Security & Electronic Technologies GmbH
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# Operating Instruction

# LC200 –Level Controller 200
# LC 201 – Level Controller 201

**Contactless tank gauging**
**with ullage indication, consumption and SMS**



SW 04.02
07 2013 LC 2 E M 07_C

## Directory



Date: 07 2013
Document: LC2 E M 07_C

**Important:**
**The technical specification stated in this document is subject to modification by the manufacturer without any notice!**

## Safety Instruction

Important: LC must not be installed in a hazardous environment and must not be used for the following liquids: Gasoline, Ethanol, aggressive chemical products like acids and aggressive chemicals.
Improper use and any resulting damages the manufacturer cannot take any responsibility.
Modifications on the product are prohibited.
Service repair and maintenance shall be done by the manufacturer or authorised service facilities only.
LC cannot not be used as an overfill prevention system.
The LC gives no security against the tank becoming empty.
Please, read this document carefully before the installation of LC.

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## Product Description

**Main advantages:**

- Tank contents in litres and volume percent
- Ullage display (how many litres can be refilled)
- Calculation of average daily demand in litres/day
- Calculation of the remaining days based on average daily demand
- 3 different tank shapes are supported by appropriate calculations
- Easy Installation
- No moving components in the tank
- Contactless measurement with ultra sonic pulses for optimal reliability
- temperature

**Applications:**

- heating oil tanks
- waste oil tanks
- water tanks
- rainwater tanks
- as a replacement for mechanical gauge indicators
- …….

## Installation Instruction

- Before you make a purchase please check for possible problems at the installation,
- Discuss on the phone, write, and e-mail or use the possibility of an individual meeting with our field staff.
- Use the device only in the right ambient conditions (read the specifications).
- The device must not be installed in a hazardous environment (94/9/EG)
- If the device is installed too near to a wall, it is possible that reflections can cause problems to the measurement, because of the characteristic of the ultra sonic pulses are reflected off the wall.
- The device should be installed in the middle of the tank, as indication you should install at least a min. distance of 5 cm from the wall to the aperture.
- The indicator should be in a position where the ultra sonic pulses can beam unhindered to the bottom of the tank.
- Built- in parts can disturb the ultrasonic pulses and may result a false measurement (e.g. pipe, manhole, cross beam).
- Check the installation situation when the tank is empty, because if the tank is full you cannot see the built-in parts which can reflect the ultra sonic pulses.
- The calculated medium value (will be calculated by the measured distance) always relates to the level of the sensor inside of the cone (this sensor is situated at the height of the bigger external thread).
- The distance between medium level and sensor can be adjusted with the offset.
- The device has a min. and max. Measurement range (look at the specifications), if you work beyond this specifications you will get wrong or no data.
- For a correct measurement you have to consider that the distance from the sensor to the maximum filling level is not lesser as the min. measurement range.
- The device must be installed perpendicular to the fluid surface, because otherwise the reflected ultra sonic pulses can´t be received.
- The sensor and the controller are not allowed to contact the medium which you want to measure.
- Be sure, that your tank manufacturer allows the installation and the tank has a minimum entry of 1.5 inch, ideally 2” BSP thread.

-

- The mathematical calculation in the LC device is designed only for cylindrical and cubic tank types, special shapes can´t be considered.
- Only a specialist licensed company is allowed to modify the tank, in case there is a need to drill or cut holes in the tank! – you lose the warranty and in case of damage you are personally liable.
- Wrap the thread with Teflon tape to ensure a good seal with the tank.
- If the tank is refuelled (actual tank contents is higher than the value from the day before) the statistics (average day demand, remaining days) are reset automatically.
- Please note that the battery life of the device depends from settings like permanent display and measurement in the test mode.
- The LC is a simple device, which helps you to measure tank contents. This is an electronic device and so it is possible to get an error so that the display shows wrong values. Always monitor the system to ensure it provides correct data and allows you to ensure manage your stocks to avoid problems, e.g. an empty tank.
- Take the time (which you have saved with the LC device) and control the tank continuous, so that it is always in good order and condition.
- Please note the legal requirements for your tank and if you have concerns ask a license specialty company.
- Always take a look to the service intervals of your tank and a specialist licensed company should advise you, that your tank meets the legal requirements (e.g. heating oil tanks should be equipped with a limit indicator for working with overfill protection system
- For using the SMS-function it is necessary that a sufficient telephone network is available. If the signal from the telephone network is bad (no signal) then the LC200 hasn´t the possibility to send a SMS.

