---

Press the key ← to stop and terminate the circuit test.

## 7.8.4 Resets



### Restart transmitter

Is used to restart the device without switching off the supply voltage.

#### Note

The simulation is interrupted. Saved configurations are not reset

| Setting | Selection    | Selection | Description         |
|---------|--------------|-----------|---------------------|
| RESET   | DEVICE RSTRT | CANCL     | Cancel              |
|         |              | OK        | Restart transmitter |

### Reset

Is used to provide various reset options of the device.

If the "Restore factory settings" option is selected, all parameters are reset to the default settings, except

- *Device address* remains unchanged
- Value of the "User PIN" (write protection) is not reset
- *Peak values* are not reset
- *Automatic false echo suppression* is reset to the default setting (deactivated), but the detected TVT is not lost
- *User-specific TVT setting* is reset to the default setting (deactivated), but "User-specific TVT index markers" are not lost

Selecting the "Restore ordered configuration" option restores the device settings ordered by the customer. The parameters that were not configured via the order are reset to their default settings.

| Setting | Selection | Selection | Description                   |
|---------|-----------|-----------|-------------------------------|
| RESET   | RESET     | NO        | Cancel                        |
|         |           | FACT      | Restore default settings      |
|         |           | CUST      | Restore ordered configuration |

### Reset peak values

Resets all recorded peak values.

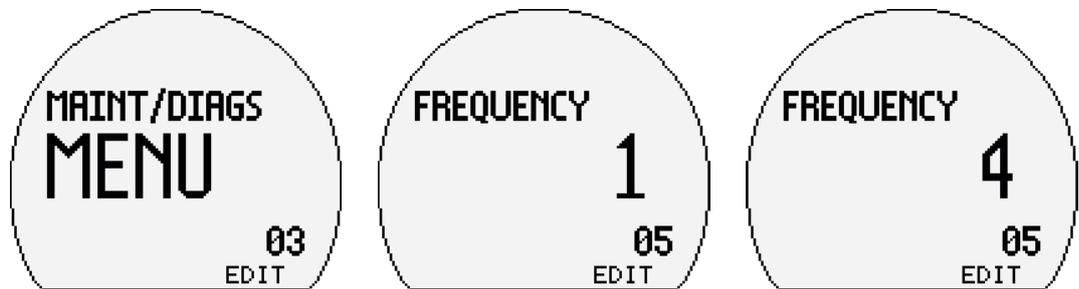
7.8.5 Frequency

| Setting | Selection  | Selection | Description             |
|---------|------------|-----------|-------------------------|
| RESET   | RESET PEAK | NO        | Cancel                  |
|         |            | DIST      | Distance                |
|         |            | STEMP     | Electronics temperature |

7.8.5 Frequency

Frequency

Country specific settings for the radar signals are determined via the menu item frequency.



- Frequency 1: EU, Albania, Andorra, Azerbaijan, Australia, Belarus, Bosnia and Herzegovina, Canada, Liechtenstein, Moldavia, Monaco, Montenegro, New Zealand, Northern Macedonia, Norway, San Marino, Saudi Arabia, Serbia, Switzerland, Turkey, Ukraine, United Kingdom, USA
- Frequency 2: South Korea, Taiwan, Thailand
- Frequency 3: South Africa
- Frequency 4: Russia

Depending on the frequency, the metrological properties of the device can change (see chapter " *Technical data, input variable*").

Further information can be found in the document " *Regulations for radar level measuring transmitters with radio licenses*" on our homepage.

## 7.9 Communication

### 7.9.1 HART address

#### Function

##### **POLLING ADR:**

Sets the device address in a HART network.

For point-to-point configurations the standard address is zero (0).

For multidrop configurations, use a non-zero HART address, i.e. 1 to 63.

## 7.10 Safety

### 7.10.1 user PIN

Is used to activate/deactivate the user PIN. If the user PIN is activated, a PIN must be entered when changing parameter settings.

#### **Note**

The device is unlocked on delivery.

A change of the setting for parameter " *User PIN*" does not take effect immediately. After changing the setting, the device must be restarted or ten (10) minutes must elapse before the change takes effect.

| Setting  | Selection | Selection | Description                            |
|----------|-----------|-----------|--|
| USER PIN | USER PIN  | ACTIVT    | Activate User PIN<br>Display = OK      |
|          |           | CANCL     | Deactivate User PIN<br>Display = ENABL |

### 7.10.2 Bluetooth PIN

#### **BLUETOOTH PIN:**

In this menu item, you can change the factory-preset Bluetooth access code to your personal Bluetooth access code.

#### **Note**

The individual preset Bluetooth access code of the device can be found on the supplied information sheet " *Device Bluetooth and Parameter Access Codes*". If this

is changed by the user and is no longer available, access is only possible via the emergency Bluetooth unlock code on the information sheet also supplied.

---

## Setup with smart device (Bluetooth)

### 8.1 Connecting

#### Connecting

Start the adjustment app. The smart device searches automatically for Bluetooth-capable transmitters in the area.

The devices found are listed.

Select the requested transmitter in the device list.

#### Authenticate

When establishing the connection for the first time, the operating tool and the transmitter must authenticate each other. After the first correct authentication, each subsequent connection is made without a new authentication query.

#### Enter Bluetooth access code

For authentication, enter the 6-digit Bluetooth PIN in the next menu window. You can find the code on the information sheet "*Device Bluetooth and Parameter Access Codes*" in the device packaging.

---

**Note**

If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

---

#### Connected

After connection, the transmitter adjustment menu is displayed on the respective adjustment tool.

## 8.1 Connecting

## Setup with PC/notebook (HART modem)

### 9.1 Saving the parameterisation data

We recommend documenting or saving the parameterisation data via SIMATIC PDM. That way the data are available for multiple use or service purposes.

*9.1 Saving the parameterisation data*

## Operating

To configure the device:

1. Download and install the *SITRANS mobile IQ* app from the App store to your mobile device.
2. Launch the app. Devices in range will appear.



3. Click on the device you wish to connect to. On first connection, a PIN code shipped with the device needs to be entered (see *Device Bluetooth and*

Parameter Access Codes sheet). Following successful PIN entry, the device cockpit will be shown.