## Checking the contents of delivery

Please, check the contents of delivery immediately after receipt and unpacking.
In case of missing components or transport damages contact your local dealer or our representative.

**Hint:** Please keep the original packing material if you have to send the instrument to a service facility. Keep these operating instructions in case you hand over the instruments to another person.

LC 200:
Unit LC 200,
Installation Instructions

LC 201:
Unit LC 201,
Installation Instructions
Main Powers,

## 1,Operating Tools / Display


Start Up 1

- insert 4 batteries / for LC 201 plug in the mains plug and switch on the main
- insert SIM-Card into GSM Modem
  **Caution:** SIM-card must not be protected!!!

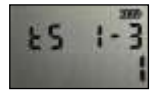
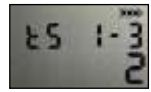
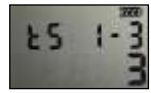
**Button functionality:**
LC 200 has 2 different mode buttons:

- "Mode" = a, change functions
  b, Wake - up function (power safe modus)
- "Arrow" = increment the selected digit (blinking) by one
  Standard mode: to get a new measurement, press the arrow button
  No data´s will be stored if the measurement was launched by pressing the arrow button.

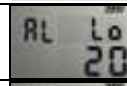
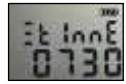
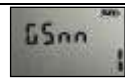
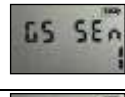
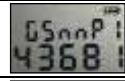
### Start up 2 Selection of Tank Type (1, 2, or 3)

Start from the standard display , press mode button 3 sec. SET UP Starts.

**Hint:**
**Button ▲:** by pressing the selected digit (blinking) figure increment by one
**Button Mode**: save actual adjustment – next data block.
The selected tank type is blinking in the right bottom corner:

| | | |
|---|---|---|
|  |  | Tank Typ1: cubic defined by height and tank capacity |
|  |  | Tank Type 2: Cylindrical horicontal, defined by height and tank capacity |
|  |  | Tank Type 3: Cylindrical vertical, defined by height and tank capacity |

## 2. Configuration

| | | | |
|---|---|---|---|
| tank volume |  | Entry tank volume in litres | Liters to the tank limit |
| Tank height „H“ |  | Entry tank height in cm | Sensor to bottom in cm |
| Offset |  | Distance between sensor to the maximum tank level | Distance measurement for e.g. manhole pit or mounting hole |
| Alarm (min.) |  | Limit for alert in percent | Alarm SMS is sent. |
| Alarm (max.) |  | Limit for alert in percent | Alarm SMS is sent |
| Temperture compensation |  | | 0: no<br>1: yes |
| date mm/dd |  | Current Date | Month and day<br>April 1st = 0401 |
| date year |  | Current year | e.g.: 2009 |
| Time |  | Current time | Hours and minutes<br>0757 |
| Instant of time |  | Measurement<br>Time (all 24 h) | e.g.: at 07:30 h<br>new measurement |
| GSM Mode |  | GSM Mode<br>1 :GSM enable<br>0: GSM disabled | SMS send according to operated settings |
| GS sen |  | GSM attidude<br>LC 200 : 0 1 2<br>LC 201: 3 4 | 0: for each 28th of month<br>1: for once per week<br>2: 14 days<br>3: each day<br>4: only in case of alarm |
| Tel.No.:<br>Receiver 1* |  | Telefon Number<br>Recipient No.1 | Domestic 0167xxxx*<br>International 44xxxx** |
| Tel.No.:<br>Receiver2* |  | Telefon Number<br>Recipient No. 2 | Domestic 0167xxxx*<br>International 44xxxx** |

* for domestic recipient: dial 0xxxx

** for foreign countries : dial country code ( e.g. 356 for Malta…. 356xxx…)

*) after last digit appears zero 0, press arrow button ▲ until no figure appears.**New Configuration on SMS function causes SMS messages for 7 days.** In this period no alarm SMS will be sent

## Operating

**First Setting**
**After inserting the batteries, the device is immediately activated and performs a measurement.**
**Reading on display :**

**Software**

**Serial number**


**Measurement**

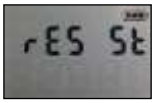
**Percent/Litres**

**Actual Date / Time**

## Reset :

**To start a "Reset" press simultaneous the "Mode" and "Arrow "button.**

## Re Reset:




Press once more the arrow button all statistical data will be deleted.
All manual installed data remains.
Remove batteries all statistic data´s will be deleted.
All manual installed data remains.

**After 50 seconds the device will automatically turn off. (Sleep mode)**

To make you familiar with the device we recommend to make some measurements outside the tank. Hold the funnel with a 90° against a plain surface ( floor , wall , or ceiling etc.) and press the arrow button to launch your first experience.

Mounting / Installation

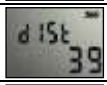
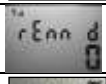
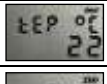
LC 200 / 201 is equipped with two threads. 1,5 Inch (6/4") und 2 Inch thread.
Use a free thread on top of the tank.
Take care that there is no obstacle between sensor and tank level for free ultra sonic beam.

Notice for your installation Parameters / Tank Setting

| | |
|---|---|
| Tank Type | |
| Height cm | |
| Offset cm | |
| Minimum Alarm | |
| Maximum Alarm | |
| Date | |
| Time | |
| Measurement | |
| GSM Modus | |
| GSM frequency | |
| Tel No. 1 | |
| Tel No. 2 | |

## Your Tank Data´s Display

Press **Mode** once the last current measurement is displayed.

| Display | Operating mode, description. | |
|---|---|---|
|  | **Standard**<br>Tank content in percent<br>Tank content in Litres. | Proceed with Mode |
|  | **Tank content in percent**<br>Up to 99.999 Litres | Proceed with Mode |
|  | **Tank content in percent** | Proceed with Mode |
|  | **Ullage**<br>How many litres can be filled for full tank | Proceed with Mode |
|  | **Measured depth**<br>Distance from Sensor to surface in cm | Proceed with Mode |
|  | **Average daily consumption**<br>litres per day (last 10 days) | Proceed with Mode |
|  | **Number of remaining days**<br>Based on average consumption<br>Available after 10 days , before the error symbol E appears | Proceed with Mode |
|  | **Temperature in °C**<br>Temperature inside LC200 device | Proceed with Mode |
|  | Full : distance sensor to sureface below 20 cm | |

| Error Measurement | Error GSM Mode |
|---|---|
|  <br>instead of the default display appears E error has occurred - The number on right side describes the type of error. |  |
|  <br>Error code figures from 0 to 3<br><br>0 – no error<br>2 – no correct measurement<br>check LC 200 position.<br>90° to surface is a must.<br>3 –measurement result not logical – check settings. Measured depth is higher than setup value |  <br>*0 = OK*<br>*1* = no answer from the GSM Module<br>*2* = no registration into the network possible<br>*3* = not possible to send the SMS to 1. *r*eceiver<br>*4* = not possible to send the SMS to 2. *r*eceiver<br>*7* = SMS was not sent to both recipient<br>*8* = the GSM-module can't receive data from the processor<br>9 = the LC lost the network registration during sending the SMS |

## Additional application with external mains power supply LC201

### 1, short time measurement

"Sen GSM" ** the setting has an additional functions:

4 = measurement every 2 hours. Only Alarm and Error SMS is sent

Note: Alarm or Error message will be sent only if a limit has been exceeded or undershot.
Important: LC201 performs a measurement only if the registration was successful in the GSM network. (Antenna icon with at minimum two strokes).
If SIM card is not inserted, the LC201will not take any measurements.
Alarm SMS is sent only after 7 days and only if the alarm is repeated on two consecutive days.

Daily SMS:
To set the daily text message, press the button on the default display mode for longer than 10 seconds. It is first setup and then GS Day On display at the display. The daily SMS is now activated.
To reinstall daily SMS press the button again 10 sec.(GS DAY OFF)

### 2, Current "Remote" Tank Contents Measurement : M -Message

A current remote tank content measurement can be made at anytime.
Send a text massage with **M** from your mobile or PC. The LC 201 will take a new measurement immediately and send a return SMS with the current measurement.
For remote measurement: GSM must be registered. LC 201 sends back to all registered phone numbers!!