6:15 100%

SITRANS LR110 DISCONNECT

**Device cockpit**

|                        |                          |              |
|------------------------|--------------------------|--------------|
|                        | Product name             | Tag          |
|                        | <b>SITRANS LR110/120</b> |              |
| Serial number          | FW version               | HW version   |
| <b>JNB/L8260000091</b> | <b>1.0.1</b>             | <b>1.1.0</b> |

---

**Device status**

---

**Current values**

|                  |                  |              |
|------------------|------------------|--------------|
| Level            | Distance         | Confidence   |
| <b>12.100 m</b>  | <b>2.899 m</b>   | <b>43 dB</b> |
| Loop current     | Percent of range |              |
| <b>17.828 mA</b> | <b>86.429 %</b>  |              |

- Use the Setup/Quick Commissioning to configure the transmitter for your application type.

The screenshot displays the 'Setup > Quick commissioning' interface. At the top, the status bar shows the time 10:47, signal strength, Wi-Fi, and 97% battery. The navigation bar includes a back arrow and the title 'Setup > Quick commissioning'. The main content area features a diagram of a tank with an orange liquid level. A vertical dimension line labeled '1' indicates the total height from the bottom to the top of the tank. A second vertical dimension line labeled '2' indicates the height from the bottom to the liquid level. The top of the tank is marked '100%' and the bottom '0%'. Below the diagram, the configuration settings are listed as follows:

|                           |                |
|---------------------------|----------------|
| Units                     | m              |
| Lower calibration point 1 | 15 m           |
| Upper calibration point 2 | 0 m            |
| Operation                 | Level          |
| Material type             | Liquids        |
| Application               | Liquid Process |

Many diagnostic tools are supported, including the echo profile viewer:



## Setup with SIMATIC PDM EDD

### 11.1 Setup with SIMATIC PDM EDD

Device descriptions as Enhanced Device Description (EDD) are available for DD adjustment programs such as for example PDM.

#### Download

SIMATIC PDM is a software package used to commission and maintain process devices.

<https://support.industry.siemens.com/cs/ww/en/view/109755005>

Check the support page of our website to make sure you have the latest version of SIMATIC PDM, the most recent Service Pack (SP) and the most recent hot fix (HF). Go to:

Software downloads: <http://www.siemens.com/processinstrumentation/downloads>

In the product tree, navigate to: "*Automation Technology > Process Control Systems > SIMATIC PCS 7 > System Components > Plant Device Management > SIMATIC PDM*".

#### Start

Proceed as follows:

1. Launch SIMATIC PDM, connect to device, and upload data from the device.
2. Adjust parameter values in the parameter value field. Then click Enter. The status fields read "*Changed*".

- Open the menu " *Device > Download to device....* ". When complete, select " *File > Save*" to save the settings offline. The status fields are cleared.

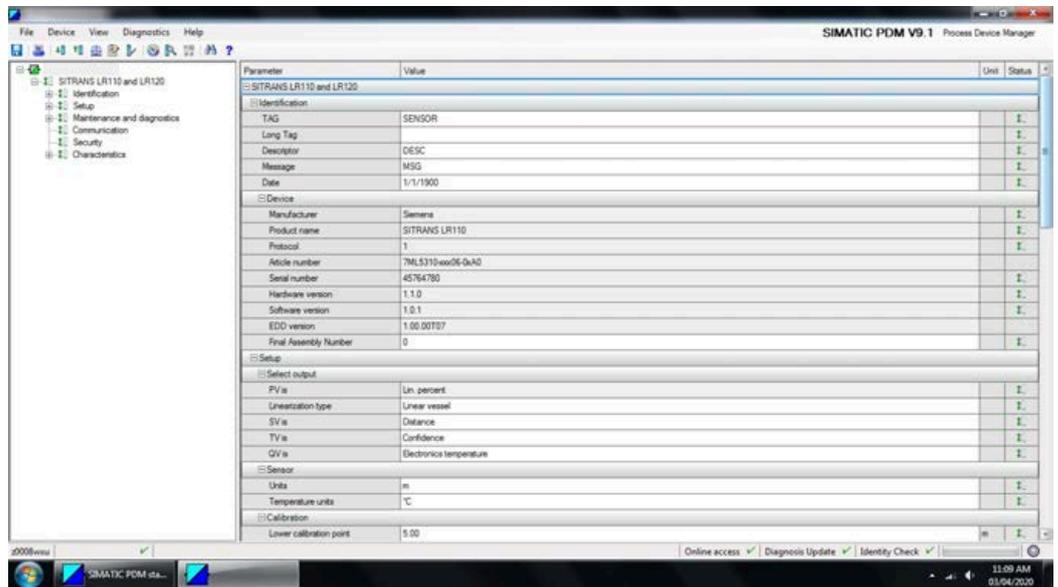


Figure 11.1 PDM structure view EDD offline, start

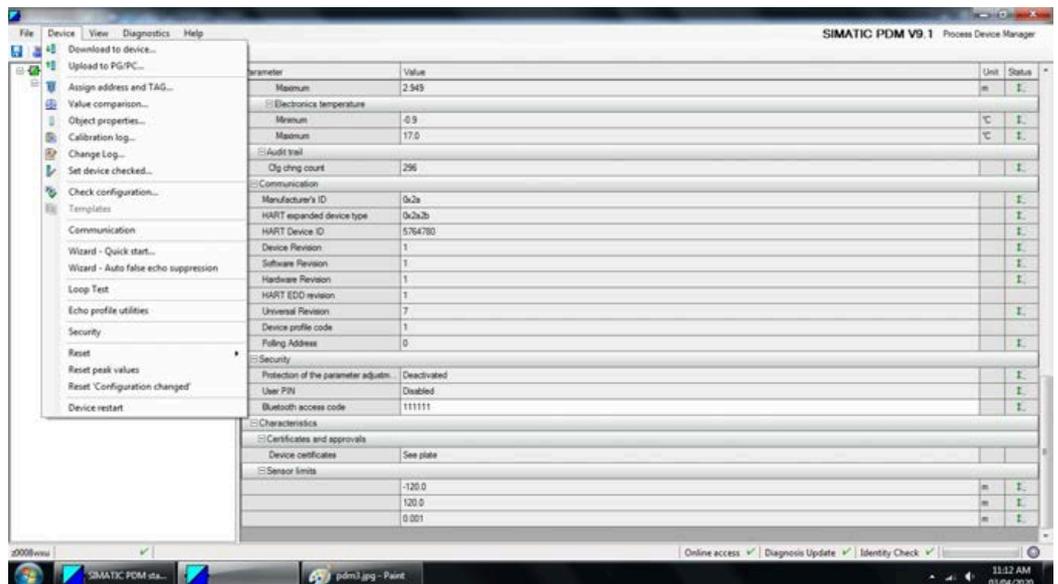


Figure 11.2 PDM structure view EDD offline, continuation

## Procedure

Select " *Device / Wizard > Quick Start*" to perform the initial commissioning. Follow the guided commissioning steps according to your specific application.