### 3, Remote control tank configuration : S-Message

Create a SMS on your cellular phone with the following format :
The S-Message below is an example with some given Settings (If the LC has received the S-Message, it will immediately send back a SMS with the new parameters)
S1,2000,150,12,25,85,0,0318,2009,1435,1605,1,0,41794235660,0,
(The S-Message is received if the GSM is active, means the antenna symbol is ON

| | |
|---|---|
| 1, | - Shape of tank (1=rectangular/2=horiz.cylindric./3=vert.cylindric.) |
| 2000, | - Volume in liters |
| 150, | - Height or diameter |
| 12, | - Offset (Distance between ultra sonic sensor to max. level) |
| 25, | - Minimal Level Alarm |
| 85, | - maximal Level Alarm |
| 1, | - Power Save (0 = ON (default) 1 = OFF |
| 0318, | - date 18.03. |
| 2009, | - year |
| 1435, | - current time 14:35h |
| 1605, | - time of measurement ((at the same time the SMS will be sent) |
| 1, | -GSM Modus 0 = OFF 1 = ON |
| 0, | - GS sen: interval period to send the Control-SMS<br>0=each 28th of the month / 1=weekly / 2=2 weeks) |
| 415677.. | - phone number 1st receiver |
| 4917089... | - phone number 2nd receiver<br>(if the first digit of a phone number is 0 –*Zero* -, the number is not valid<br>SMS will not send. |

- Important : If you want to keep the value of a certain field, you can just substitute with ,x,

S1,x,x,x,x, 75,x,x,x,x,0800,x,2,x,0

### 4, Change telephone numbers T-Message

T-message = change remotely the telephone numbers of the receivers
**T+4179303xxxx,+0, (**the first Number is set, the second Number ,+0, is OFF)
**T+0,+4170303xxxx,** (the first Number is OFF, the second Number is set)
**T+491715672xxx,+4179303xxxx,** (both numbers are set)
- the setting "GSM sen" has two additional functions:

### SMS Function

If you use the SMS function, the LC200 will send the first 7 days test SMS at the adjusted time, after the 7 days the SMS will be send at the adjusted configuration (every 28th of each month, every 7 days or every 14 days)

**Test SMS:** set in the configuration mode the measurement time 2min after the actual time – exit the configuration mode – after 2min the LC200 launches a measurement and send a SMS.

SMS Content Massage (only figures no text)

Message order (figures as examples)

| | | |
|---|---|---|
| 00805 | = | tank content in litres |
| 00080 | = | tank content in percent |
| 00195 | = | ullage in Litres |
| 0001 | = | average consumption last 10 days 805 = remaining days |
| 039 | = | measured distance in cm |
| 022 | = | ambient temperature in Celsius |
| 062 | = | Battery Voltage (example digit is 57 = 5,7 Volt) |
| 010 | = | GSM signal strength (21-30 = very good / 7-20 = good/ 1-6 = weak / 0 = no coverage) |
| 01.04.09 | = | date |
| 07.30 | = | current time |
| 0 | = | Level measurement error code (see page15) |
| 0 | = | GSM error code (see page 15) |
| 02. 54 | = | SW Version |
| 1170 | = | device ID (serial number) |
| 00000 | = | SMS ID |
| LC200 | | |
| 1 | = | set tank type |
| 01000 | = | set tank content in litres |
| 200 | = | set tank height or diameter in cm |
| 00 | = | set offset in cm |
| 20 | = | set min. alarm level |
| 90 | = | set max. alarm level |
| 0 | = | set PS (Power Save) |
| 1 | = | set GS sen (sending frequencies ) |
| 1 | = | set GSM mode |

## Maintenance, Troubleshooting, Service

The device does not need any maintenance.Clean the inside of the sensor cone once a year with a dry cloth to avoid dirt and debris which could influence the beam of the ultra sonic pulses.
Make a visual check of the batteries once a year. Depending on the charge of batteries you have to change them.
If the device shows unexpected behaviour try to reset the instrument using the Reset button.
Check your installation (look at the instructions for installation).
If the problem persists contact our service team or send the device to an authorised service facility.
If the device is damaged, remove it immediately from your tank and send it to an authorised service facility.
If the device is removed close the tank entry after that so that the vapours can´t escape.
Technical Data