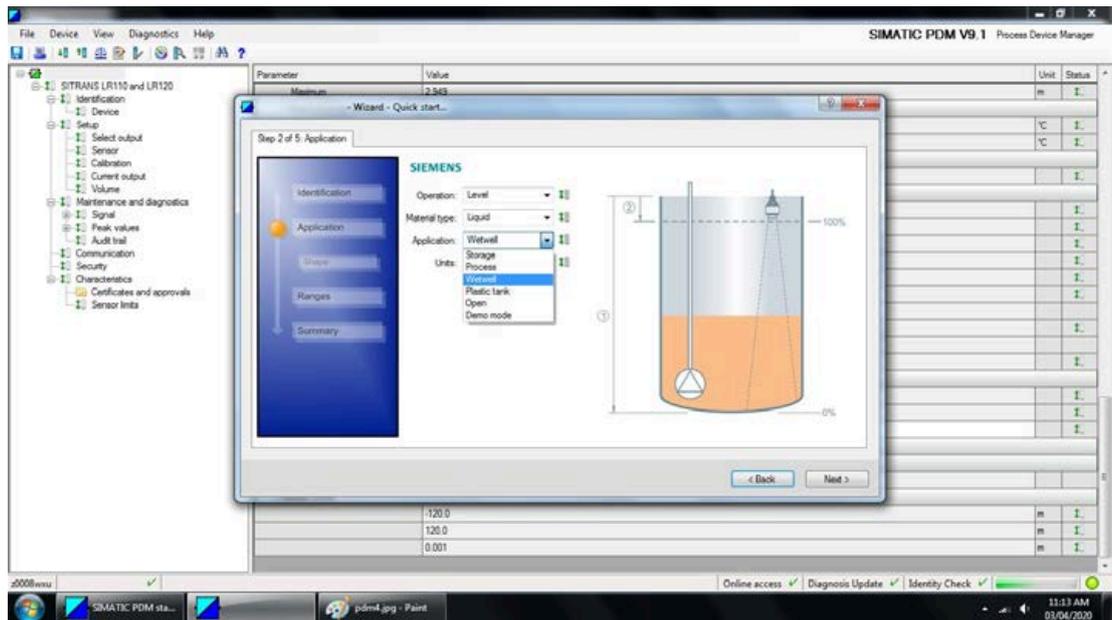
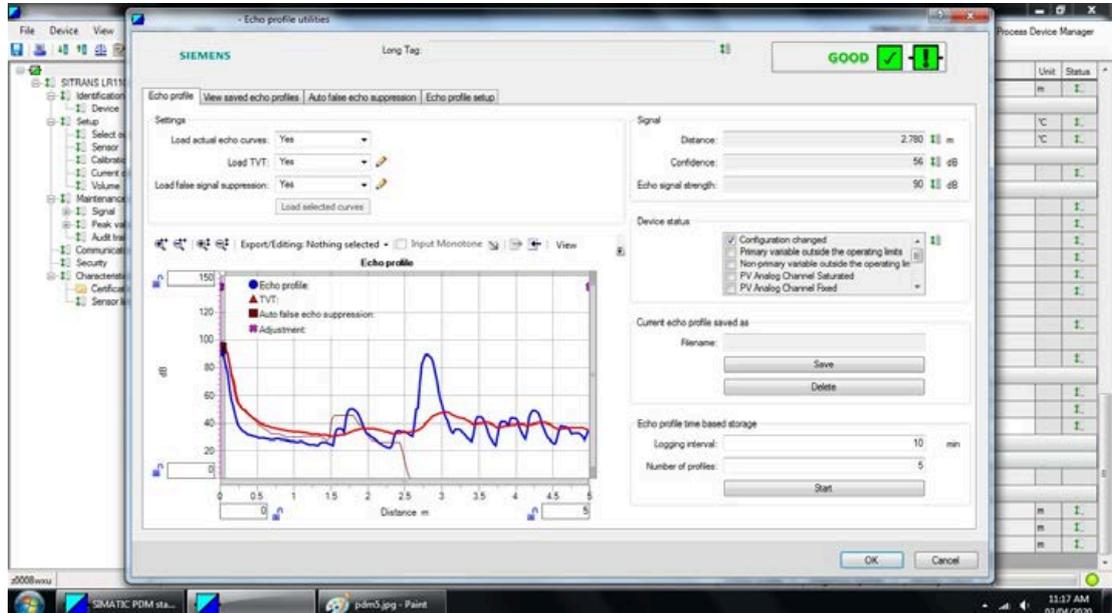


Figure 11.3 PDM quick setup wizard

Select " *Device > Echo profile utilities*" to confirm the signal quality. Select the curves to be loaded into the echo profile view, then select " *Load selected curves*". Curves and other diagnostic information will be loaded after approximately 45 seconds.



- ① Blue line - echo profile
- ② Red line - TVT
- ③ Brown line - auto false echo suppression (if active)

Figure 11.4 PDM echo profile view

To create a new AFES curve, use the " *Wizard > Auto false echo suppression*" from the device menu and enter the distance to the material surface.

SIMATIC PDM supports many other useful features, extensive diagnostic support and asset management. Details are found in the SIMATIC PDM manual here <https://support.industry.siemens.com/cs/ww/en/view/109755005>

## Diagnostics and troubleshooting

### 12.1 Maintenance

#### Maintenance

If the device is used properly, no special maintenance is required in normal operation.

#### Precaution measures against buildup

In some applications, buildup on the antenna system can influence the measuring result. Depending on the transmitter and application, take measures to avoid heavy soiling of the antenna system. If necessary, clean the antenna system in certain intervals.

#### Cleaning

The cleaning helps that the nameplate and markings on the transmitter are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, nameplate and seals
- Use only cleaning methods corresponding to the housing protection rating

### 12.2 Rectify faults

#### Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

#### Causes of malfunction

The device offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Transmitter
- Process
- Voltage supply

- Signal processing

### Fault rectification

The first measures are:

- Evaluation of fault messages
- Checking the output signal
- Treatment of measurement errors

A smart device (smartphone/tablet) with the adjustment app or a PC/notebook with the PDM and the suitable EDD offer you further comprehensive diagnostic possibilities. In many cases, the causes can be determined in this way and the faults eliminated.

### Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

## 12.3 Diagnosis, fault messages

### 4 ... 20 mA signal

Connect a multimeter in the suitable measuring range according to the wiring plan. The following table describes possible errors in the current signal and helps to eliminate them:

| Error   | Cause   | Rectification  |
|---|---|--|
| 4 ... 20 mA signal not stable                       | Fluctuating measured value                          | Set damping  |
| 4 ... 20 mA signal missing                          | Electrical connection faulty                        | Check connection, correct, if necessary                          |
|   | Voltage supply missing                              | Check cables for breaks; repair if necessary                     |
|   | Operating voltage too low, load resistance too high | Check, adapt if necessary  |
| Current signal greater than 22 mA, less than 3.6 mA | Transmitter electronics defective                   | Replace device or send in for repair depending on device version |

## 12.4 Status messages according to NE 107

The transmitter features self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650. In addition to the status messages in the following tables there are

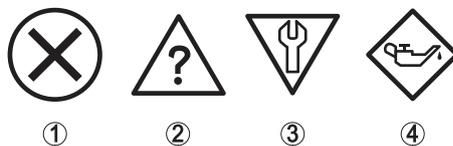
more detailed error messages available under the menu item " *Diagnostics*" via the respective adjustment module.

## Status messages

The status messages are divided into the following categories:

- Failure
- Function check
- Out of specification
- Maintenance required

and explained by pictographs:



- ① Failure - red
- ② Out of specification - yellow
- ③ Function check - orange
- ④ Maintenance required - blue

Figure 12.1 Pictographs of the status messages

**Failure:** Due to a malfunction in the transmitter, a fault message is output.

This status message is always active. It cannot be deactivated by the user.

**Function check:** The transmitter is being worked on, the measured value is temporarily invalid (for example during simulation).

This status message is inactive by default.

**Out of specification:** The measured value is unreliable because an transmitter specification was exceeded (e.g. electronics temperature).

This status message is inactive by default.

**Maintenance required:** Due to external influences, the transmitter function is limited. The measurement is affected, but the measured value is still valid. Plan in maintenance for the transmitter because a failure is expected in the near future (e.g. due to buildup).

This status message is inactive by default.

## Failure

| Code<br>Text message | Cause  | Rectification   | DevSpec<br>State in CMD 48    |
|----------------------|--|---|-------------------------------|
| F013                 | No measured value in the switch-on phase or during operation | Check or correct installation and/or parameter settings | Byte 5, Bit 0 of Byte 0 ... 5 |

| Code<br>Text message                      | Cause   | Rectification   | DevSpec<br>State in CMD 48            |
|---|---|---|---------------------------------------|
| no measured value available               |   | Clean the antenna system  |                                       |
| F017<br>Adjustment span too small         | Adjustment not within specification   | Change adjustment according to the limit values (difference between min. and max. $\geq 10$ mm)                                     | Byte 5, Bit 1 of Byte 0 ... 5         |
| F025<br>Error in the linearization table  | Index markers are not continuously rising, for example illogical value pairs                | Check linearization table<br>Delete table/Create new  | Byte 5, Bit 2 of Byte 0 ... 5         |
| F036<br>No operable software              | Checksum error if software update failed or aborted   | Repeat software update<br>Send transmitter for repair   | Byte 5, Bit 3 of Byte 0 ... 5         |
| F040<br>Error in the electronics          | Limit value exceeded in signal processing<br>Hardware error                                 | Restart transmitter<br>Send transmitter for repair  | Byte 5, Byte 5, Bit 4 of Byte 0 ... 5 |
| F080<br>General software error            | General software error  | Restart transmitter   | Byte 5, Byte 5, Bit 5 of Byte 0 ... 5 |
| F105<br>Determine measured value          | The transmitter is still in the start phase, the measured value could not yet be determined | Wait for the end of the switch-on phase<br>Duration up to 3 minutes depending on the measurement environment and parameter settings | Byte 5, Byte 5, Bit 6 of Byte 0 ... 5 |
| F260<br>Error in the calibration          | Checksum error in the calibration values<br>Error in the EEPROM                             | Send transmitter for repair   | Byte 4, Bit 0 of Byte 0 ... 5         |
| F261<br>Error in the transmitter settings | Error during setup<br>Auto false echo suppression faulty<br>Error when carrying out a reset | Repeat setup<br>Carry out a reset   | Byte 4, Bit 1 of Byte 0 ... 5         |
| F265<br>Measurement function disturbed    | Program sequence of the measuring function disturbed  | Device restarts automatically   | Byte 4, Bit 3 of Byte 0 ... 5         |

### Function check

| Code<br>Text message      | Cause                  | Rectification  | DevSpec<br>State in CMD 48                          |
|---------------------------|------------------------|--|---|
| C700<br>Simulation active | A simulation is active | Finish simulation<br>Wait for the automatic end after 60 mins. | <i>Simulation Active in " Standardized Status 0</i> |

## Out of specification

| Code<br>Text message                          | Cause   | Rectification   | DevSpec<br>State in CMD 48          |
|---|---|---|-------------------------------------|
| S600<br>Impermissible electronics temperature | Temperature of the electronics in the non-specified range | Check ambient temperature<br>Insulate electronics                       | Byte 23, Bit 4 of<br>Byte 14 ... 24 |
| S601<br>Overfilling                           | Danger of vessel overfilling                              | Make sure that there is no further filling<br>Check level in the vessel | Byte 23, Bit 5 of<br>Byte 14 ... 24 |
| S603<br>Impermissible operating voltage       | Terminal voltage too small                                | Check terminal voltage,<br>increase operating voltage                   | Byte 23, Bit 6 of<br>Byte 14 ... 24 |

## Maintenance

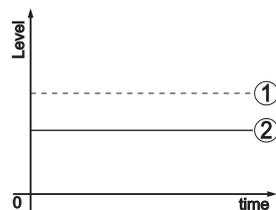
| Code<br>Text message                                | Cause   | Rectification   | DevSpec<br>State in CMD 48 |
|---|---|---|----------------------------|
| M500<br>Error in the delivery status                | The data could not be restored during the reset to delivery status                          | Repeat reset<br>Load XML file with transmitter data into the transmitter  | Bit 0 of<br>Byte 14 ... 24 |
| M501<br>Error in the non-active linearization table | Hardware error EEPROM   | Send transmitter for repair   | Bit 1 of<br>Byte 14 ... 24 |
| M504<br>Error at a device interface                 | Bluetooth function disturbed  | Send transmitter for repair   | Bit 4 of<br>Byte 14 ... 24 |
| M505<br>No echo available                           | Transmitter does not detect an echo during operation<br>Antenna dirty or defective          | Clean the antenna<br>Use a more suitable antenna/transmitter<br>Remove possible false echoes<br>Optimize transmitter position and orientation | Bit 5 of<br>Byte 14 ... 24 |
| M507<br>Error in the transmitter settings           | Error during setup<br>Error when carrying out a reset<br>Auto false echo suppression faulty | Carry out reset and repeat setup  | Bit 7 of<br>Byte 14 ... 24 |
| M508<br>No executable Bluetooth software            | Checksum error in Bluetooth software  | Carry out software update   | Bit 8 of<br>Byte 14 ... 24 |
| M509<br>Software update running                     | Software update running   | Wait until software update is finished  | Bit 9 of<br>Byte 14 ... 24 |