**LC 200**

| | |
|---|---|
| Dimension (w x d x h): | 130 mm x 65 mm x 160 mm |
| LC 200 Battery: | 4 pcs. 1,5V, Baby, Type C , Alkali |
| Battery life time: | appr. 3 years in power safe modus at room temp. |

**LC 201**

| | |
|---|---|
| Power Supply | 230 / 50 Hz |

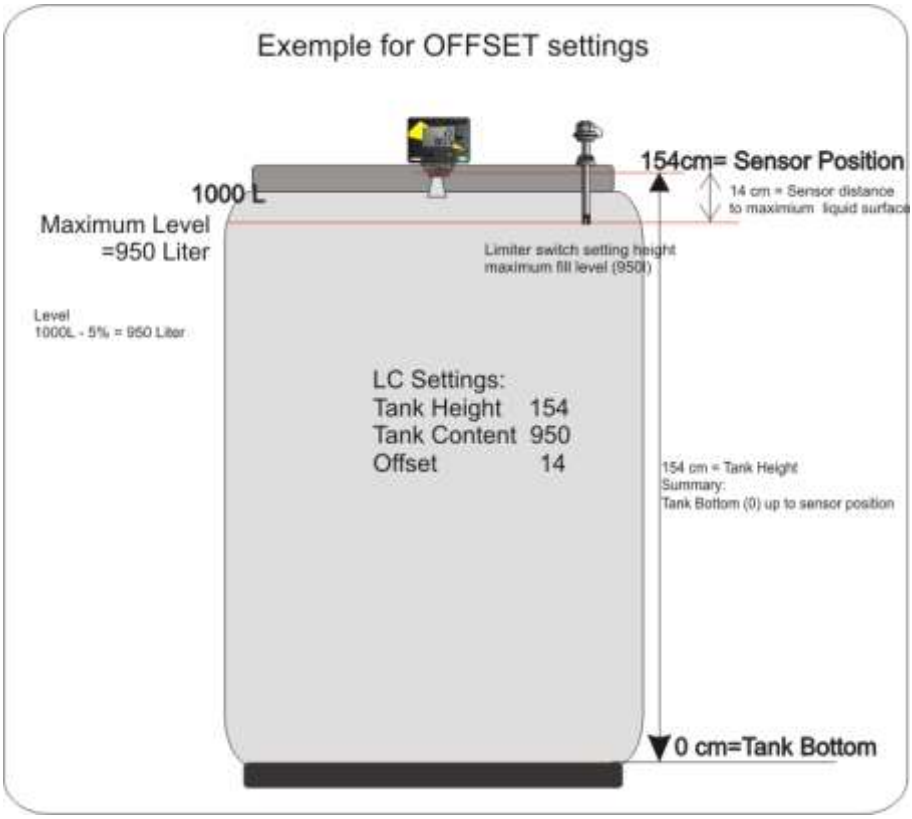
**LC 200 / 201**

| | |
|---|---|
| Housing: | IP 20 (protected) |
| Display: | 2 line LC-Display 60 mm x 40 mm |
| Weight | 440g |
| Material | ABS |
| Measurement range: | 19 cm - 270 cm, 0 - 99.999 Liter |
| Accuracy: | ±1 cm |
| Measurement intervals: | 24h |
| Operating temperature: | -10°C ... +45°C |
| Engineering standards: | CE, ROHS |
| Threads | 1 ½” and 2” |

Warranty
For the actual services and conditions see our home page www.secu-tech.at,

## See the GTCS – General Terms and Conditions of Sale

OFFSET


Exemple for OFFSET settings
154cm= Sensor Position
14 cm = Sensor distance
to maximium liquid surface
1000 L
Maximum Level
=950 Liter
Limiter switch setting height
maximum fill level (950l)
Level
1000L - 5% = 950 Liter
LC Settings:
Tank Height 154
Tank Content 950
Offset 14
154 cm = Tank Height
Summary:
Tank Bottom (0) up to sensor position
0 cm=Tank Bottom