| Code<br>Text message                              | Cause   | Rectification  | DevSpec<br>State in CMD 48 |
|---|---|--|----------------------------|
| M510<br>No communication with the main controller | Communication between main electronics and display module disturbed | Check the connection cable to the display<br>Send transmitter for repair | Bit 10 of Byte 14 ... 24   |
| M511<br>Inconsistent software configuration       | A software unit requires a software update                          | Carry out software update  | Bit 11 of Byte 14 ... 24   |

## 12.5 Treatment of measurement errors

The tables below give typical examples of application-related measurement errors.

The images in column "Error description" show the actual level as a dashed line and the output level as a solid line.

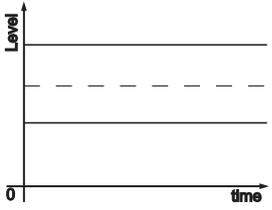


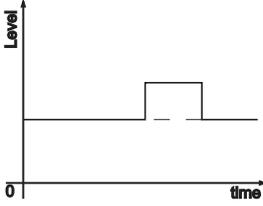
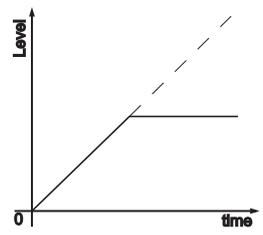
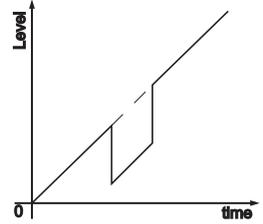
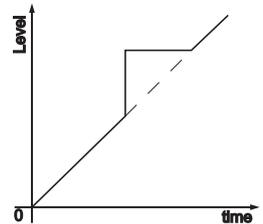
- ① Real level
- ② Level displayed by the transmitter

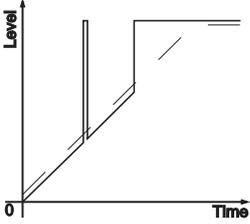
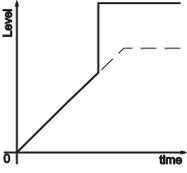
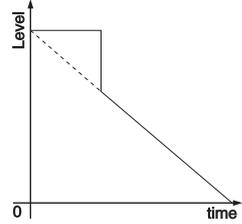
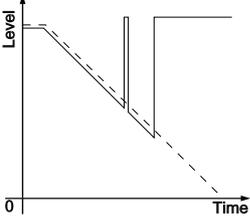
### Note

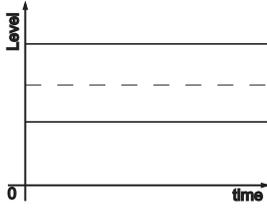
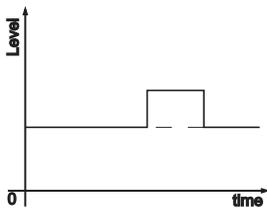
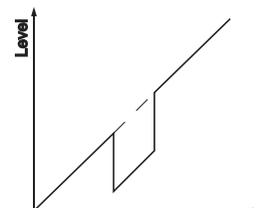
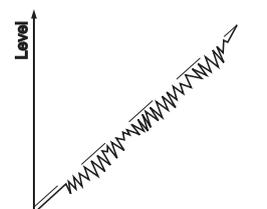
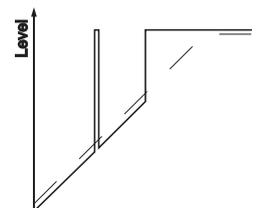
If the output level is constant, the cause could also be the fault setting of the current output to "Hold value".

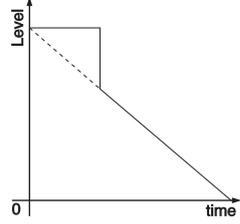
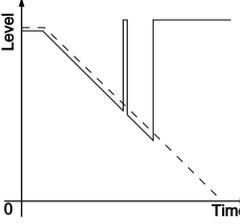
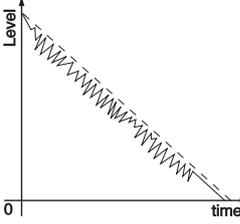
If the level is too low, the reason could be a line resistance that is too high

| Fault description   | Cause  | Rectification                           |
|---|--|---|
| Measured value shows a too low or too high level<br> | Min./max. adjustment not correct   | Adapt min./max. adjustment              |
|   | Incorrect linearization curve  | Adapt linearization curve               |
| Measured value jumps towards 100 %  | Due to the process, the amplitude of the level echo sinks<br>A auto false echo suppression was not carried out | Carry out a auto false echo suppression |

| Fault description  | Cause  | Rectification   |
|--|--|---|
|   | <p>Amplitude or position of a false signal has changed (e.g. condensation, buildup); auto false echo suppression no longer matches actual conditions</p> | <p>Determine the reason for the changed false signals, carry out auto false echo suppression, e.g. with condensation.</p>   |
| <p>Measured value remains unchanged during filling</p>      | <p>False signals in the close range too big or level echo too small<br/>Strong foam or vortex generation<br/>Max. adjustment not correct</p>             | <p>Eliminate false signals in the close range<br/>Check measuring point: Antenna should protrude out of the threaded mounting nozzle, possible false echoes through flange nozzle?<br/>Remove contamination on the antenna<br/>In case of interferences due to installations in the close range, change polarisation direction<br/>Create a new auto false echo suppression<br/>Adapt max. adjustment</p> |
| <p>Measured value jumps towards 0 % during filling</p>    | <p>The level echo cannot be distinguished from the false signal at a false signal position (jumps to multiple echo)</p>                                  | <p>In case of interferences due to installations in the close range: Change polarisation direction<br/>Chose a more suitable installation position</p>  |
| <p>Measured value jumps towards 100 % during filling</p>  | <p>Due to strong turbulence and foam generation during filling, the amplitude of the level echo sinks. Measured value jumps to false signal</p>          | <p>Carry out a auto false echo suppression</p>  |
| <p>Measured value jumps sporadically to 100 % during filling</p>   | <p>Varying condensation or contamination on the antenna</p>  | <p>Carry out a auto false echo suppression or increase auto false echo suppression with condensation/contamination in the close range by editing</p>  |

| Fault description  | Cause  | Rectification  |
|--|--|--|
|   |  |  |
| <p>Measured value jumps to <math>\geq 100\%</math> or 0 m distance</p>        | <p>Level echo is no longer detected in the close range due to foam generation or false signals in the close range. The transmitter goes into overfill protection mode. The max. level (0 m distance) as well as the status message "Overfill protection" are output.</p> | <p>Check measuring point: Antenna should protrude out of the threaded mounting nozzle, possible false echoes through flange nozzle?</p> <p>Remove contamination on the antenna</p>   |
| Fault description  | Cause  | Rectification  |
| <p>Measured value remains unchanged in the close range during emptying</p>  | <p>False signal larger than the level echo</p> <p>Level echo too small</p>   | <p>Check measuring point: Antenna should protrude out of the threaded mounting nozzle, possible false echoes through flange nozzle?</p> <p>Remove contamination on the antenna</p> <p>In case of interferences due to installations in the close range: Change polarisation direction</p> <p>After eliminating the false signals, the auto false echo suppression must be deleted. Carry out a new auto false echo suppression</p> |
| <p>Measured value jumps sporadically towards 100% during emptying</p>       | <p>Varying condensation or contamination on the antenna</p>  | <p>Carry out auto false echo suppression or increase auto false echo suppression in the close range by editing</p>   |
| Fault description  | Cause  | Rectification  |
| <p>Measured value shows a too low or too high level</p>  | <p>Min./max. adjustment not correct</p>  | <p>Adapt min./max. adjustment</p>  |
|  | <p>Incorrect linearization curve</p>   | <p>Adapt linearization curve</p>   |

| Fault description  | Cause  | Rectification  |
|--|--|--|
|   |  |  |
| <p>Measured value jumps towards 100 %</p>                           | <p>Due to the process, the amplitude of the product echo decreases<br/>A auto false echo suppression was not carried out</p>                             | <p>Carry out a auto false echo suppression</p>   |
|  | <p>Amplitude or position of a false signal has changed (e.g. condensation, buildup); auto false echo suppression no longer matches actual conditions</p> | <p>Determine the reason for the changed false signals, carry out auto false echo suppression, e.g. with condensation.</p>                                    |
| Fault description  | Cause  | Rectification  |
| <p>Measured value jumps towards 0 % during filling</p>            | <p>The level echo cannot be distinguished from the false signal at a false signal position (jumps to multiple echo)</p>                                  | <p>Remove/reduce false signal: minimize interfering installations by changing the polarization direction<br/>Chose a more suitable installation position</p> |
|  | <p>Transverse reflection from an extraction funnel, amplitude of the transverse reflection larger than the level echo</p>                                | <p>Direct transmitter to the opposite funnel wall, avoid crossing with the filling stream</p>  |
| <p>Measured value fluctuates around 10 ... 20 %</p>               | <p>Various echoes from an uneven medium surface, e.g. a material cone</p>  | <p>Check parameter "Material Type" and adapt, if necessary<br/>Optimize installation position and transmitter orientation</p>                                |
|  | <p>Reflections from the medium surface via the vessel wall (deflection)</p>  | <p>Select a more suitable installation position, optimize transmitter orientation, e.g. with a swivelling holder</p>   |
| <p>Measured value jumps sporadically to 100 % during filling</p>  | <p>Changing condensation or contamination on the antenna</p>   | <p>Carry out a auto false echo suppression or increase auto false echo suppression with condensation/contamination in the close range by editing</p>         |

| Fault description  | Cause  | Rectification   |
|--|--|---|
| <p>Measured value remains unchanged in the close range during emptying</p>  | <p>False signal greater than level echo or level echo too small</p>  | <p>Eliminate false signals in the close range. Check: Antenna must protrude out of the nozzle</p> <p>Remove contamination on the antenna</p> <p>Minimize interfering installations in the close range by changing the polarization direction</p> <p>After eliminating the false signals, the auto false echo suppression must be deleted. Carry out a new auto false echo suppression</p> |
| <p>Measured value jumps sporadically towards 100 % during emptying</p>     | <p>Changing condensation or contamination on the antenna</p>   | <p>Carry out auto false echo suppression or increase auto false echo suppression in the close range by editing</p>  |
| <p>Measured value fluctuates around 10 ... 20 %</p>                       | <p>Various echoes from an uneven medium surface, e.g. an extraction funnel</p> <p>Reflections from the medium surface via the vessel wall (deflection)</p> | <p>Check parameter "Material Type" and adapt, if necessary</p> <p>Optimize installation position and transmitter orientation</p>  |

## 12.6 Return procedure

Enclose the delivery note, the return goods delivery note and the decontamination declaration in a clear plastic pouch and attach it firmly to the outside of the packaging. Any devices/replacement parts which are returned without a decontamination declaration will be cleaned at your expense before further processing.

### Required forms:

- Delivery note

- Return goods delivery note with the following information: <https://www.siemens.com/processinstrumentation/returngoodsnote>
  - Product (item description)
  - Number of returned devices/replacements parts
  - Reason for returning the item(s)
- Decontamination declaration
  - <https://www.siemens.com/sc/declarationofdecontamination>

With this declaration you warrant that the device/replacement part has been carefully cleaned and is free of residues. The device/replacement part does not pose a hazard for humans and the environment.

If the returned device/replacement part has come into contact with poisonous, corrosive, flammable or water-contaminating substances, you must thoroughly clean and decontaminate the device/replacement part before returning it in order to ensure that all hollow areas are free from hazardous substances. Check the item after it has been cleaned.

Any devices/replacement parts returned without a decontamination declaration will be cleaned at your expense before further processing.

## 12.7 Technical support

### Technical Support

If this documentation does not provide complete answers to any technical questions you may have, contact technical support at <http://www.siemens.com/automation/support-request>.

More information about our technical support is available at <http://www.siemens.com/automation/csi/service>

### Internet service and support

In addition to our documentation, Siemens provides a comprehensive support solution at <http://www.siemens.com/automation/service&support>

### Contact person

If you have additional questions about the device, please contact your Siemens personal contact at <http://www.automation.siemens.com/partner>

To find the personal contact for your product, go to " *All products and Branches*" and select " *Products and services > Industrial automation > Process instrumentation*".

### **Documentation**

Documentation on the various products and systems can be found at <http://www.siemens.com/processinstrumentation/documentation>.

### **Certificates**

You can find certificates in the Internet under <http://www.siemens.com/processinstrumentation/certificates> or on an included DVD.

## **12.8 How to proceed if a repair is necessary**

If it is necessary to repair the transmitter, please contact Siemens. You find the locations on [www.siemens.com/processautomation](http://www.siemens.com/processautomation) [<https://www.siemens.com/processautomation>].

## Service and maintenance

### 13.1 Dismounting steps

 **WARNING**

Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel or pipeline, high temperatures, corrosive or toxic media etc.

Take note of chapters "*Mounting*" and "*Connecting to voltage supply*" and carry out the listed steps in reverse order.

### 13.2 Disposal

The device is made of recyclable materials. For this reason, it should be disposed of by a specialist recycling company. Observe the applicable national regulations.

Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE).

Devices can be returned to the supplier within the EC, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Further information about devices containing batteries can be found at: (<https://support.industry.siemens.com/cs/document/109479891/>)

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**Note**

**Special disposal required**

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.
-



## Certificates and approvals

### 14.1 Radio licenses

#### **Radar**

The device has been tested and approved in accordance with the current edition of the applicable country-specific norms or standards.

Regulations for use can be found in the document "*Regulations for radar level measuring transmitters with radio licenses*" on our homepage.

#### **Bluetooth**

The Bluetooth radio module in the device has been tested and approved according to the current edition of the applicable country-specific norms or standards.

The confirmations as well as regulations for use can be found in the document "*Radio licenses*" supplied or on our homepage.

### 14.2 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm the conformity of the transmitter with these directives.

The EU conformity declaration can be found on our homepage.



## Technical data and dimensions

### 15.1 Technical data

#### Note for approved transmitters

##### Device specifications:

Siemens makes every effort to ensure the accuracy of these specifications, but reserves the right to change them at any time.

##### Device-specific approvals:

The device-specific approvals are always to be found on the type plates on the device.

#### Materials and weights

| Materials, wetted parts              |                                      |
|--------------------------------------|--------------------------------------|
| Antenna, process fitting             | PVDF                                 |
| Process seal                         | FKM G type threaded connections only |
| Materials, non-wetted parts          |                                      |
| Housing                              | Plastic PBT (Polyester)              |
| Housing seals                        | Silicone SI 850 R                    |
| Cable gland                          | PA                                   |
| Sealing, cable gland                 | NBR, EPDM                            |
| Blind plug, cable gland              | PA                                   |
| Inspection window for the indication | Polycarbonate                        |
| <b>Weight</b>                        | 0.7 kg (1.543 lbs)                   |

#### Torques

|   |                      |
|---|----------------------|
| <b>Max. torque mounting boss</b>                          | 7 Nm (5.163 lbf ft)  |
| <b>Max. torque for NPT cable glands and Conduit tubes</b> | 10 Nm (7.376 lbf ft) |

#### Input variable

|                          |   |
|--------------------------|---|
| <b>Measured variable</b> | The measured variable is the distance between the antenna edge of the transmitter and the medium surface. The antenna edge is also the reference point for the measurement. |
|--------------------------|---|

15.1 Technical data

|   |                     |
|---|---------------------|
| <b>Max. measuring range<sup>a</sup></b> | 15 m (49.21 ft)     |
| <b>blinking distance<sup>b</sup></b>    |                     |
| Modes 1, 2, 4                           | 0 mm (0 in)         |
| Mode 3                                  | ≥ 250 mm (9.843 in) |

<sup>a</sup> Depending on application and medium

<sup>b</sup> Depending on the operating conditions

Switch-on phase

|   |          |
|---|----------|
| <b>Start-up time with operating voltage U<sub>B</sub></b> | < 15 s   |
| <b>Starting current (for run-up time)</b>                 | ≤ 3.6 mA |

Output variable

|   |   |
|---|---|
| <b>Output signal</b>  | 4 ... 20 mA/HART                              |
| <b>Range of the output signal</b>   | 3.8 ... 20.5 mA/HART (default setting)        |
| <b>Signal resolution</b>  | 0.3 μA  |
| <b>Resolution, digital</b>  | 1 mm (0.039 in)                               |
| <b>Fault signal, current output (adjustable)</b>                          | ≤ 3.6 mA, ≥ 21 mA, last valid measured value  |
| <b>Max. output current</b>  | 22 mA   |
| <b>Starting current</b>   | ≤ 3.6 mA; ≤ 10 mA for 5 ms after switching on |
| <b>Load</b>   | 545 Ohm at 24 V DC                            |
| <b>Damping (63 % of the input variable), adjustable</b>                   | 0 ... 999 s                                   |
| <b>HART output values according to HART 7.0<sup>a</sup></b>               |   |
| PV (Primary Value)  | Lin. percent                                  |
| SV (Secondary Value)  | Distance                                      |
| TV (Third Value)  | Measurement reliability                       |
| QV (Fourth Value)   | Electronics temperature                       |
| <b>Fulfilled HART specification</b>                                       | 7.0   |
| <b>Further information on Manufacturer ID, Device ID, Device Revision</b> | See website of HART Communication Foundation  |

<sup>a</sup> Default values can be assigned individually.

Deviation (according to DIN EN 60770-1)

|   |   |
|---|---|
| <b>Process reference conditions according to DIN EN 61298-1</b> |   |
| Temperature   | +18 ... +30 °C (+64 ... +86 °F)                       |
| Relative humidity   | 45 ... 75 %   |
| Air pressure  | 860 ... 1060 mbar/86 ... 106 kPa (12.5 ... 15.4 psig) |
| <b>Installation reference conditions</b>                        |   |

|  |   |
|--|---|
| Distance to installations                | > 200 mm (7.874 in)   |
| Reflector                                | Flat plate reflector  |
| False reflections                        | Biggest false signal, 20 dB smaller than the useful signal  |
| <b>Deviation with liquids</b>            |   |
| Measuring distance<br>> 0.25 m/0.8202 ft | ≤ 2 mm  |
| Measuring distance<br>≤ 0.25 m/0.8202 ft | ≤ 10 mm   |
| <b>Non-repeatability</b> <sup>a</sup>    | ≤ 2 mm  |
| <b>Deviation with bulk solids</b>        | The values depend to a great extent on the application. Binding specifications are thus not possible. |

<sup>a</sup> Already included in the meas. deviation

### Variables influencing measurement accuracy

|   |  |
|---|--|
| <b>Temperature drift - Digital output</b>                                 | < 3 mm/10 K, max. 5 mm                                   |
| <b>Temperature drift - Current output</b>                                 | < 0.03 %/10 K or max. 0.3 % relating to the 16.7 mA span |
| <b>Deviation in the current output due to digital/analogue conversion</b> | < 15 µA  |
| <b>Additional deviation through electromagnetic interference</b>          |  |
| According to NAMUR NE 21  | < 80 µA  |
| According to EN 61326-1   | None   |
| According to IACS E10 (shipbuilding)/IEC 60945                            | < 250 µA   |

### Characteristics and performance data

|  |                            |
|--|----------------------------|
| <b>Measuring frequency</b>               | W-band (80 GHz technology) |
| <b>Measuring cycle time</b> <sup>a</sup> | ≤ 250 ms                   |
| <b>Step response time</b> <sup>b</sup>   | ≤ 3 s                      |
| <b>Beam angle</b> <sup>c</sup>           | 8°                         |

<sup>a</sup> With operating voltage  $U_B \geq 24$  V DC

<sup>b</sup> Time span after a sudden distance change from 1 m to 5 m until the output signal reaches 90 % of the final value for the first time (IEC 61298-2). Valid with operating voltage  $U_B \geq 24$  V DC.

<sup>c</sup> Outside the specified beam angle, the energy level of the radar signal is 50% (-3 dB) less.

### Ambient conditions

|  |                                  |
|--|----------------------------------|
| <b>Ambient temperature device</b>        | -40 ... +70 °C (-40 ... +158 °F) |
| <b>Ambient temperature display</b>       | -25 ... +70 °C (-13 ... +158 °F) |
| <b>Storage and transport temperature</b> | -40 ... +80 °C (-40 ... +176 °F) |

### Mechanical environmental conditions

|   |   |
|---|---|
| <b>Vibrations (sinusoidal vibrations)</b> | Class 4M8 (5 g at 4 ... 200 Hz acc. to IEC 60271-3-4) |
| <b>Impacts (mechanical shock)</b>         | Class 6M4 (50 g, 2.3 ms acc. to IEC 60271-3-6)        |
| <b>Impact resistance</b>                  | IK07 acc. to IEC 62262                                |

### Process conditions

|                            |  |
|----------------------------|--|
| <b>Process temperature</b> | -40 ... +80 °C (-40 ... +176 °F)                     |
| <b>Process pressure</b>    | -1 ... 3 bar (-100 ... 300 kPa/-14.5 ... 43.51 psig) |

### Electromechanical data

|   |   |
|---|---|
| <b>Cable entry</b>                                  |   |
| Options   | M20 x 1.5; ½ NPT  |
| Cable gland   | M20 x 1.5 (cable diameter 5 ... 9 mm)                         |
| Closing cap   | ½ NPT   |
| <b>Wire cross-section (spring-loaded terminals)</b> |   |
| Stranded wire                                       | 0.2 mm <sup>2</sup> (AWG 24) ... 2.5 mm <sup>2</sup> (AWG 14) |

### Bluetooth interface

|   |   |
|---|---|
| <b>Bluetooth standard</b>               | Bluetooth 5.0 (downward compatible to Bluetooth 4.0 LE) |
| <b>Frequency</b>                        | 2.402 ... 2.480 GHz                                     |
| <b>Max. emitted power</b>               | +2.2 dBm  |
| <b>Max. number of participants</b>      | 1   |
| <b>Effective range typ.<sup>a</sup></b> | 25 m (82 ft)  |

<sup>a</sup> Depending on the local conditions

### Indication

|  |                            |
|--|----------------------------|
| <b>Measured value and menu display</b> |                            |
| Optional HMI                           | LCD display with backlight |
| Max. indicating range                  | -99999 ... 99999           |

### Adjustment

|                     |                              |
|---------------------|------------------------------|
| <b>Optional HMI</b> | 4 x keys for menu adjustment |
| <b>PC/Notebook</b>  | SIMATIC PDM                  |
| <b>Smart device</b> | SITRANS mobile IQ            |

### Voltage supply

|   |                |
|---|----------------|
| <b>Operating voltage <math>U_B</math></b>   |                |
| at 4 mA   | 12 ... 35 V DC |
| at 20 mA  | 9 ... 35 V DC  |
| <b>Operating voltage <math>U_B</math> - illuminated display and adjustment unit</b> | 15 ... 35 V DC |
| <b>Reverse voltage protection</b>   | Integrated     |

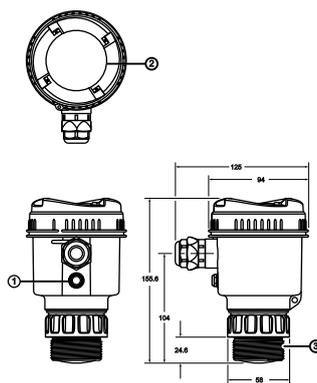
### Overvoltage protection

|  |   |
|--|---|
| <b>Dielectric strength against metallic mounting parts</b>   | > 10 kV   |
| <b>Overvoltage resistance (test impulse voltages 1.2/50 <math>\mu</math>s at 42 <math>\Omega</math>)</b> | > 1000 V  |
| <b>Additional overvoltage arrester</b>   | Due to the floating structure of the electronics and comprehensive insulation measures generally not necessary. |

### Electrical protective measures

|                                 |   |
|---------------------------------|---|
| <b>Protection rating</b>        | IP66/IP67 acc. to IEC 60529 Type 4X acc. to UL 50 |
| <b>Altitude above sea level</b> | 5000 m (16404 ft)                                 |
| <b>Protection class</b>         | III   |
| <b>Pollution degree</b>         | 4   |

## 15.2 Dimensions



- ① Ventilation/pressure compensation
- ② Housing lid
- ③ Process fitting

Figure 15.1 Dimensions SITRANS LR150

### **15.3 Licensing information for open source software**

Open source software components are also used in this device. A documentation of these components with the respective license type, the associated license texts, copyright notes and disclaimers can be found on our homepage.

### **15.4 Trademark**

All the brands as well as trade and company names used are property of their lawful proprietor/originator.

## Further Information

Process Automation

<https://www.siemens.com/processautomation>

Industry Online Support (service and support)

<https://support.industry.siemens.com>

Industry Mall

<https://mall.industry.siemens.com>

Siemens AG

Digital Industry

Process Automation

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